EDUCATION
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ORIGINAL ARTICLE

The relationship between levels of resilience and coping styles in chiropractic students and perceived levels of stress and well-being

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Objective: The aim of this study was to explore the relationship between chiropractic students' coping styles and levels of resilience with their physical injuries, perceived levels of stress, and well-being.
Methods: A questionnaire was distributed to the entire student body of the chiropractic program at Murdoch University, and gathered demographic variables and responses to the Connor-Davidson Resilience Scale, Perceived Levels of Stress Scale, Everyday Feelings Questionnaire, and Coping Inventory for Stressful Situations. Linear regression analysis was used to calculate for significant relationships.
Results: Of 244 students, 194 (81%) completed the surveys. Being female and not having recovered from an injury within 12 months was significantly associated with lower levels of well-being and higher levels of stress. Being female, possessing an increased use of an emotional-based coping style, and having lower levels of well-being were associated with higher levels of stress ($R^2 = 0.65$, $F(6,164) = 50.47$, $p < .001$). Lower levels of well-being were associated with being female, higher perceived levels of stress, lower levels of resilience, and an increased use emotional coping styles ($R^2 = 0.64$, $F[6,164] = 49.5$, $p < .001$).
Conclusion: It is possible to identify chiropractic students at the university who are at risk of experiencing low levels of well-being and high levels of stress. These students may benefit from interventions aimed at enhancing their coping style choices and increasing their resilience levels. Future studies are recommended to see if these findings are consistent across chiropractic programs nationally and internationally.

Key Indexing Terms: Resilience, Psychologic; Coping Skills; Stress, Psychologic; Chiropractic; Education

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INTRODUCTION

A tertiary student's quality of health and well-being is influenced by one's perceived level of stress.[1,2] Perceived stress, at its simplest, is defined as the extent to which life situations are considered stressful.[1,3] A cross-sectional study looked at the relationship between perceived stress, and a range of self-reported symptoms and health complaints in more than 3000 university students in the United Kingdom.[4] In this study, levels of perceived stress showed a significant association between the frequency of health complaints and symptoms and levels of psychologic symptoms, such as depression, mood swings, and anxiety.[4] In another study, women tended to experience more stress than men and this could not be explained by a response bias of greater expressiveness.[5] In the group with the highest quartile of perceived stress levels an association was found with levels of muscular pain.[5]

There is a growing body of knowledge around chiropractic students and the effects of the educational journey they must negotiate to begin practice. Studies show that chiropractic programs are demanding and have considerable impact on the physical and mental well-being of students.[6–11] A cross-sectional study exploring stress levels in 109 chiropractic students across the first 4 years of a program in the United Kingdom revealed that perceived stress was highest in year 4 respondents.[11] Fourth year students were almost 3 times more likely to experience stress related to financial issues and workload concerns compared to other year groups.[11]

Studies have suggested that chiropractic students experience high levels of stress, negative emotions, and test anxiety compared to the student population in general.[12,13] These chiropractic students experienced levels of depression that approximated those of other students from health professions, such as nursing and medicine.[10] However, levels in both groups were elevated compared to general population rates.[10] Another study of chiropractic

students in the United Kingdom has suggested that high levels of financial strain and subsequent loan default rates are indicative of the presence of considerable levels of student stress.[14]

Chiropractic students also have repeatedly reported considerable musculoskeletal injuries from administering and receiving large numbers of spinal manipulations/adjustments in technique classes, especially of the lumbar spine.[6–9] There are conflicting findings with respect to predisposing factors, such as age, body weight, height, or sex.[9,15] The role of psychosocial factors in people who experience persistent pain with high levels of disability has been studied extensively.[16] This has not been studied in chiropractic students who report ongoing musculoskeletal pain.

