CME/CE/
MOC Offering

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The Significance of Physical Activity Education: A Survey of Medical Students

Abstract: Introduction: *Less than 20% of US adults meet physical activity (PA) recommendations, yet few physicians provide consistent PA counseling. There is limited research on the state of education of PA counseling in medical school curricula. The purpose of this study was to analyze medical students' perspectives on the current state and perceived quality of PA education in medical school.*
Methods: *An online survey was administered to the students of nine United States medical schools in January 2021. Descriptive statistics were used to analyze results.*
Results: *Of 5500 invited students, 1182 (21.5%) responded. Only 8% of students received any formal training on PA counseling for patient or self-use throughout their medical education. The majority (64% and 85%, respectively) of respondents felt that both learning more about the benefits of PA and gaining more practical skills in counseling on PA should be requirements to graduate. Students across all medical school years agreed that formal training on patient counseling for PA should be taught more in-depth.*
Conclusions: *Medical students believe that PA and exercise physiology should comprise more of medical education curricula. Such training may equip students with the tools they believe they need to adequately treat patients effectively throughout their careers.*

Keywords: knowledge; organizational factors; training

> "The results highlight medical students' beliefs that physical activity and exercise physiology should comprise a larger portion of curricula as medical education evolves."

Introduction

Over two-thirds of Americans are overweight or obese, and up to 80% of US adults and adolescents are insufficiently active.[1,2] The 2018 Physical Activity Guidelines Advisory Committee recommended that adults complete at least 150 minutes per week of moderate-intensity, or 75 minutes per week of vigorous-intensity aerobic physical activity (PA) in addition to muscle-strengthening activities on 2 or more days per week.[2] Though the links between individual behavior, physical activity, and overall health are complex, PA is useful in both preventing and treating patients with chronic disease.[3-7] Yet, few adults meet physical activity guidelines and 25% are not active at all.[8] Lack of PA is strongly correlated with increased incidence of chronic disease and emphasizes importance of PA counseling.[9,10] As such, the promotion of PA has become the focal point of several strategies implemented to curb the rise of

DOI: 10.1177/15598276231187838. Geisel School of Medicine at Dartmouth College, Hanover, NH, USA; University of South Carolina School of Medicine Greenville, Greenville, SC, USA; University of Queensland School of Medicine-Ochsner Clinical School, New Orleans, LA, USA; Dartmouth College, Hanover, NH, USA; Geisel School of Medicine at Dartmouth College, Hanover, NH, USA; Harvard Medical School, Boston MA, USA; Department of Orthopedic Surgery, Mayo Clinic, Rochester, MN, USA; and Department of Urology, Mayo Clinic, Scottsdale, AZ, USA. Address correspondence to: Zachary A. Panton, BA, Geisel School of Medicine at Dartmouth College, 1 Rope Ferry Road, Hanover, NH 03755, USA. e-mail: zaapant@gmail.com.

chronic diseases, such as cardiovascular disease and diabetes.[10]

Patients who undergo PA counseling from physicians are, at least in the short term, more physically active.[11,12] Nonetheless, prior studies have found physicians engage in lifestyle and PA counseling in only 0-34% of patient interactions in the United States.[13,14] Although understudied, a physician's exercise practices are a key factor in PA counseling for patients.[11,13-16] Despite this information within the literature, little is known about how contemporary medical students value PA education and how these habits translate to effective patient counseling.

Given the barriers in providing PA counseling, additional study is needed to understand how medical students conceptualize PA and how they are currently being prepared to counsel PA to patients in their careers. Our study sought to analyze the medical students' perspectives on the current state and perceived quality of PA education in medical school and to explore current levels of medical student PA.

