

## Perception-Based Effects of Clinical Exposure to Osteopathic Manipulative Treatment on First- and Second-Year Osteopathic Medical Students

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**Context:** Little research has been done regarding osteopathic medical students' clinical exposure to osteopathic manipulative treatment (OMT). Most existing research focuses on third- and fourth-year students.

**Objective:** To determine the effects of clinical exposure to OMT on first- and second-year osteopathic medical students by assessing the same population's perceptions of OMT.

**Methods:** In the present survey-based study, conducted at the New York Institute of Technology College of Osteopathic Medicine, first- and second-year osteopathic medical students were administered an electronic survey containing 18 multiple-choice questions. The first 2 questions were demographic. The next 6 questions had participants identify what, if any, clinical exposure to OMT they had, including clinical shadowing, the MedPrep program, and the Summer Student American Academy of Osteopathy Osteopathic Manipulative Medicine Preceptorship program. The 10 questions that followed assessed the participant's perception of OMT: (1) understanding, (2) attitude toward OMT, (3) scope of practice of OMT, and (4) intention to use OMT in future clinical practice. The survey used the statistically validated Likert scale for all of the scaled questions. Analysis was performed using the Pearson  $\chi^2$  test and the Fisher exact test.

**Results:** Of the 600 students who were sent surveys, 364 replied, for a response rate of 60.7%. There was an association with students' anticipated use of OMT in their future clinical practice and the following types of clinical exposures to OMT: MedPrep ( $P=.04$ ), Summer Student American Academy of Osteopathy Osteopathic Manipulative Medicine Preceptorship ( $P=.04$ ), extracurricular OMT didactics ( $P=.048$ ), and shadowing a physician performing OMT before attending osteopathic medical school ( $P=.007$ ). Being treated with OMT had no association with anticipated future use of OMT. More OMT clinical exposures were associated with more positive responses to the perception questions ( $\chi^2_1=13.8$ ,  $P<.001$ ).

**Conclusion:** Participants with clinical exposure to OMT before entering clinical training were more likely to plan to use OMT in future practice. Early clinical exposure to OMT before or during the first 2 years of osteopathic medical school was associated with a positive perception of OMT.

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The number of osteopathic medical schools has increased in recent years. Currently, there are 30 accredited osteopathic medical schools offering instruction at 42 locations across the United States.<sup>1</sup> The number of osteopathic medical students has been increasing: in the 2006-2007 academic year, there were 14,409 students enrolled in colleges of osteopathic medicine in the United States.<sup>2</sup> As of the 2013-2014 academic year, there were more than 23,000 students enrolled, for an approximate 59% increase in enrollment.<sup>1</sup> As the osteopathic medical profession continues to grow, it is vital to assess the strengths and weaknesses of its education system, as well as investigate ways to improve it.

One of the unique aspects of an osteopathic medical education is osteopathic manipulative treatment (OMT),<sup>3(pp5-9)</sup> a practice that encompasses “a variety of techniques using the hands in the diagnosis and treatment of patients by osteopathic physicians.”<sup>3(p77)</sup> The use of OMT can benefit a patient by relieving pain, improving function of the body systems, reducing symptoms, increasing functional movement, and encouraging healing time by means of increased fluid function.<sup>3(p77)</sup> It is used in the management of many different disorders and diseases, such as rheumatic disease, gastrointestinal disorders, and respiratory problems.<sup>4-10</sup> Because of these benefits, it is essential to determine the most successful approach to educating students in OMT.

Previous studies of osteopathic medical students<sup>11-13</sup> have demonstrated that early clinical exposure in a given field can improve their perception of and attitudes about that particular field. Research on early clinical exposure to OMT, however, has mainly focused on third- and fourth-year students. Draper et al<sup>11</sup> assessed first- and second-year osteopathic medical students’ beliefs about OMT at 4 osteopathic medical schools. The authors found that participants who had been previously exposed to OMT were more likely to strongly agree or agree with statements that affirm osteopathic philosophy and with statements about the intention to use OMT in future clinical practice.<sup>11</sup> Teng et al<sup>12</sup> found that the addition of