The logical progression, having identified problematic health areas, is to look for factors amenable to change that may support or protect chiropractic students from the demands of their studies. Research suggests that resilience is one such factor. Lee et al.[17] broadly summarized resilience as "the process of effectively mobilizing internal and external resources in adapting to or managing significant sources of stress or trauma." The dynamic nature of resilience sets it apart from other related psychologic traits, such as "hardiness" or "mental toughness."[18] It has been shown to be protective from depression, other dimensions of distress, and tends to result in higher quality of life levels.[19] Dyrbye et al.[19] found that health profession students with higher levels of resilience were more likely to create a collaborative learning environment, be part of good social support networks, and be better scaffolded by faculty members' involvement in their studies, but less likely to be engaged in employment during the course.[19] Drybe et al.[19] also found that, in some, high levels of fatigue and perceived stress had a significant role in the reduction of resilience. This indicates that by maintaining or increasing resilience levels a student may be better able to manage psychologic distress.

A student's coping style may be another factor that is protective in nature.[20] Coping styles have been conceptualized in terms of specific stressful situations people experience and the different mechanisms they use to adapt and buffer its effects.[21] These can involve problem, emotion or avoidance-based strategies to reduce stressful situations.[22] Problem- or task-focused coping involves facing the challenges and seeking solutions to the stressful situation.[23] Emotion-focused strategies are emotionally centered and driven, while avoidance coping strategies are those that seek distraction or removal from the stress-producing situation. In general, greater reliance on avoidance and emotion-focused coping and a lack of problem or task-focused coping has been associated with poor emotional adjustment, psychosocial dysfunction, low self-esteem, and higher levels of anxiety, depression, apathy, and denial.[24,25] In contrast, a higher level of problem-focused coping has been associated with higher health-related quality of life and psychosocial functioning.[24,26] Sex differences have been widely reported and women have been shown to be more likely than men to engage in most coping strategies and more likely to use strategies that involved verbal expressions to others or to seek emotional support, ruminate about problems, and use positive self-talk.[27] There is some support for the notion that women tend to appraise stressors as more severe.[27]

Past research has identified the protective nature of factors, such as, but not limited to, social support, adaptive coping styles and resilience.[28,29] However, coping styles in chiropractic educational programs have not been studied. A students' capacity to manage stress, physical injuries, and general tertiary pressures could be enhanced by identifying and modifying adaptive and maladaptive coping styles. To our knowledge, this study is the first to examine chiropractic students' perceived stress, resilience levels, and coping strategies. We sought to provide information on the impact that perceived stress may have on general well-being and on the reporting of musculoskeletal injuries, and attempted to identify protective factors and predisposing demographic variables with the intent to make recommendations to improve the chiropractic students' educational experience. The objectives of this research were to explore the relationship between chiropractic students': (1) levels of resilience, perceived levels of stress, physical injuries, and well-being with a range of demographic variables; (2) coping styles and resilience with their perceived levels of stress; and (3) coping styles and resilience with their levels of well-being.

METHODS

Study Design

This was a cross-sectional study.

Questionnaire

Demographic variables included age, sex, relationship status, accommodation situation, number of hours worked per week, site, and duration of any musculoskeletal injuries sustained since entry to the chiropractic program, and year of program.

The Cope Inventory for Stress Situations (CISS)[30] was administered as part of the questionnaire. It consists of 3 scales derived from 48 items asking the respondent to indicate how much students engage in various types of coping activities when they encounter a difficult, stressful, or upsetting situation. These responses are rated on a 5-point Likert scale ranging from "not at all" to "very much." High scores indicate high levels of usage of that particular strategy. The first scale is called the Task Oriented Coping Scale (TOCS) and refers to responses directed at either problem resolution or cognitively reframing the meaning of the stressful event. The second is the Emotion Oriented Coping Scale (EOCS) and refers to responses directed towards oneself rather than the problem at hand. An individual using this coping style may respond to a difficult situation by becoming emotionally distressed or engaging in fantasy activities. The final scale is called the Avoidance Oriented Coping Scale (AOCS) and is representative of strategies that involve avoiding the

stressful situation. Such attempts may take the form of either distracting oneself with other situations, such as shopping, or through interacting with other persons. Several studies have verified the CISS 3 factor structure, validity, and internal consistency.[25,31]

The Perceived Stress Scale (PSS) also was administered and is a measure of the degree to which situations in one's life are appraised as stressful and has been validated previously.[32] Items were designed to tap how unpredictable, uncontrollable, and overloaded respondents find their lives in the last month. It is comprised of 10 items and is rated on a 5-point Likert scale ranging from 0 "never" through to 4 "very often." High scores indicate the perception of the presence of high levels of stress.

