Depressive Symptoms in Chiropractic Students
A 3-Year Study

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Background: The intensive training associated with health care education has been suggested to have unintended negative consequences on students' mental or emotional health that may interfere with the development of qualities deemed essential for proficient health care professionals. This longitudinal study examined the prevalence and severity of depressive symptoms among students at a chiropractic educational institution. **Methods:** Chiropractic students at all levels of training were surveyed at Canadian Memorial Chiropractic College during the academic years of 2000/2001, 2001/2002, and 2002/2003. The measurement tool employed was the Beck Depression Inventory, 2nd edition (BDI-II). Previously established BDI-II cutoff scores were used to assess the severity of reported depression symptoms, and these were compared by sex and year of training. **Results:** The survey was completed by 1303 students (70%) over the 3 years of the study. The prevalence of depressive symptoms was nearly 25%, with 13.7% of respondents indicating a rating of mild depression, 7.1% indicating moderate depressive symptoms, and 2.8% indicating severe symptoms. Significant differences were found between years of training, with 2nd-year students having the highest prevalence of depressive symptoms, and sex, with females having a higher rate of symptoms. **Conclusions:** Chiropractic students surveyed at Canadian Memorial Chiropractic College had high rates of depression similar to those measured in other health care profession students. Chiropractic educational institutions should be aware of this situation and are encouraged to emphasize students' awareness of their own personal health and well-being and their access to appropriate care, in addition to the same concerns for their future patients. (J Chiropr Educ 2011;25(2):142–150)

Key Indexing Terms: Chiropractic; Depression; Education; Students, Health Occupations

INTRODUCTION

Psychological distress has long been thought to be influential on learning and performance,[1] and more recently it has been shown that mental and emotional health issues are increasing in number and severity on many college campuses.[2] Mental and emotional health is especially of concern in professional health care programs, as previous studies have shown that depressive symptoms measured among students of medicine and dentistry tend to be significantly higher than those measured in the general population.[3–6] Furthermore, psychological distress experienced by health care students has been associated with cynicism,[7] decreased academic performance,[8, 9] decreased empathy[10, 11] and an unwillingness to care for the chronically ill.[12] Among medical students, the deterioration in mental and emotional health can begin in the 1st year of training and may persist or even worsen throughout the duration of the program.[6, 13, 14] The distress experienced by medical students has been attributed to factors such as academic pressure,[9] workload,[15, 16] financial concerns,[15] sleep deprivation,[15] exposure to patient suffering and death,[17, 18] and stressful personal life events.[19]

Similar to other educational programs within the health care professions, the chiropractic college curriculum is designed to ensure that the successful graduate has the attitude, knowledge, and skills required to fulfill all of the professional obligations of

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a primary care provider.[20, 21] To achieve these goals, a student of chiropractic must spend more than 4200 hours over 4 years in his or her educational journey.[20, 21] This is comparable to the requirements of other primary contact health care professions. Unfortunately, the evidence from studies of medical programs suggests that the rigors of intensive training can have unintended negative consequences on students' mental and emotional health and this may interfere with the development of qualities deemed essential for the proficient health care professional.[22, 23]

Despite previous research examining this issue in medical students, few studies to date have examined the effects of the demanding academic curriculum among chiropractic students. Kinsinger[24] found that depression rates among interns at Canadian Memorial Chiropractic College (CMCC) (Toronto, Ontario, Canada) were similar to those of the general public, but Spegman and Herrin[25] found that stress levels among interns at Western States Chiropractic College were more comparable with those reported by medical residents. One-fifth of the preinterns surveyed at Los Angeles College of Chiropractic by Bougie and Singh[26] described patterns of hazardous and harmful alcohol drinking, and Rubin[27] found that mood disorders, relationship difficulties, and substance-related disorders were, respectively, the top three presenting concerns for individuals pursuing psychological counseling among the chiropractic cohort at Life University. Although these data are of some value, there were methodological limitations in the previous studies, including the absence of standardized measures and small sample sizes. It would be imprudent to attach a high level of significance and generalizability to these findings. In addition, the complete absence of longitudinal studies limits any knowledge with regard to the magnitude and extent of the problem.

