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Osteopathic Philosophy and Manipulation Enhancement Program: Influence on Osteopathic Medical Students' Interest in Osteopathic Manipulative Medicine

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Context: Interest in osteopathic manipulative medicine (OMM) among first- and second-year osteopathic medical students typically declines toward the end of the second year of medical school. An osteopathic philosophy and manipulation enhancement (OPME) program was implemented for osteopathic medical students to gain additional exposure to OMM at the Touro College of Osteopathic Medicine in New York, New York.

Objective: To assess how additional exposure to OMM through the OPME program influenced first- and second-year students' interest in using OMM.

Methods: A survey of first- and second-year osteopathic medical students was conducted at the end of the school years to evaluate students' demographics, exposure to OMM before matriculation, reasons for participating in the OPME program, and level of interest in OMM before and after participating in the OPME program.

Results: Of 390 students, 204 returned the survey. Respondents reported that their exposure to OMM before enrollment was mostly from reading about OMM philosophy (112 [54.9%]). Respondents also gained exposure from learning about OMM from family members or friends who had been treated by an osteopathic physician (37 [18.1%]), shadowing an osteopathic physician before matriculation (33 [16.2%]), and being treated by an osteopathic physician themselves (22 [10.8%]). After the OPME sessions, respondents reported improved practical skills (98 of 170 [57.6%]) and increased level of confidence in applying OMM (87 of 170 [51.2%]). Nearly half of respondents reported that being treated by a faculty member (100 [49.0%]) was very likely to increase their level of interest in OMM, followed by treating other classmates (77 [37.7%]) and being treated by classmates (73 [35.8%]).

Conclusion: The OPME program improved students' interest in OMM and can be modified and implemented in any college of osteopathic medicine.

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Since the mid-1960s, numerous studies have documented the steady decline in osteopathic manipulative treatment (OMT) use among osteopathic medical students, residents, and physicians.[1-15] Researchers have brainstormed various reasons for this decline, collected and analyzed ample amounts of data, and recommended specific steps to remedy the situation.[16-30] Draper et al[5] found that students who reported previous exposure to OMT had a higher level of agreement with osteopathic philosophy ($P<.04$) and intention to use OMT ($P<.02$) compared with students with no previous exposure. Students' previous experience receiving OMT, choice in medical school, and current year of study have been found to be associated with their level of agreement with osteopathic philosophy and intention to use OMT.[5] Several studies[1,2,5,8,15,16,21,23,24,26,31-34] noted that students' interest in osteopathic manipulative medicine (OMM) begins to subside toward the end of their second year in school and further declines during clinical rotations, in residency, and in practice.

A 2005 report[12] by the American Osteopathic Association and the American Association of Colleges of Osteopathic Medicine found that 69% of graduating students perceived themselves as competent in integrating OMM in diagnosis and treatment. Yet a 1997 survey of 1055 osteopathic family physicians found that respondents actually used OMT only occasionally: 6.2% used OMT on more than half of their patients, whereas almost one-third used it on less than 5%.[10] The more recent their graduation from medical school, the less likely their intention to use OMT in their practices.[10] Johnson and Kurtz[8] randomly selected 3000 osteopathic physicians (ie, DOs) and assessed their use of OMT. More than 50% of the responding DOs used OMT on less than 5% of their patients.

Several authors agree that the best way to encourage students to perform OMT during their clinical years is early exposure to clinical applications of OMM and participation in various extracurricular clinical OMT experiences during the didactic years.[5,31-33] Positive role modeling by teachers during the first years of medical school is crucial and must be recognized, and role modeling opportunities should be made available.[25]

At Touro College of Osteopathic Medicine (Touro COM) in New York, New York, the osteopathic philosophy and manipulation enhancement (OPME) program was implemented to create a solid conceptual base in osteopathic philosophy, build strong manipulation skills, cultivate confidence in OMT use, and develop an arsenal of various OMT techniques to provide a foundation for students to practice OMM throughout their professional careers.