Methods

Medicine in Motion is an international non-profit organization that seeks to promote physical activity and community building to combat burnout amongst all medical professionals. To better understand medical student perceptions of physical activity education, an online survey was distributed to medical students enrolled at medical schools with active MM chapters from December 2020 to January 2021. Within each institution, the survey was distributed via whole-class communication platforms. Participants completed the survey and were permitted one response per question. Questions pertaining to physical activity asked for a single-choice of "yes" or "no" or asked for an answer choice on a 5-point Likert scale (1-Strongly Disagree, 2-Disagree, 3-Neither Agree nor Disagree, 4-Agree, 5-Strongly Agree). Questions about formal medical education in PA included either classroom experiences or hands-on experiences in an active clinical setting. Participation was incentivized by allowing students to participate in a lottery for athletic apparel such as t-shirts or jackets. Descriptive statistics were used to summarize data. The study was considered minimal risk and exempt from ethical review by Harvard Medical School's Institutional Review Board (IRB20-1953) (Figure 1).

Results

Of 5500 invited students, 1182 (21.5%) responded. The average age of respondents was 25.3 years old with a standard deviation of 2.6 years. Additionally, 60.9% of respondents identified as female while 39.1% as male. 57% identified as White, 26% as Asian, and 5% as Black (Table 1). Participants were enrolled at Boston University School of Medicine (137, 11.6%), Geisel School of Medicine at Dartmouth College (116, 9.8%), Harvard School of Medicine (162, 13.8%), Tufts School of Medicine (102, 8.6%), University of California-San Francisco (61, 5.2%), University of Massachusetts Medical School (130, 11.0%), University of Rochester School of Medicine (184, 15.6%), Wayne State University School of Medicine (211, 17.9%), and Weill Medical College of Cornell University (77, 6.5%) (Table 1). Of the 1182 respondents, 712 (60.4%) were in their preclinical training years; the remaining 470 (40.8%) of participants were in their clinical, advanced elective, or research years (Table 2). Differences in stage in training, race and ethnicity, and responses to survey questions are illustrated in (Tables 3 and 4). Of note, 16 dental students responded and were included within the survey analysis. These students were all first-year dental students from the same institution, where both dental and medical students complete the same curriculum over the first 2 years.[17]

Among all students surveyed (including first through fourth year medical students), 92.1% of respondents stated that they had not received any formal training on physical activity throughout their medical education (Table 2). Even among fourth year medical students, 93.2% reported no formal medical

Figure 1.

Approximately how many hours of physical activity education did you receive?

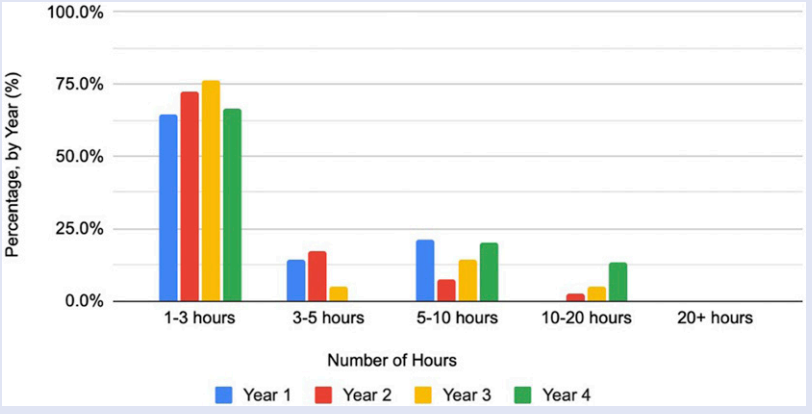

Table 1.

Demographics Amongst Medical and Dental Students who Responded to Survey (n = 1182).

