

Exercise prescription: perceptions and physical activity habits in chiropractic students at CMCC

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Background: *Health care practitioner's physical activity (PA) habits are associated with their likelihood to recommend PA to their patients. The intent of this project is to better understand the Canadian Memorial Chiropractic College (CMCC) students' perceptions and practices of PA and exercise prescription as this may predict exercise counselling they will provide to future patients.*

Methods: *A 27-item survey was distributed to Canadian Memorial Chiropractic College (CMCC) students (N = 744). The survey determined the proportion of CMCC students that meet the (2012) Canadian Physical Activity Guidelines. Additionally the survey recorded students' perceptions of PA counselling during patient visits and their own example of maintaining a healthy lifestyle.*

Results: *The response rate for the survey was*

Contexte : *Les habitudes liées à l'activité physique (AP) des professionnels de la santé sont associées à leur probabilité de recommander des AP à leurs patients. L'objectif de ce projet est de mieux comprendre les perceptions et les pratiques des étudiants du Canadian Memorial Chiropractic College (CMCC) quant aux activités physiques et à la prescription d'exercices, car cela peut être indicatif des conseils en matière d'exercices qu'ils fourniront aux futurs patients.*

Méthodologie : *Un questionnaire comportant 27 points a été distribué aux étudiants du Canadian Memorial Chiropractic College (CMCC) (N = 744). L'enquête a déterminé la proportion d'étudiants du CMCC qui respectent les Directives canadiennes en matière d'activité physique (2012). En outre, l'enquête a permis de noter les perceptions des étudiants concernant les conseils en matière d'AP pendant les visites des patients et leur propre exemple de maintien d'un mode de vie sain.*

Résultats : *Le taux de réponse pour l'enquête était de*

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46% (N = 343). By using average estimates, it was determined that 72% of the respondents meet the (2012) Canadian Physical Activity Guidelines. 86% of the respondents perceived PA counselling to be usually or always relevant during patient interactions, and approximately 73% believed that exercise counselling is highly relevant to chiropractic practice. Furthermore, at least 88% percent believed that chiropractors must adhere to a healthy lifestyle in order to effectively model a healthy lifestyle to their patients.

Conclusions: A high proportion of CMCC students meet PA guidelines, and perceive PA counselling to be highly relevant and important to patient encounters.

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KEY WORDS: exercise, prescription, physical activity, chiropractic, survey, student

46 % (N = 343). En utilisant des estimations moyennes, on a déterminé que 72 % des répondants se conforment aux Directives canadiennes en matière l'activité physique (2012). 86 % des répondants ont perçu que les conseils en matière d'AP étaient habituellement ou toujours pertinents pendant les interactions avec les patients, et environ 73 % ont estimé que les conseils en matière d'exercice sont très pertinents pour la chiropratique. En outre, au moins 88 % pour cent estiment que les chiropraticiens doivent adopter un mode de vie sain afin de donner l'exemple à leurs patients.

Conclusions : Une proportion élevée des étudiants du CMCC respectent les directives en matière d'AP et perçoivent que les conseils en matière d'AP sont très pertinents et importants pendant les consultations avec les patients.

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MOTS CLÉS : exercice, prescription, activité physique, chiropratique, enquête, étudiant

Introduction

It is well known that physical activity (PA) has a plethora of health benefits among which is a significant reduction in the risk of developing noncommunicable diseases (NCD) such as cancer, cardiovascular disease (CVD), hypertension and diabetes.¹ However, globally one in three adults are not physically active (bodily movements that increase heart rate and breathing rate) enough to achieve these benefits.¹ Physical inactivity, defined as less than three and a half hours of exercise per week, are cited as a key risk factor for common chronic NCDs.^{2,3} NCDs, although preventable, are cited as the fourth leading risk factor for death worldwide resulting in 3.2 million people deaths each year.⁴

Reflective of the global shift towards physical inactivity, obesity rates in Canada have doubled between 1981 and 2007, resulting in an increased prevalence of NCDs.⁵ In 2011, Statistics Canada revealed that one in four Canadian adults and 9% of children between the ages of six and 17 years old were obese.⁶ Obesity and its associated conditions have cost the Canadian economy approximately \$4.6 billion in 2008, an increase of \$735 million or ap-

proximately 19% since 2000.⁶ Research has identified a number of determinants associated with obesity, including PA, diet, socioeconomic status, ethnicity, immigration and environmental factors. When studying these determinants, physical inactivity emerged as the most strongly associated with obesity at the population level for both men and women after adjusting for age and other behavioral and social determinants of health.² Specifically, an American based study found excess weight, defined as a body mass index (BMI) of 25 or greater, and physical inactivity, defined as less than three and a half hours of exercise per week, could collectively account for 31% of all premature deaths, 59% of deaths from CVD and 21% of deaths from cancer among nonsmoking women.² Furthermore, sedentary lifestyle is responsible for roughly one third of deaths due to coronary heart disease, colon cancer and diabetes three diseases for which physical inactivity is an established causal factor.⁷ Results from the Canadian Community Health Survey showed that from 2003 to 2007/2008, the prevalence of diabetes mellitus in those from 12 years and older rose from 1.22 to 1.67 million.⁶