To assess how additional exposure to OMM through the OPME program influenced students' interest in OMM, a survey was distributed to first- and second-year students. We hypothesized that students' interest in OMM would increase after additional exposure at OPME sessions.

Methods

Participants

Students from the graduating classes of 2016, 2017, and 2018 were invited to participate in this study during their first and second years of medical school. The graduating classes of 2016 and 2017 were recruited at the end of their second and first year, respectively, in May 2014. The class of 2018 was targeted at the end of their first year in May 2015.

The institutional review board at TouroCOM approved this study. Respondents were informed that their participation was voluntary and unrelated to academic performance. Those who agreed to participate signed a consent form that was attached to the survey.

OPME Sessions

The OPME program is conducted twice per week on the same day that first- and second-year students have their OMM laboratory classes. A total of 35 sessions are held each year. All students regardless of their year in school

are welcome to participate in any OPME program as a "patient" or "physician." Sessions start after all other regular classes are finished and last for approximately 2 hours. The OPME program consists of 2 parts. In the first part, students have the opportunity to ask about theoretical and practical clarifications of OMM laboratory and lecture materials. Before OMM practical and written examinations, material to be tested is thoroughly reviewed and all manipulative techniques are practiced under the supervision of student teaching assistants or faculty members. The second part is devoted to case-based teaching of clinical applications and the osteopathic approach to patient care. Students who have musculoskeletal complaints serve as patients (ie, student-patients), and the rest of the students (ie, student-physicians) are guided by OMM department faculty members through observation, palpation, range of motion, and test sequences to arrive at the diagnosis and create a treatment plan.

When all students understand the clinical thought process based on particular objective palpatory findings of the student-patient, differential diagnosis options are discussed, the osteopathic diagnosis is made, and then OMT is applied by student-physicians under the attending physicians' supervision. On occasion, student-physicians, usually student teaching assistants, go through the examination on their own, make a diagnosis (or not), then present the case to an attending physician and the rest of the participants for discussion.

Typically, each part takes about an hour; however, the time may vary depending on the number of participants, the number of clarification requests, and the number of teaching cases. The number of participants on average ranges from 20 to 65. One or 2 OMM department faculty members are assigned to each OPME session. At the end of an OPME session, interested students remain to receive treatment for their own somatic or visceral dysfunction by a faculty member, senior student, or fellow classmate who wishes to practice OMT under the supervision of an attending physician.

Survey

Hardcopy surveys were distributed at the end of the OMM class at the end of the spring semester. Students were asked to complete 5 items about their demographics, including religious beliefs, to investigate whether interest in OMM crossed cultures and religions. The survey also comprised 18 items regarding students' exposure to OMM before matriculation at TouroCOM, OPME attendance, and changes in perception after attending the OPME sessions. Questions were structured as multiple choice or used a 5-point Likert-type scale, ranging from 1 ("very likely") to 5 ("very unlikely"). The survey was not validated.

Survey Collection and Data Analysis

Students were given the option of turning in the survey immediately after completion or returning the survey to research team members by the end of day at the OPME session. To preserve confidentiality, no names were identified on the survey. Members of the research team collected surveys with signed consent forms attached. Once collected, the signed consent forms were separated from the surveys and stored in a locked filing cabinet away from the completed surveys. Responses were transferred into a spreadsheet and then analyzed using descriptive statistics to assess trends and frequencies.

Results

With approximately 130 in each class, 70 students (53.8%) responded from the class of 2016, 71 students (54.6%) from the class of 2017, and 63 (48.5%) from the class of 2018. Of 390 surveys that were distributed, 204 (52.3%) were collected from respondents. *Table 1* summarizes the demographic characteristics. The results of the demographic questions indicate diversity in the respondents' ethnicity and religion and suggest that OMM can cross cultures.

