First-Year Osteopathic Medical Students’ Knowledge of and Attitudes Toward Physical Activity
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Context: Current guidelines recommend that primary care physicians provide physical activity counseling as part of routine preventive health care. However, education regarding physical activity counseling often is not included or is inadequately covered in medical school curriculum, and it is unclear whether future physicians are prepared to offer effective counseling in this area.

Objective: To examine first-year medical students’ knowledge of and attitudes toward physical activity and the importance of physical activity in patient counseling.

Methods: An anonymous electronic survey was distributed to all first-year students enrolled at the Ohio University Heritage College of Osteopathic Medicine. The survey assessed students’ knowledge, beliefs, and behavior regarding physical activity and physical activity counseling for patients. The frequencies of students’ weekly physical activity were computed to assess students’ physical activity behaviors. Attitudes toward personal importance of physical activity and physical activity counseling in primary care were also assessed by response frequency. The relationship between students’ knowledge of and participation in physical activity and the priority placed on exercise for future patients were assessed by correlation.

Results: Of 243 potential participants, 144 students (59.3%) returned the survey. The majority of students (131 of 144 [91.0%]) indicated that living a healthy lifestyle was very or extremely important to them, and 125 of 144 (86.9%) prioritized physical activity as moderately, very, or extremely important. Of 122 students, 81 (66.4%) exercised for at least 30 minutes on 3 or more of the past 7 days, and 36 (29.5%) reported doing so on 5 or more of the past 7 days. Nearly all of the students (127 of 133 [95.5%]) indicated that exercise is important for their future patients, 97 of 133 (72.9%) indicated feeling moderately or extremely comfortable counseling patients on exercise, and 113 of 134 (84.3%) desired to include physical activity counseling in their practice. Fifty of 134 students (40.3%) indicated that they were aware of current physical activity recommendations for adults in the United States; however, of these 50 students, 1 (2.0%) provided a correct definition of the national recommendations.

Conclusion: Although students prioritized healthy lifestyles for themselves and their future patients and indicated a desire to include physical activity counseling as part of routine clinical care, the majority were unaware of the current physical activity recommendations. Thus, there is a need to address physical activity recommendations in the medical school curriculum.

Keywords: lifestyle medicine, physical activity, primary care
In 2012, the Centers for Disease Control and Prevention’s ambulatory health care data showed that there were more than 506 million visits to primary care physicians in the United States and that more than 60 million of those visits were to doctors of osteopathic medicine (ie, DOs).1 The osteopathic medical profession embraces a holistic approach to medicine and recognizes the importance of adequate physical activity in preventive medicine.2 For this reason, DOs are well positioned to play a key role in promoting a healthy lifestyle to their patients.3

Regular physical activity can decrease the risk of many chronic diseases, including obesity, heart disease, hypertension, stroke, certain cancers (eg, breast cancer, colon cancer), and cognitive decline.4 Furthermore, physical activity can promote mental well-being and may be as effective as antidepressant medications or psychotherapy for managing mild to moderate anxiety and depression.5 The 2008 Physical Activity Guidelines for Americans recommended that adults complete at least 150 minutes of moderate-intensity physical activity or 75 minutes of vigorous-intensity aerobic physical activity weekly, and they should complete moderate- or high-intensity muscle-strengthening activities at least 2 days per week.6 The American College of Sports Medicine maintained these recommendations in 2011.7 Despite the importance of regular physical activity, 4 of every 5 adults in the United States fall short of meeting these recommendations.4 A 2009 survey-based study8 revealed that one-third of respondents were aware of government physical activity guidelines, and less than 1% knew of the moderate-intensity physical activity guideline. A larger study9 found that 25.6% of adults knew the correct government recommendations for physical activity.

The US Preventive Services Task Force recommends that primary care physicians provide physical activity counseling as part of routine preventive health care.10 However, in a 2009 review of clinical counseling for physical activity, it was estimated that 30% to 50% of physicians in the United States consistently provide physical activity counseling to their patients.11 Factors associated with an increased likelihood for physical activity counseling include physicians’ knowledge, attitudes, and beliefs regarding physical activity counseling; personal lifestyle behaviors; personal confidence in physical activity counseling; and previous training in physical activity counseling.12-16 Osteopathic medical students’ knowledge of and attitudes toward physical activity have not been studied extensively. Thus, the purpose of the current study was to assess first-year osteopathic medical students’ knowledge of and attitudes toward the importance of physical activity counseling in primary care but would lack accurate knowledge of current US government physical activity recommendations.

Methods
The Ohio University Office of Research Compliance approved the research protocol and all recruitment procedures and materials for this descriptive, cross-sectional study.

Participants
First-year osteopathic medical students enrolled at the Ohio University Heritage College of Osteopathic Medicine (Athens, Cleveland, and Dublin campuses) were invited to participate in an anonymous electronic survey to assess health-related knowledge, beliefs, and behaviors. Participation in the study was voluntary. In return for their participation, students received a $15 gift card by clicking on a new Qualtrics link, which prevented responses from being linked to students’ names or email addresses.