Regular PA is associated with a range of health benefits,

including a markedly reduced risk of chronic disease morbidity and premature mortality.^{8,9} In addition to these preventative aspects physical activity may also be considered as a therapeutic intervention unto itself. While physical activity and exercise are often used interchangeable it is widely understood that exercise is planned, structured and purposeful. Exercise therapy, as it is often referred to in the literature, is not only helpful for the prevention of chronic NCD's, but has also been shown to be effective in increasing function and decreasing pain for a wide range of chronic musculoskeletal (MSK) disorders.¹⁰ In addition to the breadth of global health benefits noted with movement, robust evidence shows that exercise itself can have a profound effect on analgesia and pain reduction in MSK conditions.^{11,12} The effectiveness of PA and its transferability into the healthcare system as a therapeutic intervention has led the American College of Sports Medicine (ACSM) to establish the "Exercise is Medicine" (EIM) movement.¹³ With the goal of transitioning into a preventative healthcare model, this global health initiative encourages mainstream and complementary healthcare providers to understand and promote active lifestyles in their patients and clients. EIM extolls the belief that physical activity is integral in the prevention and treatments of diseases and should be regularly assessed and recommended as part of all healthcare. The Canadian Society for Exercise Physiology (CSEP) is the host organization for EIM in Canada (EIMC) and chairs the multidisciplinary advisory council which provides leadership in promoting physical activity in Canada. Lifestyle modifications are fundamental to managing chronic disease risk, and there is some evidence that exercise counseling by medical doctors can help patients increase their PA levels.²

The ACSM recommend that men over 45 years of age and women over 55 who currently have or at risk for any chronic health problems should consult a physician prior to beginning any vigorous physical activity regimen.¹⁴ Furthermore, advertisements for commercial health and fitness products commonly advise people to consult their physician prior to exercise participation. However, few physicians report including advice on PA in their history taking or report process.¹⁵ When asked about their ability to provide such advice, they cite insufficient time, lack of reimbursement and inadequate training in PA counseling as reasons they fail to discuss exercise.¹⁵ Therefore, despite the well-established health benefits of PA and the ef-

fectiveness of PA prescribed by doctors, rates of exercise counseling by doctors remain unfortunately low.¹⁶⁻¹⁹

Studies have shown that 64% of Canadian medical students and 61% of American medical students meet the ACSM guidelines for weekly PA.²⁰ While almost two thirds of Canadian medical students meet the recommended weekly guidelines for PA, approximately 75% percent do not regularly engage in exercise counseling with patients.²¹ Evidence also reveals that physicians who are physically active may be up to 5.7 times more likely to recommend PA to patients²¹⁻²⁴ and it is suggested that active physicians are not only more likely to prescribe exercise and lifestyle advice, but their patients are also more likely to follow the advice⁸. Thus, despite the low exercise prescription rates in both active and inactive doctors, it appears that there is a greater chance of active physicians discussing it with their patients during a medical consultation.

This current study was conducted to determine if the medical student findings are similar for Canadian chiropractic students. Specifically, the purpose of this study was to evaluate the proportion of chiropractic students at the Canadian Memorial Chiropractic College (CMCC) engaging in at least 150 minutes of moderate to vigorous physical activity (MVPA) per week (as recommended for adults aged 18-64 years of age by the Canadian Physical Activity Guidelines).²⁵ MVPA includes activities such as running, biking, brisk walking and even yard work akin to raking. The Canadian guidelines aim to reduce disease and achieve greater health benefits by giving specific activity tips to accumulate more exercise. Exercise bouts of ten minutes or more and strengthening activities at least 2 days per week are also suggested. Additionally this study attempts to evaluate the perceptions of chiropractic students as to the importance of exercise counseling during patient encounters. Finally, the association between PA and personal psychological well-being or mental health amongst chiropractic students themselves will be considered as previous studies have noted high stress in medical students to be important to PA habits.^{1,20}

Methods

Study Population

The population eligible for sampling included all students enrolled in the CMCC undergraduate Doctor of Chiropractic program as of September 1st, 2013. The undergraduate

program at CMCC is a four year program and includes students from a diverse educational background provided they meet the prerequisite grade point average and have at least three years of undergraduate studies by Canadian standards. Students registered in postgraduate chiropractic studies, such as the CMCC residency Programs, were excluded from the study population as the intent was to capture a cross-sectional study of the entire undergraduate CMCC student population. Participants were contacted through the CMCC student email database as well as through cohort-wide social media forums. The surveys were completed anonymously and submitted online in the months of March and April 2014. Ethics approval was obtained from the CMCC Research Ethics Board.

