WELLNESS KNOWLEDGE, ATTITUDES, AND BEHAVIORS OF CHIROPRACTIC STUDENTS

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ABSTRACT

Objective: To determine the relationships between wellness knowledge, attitudes, and behaviors in a chiropractic student population.

Methods: Students at a chiropractic college were administered a validated Wellness Knowledge, Attitude, and Behavior Instrument (WKABI). The WKABI instrument measures knowledge, attitudes, and behaviors in the intervention areas of physical activity, nutrition, and stress management. Scores were tabulated for each section. Demographics were included as part of the instrument. Spearman's Rho correlations, standard deviation, and mean were used to analyze the data.

Results: Knowledge scores were significantly correlated with attitude scores and were also significantly correlated with behavior scores. Attitude scores were significantly correlated with behavior scores as well. Mean scores for all subjects on the knowledge, attitude, and behavior sections were 77.3%, 86.6%, and 65.9% of the highest possible scores, respectively.

Conclusion: Significant relationships exist between wellness knowledge, attitudes, and behaviors of students at a chiropractic college. Further research will be required in this population to identify what other factors may influence wellness behaviors. *(J Contemporary Chiropr 2022;5:196-205)*

Key Indexing Terms: Chiropractic; Wellness; Knowledge; Attitudes; Behaviors; Medical Education

INTRODUCTION

It is undeniable that the role of behavior in public health is vital. Health behaviors can influence health and well-being and have become a primary objective of public health and public health policy. Evidence for the powerful impact of healthy lifestyle behaviors such as healthy diet, adequate exercise, and smoking abstinence on the reduction of morbidity and mortality is compelling. (1) A report measuring the burden of disease in the United States placed diet as the primary risk factor for death and disability. (2) The most common causes of death in the United States are both preventable and nutrition-related. (2) Of the 7 top chronic disease risk factors, 4 are associated with both dietary behavior and nutrition (diabetes, high cholesterol, high blood pressure, and obesity). (3)

While the benefits of healthy diet and exercise have been heavily promoted, the health of Americans is on the decline. The percentage of adults aged 20 and over that are overweight or obese currently resides at 73.6%. (4) Over 40 years ago, 108 million people had diabetes; by 2014, that number had increased to 422 million, and it is estimated that 783 million adults globally will have diabetes by 2045. (5,6) Heart disease remains the leading cause of death in the United States accounting for 1 in every 4 deaths. (7-9) Adults who refrain from smoking, eat a healthy diet, and engage in adequate physical activity can substantially reduce their risk of these diseases and reduce their risk of an early death. (10) Furthermore, the mortality rate of chronic diseases can be reduced through prevention, and chronic disease is closely related to health behaviors. (11-15)

Though the importance of diet and exercise are well-documented, a more prominent role for stress in these recommendations remains elusive. Stress has multifactorial causes, which makes it both complex and difficult to analyze at the physiological and psychosocial levels. Stress is ultimately the body's response to any mental, emotional, or physical disturbance. Stress can equally be a symptom and a major risk factor for anxiety, migraines, substance abuse, obesity, and heart disease. (16) The prevalence of stress, anxiety, and depression amongst college students is higher than the general population. (17,18) In addition, more than 80% of medical students report some form of psychological distress. (19) This can not only directly influence quality of life but also be influenced by quality of life. (20)

While the college years are traditionally a time of optimal health and well-being, recent data suggests otherwise. (21) For example, less than 10% of college students are consuming the recommended amounts of fruits, vegetables, and fiber. (22) Aerobic exercise activity in this population is only an average of 2.8 days per week. (21) The older the student gets, the less likely they are to exercise. (23) Research specifically targeting a chiropractic student population and exercise is lacking in this area.