Characteristic	N (Std. Dev) N (%)
Age	25.3 (2.6)
Sex	
Male	39.1%
Female	60.9%
Race	
White/Caucasian	57.1%
Asian	26.0%
Black/African American	5.4%
Ethnicity	
Hispanic or Latino or Spanish Origin	9.2%
Year of school	1179*
Year 1	420 (35.6%)
Year 2	292 (24.8%)
Year 3	248 (21.0%)
Year 4	219 (18.6%)
University	
Boston University School of Medicine	137 (11.6%)
Geisel School of Medicine at Dartmouth college	116 (9.8%)
Harvard School of Medicine	162 (13.8%)
Tufts School of Medicine	102 (8.6%)
University of California-San Francisco School of Medicine	61 (5.2%)
University of Massachusetts Medical School	130 (11.0%)
University of Rochester School of Medicine	184 (15.6%)
Wayne State University School of Medicine	211 (17.9%)
Weill Medical College of Cornell University	77 (6.5%)

*Three participants did not select Year in School.

education in PA. Among the 7.9% of students across all 4 years who did report formal training, 70% stated that this formal training amounted to 1-3 hours in total (Table 2). Two-thirds (67%) of those who did receive formal PA education did so via a required course.

When asked if formal training in physical activity should be required to graduate, 751 (63.5%) respondents agreed (Tables 2 and 3, 4). Out of all

Table 2.

Survey Responses by Year in Medical School.

Question	Answer	Year 1 (420 Students)	Year 2 (292 Students)	Year 3 (248 Students)	Year 4 (219 Students)
Have you participated in a medical school course that provides formal medical education in physical activity?	Yes	15 (3.6%)	40 (13.7%)	23 (9.3%)	15 (6.8%)
	No	405 (96.4%)	252 (86.3%)	225 (90.7%)	204 (93.2%)
	Total	420	292	248	219
Was the course required or an elective?	Required	3 (21.4%)	33 (82.5%)	17 (77.3%)	8 (53.3%)
	Elective	11 (78.6%)	7 (17.5%)	5 (22.7%)	7 (46.7%)
	Total	14	40	22	15
Approximately how many hours of physical activity education did you receive?	1-3 hours	9 (64.3%)	29 (72.5%)	16 (76.2%)	10 (66.7%)
	3-5 hours	2 (14.3%)	7 (17.5%)	1 (4.8%)	0 (.0%)
	5-10 hours	3 (21.4%)	3 (7.5%)	3 (14.3%)	3 (20.0%)
	10-20 hours	0 (.0%)	1 (2.5%)	1 (4.8%)	2 (13.3%)
	20+ hours	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
	Total	14	40	21	15
Should medical schools require formal physical activity education (basics, physiology, etc.) to graduate?	Yes	285 (67.9%)	187 (64.0%)	141 (56.9%)	136 (62.1%)
	No	135 (32.1%)	105 (36.0%)	107 (43.1%)	83 (37.9%)
	Total	420	292	248	219
Should medical schools require formal training on patient counseling for physical activity to graduate?	Yes	373 (88.8%)	253 (86.6%)	197 (79.4%)	184 (84.0%)
	No	47 (11.2%)	39 (13.4%)	51 (20.6%)	35 (16.0%)
	Total	420	292	248	219
Understanding the effects of physical activity and inactivity on the human body is critical to maximizing patient care	Strongly disagree	12 (2.9%)	6 (2.1%)	10 (4.0%)	7 (3.2%)
	Somewhat disagree	4 (1.0%)	2 (.7%)	1 (.4%)	3 (1.4%)
	Neither Agree nor disagree	13 (3.1%)	16 (5.5%)	18 (7.3%)	14 (6.4%)
	Somewhat Agree	133 (31.7%)	104 (35.6%)	103 (41.5%)	90 (41.1%)
	Strongly Agree	258 (61.4%)	164 (56.2%)	116 (46.8%)	105 (47.9%)
	Total	420	292	248	219

medical students surveyed, 84.7% agreed that formal training on counseling patients about incorporating physical activity into their daily routine should also be included as a graduation requirement (Tables 2 and 3, 4). Similarly, most students strongly (41.1%) or somewhat agreed (47.9%) that understanding the effects of physical activity is critical to maximizing patient care.

75% of medical students surveyed believe they are not getting as much personal physical activity as they would like. Most commonly reported reasons included having limited time outside of study requirements (32.6%), difficulty accessing appropriate facilities (29.1%), and barriers related to the

Table 3.

Survey Response by Demographic.