Survey Tool

Data were drawn from a 41 item survey that was created based on a modified 27 item template originally published by Ng and Irwin²⁰, reconfigured to be applicable to a chiropractic study population. The specific validity and reliability of the chiropractic survey was not tested. The Ng survey was created by utilizing Erica Frank's²⁶ questionnaire, which was used to determine medical students' perception of the relevance and frequency of PA counseling during patient visits. Furthermore, to determine PA habits, Ng and Irwin²⁰ combined Frank's questionnaire²⁶ with a condensed version of the International Physical Activity Questionnaire (IPAQ) validated and published by Craig *et al.*²⁷ The survey used in this study is simply a reworded version of the survey used by Ng and Irwin²⁰ in order for the vocabulary used to have greater applicability/readability to chiropractic students as opposed to medical students. Survey responses were scored and numerical data was generated using a 3-5 point Likert-type scale (ranging from nothing, somewhat, highly for 3 points or from strongly agree, agree, neutral, disagree, and strongly disagree for 5 points), and simply scored from 1-3 or 5 (options A, B, C, D, E). The survey was posted to, and issued through, the Survey Monkey program (www.surveymonkey.com, LLC) for ease of completion and data collection. CMCC years 1 through 4 class representatives sent out the survey invitation to their respective years with 3 follow up reminders 2 weeks apart. An additional verbal request from the researchers was also made to a class of each year in the final week that the survey was open to optimize response rates.

Outcome Measures

In order to assess the attitudes and exercise habits of chiropractic students, questions involving frequency, intensity, and type of exercise performed along with exercise perceptions were created to assess if students met the recommended 150 minutes of PA per week (for 18-64 yrs. old), as recommended in the most recent Physical Activity Guidelines outlined by the Canadian Society of Exercise Physiologists (CSEP).²⁵ To assess chiropractic students' attitudes toward PA counseling, specific questions were asked with regard to their perceptions of credibility and authenticity in counseling and the influence in prescribing PA to patients. To consider the influence of mood on exercise habits additional questions were included that specifically asked about mental health and stress.

Statistical Analysis

Self reported habits and attitudes towards exercise and exercise prescription were compared to a determination of whether chiropractic students meet the weekly minimum amount of exercise as determined by the Canadian Society of Exercise Physiologists (150 minutes of MVPA).²⁵ Analysis of frequency and count data were determined using Microsoft Excel and through Survey Monkey. We then further organized the data based on specific subject responses, and compared those answers to a set of questions e.g., "How relevant do you think exercise counseling is during patient encounters?" Survey responses were scored and numerical data was generated using a 3-5 point Likert-type scale, all variables were categorical with chi-square tests of independent variables used to assess association with outcomes. P-values ≤ 0.05 were considered statistically significant. Additionally, a difference of proportions test was utilized to assess the difference between the number of chiropractic students who met the exercise guidelines versus the previously reported²⁰ medical student data. Statistical analysis of the impact that mental health of chiropractic students has on exercise habits was conducted in a two-step manner. A mental status latent score was estimated using the Rizopoulos item response theory based on summing the three questions asked about stress and mental health. A t-test for the difference in the means of the latent score between those that met exercise guidelines and those that did not was calculated.

Table 1.
Characteristics of chiropractic students and comparison between physical activity levels.