This 3-year, longitudinal-type study examined the prevalence and severity of depressive symptoms among chiropractic students at CMCC using a standardized, well accepted measure of the symptoms of depression, the Beck Depression Inventory, 2nd edition (BDI-II). The study was designed to answer the following three questions: (1) what is the incidence of a depressed mood among chiropractic students?; (2) when are depressive symptoms most likely to be manifest during the program?; and (3) are there sex differences in depression? Based on the current available evidence, it was hypothesized that the rate of depressive markers among chiropractic students would be similar to those of medical students and would be highest among women.

METHODS

Sample and Procedure

Students from all years of training [1st, 2nd, 3rd, and clinic interns (4th year of study)] were recruited at CMCC during the academic years of 2000/2001, 2001/2002, and 2002/2003. During the last week of February or 1st week of March of these years, students were asked to complete the BDI-II. The exact date for administration of the questionnaire was chosen during a time when none of the courses had major assessments during the weeks preceding or following, to minimize any temporary aberrantly high stress levels. The study investigators and research assistants distributed the surveys to students at the beginning of classes chosen in which a healthy attendance was expected. Cover letters described the project as an "assessment of mood" and solicited participation. All responses were anonymous; therefore, written consent was not required and was assumed if the survey was returned completed. This study was approved by the college's Institutional Review Board.

One of the institution's staff psychologists was recruited as an advisor and assisted in three key areas. The instrument is protected by copyright and only available through a licensed psychologist or medical physician. The psychologist assisted in the interpretation of test scores. Additionally, he was available to act in a professional capacity for the college community. This was designed to offer assistance to any participant who felt motivated to seek help after completing the survey instrument. Since the survey is designed to ask personal questions, any psychological provocation arising as a sequela of the study needed to be addressed. The protection of the participants was nurtured by having all surveys omit names. Students were further informed that all responses would be kept strictly anonymous. Participants were informed of the advisor's role of providing counseling following the administration of the survey should any subject seek psychological assistance following participation in the study. None did.

Instrument

The BDI-II is a 21-item self-report instrument intended to assess the presence and severity of symp-

toms of depression as listed in the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition (DSM-IV).[28] Each of the 21 items corresponds to a marker of depression and is scored by the subject on a four-point scale (0–3) according to the way the participant has been feeling in the previous 2 weeks. The 21 items are then summed to give a single total score for the BDI-II, for which cutoff scores have previously been established. Though the BDI-II has recognized limitations as a self-scoring testing instrument, it has demonstrated excellent test–retest correlations, internal consistency, and convergent and discriminant validity.[29] In the clinical setting it is used with other assessment protocols in order for a DSM-IV diagnosis of depression to be made.

Data Analysis

Average BDI-II scores were calculated and compared by sex and year of training using Student *t* tests. The established BDI-II cutoff scores were also applied to assess four levels of depression: 0–13, minimal range; 14–19, mild depression; 20–28, moderate depression; and 29–63, severe depression. BDI-II categories were compared by sex and year of training using the chi-square test (χ^2). A two-tailed significance level of .05 was used to determine the statistical significance of observed differences. SPSS version 16.0 was used for all analyses.

RESULTS

Between 2000 and 2003 the CMCC student population consisted of approximately 155 students per year of training, or 620 students overall, with males and females being represented almost equally. Of the possible 1860 surveys, a total of 1392 surveys (75%) were returned. Participants not reporting on all 21 items were excluded. The survey was completed in its entirety by 1303 students (70%) and these were used for data analysis. The response rates were calculated based on the estimated number of potential respondents by training level and sex. Students were more likely to complete the survey when they were in their 3rd year of training and least likely to respond in their 4th year (76% versus 61%, respectively; $\chi^2 = 25.8$, $df = 3$, $p < .001$). The slightly lower response rate from the 4th-year students was likely due to logistical difficulties associated with survey distribution in the clinical setting required for this year of training. Of the 1303 participants, 680 were females (52%) and 623 were males (48%). Table 1 shows the demographic characteristics of responders by academic year, year of study, and sex.