a third- and fourth-year mandatory OMT clinical exposure caused an increase in participants’ comfort level with OMT. Gamber et al<sup>13</sup> assessed students’ perceptions of OMT after they completed their core osteopathic manipulative medicine (OMM) rotation. A disjunction was found between participants’ perception of their skill level with OMT, scored by almost 85% of the participants as average or above average, and their usage of OMT on clinical rotations, scored by approximately 70% of the participants as sometimes/never.<sup>13</sup> Those investigations revealed positive associations with regard to perception and attitudes. Additionally, Dalprat et al<sup>14</sup> surveyed third-year students on completion of their core third-year clerkships. They found an association between early clinical exposure to OMT and an increased tendency to perform OMT while on rotations.<sup>14</sup>

Studies of other areas of health care have also found positive outcomes from early clinical exposure to certain practices or phenomena. For example, Hodges et al<sup>15</sup> found that 62.1% of medical students are exposed to the pharmaceutical industry during their training but did not assess the effect of this exposure. Keating et al<sup>16</sup> found that the introduction of a pediatrics program for medical students was associated with an increased interest in the field of pediatrics. Jain et al<sup>17</sup> discovered that an addition of a nurse-shadowing program to the first-year medical curriculum at the University of Michigan Medical School was associated with improvements in participants’ attitudes toward nurses. In addition, Turner et al<sup>18</sup> found that a resident-shadowing program for first-year medical students caused participants to consider themselves better prepared for clinical rotations.

Our study was designed to assess the effects of exposing first- and second-year osteopathic medical students to OMT on students’ specific and overall perceptions of OMT. We hypothesized that if osteopathic medical students are clinically exposed to OMT before or during their first or second year of osteopathic medical school, then their perception of OMT would improve. Should the hypothesis be proven true, our results would help establish a

reason to require an early OMT clinical exposure component in osteopathic medical schools' curricula.

## Methods

The present survey-based study was approved by the New York Institute of Technology (NYIT) Institutional Review Board. The participant pool consisted of students who were either first- or second-year osteopathic medical students at NYIT College of Osteopathic Medicine (NYIT-COM). The inclusion criterion for participants was enrollment as a first- or second-year osteopathic medical student at NYIT-COM. Exclusion criteria included the following: (1) being a third- or fourth-year osteopathic medical student, (2) being a medical student who attends a different academic institution; and (3) being a potential participant who was not currently attending medical school.

In March 2013, all first- and second-year students received an e-mail invitation to a survey created using Survey Monkey (<https://www.surveymonkey.com/>). The invitation explained that participation in the survey was voluntary. The participants were given 1 week to complete the survey. A reminder e-mail was sent 2 days before the survey's closing date.

The electronic survey contained 18 multiple-choice questions. The first 2 questions were demographic. The next 6 questions asked whether the participant was exposed to OMT in various clinical settings. The next 4 questions assessed the participant's perception of OMT broken into 4 parts: (1) understanding of OMT, (2) attitude toward OMT, (3) scope of practice of OMT, and (4) intention to use OMT in future clinical practice. The final 6 questions concerned whether the participant believed exposure in the various clinical settings improved his or her overall perception of OMT.

The exposure questions solicited whether participants were exposed to OMT through 6 types of exposures before or during their first 2 years of osteopathic medical school, as follows: (1) receiving OMT before attending

medical school, (2) shadowing a physician performing OMT before medical school, (3) participating in the MedPrep program, (4) participating in the NYIT-COM Chapter of the Summer Student American Academy of Osteopathy (SAAO) OMM Preceptorship program, (5) receiving OMT while in medical school, and (6) attending any extracurricular OMT didactics (eg, the Osteopathic Medical Conference & Exposition, American Academy of Osteopathy symposia, cranial workshops). The MedPrep and the SAAO OMM Preceptorship programs are educational opportunities offered at our institution. MedPrep is a medical school preparatory program that, as part of its syllabus, requires students to shadow an osteopathic physician who uses OMT in practice for approximately 2 hours. This program is offered to students before the start of their first year of osteopathic medical school. The SAAO OMM Preceptorship program, which takes place during the summer between the first and second year of osteopathic medical school, provides students with the opportunity to shadow a physician who uses OMT in practice for 4 to 8 hours, as well as attend OMT workshops. An affirmative response to each OMT exposure setting was counted as 1 exposure for the purposes of the present study; therefore, response scores for this portion of the survey could range from 0 to 6.