	Meets Physical Activity Levels		P Value
	No (<150 min per week)	Yes (>150 min per week)	
	N=85	N=247	
Current Year of Chiropractic School			
1st	18	73	0.047
2 nd	22	57	
3 rd	36	71	
4 th	9	46	
Sex			
Male	37	121	.368
Female	48	125	
Undergraduate Program of Study			
Health Sciences	12	31	.009
Basic Sciences	15	28	
Kinesiology	46	173	
General Arts	4	9	
Other	8	5	
Frequency on counseling exercise during patient interaction			
Rarely	2	3	.00001
Sometimes	13	14	
Usually	50	98	
Always	20	132	
Relevance of exercise counseling to intended specialty			
Not at all	0	2	.004
Somewhat	30	45	
Highly	55	199	
To effectively encourage a patient, a chiropractor must also adhere to a healthy lifestyle			
Strongly agree	47	181	.006
Agree	33	59	
Neutral	4	2	
Disagree	1	2	
Strongly disagree	0	2	
Provide more credible and effective counseling if I exercise and stay fit			
Strongly agree	48	184	.001
Agree	29	56	
Neutral	7	3	
Disagree	1	2	
Strongly disagree	0	2	
I currently exercise enough			
Strongly agree	0	86	<.0001
Agree	11	100	
Neutral	15	33	
Disagree	42	26	
Strongly disagree	17	1	

Results

The survey was sent out to 744 participants with 344 students responding, representing a response rate of 46%. The respondents were represented across the four years of study with approximately ¼ of each class responding. Of the respondents 332 (96.5%) provided answers for the exercise questions such that the number of minutes of MVPA could be calculated and used for interpretation. All respondents of this survey were students at CMCC.

To correspond to this study's main purpose, Table 1 shows characteristics of the study population and whether or not the study population meets the Canadian Physical Activity Guidelines of at least 150 of MVPA per week. This study found that 74% (247/332) of chiropractic students at CMCC meet the Canadian Physical Activity Guideline for recommended MVPA per week (Table 1). Considering the previously reported 64% (969/1510) of medical students that meet the guidelines our test for difference in proportions shows a significantly higher proportion of chiropractic students to meet the physical activity guidelines ($P = 0.000416$).

Table 1 also corresponds to the study's second purpose in exploring the association between PA and personal psychological well-being or mental health amongst chiropractic students themselves. No differences were noted between male (158) and female (173) respondents. A significant finding from Table 1 showed 99% of students saw exercise counseling as "somewhat" or "highly" relevant to their intended practice style ($P = 0.004$). Furthermore, additional significant findings from Table 1 revealed 96% of students either agree or strongly agree that a chiropractor must adhere to a healthy lifestyle in order to effectively encourage patients to exercise ($P = 0.006$). When asked about their intended frequency of exercise counseling, approximately 90% of students will usually offer counsel promoting exercise ($P = 0.00001$). When presented with the statement "I will be able to provide more credible and effective counseling if I exercise and stay fit, 95% of students either agree or strongly agree ($P = 0.01$). When assessing respondent's current level of exercise, 59% of students either agree or strongly agree that their current exercise level is adequate ($P = 0.0001$).

Stress in the last 2 weeks, last 12 months and number of days with bad mental health in the last 30 days were combined to estimate a mental status latent score. The mean latent score for those who meet exercise guidelines

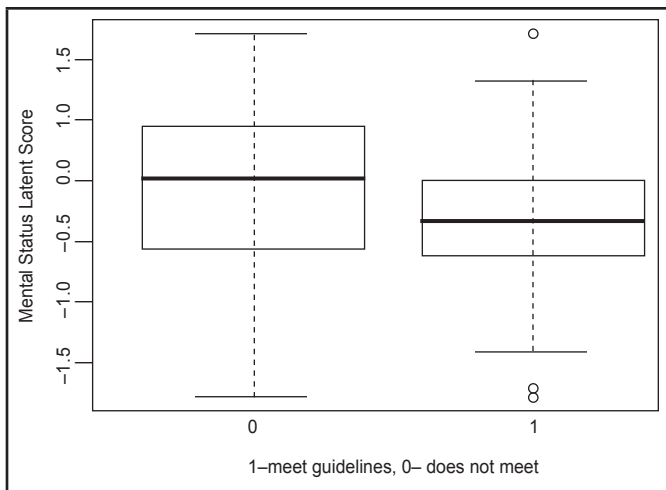


Figure 1.

Box Plot – Mental Health Status and Physical Activity.

is -0.0782 while the mean latent score for those that do not meet the exercise guidelines is 0.2207 (Figure 1 Box Plot). The t-test shows a significant difference between the two groups with the students who do not meet the guidelines having a significantly higher mental health latent score, suggesting higher stress (t test stats = 3.007298, $P = 0.00284$).