In the 1303 BDI-II questionnaires that were completed between 2000 and 2003, 13.7% (178) indicated symptoms of mild depression (BDI-II = 14–19), 7.1% (93) indicated moderate depression (BDI-II = 20–28) and 2.8% (36) indicated severe depression (BDI-II = 29–63). Figure 1 provides overall prevalence rates for the BDI-II categories of depression by year of training. During the years of this study, chiropractic students at CMCC were significantly more likely to be depressed during their 2nd year of training than in any other year and, conversely, least likely to be depressed during their 4th year of training ($\chi^2 = 41.3$, $df = 9$, $p < .001$). Among 2nd-year students, 34% (113) of those who responded were found to be tending to depressed mood (mild, moderate, or severe) compared with 24% (81) of 1st- or 3rd-year students and less than 13% (36) of 4th-year students. When the data from each academic year were analyzed independently, the 2nd year of training consistently had the highest percentage of depressed students and the 4th year consistently had the lowest percentage of depressed students (Fig. 2). Only the differences within the 2000/2001 academic year were statistically significant. There were also significant differences in depressive mood between the sexes ($\chi^2 = 14.6$, $df = 3$, $p < .005$). Female students were more likely to be depressed, with 27% (186) having mild, moderate, or severe depression, as compared with 19% (118) of their male peers. Figure 3 provides prevalence rates for the BDI-II categories of depression by student sex.

Average BDI-II scores were calculated and compared by sex and year of training using *t* tests. There was a significant difference in average BDI-II scores between sexes during all 3 academic years of the study. Furthermore, these differences were present during each of the 4 years of training in the chiropractic program (Fig. 4). Consistent with the higher percentage of students with symptoms of depression in the 2nd year of the chiropractic program, the average BDI-II score was also found to be significantly higher for 2nd-year students and significantly lower for 4th-year students.

Table 1. Demographics and characteristics of 1303 participating chiropractic students at CMCC between 2000 and 2003

Academic Year of Sampling	Proposed Year of Graduation	Current Year of Study	Response Rate (%)	Subjects (No.)	Men [No. (%)]	Women [No. (%)]	Age [Mean (SD)]
2000/2001	2004	1	83.2	129	57 (44)	72 (56)	24.2 (2.1)
	2003	2	75.5	117	58 (50)	59 (50)	26.1 (3.6)
	2002	3	82.6	128	65 (51)	63 (49)	26.4 (2.6)
	2001	4	71.6	111	53 (48)	58 (52)	27.3 (2.9)
	Total		78.2	485	233 (48)	252 (52)	25.9 (5.7)
2001/2002	2005	1	58.7	91	49 (54)	42 (46)	24.8 (3.7)
	2004	2	76.1	118	57 (48)	61 (52)	25.3 (2.3)
	2003	3	78.1	121	64 (53)	57 (47)	27.0 (3.6)
	2002	4	51.0	79	39 (49)	40 (51)	27.3 (2.5)
	Total		66.0	409	209 (51)	200 (49)	26.0 (6.2)
2002/2003	2006	1	74.8	116	51 (44)	65 (56)	24.8 (3.1)
	2005	2	62.6	97	45 (46)	52 (54)	25.5 (3.7)
	2004	3	66.0	102	40 (39)	62 (61)	26.4 (2.3)
	2003	4	60.6	94	45 (48)	49 (52)	27.6 (3.2)
	Total		66.0	409	181 (44)	228 (56)	26.0 (6.2)
Totals		1	72.3	336	157 (47)	179 (53)	24.6 (3.8)
		2	71.4	332	160 (48)	172 (52)	25.6 (3.9)
		3	75.5	351	169 (48)	182 (52)	26.6 (3.3)
		4	61.1	284	137 (48)	147 (52)	27.4 (2.9)