Respondents were asked about their level of exposure to OMM before enrollment at TouroCOM. Overall,

112 respondents (54.9%) reported that they had read about OMM philosophy, and 22 (10.8%) said they had been treated by a DO. In addition, 37 (18.1%) had received anecdotal evidence from family or friends who were treated by a DO, and 33 (16.2%) had shadowed a DO. Respondents also demonstrated strong interest in OMM before enrollment at TouroCOM: 102 (50%) showed interest in improving OMM test grades, 76 (37.3%) showed interest in treating future patients with OMM, and 63 (30.4%) were interested in improving OMM skills through advanced OMM courses.

Of 204 respondents, 170 (83.3%) indicated that they had attended an OPME session. Overall, 110 respondents (54.9%) attended to receive OMT, 102 (50%) were interested in reviewing laboratory material for examinations and practical tests, 97 (47.5%) were interested in learning OMT, and 36 (17.6%) were interested in learning more about OMM philosophy.

Respondents indicated that attending OPME sessions very likely improved their skills for practical examinations and increased their level of confidence in applying OMM (*Table 2*). The survey also measured whether respondents' level of interest in OMM since matriculation had increased (*Table 3*). Overall, 100 respondents (49.0%) reported that receiving OMT from a faculty at an OPME session was very likely the reason for increased interest in OMM (49%). Respondents also noted receiving OMT from classmates (73 [35.8%]) and treating other classmates (77 [37.7%]) as reasons for the increase in their level of interest.

Table 1.
Demographic Characteristics of First- and Second-Year Students Surveyed About the Osteopathic Philosophy and Manipulation Enhancement Program (N=204)

Characteristics	No. (%)
Graduating Class	
2016	70 (34.3)
2017	71 (34.8)
2018	63 (30.8)
Sex	
Men	74 (36.3)
Women	80 (39.2)
No response	50 (24.5)
Age, y	
20-25	95 (46.6)
26-35	103 (50.5)
36-45	6 (2.9)
Religion	
Atheist	26 (12.7)
Christian	29 (14.2)
Jewish	44 (21.6)
Catholic	44 (21.6)
Buddhist	7 (3.4)
Muslim	21 (10.3)
Hindu	6 (2.9)
No response	27 (13.2)
Race/Ethnicity	
Black Hispanic	4 (2.0)
Black non-Hispanic	8 (3.9)
Asian	57 (27.9)
White	102 (50.0)
Hispanic/Latin American	13 (6.4)
Other	6 (2.9)
No response	14 (6.9)

Discussion

During clinical years, third- and fourth-year students are introduced to a multitude of new modalities for diagnosis and treatment, such as pharmaceutical, medico-technological, and surgical processes. Without a solid foundation of osteopathic principles and practice (OPP) and continuation of OMM teaching and training, most fourth-year students would have a high probability of

Table 2.
Effects of OPME Sessions on Surveyed First- and Second-Year Osteopathic Medical Students (n=170)[a]

Survey Item	Very Likely	Somewhat Likely	Do Not Know	Somewhat Unlikely	Very Unlikely
Increased knowledge of OMM philosophy	67 (39.4)	60 (35.3)	21 (12.4)	14 (8.2)	8 (4.7)
Increased knowledge of anatomy and physiology	61 (35.9)	78 (45.9)	18 (10.6)	8 (4.7)	5 (2.9)
Improved practical skills	98 (57.6)	53 (31.1)	5 (2.9)	9 (5.3)	5 (2.9)
Increased level of confidence in applying OMM	87 (51.2)	57 (33.5)	15 (8.8)	6 (3.5)	5 (2.9)
Expanded scope of OMM clinical applications	83 (48.8)	53 (31.2)	20 (11.8)	7 (4.1)	7 (4.1)
Increased intent for incorporating OMM into future medical practice	72 (42.4)	48 (28.2)	29 (15.3)	9 (5.3)	12 (7.1)

[a] Data are given as No. (%).