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The only study to date indicated that 72% of Canadian chiropractic students met the 2012 Canadian Physical Activity Guidelines. (24) However, a survey indicated that chiropractic students, faculty members, and practicing chiropractic physicians had a positive outlook toward preventive services and health promotion, especially physical activity, and diet. (25) While promising, college students still consistently engage in unhealthy behaviors increasing their risk for developing health problems later in life. (26-30)

An important concept to define is wellness in the context of this research. It should be appreciated that terms such as wellness, wellbeing, and quality of life are often used interchangeably in the literature. Wellness can be perceived as a broader definition of the term health. The original definition of health from the World Health Organization (WHO) which has stood for more than 70 years is that "Health is a state of complete physical, mental, and social wellbeing and not merely the absence of disease or infirmity". (31) This definition encompasses wellness but excludes some multidimensional aspects such as intellectual, spiritual, emotional, and occupational. (32) Therefore, wellness transcends the absence of disease, health is dependent on sufficient wellness, and our interpretation encompasses the WHO definition with a multidimensional aspect. Wellness within the chiropractic profession is considered a patient-centered process emphasizing health promotion, disease prevention, and pursuit of wellbeing with a focus on the spine. (33,34)

An important aspect of chiropractic education is supporting the wellness of the student, a subject that has been emphasized more in recent years. The World Federation of Chiropractic (WFC) has supported many World Health Organization (WHO) initiatives including the Global Strategy on Diet, Physical Activity and Health. In addition, the WFC has a committed public health agenda promoting the ability of chiropractors to engage in health promotion activities that follow WHO priority areas. (35) Wellness education is vital because physicians regularly drive the health care system in the United States. This offers potential to create awareness of the importance of wellness in health and disease prevention and to become one of its biggest proponents.

Assessment, intervention, and evaluation of health and health behaviors are key elements to improve public health. Understanding influences on health behaviors and health risk factors is essential and is associated with behavioral change which can be protective and health enhancing. A recognized approach in the implementation of wellness education is the Knowledge, Attitudes, and Behavior (KAB) Model. Thus, as knowledge is acquired, attitudes change, and there is greater probability that behavior will also change. (36) The accumulation of knowledge is the primary motivator of this model. However, changes in behavior are considered more complex than knowledge accumulation. When overall knowledge is acquired, it can frame outcome beliefs that can motivate healthy behavior that may impact wellness.

The objective of this study was to determine the relationships between wellness knowledge, attitudes, and behaviors in a chiropractic student population utilizing a valid and reliable instrument: The Wellness Knowledge, Attitude, and Behavior Instrument (WKABI). (37)

METHODS

Approval for the study was obtained from the Institutional Review Board (IRB) of Palmer College of Chiropractic. An Informed Consent document was distributed with the questionnaire. The primary investigator (PI) was available to answer questions and ensure the clarity of answers. The Wellness Knowledge, Attitude, and Behavior Instrument (WKABI) was administered over a 21-day period to students enrolled in quarters 1 through 13 at Palmer College of Chiropractic, Florida campus. The primary investigator eliminated surveys in which all questions were not completed on the instrument. Students volunteered to participate, and no rewards were given for completion of the questionnaire.

Qualifying criteria for participation in this study consisted of chiropractic students in quarters 1 through 13. The WKABI consisted of 72 items including 5-point Likert scale (ranging from "strongly agree" to "strongly disagree" and "always" to "never") and multiple choice formats. It was distributed via email and college wide learning platform announcement to 829 students. Power analysis suggested a minimum sample size of 263 to achieve a 95% confidence level and 5% margin of error. In total, 271 students participated in the study.

Data related to wellness knowledge, attitudes, and behaviors as well as demographic information were collected using a modified version of the WKABI originally developed by Dinger, Watts, and Barnes. (37) The WKABI meets criteria for internal consistency reliability, with reliability studies performed as both a whole and each section independently. (37) This allows for separate measurement of each section when required. For the purpose of this study, several minor changes were made to the WKABI. A sample nutrition label was updated to reflect current standards in the following ways: "Calories from fat" was removed and "Trans Fat" was added, "Sugars" was changed to "Total Sugars" with "Added Sugars" included as well. Demographic questions addressed current academic quarter, gender, overall state of health, current marital status, body mass index, ethnicity, and highest completed level of education. These changes were consistent with other research in

Table 1. *Sample questions from the Wellness Knowledge, Attitude, and Behavior Instrument*