The survey used the statistically validated 5-point Likert scale for the last 10 questions, with 1 indicating strongly agree and 5 indicating strongly disagree. Specific perception-based responses were measured using the following 4 statements: "I believe I possess a thorough understanding of the principles of OMT" (understanding); "I believe that OMT is a beneficial treatment option for patients" (attitude); "I believe OMT should be used on every patient" (scope); "I plan to use OMT in my future clinical practice" (intention to use). As previously mentioned, the final 6 questions, which also used the Likert scale (with the addition of a sixth option, "I did not have this exposure"), solicited participants' agreement with exposure in the various clinical settings improving their overall perception of OMT.

Survey responses were categorized according to the type of clinical exposure to OMT the participant reported. We analyzed the data using Pearson  $\chi^2$  tests and Fisher exact tests, which yielded odds ratios and 95% confidence intervals. To describe the data, the frequency and proportion in percentages were calculated. To compare the ordinal levels of perceptions between the 2 groups—those with clinical exposures to OMT and those without such experiences— $\chi^2$  tests were performed. To properly evaluate the variables between the 2 groups, the 5 categories from the Likert scale were collapsed into 2. Category 1 encompassed answers of strongly agree and agree and category 2 encompassed answers strongly disagree, disagree, and undecided. Fisher exact tests for 2×2 tables were performed because the number of respondents was less than 5 for certain variables. Odds ratios and their associated 95% confidence intervals were calculated as measures of effect sizes.

To assess the exposure-response relationship between the number of OMT clinical exposures and the positively responded perceptions, we classified survey respondents into 3 groups according to the number of reported OMT clinical exposures (ie, 0 exposures, 1 exposure, and 2 or more exposures) and also according to how many perception questions that were answered with agree or strongly agree. The exposure-response relationship was dichotomized according to the number of OMT clinical exposures (0 exposures vs 1 or more exposures) and according to the frequency of positive responses to perception questions: 2 or fewer vs 3 or more. For statistical significance,  $\alpha$  was set at .05.

## Results

Of the 600 first- and second-year osteopathic medical students we contacted, 367 agreed to participate. We received 364 responses, for a response rate of 60.7%. Of those who replied, 166 (45.6%) were men and 198 (54.4%) were women. One hundred eighty-six (51.1%) were first-year students and 178 (48.9%) were second-

year students. Twenty-six (7.1%) were treated with OMT by an osteopathic physician before attending medical school. Seventy-four (20.3%) shadowed a physician who performed OMT.

### Individual OMT Clinical Exposure vs Participant's Perception of OMT

The associations between each of the 6 identified OMT clinical exposures and each of the 4 parts of perception yielded 24 combinations. Statistically significant associations were found between each of 4 separate OMT clinical exposures and the intention to use OMT in future clinical practice, as follows: (1) participation in the Med-Prep program ( $\chi^2=4.1$ ,  $P=.040$ ), (2) participation in the NYIT-COM chapter of the SAAO OMM Preceptorship program ( $\chi^2=4.3$ ,  $P=.040$ ), (3) participation in extracurricular OMT didactics ( $\chi^2=4.2$ ,  $P=.048$ ), (4) shadowing a physician performing OMT before attending medical school ( $\chi^2=7.6$ ,  $P=.007$ ) (*Table 1*). Additionally, statistical significance was found among the following answer pairs: (1) scope of OMT and participation in the MedPrep Program ( $\chi^2=6.4$ ,  $P=.010$ ), (2) shadowing a physician performing OMT before attending medical school and attitude toward OMT ( $\chi^2=4.6$ ,  $P=.033$ ), (3) participation in extracurricular OMT didactics and perceived understanding of OMT ( $\chi^2=13.7$ ,  $P<.001$ ), and (4) participation in the SAAO OMM program and perceived understanding of OMT ( $\chi^2=3.9$ ,  $P=.048$ ).