Abbreviations: OMM, osteopathic manipulative medicine; OPME, osteopathic philosophy and manipulation enhancement.

losing their OMT skills developed in preclinical years. Data also indicate that OMT is becoming less popular among fourth-year students.[1,3,4,7,14,16,25,33,35]

Teitelbaum[12] assessed DOs' and residents' opportunities to practice OMT and found that both groups reported little opportunity to practice OMT after the first 2 years of medical school. Students may report a low or moderate level of confidence in performing OMT because they lack OMT practice time,[34] they have difficulty finding OMT practitioners,[14] or they receive a lack of emphasis on OMT techniques by physicians who practice OMM.[14] Other reasons include lack of confidence, lack of role models and mentors, intent to go into a specialty that did not use OMM, the amount of time required to perform OMT with comparatively less reimbursement, perceived ineffectiveness of OMT in critical clinical situations, and perceived insufficient scientific basis for OMM as well as insufficient OMT research database.[14]

If colleges of osteopathic medicine are interested in improving students' attitudes toward OMM, we recommend the following changes:

- Increase preadmission OMM exposure as an option or requirement.
- Provide a list of DOs practicing OMT in the area to students interested in shadowing or participating in a rotation.
- Encourage students to participate in OMM clinics, seminars, workshops, and other educational programs.
- Create smaller OMM classes.
- Create smaller table trainers–to-student ratio.
- Mandate third- and fourth-year OMM exposure.
- Increase the use of near-peer tutors (ie, teaching assistants, upperclassmen, residents).

Early OMT exposure and clinical applications of OMM during the didactic years make students more likely to perform OMT during their clinical years.[8,14,20,31-35] For example, researchers at UHS Wilson Medical Center in Johnson City, New York, evaluated student attitudes toward OMM use after incorporating a mandatory OMM curriculum consisting of a 1-hour didactic lecture and a 3-hour practical clinic every week into third-

Table 3.
Likelihood That Activities Increased OMM Interest Among Surveyed First- and Second-Year Osteopathic Medical Students (N=204)[a]

Survey Item	Very Likely	Somewhat Likely	Do Not Know	Somewhat Unlikely	Very Unlikely
Review of OMM lecture and laboratory	59 (28.9)	94 (46.1)	29 (14.2)	12 (5.9)	10 (4.9)
Getting treated by faculty at OPME session	100 (49.0)	52 (25.5)	29 (14.2)	9 (4.4)	14 (6.9)
Getting treated by classmates	73 (35.8)	68 (33.3)	26 (12.7)	19 (9.3)	18 (8.8)
Treating other classmates	77 (37.7)	74 (36.3)	30 (14.7)	11 (5.4)	12 (5.9)
Case group discussions	39 (19.1)	79 (38.7)	49 (24.0)	21 (10.3)	16 (7.8)

[a] Data are given as No. (%).

Abbreviations: OMM, osteopathic manipulative medicine; OPME, osteopathic philosophy and manipulation enhancement.

and fourth-year clinical clerkships.[16] The study demonstrated a statistically significant increase in comfort level of 17.9% in OMT use after exposure to mandatory OMM clinical curriculum.[16] At the University of North Texas Health Science Center Texas College of Osteopathic Medicine, a required 1-month rotation in OMM was added to the clinical curriculum and was found to positively affect students' attitudes and opinions regarding OMT, osteopathic medicine, and their own OMT skills.[35] Yet, not all colleges of osteopathic medicine have mandatory OMM rotations during years 3 and 4, and an OPME program, such as the one at TouroCOM, may provide the necessary OMM exposure.

Benefits of the OPME Program

In the current study, OPME sessions were conducted in an OMM laboratory hall rather than in a clinical setting because TouroCOM does not have an OMM or osteopathic family practice clinic where students can encounter actual patients and have the opportunity to use OMT. From a practical point of view, the lack of such clinics allowed TouroCOM faculty to offer a unique solution for providing early OMM clinical exposure to a relatively large number of students. From a research point of view, this uncommon experience proves that early clinical exposure to OMM works well for first- and second-year students in any setting.