Survey
The 19-item survey was created based on a 2017 survey-based study17 that assessed primary care physicians’ knowledge of physical activity. Supplemental
information from group discussions was used to develop the questions. Then, the investigators reviewed and rated each question to determine whether the questions were necessary, useful, and relevant to the constructs being measured. Students completed the survey online via Qualtrics, which permitted our research team to download survey responses into a spreadsheet without including identifying information (eg, email address, name). The research team distributed the survey link and a short description of the study via email to all first-year osteopathic medical students enrolled at the Ohio University Heritage College of Osteopathic Medicine in November 2016. A reminder email that included the link was sent in December 2016, and data collection commenced at the end of the month.

All participants provided informed consent after completion of the survey by clicking a radio button that read, “Yes, I consent to participate in this study. I may withdraw my participation at any time.” To avoid coercion, the online screen to the survey and the informed consent document both specified the voluntary nature of participation. Students were explicitly informed that their responses had no bearing on their academic status and that they could decline participation at any time during the process. No researchers were present when potential participants decided to participate or decline. The research investigators’ contact information was provided for students with questions about the study.

Sociodemographic characteristics (age, sex, ethnicity) were collected at the beginning of the survey. Then, students responded to survey items regarding their own awareness and knowledge of physical activity recommendations, their attitudes toward the role of physical activity counseling in primary care, and their engagement in physical activity. Quantitative responses regarding students’ level of comfort with counseling patients on exercise and lifestyle changes were measured on 7-point Likert scales, with 1 representing the highest level of comfort and 7 representing the lowest. Three survey items used a 5-point Likert scale to measure the level of importance that students placed on exercising and living a healthy lifestyle for themselves and their patients, with 1 representing the highest level of importance and 5 representing the lowest. Survey items regarding students’ intent to counsel patients on diet and exercise and whether they were aware of current recommendations for physical activity gave students the option to choose a response of yes, no, or maybe and yes or no, respectively. Qualitative responses were also gathered from 4 additional open-ended questions (eg, “What does living a healthy lifestyle mean to you?”), but only the question that asked students to define the physical activity recommendations was evaluated in the present study.

Statistical Analysis

Basic sociodemographic characteristics were assessed using frequencies and descriptive characteristics. Frequencies of individual responses were also calculated. Knowledge of physical activity recommendations was coded according to degree of accuracy by 2 researchers (E.H.G. and J.W.). Specifically, responses were compared with the current physical activity recommendations for adults and coded as incorrect, partially correct, or entirely correct. Frequencies of students’ weekly physical activity participation were computed to assess students’ current physical activity behaviors. Attitudes toward the importance of physical activity and physical activity counseling in primary care were also assessed by response frequency. Incomplete surveys were included in the analysis.

The relationship between students’ knowledge of and participation in physical activity and the priority placed on exercise for future patients was assessed by correlation. Logistic regression analysis was used to determine whether students’ prioritization of physical activity for themselves predicted how highly they valued physical activity for their future patients. Statistical analyses were performed using SPSS version 24 (IBM). Statistical significance was defined as $P<.05$. 
Results
Of the 243 students emailed, 144 returned the survey (response rate, 59.3%). The mean (SD) age of the students was 24.1 (2.0) years. More than half of the students were women (76 of 144 [58.2%]). Of the 144 students, 76 (71.3%) identified as white, 16 (11.2%) identified as Asian or Pacific Islander, 13 (9.1%) identified as black, 12 (8.4%) identified as other, and 3 (2.1%) identified as Hispanic/Latino. The majority of participants were enrolled at the Athens campus (85 [59%]), followed by the Dublin (32 [22.2%]) and Cleveland (27 [18.8%]) campuses. Of the 144 students, 9 (6.2%) completed an undergraduate degree in exercise science or a closely related discipline (eg, kinesiology, athletic training) and 25 (17.4%) had a graduate degree, 1 of which was in exercise science.

The majority of students indicated that living a healthy lifestyle was very or extremely important to them (131 of 144 [91.0%]) and prioritized exercise as moderately, very, or extremely important to them (125 of 144 [86.9%]) (Figure 1 and Figure 2). Eighty-one of 122 students (66.3%) participated in at least 30 minutes of physical activity on 3 or more of the past 7 days, and 36 (29.5%) reported doing so on 5 or more of the past 7 days (Table). The majority of students indicated that exercise is very or extremely important for their future patients (137 of 143 [95.5%]), that they felt moderately or extremely comfortable counseling patients on diet and exercise (105 of 144 [72.9%]) (Figure 3), and that they desired or may desire to counsel their patients on diet and exercise (121 of 143 [84.3%]).

When asked whether they were aware of the “current recommendations for physical activity,” 50 of 134 students (37.3%) indicated that they were. Of these 50 students, only 1 (2.0%) provided an accurate definition of the recommendations, and 17 (34.0%) provided partially correct responses. The muscle-strengthening activities portion of the recommendation was the portion that the largest number of students did not include in their definition (49 of 50 [98.0%]), and the recommendation to complete at least 150 minutes of moderate-intensity physical activity per week was the most commonly included aspect of the recommendations in student responses (18 of 50 [36.0%]).