### Overall OMT Clinical Exposure vs 4-Part Perception of OMT

The associations between the overall OMT clinical exposures and each of the 4 OMT perception questions are shown in *Figure 1*. A trend was found in which the proportion of positive responses to the perception questions increased as the number of OMT clinical exposures increased (*Figure 1*).

There were statistically significant linear-by-linear associations between positive responses to 3 perception questions—“OMT is a beneficial treatment option for

**Table 1.**  
**Association Between Clinical Exposures to OMT and Anticipated Use of OMT in Future Clinical Practice for First- and Second-Year Osteopathic Medical Students (N=364)**

Means of Exposure	No. (%)	“I plan to use OMT in my future clinical practice.”		P Value	OR (95% CI)
		Strongly Agree or Agree	Strongly Disagree, Disagree, or Undecided		
<b>MedPrep</b>					
Yes	68 (18.7)	54 (79.4)	14 (20.6)	.04 <sup>a</sup>	1.91 (1.01, 3.61)
No	296 (81.3)	198 (66.9)	98 (33.1)	NA	NA
<b>OMT Before Medical School</b>					
Yes	26 (7.1)	21 (80.8)	5 (19.2)	.27	1.95 (0.71, 5.30)
No	338 (92.9)	231 (68.3)	107 (31.7)	NA	NA
<b>OMT Physician Shadowing Before Medical School</b>					
Yes	74 (20.3)	61 (82.4)	13 (17.6)	.007 <sup>a</sup>	2.43 (1.28, 4.64)
No	290 (79.7)	191 (65.9)	99 (34.1)	NA	NA
<b>SAAO OMM Preceptorship</b>					
Yes	31 (8.5)	26 (83.9)	5 (16.1)	.04 <sup>a</sup>	2.78 (1.02, 7.58)
No	195 (53.6)	127 (65.1)	68 (34.9)	NA	NA
<b>OMT During Medical School</b>					
Yes	169 (46.4)	122 (72.2)	47 (27.8)	.31	1.30 (0.83, 2.03)
No	195 (53.6)	130 (66.7)	65 (33.3)	NA	NA
<b>Extracurricular OMT Didactics</b>					
Yes	61 (16.8)	49 (80.3)	12 (19.7)	.048 <sup>a</sup>	2.01 (1.02, 3.95)
No	303 (83.2)	203 (67.0)	100 (33.0)	NA	NA

<sup>a</sup> Statistically significant using Fisher exact test ( $P < .05$ ).

**Abbreviations:** CI, confidence interval; NA, not applicable; OMM, osteopathic manipulative medicine; OMT, osteopathic manipulative treatment; OR, odds ratio; SAAO, Student American Academy of Osteopathy.

patients” ( $\chi^2_1=6.2, P=.013$ ), “I possess a thorough understanding of the principles of OMT” ( $\chi^2_1=8.2, P=.004$ ), and “I plan to use OMT in my future clinical practice” ( $\chi^2_1=4.3, P=.038$ )—and the number of OMT

exposures. A statistically significant trend demonstrated that the percentage of positive responses to perception questions were higher as the participants were exposed to OMT earlier (*Figure 2*).

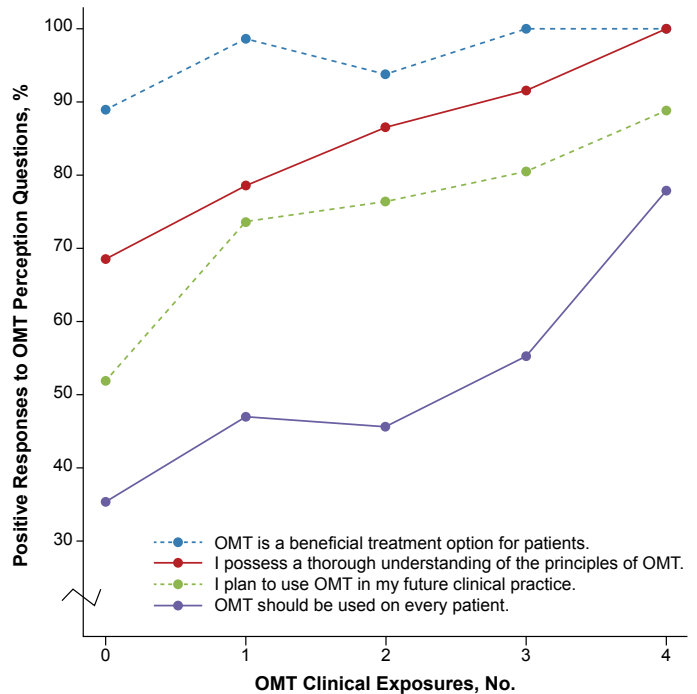
**Overall OMT Clinical Exposure vs Overall Perception of OMT**