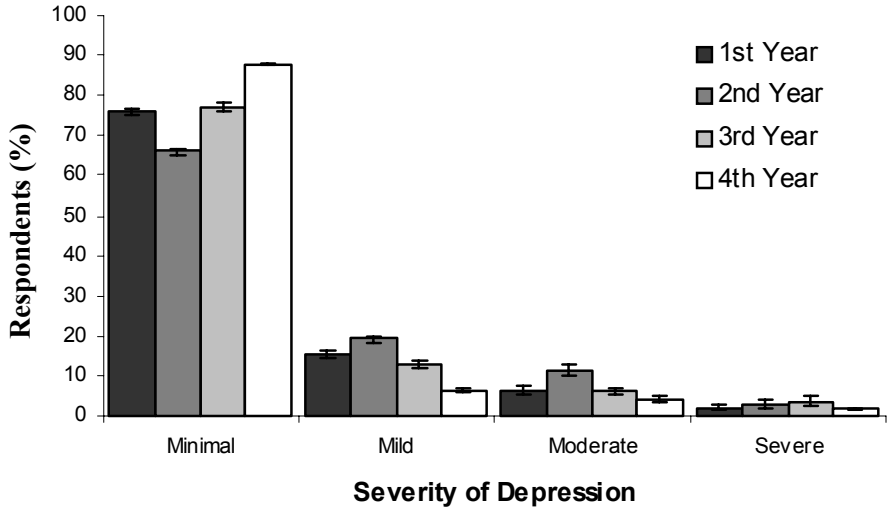

Figure 1. Overall prevalence rates for the BDI-II categories of depression by year of training. Error bars represent 95% confidence intervals.

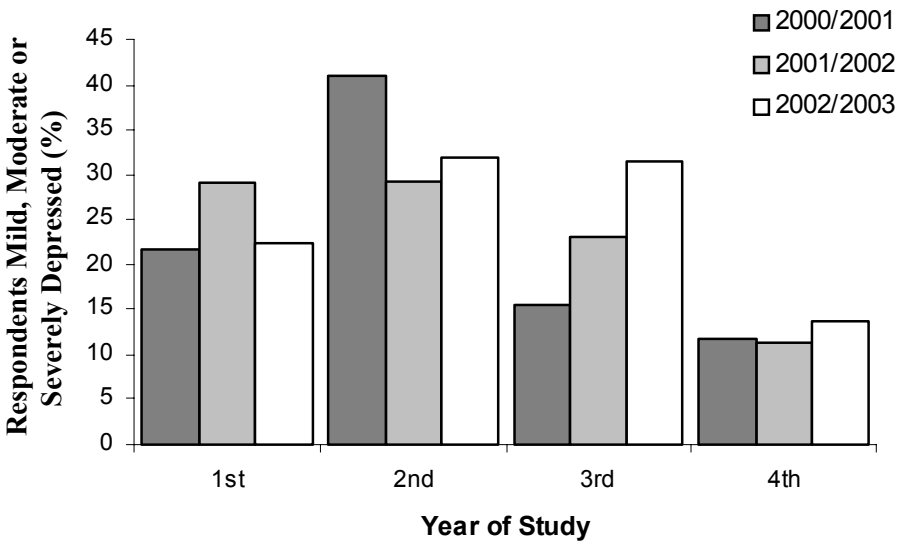

Figure 2. Prevalence rates for depression (mild, moderate, or severe) by year of training and academic year of the study.

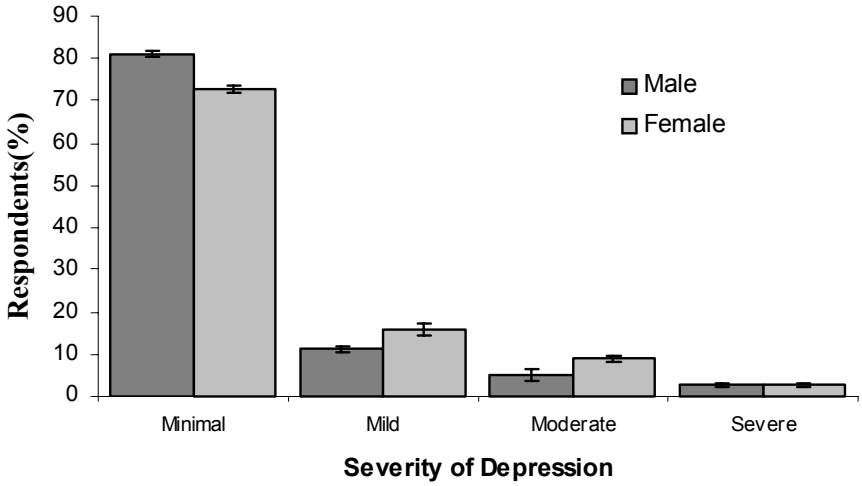

Figure 3. Overall prevalence rates for the BDI-II categories of depression by sex. Error bars represent 95% confidence intervals.