The questionnaire also included the Connor-Davidson Resilience Scale,[33] which contains 25 items, all of which carry a 5-point range of responses ranging from 0 "Not true at all" through to 4 "True nearly all of the time." Questions include those aspects of behavior known to be indicative of resilience, such as "able to adapt to change" and "close and secure relationships." Higher scores indicate higher level of resilience. Several studies have confirmed the reliability and validity of this inventory.[34,35]

Finally, the Everyday Feeling Questionnaire (EFQ)[36] also was included in the survey. The EFQ is a single score scale that has 2 constructs; psychologic distress and psychologic well-being. These 2 dimensions are thought to vary inversely to reflect the person levels of overall well-being. It is comprised of 10 items scored on a 5-point Likert scale ranging between 0 and 4. A high score on the EFQ represents low levels of psychologic well-being and high levels of psychologic distress. Its internal consistency, structure, and validity have been demonstrated previously.[36]

Study Population

The entire chiropractic student population (244 students) enrolled across the 5-year program at Murdoch University in Perth Australia were recruited. Ethics approval was granted by Murdoch University Human Research Ethics Committee.

Sample Size

Sample size calculation for 250 students with a conservative 60% completion rate with 95% confidence interval (CI) was deemed to be 149 using the statistical software Epi-Info7 (Centers for Disease Control and Prevention, Atlanta, GA).

Survey Implementation

Research assistants explained the nature and purpose of the study the week before the questionnaire distribution to each year of the program. The students also were provided with an information letter explaining the study and the voluntary anonymous nature of participation. The survey was distributed in the classroom as a paper questionnaire.

Data Analysis

Data were entered and analyzed in SPSS v.21 (IBM Corporation, Armonk, NY). Descriptive statistics were calculated for the demographic items and Cronbach's α was used to confirm the internal consistency of the survey instruments. Linear regression analysis was conducted to examine the following associations: (1) responses to items measuring well-being and perceived stress levels with items measuring coping strategies, resilience levels, and demographic variables; and (2) responses to items related to musculoskeletal injury with items measuring perceived stress levels, coping strategies, and resilience levels. Categorical variables with more than 2 levels were recoded into separate, dichotomous variables for the regression prediction model so that the results were interpretable ("dummy coding").

RESULTS

Data were analyzed to ensure they did not violate linear regression assumptions. The Durbin-Watson test indicated that the residual values were independent and that colinearity was not violated. Skewness for all variables was between 0 and 1 and acceptable Kolmogorov-Smirnova values also were found.

The overall response rate to the survey was 81% (n= 198). Demographic data are summarized in Table 1. Mean scores, standard deviations and measures of internal consistency were calculated on the survey variables and are reported in Table 2.

Objective 1: Demographic Variables Relationship to EFQ and PSS

Of the predictor demographic variables (age, sex, number hours per week worked, place of residence, relationship status, and still recovering from an injury) in the linear regression analysis, sex ($\beta = -0.20$; 95% CI, −4.3 to −0.30) and still recovering from injury ($\beta = 0.21$; 95% CI, 0.75–4.7) were significant in students' EFQ score ($R^2 = 0.08$, $F[7,151] = 3.03$, $p = .005$). The same 2 variables, sex ($\beta = -0.25$, 95% CI, −5.4 to −1.3) and recovering from injury ($\beta = 0.24$, 95% CI, 1.2–5.4) were significant in students' PSS score ($R^2 = 0.11$, $F[7,152] = 3.8$, $p = .001$).