Table 2 shows the exposure-response relationship. A higher number of OMT clinical exposures was associated with higher frequency of positive responses to the perception questions ( $\chi^2_1=13.8, P<.001$ ). Participants who reported having 2 or more clinical exposures to OMT had a 2.7 times higher odds of answering 3 perception questions positively than those who reported no OMT clinical exposure. In addition, the odds of a participant answering positively to 4 perception questions was 3.2 times higher if he or she reported 2 or more OMT clinical exposures compared with those who reported 1 OMT clinical exposure. The odds of a participant answering positively to 4 perception questions was 3.5 times higher when he or she reported 2 or more OMT clinical exposures compared with those who reported no exposure.

The last column of Table 2 shows that the high frequency of OMT clinical exposures is strongly associated with the high frequency of positively responded perceptions ( $\chi^2_1=13.8, P<.001$ ). The odds of having 3 or more positively responded perceptions compared with having 2 or fewer is 3.0 times higher with 1 or more OMT clinical exposures compared with none.

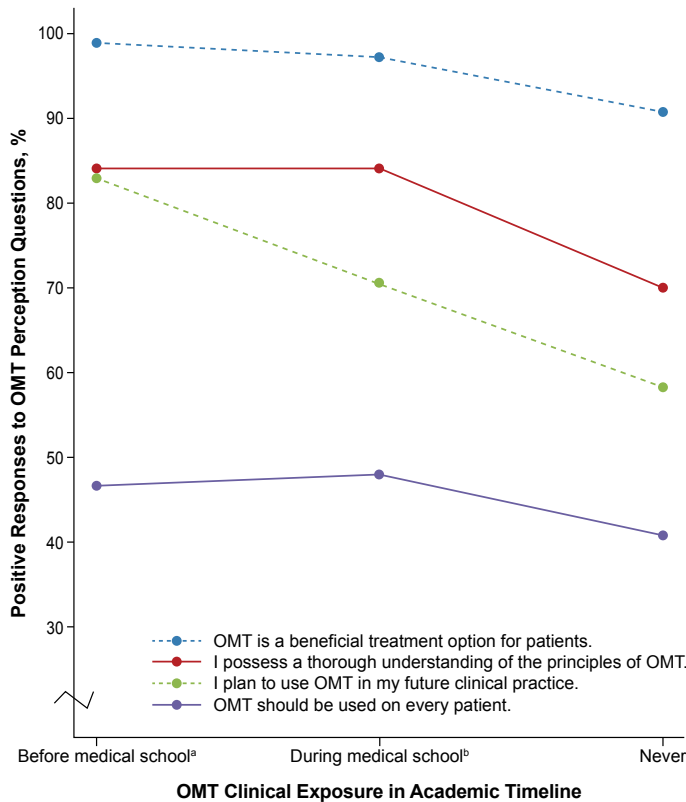
**Discussion**

The present study demonstrated an association between certain means of early clinical OMT exposure and participants' perception of OMT. One aspect of perception—intended future use of OMT in clinical practice—had a positive association with several exposures: participating in the MedPrep program, participating in the SAAO OMM Preceptorship program, attending extracurricular OMT didactics, and shadowing before osteopathic medical school. Additionally, programs that occurred earlier in the academic timeline affected several aspects of participants' perception of OMT. The SAAO OMM Preceptorship program, which occurs during the



**Figure 1.** Association between the number of osteopathic manipulative treatment (OMT) clinical exposures and positive responses (ie, strongly agree or agree) to the 4 OMT perception questions.

summer between the first and second year of osteopathic medical school, was associated with positive responses regarding perception of understanding and future use. The MedPrep program, which occurs before the first year, was associated with planned future use of OMT and positive attitude toward OMT. Shadowing a physician performing OMT before attending medical school was found to be associated with positive responses to questions on the perceived scope of OMT as well as intended future clinical use. Being treated with OMT, whether before or during medical school, was not found to have a statistically significant association with anticipated future use of OMT. Additionally, participants with more OMT clinical exposures were more likely to respond positively to more OMT perception questions.