Section	Sample Questions
Knowledge	Aerobic exercise conditioning has been shown to increase: (a) High density lipoprotein cholesterol (HDL) (b) Low density lipoprotein cholesterol (LDL) (c) Very low density lipoprotein cholesterol (VLDL) (d) None of the above types of cholesterol
Attitude	The information on a nutrition label is important. (a) Strongly agree (b) Agree (c) Undecided (d) Disagree (e) Strongly disagree
Behavior	I make time to relax daily. (a) Always (b) Most of the time (c) Some of the time (d) Not very often (e) Never

which modification of the WKABI was required due to target population differences. (38-39)

The WKABI instrument measures knowledge, attitudes, and behaviors (three scales) in the intervention areas of physical activity, nutrition, and stress management. Items in the survey consisted of a statement of consent, seven demographic inquiries, and 33 knowledge questions in multiple choice format with 1 correct answer and 3 incorrect foils. The scoring of knowledge questions consisted of 1 point for a correct answer and 0 points for an incorrect response. Attitude (14 items) and behavior (17 items) were scored on a 5-point Likert scale awarding 5 points to 1 point for individual responses. Higher total scores on each of the three scales reflect higher levels of knowledge, attitude, and behavior. Maximum scores are 33, 70, and 85, respectively. Results are expressed as mean with standard deviation, overall range of scores, and percentage of the mean. Spearman's Rho correlations are performed with statistical significance set at $p < .05$. Sample questions from each section of the WKABI are shown in Table 1.

RESULTS

The WKABI was administered to 271 students, 139 male and 132 female. The demographic characteristics of the sample are shown in Table 2. Slightly more student participants were male, described their overall health as very good, were single, had normal body weight, were Caucasian, and had completed a bachelor's degree. 17 respondents were in the first academic quarter, 16 in the second, 18 in the third, 22 in the fourth, 20 in the fifth, 15 in the sixth, 41 in the seventh, 44 in the eight, 16 in the ninth, 15 in the tenth, 20 in the eleventh, 15 in the twelfth, and 12 in the thirteenth.

Mean score for all subjects on the knowledge section was 25.5 (± 5.8), with a low of 4 and a high of 33, resulting in a 77.3% average of the highest possible score. Mean score on the attitude section was 60.6 (± 6.6), with a low of 35 and a high of 70, resulting in an 86.6% average of the highest possible score. Mean score on the behavior section was 56.0 (± 10.1), with a low of 30 and a high of 77, resulting in a 65.9% average of the highest possible score. Section scores for the WKABI are presented in Table 3.

DISCUSSION

This study contributes to filling the current void in the literature illuminating what relationships exist between wellness knowledge, attitudes, and behaviors in a chiropractic student population. Strengths of the present study included the use of a validated instrument to measure wellness knowledge, attitudes, and behaviors of students (WKABI), it's revision to include the use of appropriate and updated food terminology that reflects changes to the nutrition facts label as of January 1, 2020, and research into a student population that is not well-represented in the literature. (37,40) Additionally, the WKABI instrument not only measures knowledge, attitudes, and behaviors in the areas of physical activity, nutrition, and stress management but is also a valid way

Table 2. *Demographic characteristics of the sample*

Characteristics	"	%
Gender		
Male	139	51.3
Female	132	48.7
Description of Health		
Poor	1	0.4
Fair	20	7.4
Good	74	27.3
Very Good	132	48.7
Excellent	44	16.2
Marital Status		
Single	227	83.8
Married, Living as Married, or Previously Married	44	16.2
Body Mass Index		
< 18.5 (underweight)	9	3.3
18.5 – 24.9 (normal weight)	143	52.8
25.0 – 29.9 (overweight)	97	35.8
30 or above (obese)	22	8.1
Ethnicity		
Caucasian	201	74.2
African American	17	6.3
Asian/Pacific Islander	7	2.6
Hispanic/Latino	39	14.4
Middle Eastern/Other	7	2.6
Highest Level of Education		
Bachelor's Degree	250	92.3
Master's Degree	17	6.3
Doctorate	4	1.5

of determining the impact of wellness-related courses in the curriculum on students. (37)