Objective 2: Relationship of Amenable Factors to PSS

In the linear regression analysis, of the 6 variables (CISS type, resilience, EFQ, and sex), significant associations were found between EOCS ($\beta = 0.16$; 95% CI, 0.90–0.22), sex ($\beta = -1.3$; 95% CI, −2.5 to −0.41), and EFQ ($\beta = .64$; 95% CI, 0.51–0.76) with PSS ($R^2 = 0.65$, $F[6,164] = 50.47$, $p < .001$).

Objective 3: Association of Amenable Factors with EFQ

In this linear regression, the variables sex ($\beta = -1.96$; 95% CI, −3.50 to −0.43) and resilience ($\beta = -0.17$; 95% CI, −0.24 to −0.09) were significantly negatively associated with EFQ while PSS ($\beta = 0.60$; 95% CI, 0.48–0.72) and EOC ($\beta = 0.27$; 95% CI, 0.20–0.34) were significantly positively associated with EFQ ($R^2 = 0.64$, $F[6,164] = 49.5$, $p < .001$).

Table 1 - Demographics and Characteristics of Students in the Sample

Variable	*n*	%
Sex		
Men	92	48
Women	100	52
Y of program		
Y 1	45	23
Y 2	47	24
Y 3	36	19
Y 4	35	18
Y 5	30	15
Age (SD)		
Men	22.7 (3.5)	
Women	22.8 (4.4)	
Relationship status		
Single	141	74
Cohabiting	37	19
Married	13	7
Place of residence		
Parents	91	48
Rental	81	42
Own home	19	10
Mode of entry to chiropractic		
Secondary school	85	45
University	56	29
Work	47	25
Unemployment	3	2
Employment status		
Full time	7	4
Part time	132	69
Self employed	9	5
Student, no employ	44	23
Number of h working per wk	10 (SD 8.3)	
Method of course payment		
Government HECS	155	82
Parent help	27	14
Other loan	2	1
Own savings	4	2
Working	1	1
Presence of injury		
Present	80	42
Absent	112	58
Duration of injury		
0	85	50
1–3 mos	10	6
3–6 mos	9	5
7–12 mos	19	11
Longer than 12 mos	46	27
Still recovering from injury		
Recovered	72	43
Not recovered	97	57

Table 2 - The Mean Results, Standard Deviations and Internal Consistency Scores of the Variables

Variable	Score (SD)	Cronbach's α
Resilience	Male 66.0/100 (14.5)	0.89
	Female 66.7/100 (11.4)	
	Total 65.0/100 (12.9)	
Perceived Stress	Male 17.5/40 (6.6)	0.88
Scale (PSS)	Female 21.3/40 (6.2)	
	Total 19.5/40 (6.6)	
Everyday Feelings	Male 15.140 (6.3)	0.86
(EFQ)	Female 18.1/40 (6.2)	
	Total 16.6/40 (6.3)	
Task-problem Oriented	Male 50.6/80 (9.6)	0.88
(TOCS)	Female 52.9/80 (9.2)	
	Total 52.1/80 (9.4)	
Emotion Oriented	Male 43.0/80 (10.6)	0.89
(EOCS)	Female 48.3/80 (12.5)	
	Total 45.2/80 (11.9)	
Avoidance (AOCS)	Male 42.3/80 (10.3)	0.84
	Female 43.5/80 (10.5)	
	Total 42.5/80 (10.7)	

DISCUSSION

To my knowledge, this is the first study to look at the psychosocial factors that impact negatively on chiropractic students and factors that may be protective during their education. The findings suggested that sex, not having recovered from an injury within 12 months, coping style, and resilience levels are related to chiropractic students' levels of perceived stress and psychologic well-being.

Of the demographic variables in this study, being a female chiropractic student was associated with higher levels of perceived stress and lower levels of psychologic well-being. Sex differences have been reported in coping styles, with females being more likely to choose emotional based coping styles.[27] This sex difference has not been reported with respect to perceived stress levels or psychologic well-being. Coping style and resilience appeared to explain only a small portion of the total variance of measures of psychologic health in this student population. Factors other than those measured in this study are more important in determining mental health levels. It is not known if this finding is unique for the Murdoch University chiropractic program or a reflection of the broader university female population. A study sampling the wider university, other chiropractic programs, as well as looking for other possible factors, such as cultural or broader societal factors, would clarify this concern. Further, a qualitative study seeking female chiropractic students' opinions of what they perceive as sources of stress and psychologic distress may add direction for future quantitative investigations.