Although the OPME program focuses on first- and second-year students at TouroCOM, third- and fourth-year students also actively participated, including one of the authors of this study (P.V.G.). Third- and fourth-year students used this opportunity to refresh their theoretical knowledge, ask specific clinical questions, and sharpen their OMT skills. They also shared with fellow students interesting cases of educational value encountered at rotation sites, research articles they read, and cases of successful OMT they performed.

The OPME program will play an important role in building the core competencies per the Association of American Medical Colleges' Core Entrustable Professional Activities for Entering Residency by teaching and assessing these activities and their component competencies (eg, gather a history and perform a physical examination, prioritize a differential diagnosis after a clinical encounter, document a clinical encounter in the patient record, provide an oral presentation of a clinical encounter).

In anticipation of the full implementation of the single graduate medical education accreditation system, the OPME program can be modified to offer an osteopathic model of treating patients and training young physicians. Allee et al[2] reported that 90% of surveyed allopathic residents believed that OMT was effective for treating somatic dysfunction, and 70.9% of allopathic physicians indicated that they had some interest in learning OMT. The OPME program can be used to address future needs to train allopathic graduates entering residency programs with osteopathic recognition on the necessary OMM philosophy, theory, and practical OMT skills. The presented OPME model could be modified and used at colleges of osteopathic medicine to educate allopathic students who are applying to osteopathic residency programs in OMM. For example, colleges of osteopathic medicine could implement extra hours at OPME sessions that allopathic students could attend.

The Osteopathic Principles Committee of the Accreditation Council for Graduate Medical Education expects that non-DO applicants will demonstrate some level of preparation for entry into a residency program with osteopathic recognition. Interested non-DO applicants must have sufficient background or instruction in OPP and techniques in OMM.[36] Such preparation may be demonstrated by structured basic OPP training before beginning residency, completion of elective OPP rotations, or completion of OPP courses at a college of osteopathic medicine.

Because of the way the OPME program is structured, any allopathic medical student, intern, or resident can easily attend and receive OMM education. However, minor adjustments to the program would be needed, such as tailoring the curriculum for allopathic graduates, administering written and practical OMM tests for competency, and possibly enlisting additional faculty members. Most likely, some individualized attention should be paid to palpation skills development. Self-learning can be incorporated with home-study assignments, as the TouroCOM library offers vast OMM online resources with recorded OMM lectures and laboratory technique presentations.

Limitations

The current study has many limitations. The sample size (N=204) was relatively small, and students who chose to complete the survey likely already had some interest in OMM. The number of OPME sessions students attended and how that number may have influenced responses was not assessed. No long-term outcomes could be examined. We did not study the influence of different TouroCOM faculty members as role models on students' OMM perception. No available data existed on additional students' OMM exposure outside the OPME program, such as being treated by a DO other than a TouroCOM faculty member or a fellow student, or participating in an educational OMM program outside of TouroCOM (eg, workshop, seminar, continuing medical education course). No control groups or independent data were used from other colleges of osteopathic medicine with students not attending the OPME program. A future study may focus on OPME attendance numbers correlated with the written and practical OMM test or Comprehensive Osteopathic Medical Licensing Examination-USA Level 2-Performance Evaluation results and the influence of the OPME program on third- and fourth-year students.

Conclusion

Increased exposure to OMM can maintain and expand students' interest in OMM and intention for future OMT use. Typically, students' interest in OMM declines substantially in the first and second years of medical school, which leads to further decrease in years 3 and 4 and then in clinical practice. The OPME program was able to increase the level of interest in OMM among first- and second-year students because faculty provided OMT and positive role modeling. This program can provide early exposure to OMM and can be easily implemented and maintained in any college of osteopathic medicine, especially in the absence of an OMM or osteopathic family practice clinic. The OPME

program should be considered an effective tool in the osteopathic medical profession to maintain its unique identity and create new generations of DOs willing and able to perform OMT.