Questions that were directly reflected on this instrument in the chiropractic curriculum include basic nutrition, clinical nutrition, pain and stress management, health psychology, special populations and active care, public health, and wellness and chiropractic. However, these courses are spread out between quarters 5-13, and thus some of the participants in this study had not received prior instruction at this institution prior to completion of the survey. This is an important consideration, as 26.9% (73) of the respondents were currently enrolled in quarters 1-4. Additionally, demographic information

Table 3. *Section scores for the Wellness Knowledge, Attitude, and Behavior Instrumen*

	(n = 271)		
Section (maximum points)	**Mean ± SD**	**Range**	**%**
Knowledge (33)	25.5 ± 5.8	4-33	77.3
Attitude (70)	60.6 ± 6.6	35-70	86.6
Behavior (85)	56.0 ± 10.1	30-77	65.9

did not include what type of major the student had in college and only addressed the highest level of education completed. If a student did not have a wellness related major in college and had not received prior instruction on these topics, the expectation is that improvement in these scores would occur following completion of those classes in the curriculum. This will be a focus of future research in this population.

Table 4. *Correlation between sections of the WKABI*

	Spearman's Rho	p value
Knowledge and Attitude	0.29231	0
Knowledge and Behavior	0.14175	.01957
Attitude and Behavior	0.50718	0

A primary focus of this study was to examine the relationship between the score on the knowledge test to the score on the attitude survey and to the score on the behavior survey. We hypothesized that chiropractic students who scored higher on the knowledge test would also score higher on the attitude and behavior scale. A significant correlation was found between all three scores, knowledge, attitude, and behavior. The WKABI instrument suggested that chiropractic students in the program demonstrated a mean overall accuracy of 77.3% on the knowledge questions, 86.6% on the attitude questions, and 65.9% on the behavior questions. This indicated adequate overall competency regarding the questions relating to knowledge and attitude, but also room for improvement regarding questions relating to behavior. Changing a behavior is the definitive goal for wellness related activities such as diet, exercise, and stress management. However, while setting goals are relatively easy, accomplishing them is far more difficult. Goals are generally things we want but often have difficulty achieving. Defining that sense of wanting to achieve a goal and the struggle that ensues is captured perfectly with the term behavior change. Behavior change is goal

pursuit. It is not the engagement of behavior in general that is challenging, but rather the new behavior that is difficult. To appreciate the complexities of why a new behavior is so difficult, consider the different elements that influence them. This is explained by the KAB model. At its core, the KAB model proposes that behavior changes gradually. The KAB model is developed as a health promotion model and frequently utilized to assess behavior change, and in part, a way of explaining the role of knowledge in that process. Knowledge captures not only the cognitive aspect, but also the skills and capacities necessary to engage in a behavior. Attitude captures intention, desire, motivation, and the importance of a behavior. As knowledge accrues in a particular domain of behavior, resultant changes in attitude begin. Over time, as the changes in attitude accumulate, behavioral change may occur. Although commentary of the KAB model and the relationships between knowledge-attitudes-beliefs is necessary within the context of this paper, no attempt is made to critically review and critique the model. Within the KAB model, we can assume that the knowledge of chiropractic students on nutrition, physical activity, and stress awareness and management will affect their attitudes towards it, and that their attitudes affect the actions (behaviors) they take.

Knowledge Questions

A total of 33 questions were provided in the instrument under the knowledge section. Of the 33 questions, 11 were related to physical activity, 13 for nutrition, and 9 for stress awareness and management. The mean score for the knowledge section was 77.3% (25.5 ± 5.8). While direct comparisons are not possible, it was interesting to note the score on the knowledge section in other student populations in which WKABI was utilized. For example, in college students with a wellness major including physical education, health, and nutrition/dietetics the mean score was 70% and in other non-wellness related majors, 63%. (38) The higher score in the chiropractic student population was likely influenced by the additional education received through the Doctor of Chiropractic program or an unmeasured influence of their undergraduate education. Demographic information from a research study on a chiropractic student population indicated that majority (66.7%) of chiropractic students had taken a college-level nutrition course. (41) In addition, the only research on a chiropractic student population utilizing a valid and reliable nutrition questionnaire demonstrated a mean overall accuracy of 70.1% regarding nutrition knowledge. (41) While many different factors affect dietary behavior, nutrition knowledge is a recognized component. (42) Positive associations between nutrition knowledge and healthy dietary behavior (fruit and vegetable intake) have been identified. (42-45) Having nutritional knowledge does not always equate to using that nutritional knowledge to make healthy food choices. This is particularly significant, as questions related to nutrition knowledge occupied the highest number of questions on the knowledge section of WKABI. Research has also suggested that in nutrition and dietetics students, the only variables to significantly effect nutrition knowledge were academic experience and degree program. (46) Research into chiropractic students' attitudes and beliefs regarding health promotion and wellness indicated that most believed a concept of wellness should be incorporated into their future practices and their education positively impacted their knowledge and beliefs. (47) Additionally, other research into this population indicated most students will use some form of health promotion in practice, which is influenced not only by education, but also colleagues, influencers, and the perception of having enough time for utilization, thus affecting their attitudes. (48)