DISCUSSION

This study is the first to examine the rates of depressive symptoms among chiropractic students during all 4 years of training. Furthermore, this has now been done on a relatively large scale using a longitudinal-type design. The results clearly indicate that depression is a significant issue for chiropractic students at CMCC, with between 22% and 25% of respondents having mild, moderate, or severe depression in any given academic year between 2000 and 2003. These data suggest that chiropractic students have higher rates of depression than those found in the general, postsecondary school, college population, where approximately 17% of students report either feeling depressed or have been treated for depression in the previous 12 months.[30] In addition, these findings suggest that chiropractic students have rates of depressed mood similar to those of medical students, for which the most recent and comprehensive study has reported overall rates of depression of 22%.[6] To meet the requirements for the educational

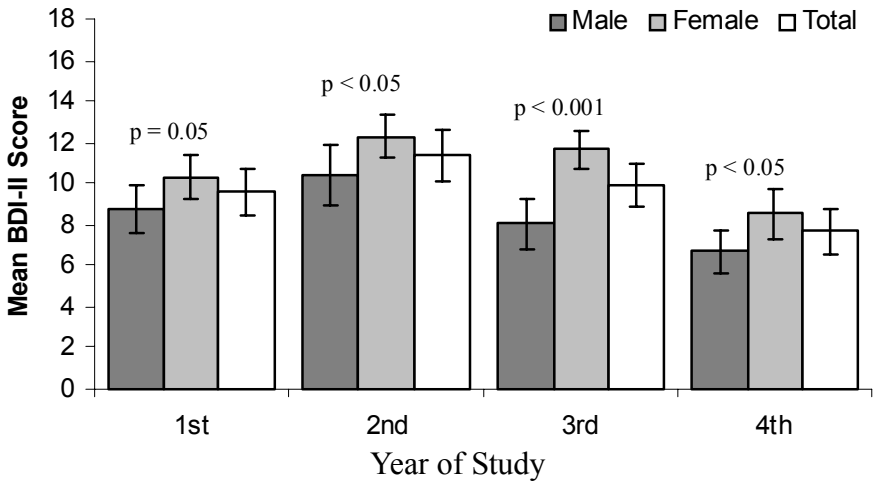

Figure 4. Average BDI-II scores by year of training and sex. Error bars represent 95% confidence intervals; p values indicate significance of difference between males and females.

accreditation standard's 4200 contact hours within 4 years of training,[20, 21] the combination of in-class schedules and independent study has the student often exceeding 80 hours per week, and, as such, relatively high rates of depression were arguably to be expected. This level of workload can be a cause of sleep deprivation, and when compounded by academic pressures, financial concerns, and stressful personal life events, the risk of depression is high.[22, 23]

Students in their 2nd year of training in the program were found to have the highest prevalence of depression. Between 29% and 41% of students at this level of training had symptoms of depression between the 2000 and 2003 academic years. By comparison, medical students in the first 3 years have been found to report feeling similar rates of depression.[6] This discrepancy (2nd year highest in the chiropractic program) may in part be attributed to the structure of the chiropractic curriculum. The first 2 years of the curriculum has a heavy emphasis on the more basic sciences to provide students with a vast amount of basic knowledge before they enter 3rd year, where courses require more clinical application of knowledge and problem solving. It is possible that the 2nd year of study holds students accountable for learning a disproportionately high amount of content in the curriculum, or perhaps students are experiencing burnout by this stage in their training. This content-related burnout is then subsequently alleviated in the 3rd year when the focus of the curriculum changes to a more clinical application. Fourth-year chiropractic students were found to have the lowest rates of depressive symptoms as measured between 11% and 14%, a proportion closer to that expected from a general postsecondary student body.[30] These values are not easily compared with those of 4th-year medical students because the programs become quite distinct at this level of study. The 4th and final year of study allows chiropractic students to focus entirely on their clinical competencies, and it is the transition away from the classroom and into a clinical setting that may underlie the lower rates of depression among students at this stage. Although there are expected stressors for 4th-year students that stem from the pressures of impending board exams, the move away from a predominantly classroom-based setting and a decrease in the frequency of examinations likely contributes to the overall reduction of stress and subsequent feelings of depression.