Discussion

To our knowledge, this is the first study to examine the PA levels and intended counseling practices of chiropractic students. Comparing adherence to PA recommendations with previous American (61%) and Canadian (64%) medical student studies, our (74%) Canadian chiropractic students PA participation compares exceedingly well.^{20,26} As in the previous medical study by Ng and Irwin, the percentages of chiropractic students who met PA guidelines were stable throughout their chiropractic education. This finding was not surprising given that 79% of our respondents had undergraduate degrees in health science or kinesiology and likely developed their PA habits earlier. Beyond improving fitness, PA has also been identified as playing a role in prevention and therapy for mental health, and given the known stress associated with professional education this aspect was considered.^{1,20} Similar to medical student findings those students who met PA requirements also reported less stress or better mental health and

this might provide another avenue for research in student success and education satisfaction. While we recognize the inherent validity/reliability issues in creating a latent score to quantify mood we are confident this approach could prove useful in future research.

Approximately 99% of the chiropractic students saw exercise counseling as relevant to their intended practice style which was similar to the medical student findings of Ng and Irwin (93%). Chiropractic and medical students were both in line with the notion put forth by Erica Frank that a healthy doctor equates to healthy patients (95% of chiropractic students and 94% of medical students) agree that advice is more credible and authentic by staying fit themselves. Additionally, chiropractic students (96%) are in greater agreement that they must adhere to PA guidelines in order to effectively encourage patients to do the same versus only 80% of medical students saying the same.²⁰

Limitations

There are a variety of limitations and potential sources of bias that may have caused for lower responses and over representation of the actual habits and perceptions of exercise and counseling amongst chiropractic students at CMCC. One such source of bias that may exist is the presence of social desirability bias. Social desirability bias can result when respondents systematically alter questionnaire responses in the direction they perceive to be desired leaving undesirable results to be underreported.²⁸ In this investigation, social desirability bias could have manifested in respondents reporting higher PA levels than they actually perform as well as a higher value for exercise prescription. This can be explained by the social role of a chiropractor to patients' wellness being more important than they would otherwise perceive. Another source of bias that is inherently associated with the utilization of self-directed surveys is the presence of a self-selection bias. Due to the nature of this investigation being based on volunteer participation, only those willing to fill out the study were included instead of all individuals of the target population.²⁹ Unfortunately we did not capture the responses of the entire student body at CMCC as the response rate in our study was only 46%. Although the response rate was greater than the 24% response rate of the Ng and Irwin study, these response rates limit the overall interpretation.

As indicated in the methods, the survey tool used in this investigation is an amalgamation of a previously validated International Physical Activity Questionnaire, and the questionnaire used by Frank *et al.*²² that was changed to apply to a chiropractic audience. It is a major limitation that the modified survey used in this investigation was not previously validated nor was the reliability assessed. Test-retest reliability was not assessed and it can be argued that the results from this study do not adequately answer the question sought by the authors.

Finally, a cross-sectional study does not allow us to determine if this cohort of students change their level of PA or exercise counselling as they progress through their medical training or upon graduation however important conclusions can still be drawn.

Conclusion

This study provides a baseline understanding of Canada's future chiropractors' current PA behaviors, attitudes and counseling habits. It is becoming more apparent in mainstream healthcare that a paradigm shift is underway towards a more preventative model of health. Engaging in 150 minutes of MVPA per week is the minimum amount required to attenuate morbidity and ultimately prevent disease.²⁵ One way to encourage greater participation in PA is through health practitioners actively counseling patients. Previous studies show that personal activity behavior is a strong predictor of whether healthcare providers value PA counseling as a part of routine patient visits.⁸

It has been demonstrated that nearly three-quarters of chiropractic students at CMCC that completed our survey meet the Canadian Physical Activity Guidelines for PA along with almost all of them perceiving PA counseling as somewhat to highly relevant in patient encounters. This compares with previous research that shows 64% of medical students meet the Canadian Physical Activity Guidelines²⁰, whereas this preliminary study reveals 74% of chiropractic students met the Canadian Physical Activity Guidelines, which is significantly more ($p=0.000416$). Overwhelmingly CMCC students plan on implementing exercise counseling in their patient visits (90%). In accordance with this, 96% percent of chiropractic students at CMCC believe chiropractors must adhere to a healthy lifestyle to encourage/model healthy lifestyles effectively in their patients and to further demonstrate authenticity and credibility. It was also found that while 59% of stu-

dent's view their current level of exercise as adequate, over 40% would like to do more. Given the chiropractic and university undergraduate education of CMCC students we were not surprised that these results did not change regardless of the students' years of study.

It is well understood that exercise is effective in preventing chronic disease.¹ Chiropractors are well positioned to contribute and take on a leadership role in the "Exercise is Medicine" movement of health promotion and disease prevention in Canada, and the profession should take on an influential role in encouraging its implementation. Future research efforts should investigate the health habits and counseling practices of chiropractors in the field within Canada, the United States, Europe and Australia to further solidify this notion and enhance the global "Exercise is Medicine" movement.

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