Students who reported themselves as not having recovered from injury within 12 months described themselves in a similar manner to those people who experience persistent pain with high levels of disability.[16] In particular, they were more likely to experience lower levels of psychologic well-being and higher levels of stress. Past research has found that chronic or persistent pain sufferers are vulnerable to a range of poor health outcomes[16] and, if they are studying, lower levels of academic achievement.[37] It would seem logical that applying the same strategies for those with acute pain

who are at risk of transitioning to one of chronic disability also would apply to the students in this sample. This could potentially include early identification and interventions, such as education, early return to activities, and addressing any psychosocial factors thought to negatively impact on the students.[38] However, further work is needed to identify the type and extent of psychosocial factors in Murdoch chiropractic students as well as trialing any potential interventions.

This study intended to identify factors amenable to change which could offer avenues for reducing stress levels and increasing well-being for the university's chiropractic students. This population was consistent with previous findings in general adult and student populations that emotional-based coping styles were associated with higher levels of perceived stress.[24] This counterproductive strategy increased in its frequency of use for the first 3 years of the program and then decreased over the final 2 years, though this did not reach a level of significance. These variations also may be explained by cohorts being composed of different people and consequently report using different strategies.

The levels of well-being and resilience did not vary throughout the Murdoch program as has been reported in the UK study.[11] The reason for this difference between the 2 student populations is unknown. Collectively, Murdoch University students who used emotional-based coping strategies were more likely to report higher levels of perceived stress and lower levels of well-being. Past research has shown that interventions aimed at changing coping styles has improved health outcomes.[39] Consequently, consideration should be given to some form of education or intervention for these young adults aimed at increasing the problem-based strategies and minimizing emotion and avoidance based strategies.

There was a general nonsignificant trend for resilience levels to gradually increase over the program. This trend is in accord with previous research showing that resilience increases with life experience and age.[40] This student mean score (66.0, standard deviation [SD] 12.9) in this study was below that of past Australian university students scores[35] (69.1, SD 13.4) and the Australian general population[34] (71.5, SD 12.4). This suggests that there is some scope for improving the overall resilience levels of the chiropractic students at Murdoch University. Further this study revealed that there was an association between reduced levels of well-being and resilience. This suggests that an intervention aimed at enhancing resilience levels has the potential to effectively reduce stress levels and increase students' general psychologic well-being.[41]

There are limitations to this study. This study engaged the majority of the chiropractic student cohort and provided broad insights into this population. However, these are not generalizable to the student population within the larger university or other chiropractic programs within Australia and beyond. While over 80% of the total student population participated in the study, the remaining 19% may not have chosen to respond because of significant levels of mental health issues. As such, it could impact on the findings. Finally, this survey was cross-sectional in nature. Causality between the coping strategies, resilience, and overall health dimensions cannot be assumed. A longitudinal study following the students over the length of the program may add further insight in the relationships between these factors.

CONCLUSION

Chiropractic programs have a significant impact on the physical and mental health and well-being of students undertaking these courses. This study showed that factors amenable to change, resilience, and coping style affect chiropractic students' levels of perceived stress and psychologic well-being at one university. Female chiropractic students appeared to be more prone to these negative dimensions of health than males. There appeared to be scope to improve psychologic health levels, and assist in coping with physical injuries accrued and the demands of the chiropractic program by enhancing students' choice of coping style and resilience levels.

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This work was funded internally. The author declares that there are no competing interests in this study.

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Author Contributions

Concept development: SII. Design: SII. Supervision: SII. Data collection/processing: SII. Analysis/interpretation: SII. Literature search: SII. Writing: SII. Critical review: SII.

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