		Dartmouth College		Wayne State University		University of Massachusetts		University of California, San Francisco		Cornell	
Total Responses	593	115		211		129		61		77	
Stage in Training		N	%	N	%	N	%	N	%	N	%
	Preclinical	75	65.22%	138	65.40%	74	57.36%	27	44.26%	35	45.45%
	Clinical	23	20.00%	39	18.48%	35	27.13%	12	19.67%	24	31.17%
	Advanced Clinical/Sub-I	14	12.17%	26	12.32%	18	13.95%	18	29.51%	12	15.58%
	Research Year	1	0.87%	5	2.37%	2	1.55%	4	6.56%	5	6.49%
	Other	2	1.74%	3	1.42%	0	0.00%	0	0.00%	1	1.30%
Race	Asian	19	16.52%	49	23.22%	31	24.03%	22	36.07%	29	37.66%
	White/Caucasian	74	64.35%	123	58.29%	87	67.44%	20	32.79%	33	42.86%
	Other/Prefer Not to Say	13	11.30%	27	12.80%	4	3.10%	11	18.03%	7	9.09%
	Black or African American	9	7.83%	11	5.21%	6	4.65%	7	11.48%	6	7.79%
	Native or Pacific Islander	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	American Indian or Alaska Native	1	0.87%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Ethnicity	Not Hispanic/Latino/Spanish Origin	105	91.30%	187	88.63%	120	93.02%	49	80.33%	69	89.61%
	Hispanic/Latino/Spanish Origin	6	5.22%	17	8.06%	7	5.43%	12	19.67%	8	10.39%
Have you Participated in a Medical School Course that Provides Formal Medical Education in Physical Activity?	Yes	3	2.61%	7	3.32%	14	10.85%	10	16.39%	13	16.88%
	No	113	98.26%	204	96.68%	116	89.92%	51	83.61%	64	83.12%
Should Medical Schools Require Formal Physical Activity Education (basics, physiology, etc.) to Graduate?	Yes	65	56.52%	149	70.62%	80	62.02%	41	67.21%	48	62.34%
	No	51	44.35%	62	29.38%	50	38.76%	20	32.79%	29	37.66%

(continued)

Table 3. (continued)

Should Medical Schools Require Formal Training on Patient Counseling for Physical Activity to Graduate?	Yes	97	84.35%	170	80.57%	118	91.47%	55	90.16%	69	89.61%
	No	19	16.52%	41	19.43%	12	9.30%	6	9.84%	8	10.39%
Understanding the Effects of Physical Activity and Inactivity on the Human Body is Critical to Maximizing Patient Care.	Strongly Agree	4	3.48%	5	2.37%	3	2.33%	1	1.64%	2	2.60%
	Somewhat Agree	2	1.74%	1	0.47%	1	0.78%	0	0.00%	0	0.00%
	Neither Agree or Disagree	7	6.09%	12	5.69%	3	2.33%	0	0.00%	3	3.90%
	Somewhat Disagree	46	40.00%	63	29.86%	53	41.09%	24	39.34%	28	36.36%
	Disagree	57	49.57%	130	61.61%	70	54.26%	36	59.02%	44	57.14%

*Harvard University students included medical students as well as Harvard Dental School students who were taking the preclinical courseload offered by the preclinical curriculum.
**Percentages are calculated using total respondents from each school. Due to omitted answers throughout the survey, percentages may not add to 100%.

Table 4.

Survey Responses by Demographic.