The WKABI instrument indicated adequate overall knowledge in physical activity and dimensions of stress related to both awareness and management. However, the impact of physical activity and stress in this population is not well represented in the literature. Chiropractic students experience higher levels of perceived stress than the general population and may experience levels of burnout similar to medical students. (49) Regarding physical activity, 72% of Canadian chiropractic students were meeting the Canadian Physical Activity Guidelines. (24) Furthermore, 88% held the belief that chiropractors must adhere to a healthy lifestyle in order to effectively model that lifestyle for their patients. (24)

Attitude Questions

A total of 14 questions were provided in the instrument under the attitudes section. Of the 14 questions 5 were related to physical activity, 5 for nutrition, and 4 for stress awareness and management. The mean score for the attitudes section was 86.6% (60.6 ± 6.6), the highest score of all three sections. Research utilizing the WKABI instrument on a college student population indicated that of those in wellness majors, including physical education, health, and nutrition/dietetics, the mean attitudes score was 87%, and in other non-wellness related majors, 84%. (38)

Students' belief about physical activity, nutrition, and stress are important factors that can influence their decision to accept, decline, or comply with wellness related activities. Attitudes captures intention, desire, motivation, and the importance of a behavior. Demographic data provided from research into a chiropractic student population indicated most had a health-related undergraduate major. (41) Although not measured directly, this would suggest this population possesses strong attitudes towards wellness developed prior to the Doctor of Chiropractic program. Furthermore, it is likely that the courses in the curriculum related to

physical activity, nutrition, and stress awareness and management contributed to the development of positive attitudes. Research has also identified that other factors aside from education, such as colleagues, influencers, and the perception of having enough time for utilization affected chiropractic students' attitudes towards wellness. (48) Knowledge can be a positive predictor of attitude. An important finding from this study was a significant correlation between all three scores, knowledge, attitude, and behavior. Students with more knowledge possessed more positive attitudes towards physical activity, nutrition, and stress awareness and management. This is consistent with the KAB model.

Behavior Questions

A total of 17 questions were provided in the instrument under the behavior section. Of the 17 questions 5 were related to physical activity, 7 for nutrition, and 5 for stress awareness and management. The mean score for the behavior section was 65.9% (56.0 ± 10.1). Research utilizing the WKABI instrument on a college student population indicated that of those in wellness majors, including physical education, health, and nutrition/dietetics, the mean behavior score was 68%, and in other non-wellness related majors, 62%. (38)

It is often difficult to change the undesirable habitual behaviors related to physical activity, nutrition, and stress, let alone adopt new ones. The problem of changing behavior has been studied for a considerable period in various research fields such as psychology, pedagogy, nursing, public health, medicine, and health promotion. (50) A recent meta-analysis on the impact of changing attitudes, norms, and self-efficacy on health-related intentions and behavior indicated that predictions from current health behavior theories demonstrate that interventions which modify attitudes, norms, and self-efficacy are effective in promoting health behavior change. (51) These findings provide rationale for the significant correlation between all three scores, knowledge, attitude, and behavior in our study. In addition, the KAB model proposes gradual and modest changes in behavior over time. The WKABI instrument captured a snapshot of chiropractic students progressing through a Doctor of Chiropractic curriculum in different quarters in the program. As indicated previously, 26.9% of the students that participated in the study had not taken 1 or more of the 7 courses (basic nutrition, clinical nutrition, pain and stress management, health psychology, special populations and active care, public health, and wellness and chiropractic) identified as providing content related to questions on the WKABI instrument. The impact of the educational component (knowledge), on the attitudes and eventual potential changes to behavior were not measured and can only be estimated based on the predictive KAB model. Future prospective research on this population over a longer period would be necessary to measure any genuine changes in behavior.