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Author Contributions

All authors provided substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; all authors drafted the article or revised it critically for important intellectual content; 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

1. Chamberlain NR, Yates HA. A prospective study of osteopathic medical students' attitudes toward use of osteopathic manipulative treatment in caring for patients. *J Am Osteopath Assoc.* 2003;103(10):470-478.
2. Allee BA, Pollak MH, Malnar KF. Survey of osteopathic and allopathic residents' attitudes toward osteopathic manipulative treatment. *J Am Osteopath Assoc.* 2005;105(12):551-561.
3. Gimpel JR, Boulet JR, Weidner AC. Survey on the clinical skills of osteopathic medical students. *J Am Osteopath Assoc.* 2006;106(5):296-301.
4. Stockard AR, Allen TW. Competence levels in musculoskeletal medicine: comparison of osteopathic and allopathic medical graduates. *J Am Osteopath Assoc.* 2006;106(6):350-355.
5. Draper BB, Johnson JC, Fossum C, Chamberlain NR. Osteopathic medical students' beliefs about osteopathic manipulative treatment at 4 colleges of osteopathic medicine. *J Am Osteopath Assoc.* 2011;111(11):615-630.
6. Hasty RT, Snyder S, Suciu GP, Moskow JM. Graduating osteopathic medical students' perceptions and recommendations on the decision to take the United States Medical Licensing Examination. *J Am Osteopath Assoc.* 2012;112(2):83-89.
7. Caruso HM, Bernstein B. Evidence of declining empathy in third year osteopathic medical students. *Int J Osteopath Med.* 2014;17(1):22-27.
8. Johnson SM, Kurtz ME. Diminished use of osteopathic manipulative treatment and its impact on the uniqueness of the osteopathic profession. *Acad Med.* 2001;76(8):821-828.
9. Spaeth DG, Pheley AM. Evaluation of osteopathic manipulative treatment training by practicing physicians in Ohio. *J Am Osteopath Assoc.* 2002;102(3):145-150.
10. Johnson SM, Kurtz ME, Kurtz JC. Variables influencing the use of osteopathic manipulative treatment in family practice. *J Am Osteopath Assoc.* 1997;97(2):80-87.
11. Fry LJ. Preliminary findings on the use of osteopathic manipulative treatment by osteopathic physicians. *J Am Osteopath Assoc.* 1996;96(2):91-96.
12. Teitelbaum HS. *Osteopathic Medical Education in the United States: Improving the Future of Medicine.* Washington, DC: American Association of Colleges of Osteopathic Medicine and the American Osteopathic Association; 2005.
13. Shannon SC, Teitelbaum HS. The status and future of osteopathic medical education in the United States. *Acad Med.* 2009;84(6):707-711. doi:10.1097/ACM.0b013e3181a43be8
14. Quinn T, Best M, Fotopoulos TJ, Ball LD, Ruston VJ. Attitudes and confidence levels of fourth-year osteopathic medical students towards osteopathic manipulative medicine. *Am Acad Osteopath J.* 2010;20(3):23-28.
15. Nemon BM. Osteopathic medical profession: who are we & where are we going? a student perspective. *Am Acad Osteopath J.* 1997:10-34.
16. Teng AY, Terry RR, Blue RJ. Incorporating a mandatory osteopathic manipulative medicine (OMM) curriculum in clinical clerkships: impact on student attitudes toward using OMM. *J Am Osteopath Assoc.* 2011;111(4):219-224.
17. Ching LM, Burke WJ. Osteopathic distinctiveness in osteopathic predoctoral education and its effect on osteopathic graduate medical education. *J Am Osteopath Assoc.* 2011;111(10):581-584.
18. Snider KT, Seffinger MA, Ferril HP, Gish EE. Trainer-to-student ratios for teaching psychomotor skills in health care fields, as applied to osteopathic manipulative medicine. *J Am Osteopath Assoc.* 2012;112(4):182-187.
19. Noll Dr, Channell MK, Basehore PM, et al. Developing osteopathic competencies in geriatrics for medical students. *J Am Osteopath Assoc.* 2013;113(4):276-289.
20. Wachtel JK, Greenberg MR, Smith AB, Weaver KR, Kane BG. Residents as teachers: residents' perceptions before and after receiving instruction in clinical training. *J Am Osteopath Assoc.* 2013;113(1):23-33.
21. Tamura L. How I survived the first 2 years of medical school. *The DO.* November 27, 2013.
22. Jons-Cox LD. The self-directed osteopathic medical student: bringing adult learning into the osteopathic manipulative technique lab. *Int J Osteopath Med.* 2014;17(1):61-65. doi:10.1016/j.ijosm.2013.11.003
23. Luciani E, Cerritelli F, Waters M, Zegarra-Parodi R. Osteopathic student satisfaction and preparedness to practice: a comparative study. *Int J Osteopath Med.* 2014;17(1):28-37. doi:10.1016/j.ijosm.2013.10.009