		Tufts University		Boston Univerity		Harvard University		University of Rochester	
Total Responses	589	102		141		162		184	
Stage in Training		N	%	N	%	N	%	N	%
	Preclinical	72	70.59%	39	27.66%	77	47.53%	94	51.09%
	Clinical	15	14.71%	38	26.95%	27	16.67%	49	26.63%
	Advanced Clinical/Sub-I	11	10.78%	37	26.24%	42	25.93%	24	13.04%
	Research Year	4	3.92%	27	19.15%	9	5.56%	12	6.52%
	Other	0	0.00%	0	0.00%	7	4.32%	5	2.72%
Race	Asian	20	19.61%	46	32.62%	55	33.95%	35	19.02%
	White/Caucasian	71	69.61%	70	49.65%	78	48.15%	114	61.96%
	Other/Prefer Not to Say	9	8.82%	19	13.48%	16	9.88%	20	10.87%
	Black or African American	2	1.96%	1	0.71%	11	6.79%	10	5.43%
	Native or Pacific Islander	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	American Indian or Alaska Native	0	0.00%	0	0.00%	0	0.00%	2	1.09%
Ethnicity	Not Hispanic/Latino/Spanish Origin	94	92.16%	117	82.98%	147	90.74%	163	88.59%
	Hispanic/Latino/Spanish Origin	5	4.90%	19	13.48%	12	7.41%	21	11.41%
Have you Participated in a Medical School Course that Provides Formal Medical Education in Physical Activity?	Yes	4	3.92%	5	3.55%	10	6.17%	27	14.67%
	No	98	96.08%	132	93.62%	152	93.83%	157	85.33%
Should Medical Schools Require Formal Physical Activity Education (basics, physiology, etc.) to Graduate?	Yes	59	57.84%	83	58.87%	103	63.58%	123	66.85%
	No	43	42.16%	54	38.30%	59	36.42%	61	33.15%
	Yes	86	84.31%	110	78.01%	140	86.42%	161	87.50%

(continued)

Table 4. (continued)

Should Medical Schools Require Formal Training on Patient Counseling for Physical Activity to Graduate?	No	16	15.69%	27	19.15%	22	13.58%	21	11.41%
Understanding the Effects of Physical Activity and Inactivity on the Human Body is Critical to Maximizing Patient Care.	Strongly Agree	3	2.94%	7	4.96%	3	1.85%	7	3.80%
	Somewhat Agree	1	0.98%	3	2.13%	3	1.85%	0	0.00%
	Neither Agree or Disagree	9	8.82%	12	8.51%	7	4.32%	8	4.35%
	Somewhat Disagree	32	31.37%	58	41.13%	62	38.27%	63	34.24%
	Disagree	57	55.88%	57	40.43%	87	53.70%	106	57.61%

Harvard University students included medical students as well as Harvard Dental School students who were taking the preclinical courseload offered by the preclinical curriculum.
Percentages are calculated using total respondents from each school. Due to omitted answers throughout the survey, percentages may not add to 100%.

onset of the COVID-19 pandemic (28.8%).

Discussion

Few medical students reported formal training in PA counseling; yet, students overwhelmingly want this education before graduating. Even among students in their final year of medical school, 93.2% said they received no formal education in PA. Yet, 84.7% felt training on counseling patients about PA should be a graduation requirement. The results highlight medical students' beliefs that physical activity and exercise physiology should comprise a larger portion of curricula as medical education evolves. In fact, the data demonstrates that medical students do not just desire this training, but they also deem it necessary for clinical competency. Respondents felt that gaining more tangible skills in counseling about physical activity would allow them to be better clinicians and should be required prior to graduation. Given that self-perceived knowledge of physical activity affects a provider's tendency to counsel on physical activity,[19] additional training will advance student's confidence and ability in doing so more frequently.

Prior studies suggest the value of integrating PA content into medical school curricula stems from boosts in overall perceived competence and confidence with counseling.[20,21] Despite this, there is debate about an optimal way to implement new curriculum content.[20] One possible forum in which to catalyze incorporation of this material into medical curricula is via the United States Medical Licensing Examination (USMLE) and Comprehensive Osteopathic Medical Licensing Examination (COMLEX) exams. This strategy provides an ideal means for creating change within medical education as students and institutions use material on these exams as an indicator of the most relevant and impactful medical knowledge for learners; additionally, passing these exams with mastery of material is required for progression in medical training. Incorporating physical activity content will incentivize both medical teaching institutions and trainees to learn more about physical activity as a clinical practice tool. Objective Structured Clinical Examinations (OSCE's) could also be developed to evaluate students' abilities to apply knowledge about the benefits and types of physical activity to motivational interviewing with patients. Alternatively, requiring brief rotations with physical fitness centers, physical medicine and rehabilitation practices, physical therapists, and/or occupational therapists would improve student exposure to the importance of movement as medicine. Our data supports the notion that these opportunities would be well received.