The fact that the behavior section was the lowest score has been recently addressed in the literature regarding the gap between intention/attitudes and behavior. (51-57) The assumption models the Theory of Planned Behavior in that individual attitudes can positively influence behavioral intentions and eventually behavior. However, nutrition-related research has suggested that this intention/attitude-behavior gap may be explained by values which may act as both drivers and barriers of behavior. (52) Thus, knowledge formed attitudes do not completely reconcile the effect of values on behavior. For example, a study of more than 8,000 consumers regarding organic food purchases found that approximately 1 in 4 consumers had positive attitudes regarding organic food, but in only 4% did that positive attitude directly translate into purchase behavior. (52) Furthermore, a meta-analysis illustrated that medium/large sized change in intentions lead to only small/medium sized changes in behavior. (57) Intentions are less impactful on behavior when one lacks control over the behavior, when there is a potential for social reaction, and when the performance of the behavior is favorable to habit formation. (51) Ultimately, the goal of wellness activities such as physical activity, nutrition, and stress management are to change a behavior. The results of the present study suggest that knowledge and attitudes influence behavior choices and that students are applying some elements of what is learned during the Doctor of Chiropractic program in their lifestyle choices.

Several questions remain regarding the intersection of knowledge, attitudes, and behavior in chiropractic students that were not directly quantifiable from this study. From an academic perspective, providing course work that is congruent with the development of wellness related knowledge provides an important framework through the KAB model for changes in attitudes and hopefully behavior. However, what barriers exist within the chiropractic student population regarding the engagement of wellness related behaviors? While this curriculum does offer 7 courses directly related to wellness and according to the results of this study are impactful, without identifying and addressing the barriers to implementing wellness activities, the course is ultimately unsuccessful if behavior does not change. What changes could be implemented to effect wellness behavior during the Doctor of Chiropractic program? Wellness programs offered through businesses have become increasingly more prevalent due to changes in the Affordable Care Act. (58) Approximately 93% of United States and Canadian medical schools have a formal wellness program. (59) However, little is known about the existence and scope of wellness programs in chiropractic schools.

Limitations

This study included students from 1 chiropractic college campus in the United States. Therefore, limitations exist in applying this data to other chiropractic colleges. Due to an absence of wellness knowledge data in the specific population of chiropractic students, this study may provide preliminary information that was previously unavailable. As such, the students in this study were spread throughout the curriculum, some had already completed classes involving physical activity, nutrition, and stress management, whereas others had not. Future research examining wellness knowledge with regards to enrollment term status may further elucidate the subject.

While the WKABI has been validated in undergraduate populations, it has not been specifically validated in a chiropractic student population. Limitations may exist in comparing this data to other studies using the WKABI due to population studied.

CONCLUSION

The Council on Chiropractic Education (CCE) defined a set of standards for all US chiropractic colleges as of January of 2007 recommending wellness and health promoting efforts that should be performed by chiropractors. (60) These standards address knowledge and attitudes within chiropractic education, and following the KAB model should influence behavior, but that is not addressed specifically. Research has demonstrated that exposure to wellness programs significantly increased rates of positive health behavior compared to those who were not exposed. (58) A potential solution that has widespread adoption is the introduction of wellness programs in chiropractic schools after identifying the barriers in this population to engaging in wellness behaviors. This study suggests that significant relationships exist between wellness knowledge, attitudes, and behaviors of chiropractic students, and shines a light on the importance of ensuring effective wellness courses within chiropractic curricula. When students become physicians, they pass knowledge on to their patients. Following the KAB model, raising patient knowledge should affect patient attitudes and behaviors, with the ultimate goal of a positive effect on public health.

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