The priority that students placed on exercise for themselves was moderately correlated with how highly they valued exercise for their future patients ($r=0.44$; $P<.001$). Students who indicated that they exercised for at least 30 minutes on at least 5 of the past 7 days were 3 times more likely to value exercise for their patients (OR=3.3; 95% CI, 1.4-7.4; $P=.005$) than
students who did not. Students’ knowledge of current physical activity recommendations did not significantly predict how strongly they valued physical activity for their future patients ($P$=.76).

**Discussion**

Results from the current study support our hypothesis regarding the importance of physical activity counseling in primary care. Students generally believed that exercise is important for their future patients and that physicians are responsible for counseling patients regarding physical activity. Furthermore, students were generally physically active themselves. The survey results showed that students who exercised at least 150 minutes per week were more than 3 times more likely to value exercise for their patients. This finding is consistent with previous research that has shown the same relationship for both aerobic exercise and strength training, indicating that physicians who are physically active are more likely to support physical activity for their patients than physicians who are not.\(^{18}\)

The majority of students indicated that they would like to counsel their future patients about diet and exercise. Students were also very confident in their ability to deliver physical activity counseling, although their knowledge regarding current recommendations was low. Meyer et al\(^{19}\) found that physicians who are overly confident are less likely to seek additional sources or training. Results of the current study suggest that, because medical students are interested in physical activity counseling, medical school may be an ideal time to provide training on physical activity recommendations. A 2015 study\(^{20}\) that included both osteopathic and allopathic medical schools found that during the 4 years of medical school, an average of 8.1 hours of mandatory physical activity training was offered. Because more than 50% of osteopathic medical students go on to practice in primary care fields, these students and their future patients would benefit from more training in the importance of physical activity in health.\(^{21}\) Furthermore, physical activity reinforces the 4 tenets of osteopathic medicine by supporting the idea that the body is a unit of body, mind, and spirit that is capable of self-regulation, self-healing, and health maintenance.\(^{22}\)

### Table.

**Physical Activity Reported by First-Year Osteopathic Medical Students (n=122)**

<table>
<thead>
<tr>
<th>Days Per Week, No. (%)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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<tr>
<td></td>
<td>10 (8.2)</td>
<td>13 (10.6)</td>
<td>18 (14.8)</td>
<td>30 (24.6)</td>
<td>15 (12.3)</td>
<td>22 (18.0)</td>
<td>7 (5.7)</td>
<td>7 (5.7)</td>
</tr>
</tbody>
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On how many of the past 7 days did you participate in at least 30 minutes of physical activity?

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![Figure 3. First-year osteopathic medical students’ level of comfort with counseling patients on physical activity (n=133).](image-url)
It is important that students are able to identify the minimum amount of aerobic exercise and strength training needed to help their future patients set specific goals, which are more likely to be achieved than non-specific goals.\textsuperscript{23} We recommend that osteopathic medical schools evaluate their preclinical curriculum to ensure that current physical activity guidelines for children and adults are addressed and that student knowledge of these guidelines is assessed. Students may benefit from standardized patient encounters addressing physical activity guidelines, counseling, and modifications appropriate for patients with signs and symptoms of chronic disease. These sessions could include the use of online resources, such as MyPlate (Livestrong.com), a tool to help visually assess diet quality that provides accessible tips for increasing physical activity, to support effective physical activity counseling.

One limitation of the current study is the use of a nonvalidated survey with an item that could have been misinterpreted by respondents (ie, we did not specify US Department of Health and Human Services recommendations in the question that asked students to provide current recommendations). Limitations also include the homogeneity of the study sample from 1 osteopathic medical school, the cross-sectional study design, and the use of self-reported data. Data from 1 osteopathic medical school limits the ability to generalize the findings to all osteopathic medical schools. However, the 3 campuses for this single medical school reside in very different geographical regions across the state. Furthermore, only first-year medical students in their first semester of training were included in the study. In addition, the participating students who volunteered may have been more willing or motivated to answer questions about physical activity compared with the students who did not participate. For these reasons, the self-reported findings are susceptible to selection bias. Future research with a larger, more heterogeneous sample should include students in all 4 years of medical school and from multiple osteopathic medical schools.

Conclusion
Most first-year medical students were physically active and intended to counsel their patients in physical activity in the future; however, few of these students were familiar with current physical activity guidelines. Although the students were in early stages of their medical school career and, perhaps, should not have been expected to be familiar with current recommendations based on their undergraduate education, these data underscore the need to address physical activity counseling in the first year of medical school. This study also showed that students who exercised regularly were 3 times more likely to value exercise for their patients. Medical education should be enhanced to provide students with the tools to effectively counsel patients regarding physical activity and to encourage their own lifestyle changes.

Author Contributions
Drs Guseman and Beverly provided substantial contributions to conception and design, acquisition of data, and data analysis; all authors provided substantial contributions to the interpretation of data; all authors drafted the article; all authors revised the article critically for important intellectual content; and all authors gave final approval of the version of the article to be published; and all authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

References


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