A secondary benefit to incorporating a more formalized physical activity curriculum is promoting physical activity among students. Our survey respondents expressed a desire to exercise more, with three-quarters of medical students stating that they were not able to exercise as much as they would prefer primarily due to limited time outside of study requirements, difficulty accessing appropriate facilities, and barriers related to the onset of the COVID-19 pandemic. This is significant as healthy exercise habits amongst students are linked with holistic academic success and improved academic performance in medical school.[22,23] Beyond medical training, personal exercise habits also affect performance within the clinical sphere. Consistent physical activity is linked with increased likelihood of counseling patients about physical inactivity.[19,24,25] In-depth physical activity knowledge can simultaneously equip medical professionals with stronger tools to be resilient against the demands of medical training and increase aptitude for counseling on physical activity.[22,26] Promoting physical fitness amongst medical students will help to build resilience against burnout and stress. Data suggests that medical students who are more physically active are more likely to report lower levels of personal stress.[15,27] Furthermore, students who are more physically active themselves are also more likely to value the importance of physical activity counseling in the clinical setting.[27]

A 2008 review by Lobelo et al found that physicians who met PA guidelines were more likely to give their patients confident PA counseling.[16] Similarly, medical students who met recommended PA guidelines were more likely to believe that PA counseling would be an important part of their future medical practice than their less active colleagues.[16] Their findings were corroborated in a 2019 study conducted by Cody et al who found that medical students and physicians who met US Department of Health and Human Services (USDHHS) guidelines for vigorous activity were almost twice as likely to be confident in their ability to give patients PA counseling when compared to their peers who did not meet the guidelines.[17]

Although personal exercise habits are an important component in PA counseling amongst medical professionals, studies suggest that there is heterogeneity in fitness participation across the medical community.[19,28-30] Physicians and medical students tend to engage in more PA relative to the general population; however, in one survey, 22% of responding physicians and medical students did not meet USDHHS guidelines for physical activity and there were clear regional disparities in activity levels.[28]

One strength of this study is that the gender and racial breakdowns closely mirror those seen within

matriculation statistics published by the Association of American Medical Colleges.[31] However, this study is limited in that the respondents represent only 1.1% of the total estimated 89000 U.S. medical students,[32] limiting overall representativeness and generalizability of our study results. Also, of the nine MM-affiliated, academic programs that participated in the survey, seven of the programs are located on the east coast of the U.S., one on the west coast of the U.S., and one in the midwestern U.S. This may contribute to sampling bias that is demographically and culturally skewed. This may impact the data's ability to be generalized as a national representation. The response rate was low at 21.5%, which could introduce additional selection bias in that those who were most passionate about the subject matter decided to respond. To limit this bias, survey distribution protocols leveraged class-wide communication mechanisms to invite all students at an institution to participate in the survey, regardless of personal connection with the respective institution's MM chapter.

Another potential limitation to our study is that all nine schools that participated in the survey were founded earlier than 1962. Conceivably, the curricula within these nine institutions could be both unrepresentative of national trends in medical education and of curricular innovation that currently exists within newer institutions. This also impacts the generalizability of our data to represent medical school curricula as a national sample.

In conclusion, this online survey of US medical students found that the vast majority wish medical curricula included more content on physical activity and exercise physiology. Future physicians desired a greater understanding of physical fitness, not only to promote better care for their patients, but also to preserve their own well-being and happiness in a challenging yet rewarding lifelong profession.

CME/CE Article Quiz

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Author Notes

All authors were involved in idea generation, data collection, data analysis, and manuscript drafting and editing.

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Declaration of Conflicting Interests

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