24. Kaye KE, Berns AL, Cress LR, Nazar AM. Mini-medical school programs are an effective tool to introduce students to osteopathic medicine. *J Am Osteopath Assoc*. 2014;114(2):109-112. doi:10.7556/jaoa.2014.024

25. Gamber RG, Gish EE, Herron KM. Student perceptions of osteopathic manipulative treatment after completing a manipulative medicine rotation. *J Am Osteopath Assoc*. 2001;101(7):395-400.

26. Steele KM, Baker HH. Clearly distinct: outcomes of initiative to increase integration of osteopathic principles and practice at West Virginia School of Osteopathic Medicine. *J Am Osteopath Assoc*. 2009;109(11):579-590.

27. Turner SR, White J, Poth C, Rogers WT. Preparing students for clerkship: a resident shadowing program. *Acad Med*. 2012;87(9):1288-1291.

28. Sternszus R, Cruess S, Cruess R, Young M, Steinert Y. Residents as role models: impact on undergraduate trainees. *Acad Med*. 2012;87(9):1282-1287.

29. Vaughan B, Macfarlane C. Perceived teaching quality between near-peer and academic tutors in an osteopathic practical skills class. *Int J Osteopath Med*. 2015;18(3):219-229.

30. Obadia SJ. Role modeling in the first 2 years of medical school. *J Am Osteopath Assoc*. 2015;115(8):510-512. doi:10.7556/jaoa.2015.105

31. Vazzana KM, Yao SC, Jung MK, Terzella MJ. Perception-based effects of clinical exposure to osteopathic manipulative treatment on first- and second-year osteopathic medical students. *J Am Osteopath Assoc*. 2014;114(7):572-580. doi:10.7556/jaoa.2014.111

32. Vazzana KM, Chan V, Wenzel CH, Yao SC. The effect of the student American Academy of Osteopathy summer preceptorship program on students' perception of osteopathic manipulative treatment. *Am Acad Osteopath J*. 2013;23(4):14-19.

33. Dalprat J, Thompson C, Hruby R. Dig on: the effect of early clinical exposure on future OMT use. *Am Acad Osteopath J*. 2010;20(1):7-9.

34. Quinn TA, Fotopoulos TJ, Best MA. Attitudes and confidence levels of second-year osteopathic medical students towards osteopathic manipulative medicine. *Am Acad Osteopath J*. 2007:23-27.

35. Magnus WW, Gamber RG. Osteopathic manipulative treatment: student attitudes before and after intensive clinical exposure. *J Am Osteopath Assoc*. 1997;97(2):109-113.

36. *Osteopathic Recognition Requirements*. Chicago, IL: Accreditation Council for Graduate Medical Education; 2015. http://www.acgme.org/Portals/0/PFAssets/ProgramRequirements/Osteopathic_Recogniton_Requirements.pdf. Accessed November 14, 2016.