Males and females were nearly equally represented within the student body at CMCC, but the prevalence of depressive symptoms among the sexes was not as evenly distributed. It was found that rates of depression among females were significantly higher than for males in the same year of training. These findings are consistent with the trends found in both the general population[31] and medical students.[6, 23] Explanations for why the rates of depression are higher among women both in the general population and within health care education are numerous and

include, but are not limited to, genetic and biological factors, pressures of family life, overcoming social and cultural norms, increased need for social support, and other artifactual determinants.[32] Attempts at rationalizing this sex-based inequality of depressive symptoms are beyond the scope of this study, but, nonetheless, institutions must consider this reality in the design of both scholastic programs and services offered to aid students in dealing with such issues.

The response rate for this survey was favorable, ranging from 51% to 83% depending on the academic year in which the study took place and the year of student training. However, despite the acceptable rate of response, it is impossible to determine if nonrespondents had equivalent rates of the symptoms of depression and whether or not their inclusion would have made a notable impact on the results. In addition, there are a number of noteworthy limitations to this study. The BDI-II is an instrument used to measure the severity of depressive symptoms, and it was used in this study to provide an empirical measure of the levels of depression. It is well accepted that measured symptoms of depression do not necessarily imply depression syndrome and this must be considered when interpreting these results. Because baseline measurements were not taken for any of the students surveyed in this study, the prevalence of depression that existed among students before beginning the chiropractic program at CMCC is unknown, and thus whether or not the underlying cause for the results are due to the stresses associated with the academic program is also unknown. Moreover, with neither student depressive history nor any information about personal circumstances, the authors are unable to account for the contributions that previous incidences of depression, family history of depression, or personal life events may have had on the results. It is not known if any participants had been diagnosed with clinical depression and undergone treatment. These factors have all been shown to have a significant impact on depressive symptoms.[19, 22] Finally, in an attempt to maximize comparability of the data between academic years and years of training, all surveys were distributed during the same 2 weeks of the program. Although this strategy allowed for the control of many variables, the study did not make adjustments for any seasonal depressive effects and therefore the year-round generalizability of the data was compromised.

The curriculum mandated by the Council on Chiropractic Education at all 17 American and two Canadian chiropractic colleges is designed to ensure that every graduate has the attitude, knowledge, and skills required to undertake the professional obligations of a primary care provider. The potential negative effect of depression on chiropractic students, both while in school and subsequently in the post-graduate clinical practice environment, makes it important to elucidate the incidence and severity of the problem. This knowledge can not only assist in the design of specific interventions to improve the mental and emotional well-being of students, but also help to ameliorate and prevent the negative consequences associated with depression. Moreover, an inherent similarity between professional health care education programs, more specifically within the first 2 years of study, may allow such information to be utilized by institutions, regardless of the discipline. Understanding similarities and differences between professional health care students' mental and emotional health may thus assist in the recognition and establishment of improvements that can be made to such educational programs.

CONCLUSION

This study highlights the fact that students within chiropractic programs are not immune to the stresses that stem from an intensive health care educational program, which should be considered in the design of their curricula. Since poor mental health among health care students has been associated with cynicism,[7] decreased academic performance,[8, 9] decreased empathy,[10, 11] and an unwillingness to care for the chronically ill, any strategy to identify and remediate less than optimal mental health functioning carries significant value. For these reasons, chiropractic educational institutions should be encouraged to place emphasis on students' awareness of their own personal health and well-being, in addition to that of their future patients, because this will benefit the profession, future practitioners, and the public for whom they will provide care.

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CONFLICTS OF INTEREST

The authors state that there are no conflicts of interest or competing interests to declare.

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