**Figure 2.**

Association between the positive responses to the osteopathic manipulative treatment (OMT) perception questions and the time at which first- and second-year osteopathic medical students underwent clinical exposure to OMT in an academic setting. <sup>a</sup> Responded yes to “Before attending medical school, were you ever treated with Osteopathic Manipulative Treatment (OMT) by a clinician?” and “Before attending medical school, did you ever shadow a physician performing OMT on patients?” <sup>b</sup> Responded yes to “Were you a participant in the MedPrep program?”; “Were you a participant in the Summer SAAO [Student American Academy of Osteopathy] OMM [Osteopathic Manipulative Medicine] Preceptorship Program?”; “Since starting medical school, have you ever been treated with OMT by a clinician?”; or “Did you attend any extracurricular OMT didactics (such as OMED, AAO, Cranial Workshops)?”

These findings suggest the benefit of having clinical exposures to OMT during the preclinical osteopathic medical education years and agree with the observations of Turner et al<sup>18</sup> regarding being exposed to a practice early on in the academic timeline. Early clinical shadowing, during the first year of medical school, was associated with perceived preparedness for future clinical rotations.<sup>18</sup> Our findings also coincide with those of Gamber et al<sup>13</sup> regarding clinical OMT exposure in the third and fourth academic years and the positive association with participants’ perceptions of OMT. West Virginia School of Osteopathic Medicine’s implementation of an initiative to promote osteopathic principles and practice was found to help alumni maintain their use of OMT.<sup>19</sup>

These findings align with our finding regarding the association of a positive perception of OMT with the Summer SAAO OMM Preceptorship program, which was implemented to promote osteopathic principles and practice. However, participants in the SAAO OMM Preceptorship program reported significantly more of an intention to use OMT in future clinical practice, and the West Virginia study reported actual use in future clinical practice. The results are also supported by the association found by Dalprat et al,<sup>14</sup> who determined an association between early OMT clinical exposure and use of OMT during third-year clinical rotations. This finding aligns with one of the associations found in this study—namely, that having certain early OMT clinical exposures was associated with the intention to use OMT in future clinical practice.

With these exposures causing an improvement in the participants’ perception of OMT, it can be argued that the implementation of such programs into the osteopathic medical education curriculum will lead to similar results in the entire class. In other words, this change could lead to students having a more positive perception of OMT and having a strong intention to use OMT in future clinical practice.

**Table 2.**  
**Clinical Exposures to OMT and Perception Questions Answered Positively by First- and Second-Year Osteopathic Medical Students (N=364)**

Exposures, No.	Perception Questions Answered Positively, No. (%) <sup>a</sup>			Clinical Exposures to OMT vs Positive Responses to Perception, OR (95% CI)			
	4	3	≤2	4 vs ≤2	3 vs ≤2	4 vs 3	>2 vs ≤2
2	34 (41.5)	26 (31.7)	22 (26.8)	3.48 (1.69, 7.15) <sup>b</sup>	2.66 (1.26, 5.60) <sup>b</sup>	1.31 (0.61, 2.80)	2.97 (1.85, 4.77) <sup>b</sup>
1	71 (39.4)	59 (32.8)	50 (27.8)	3.20 (1.75, 5.83) <sup>b</sup>	2.65 (1.44, 4.89) <sup>b</sup>	1.20 (0.62, 2.33)	2.97 (1.85, 4.77) <sup>b</sup>
0	24 (23.5)	24 (23.5)	54 (52.9)	NA	NA	NA	NA

<sup>a</sup> Positive perception question number ranges from 0 to 4.

<sup>b</sup> Statistically significant (*P*<.05).

**Abbreviations:** CI, confidence interval; NA, not applicable; OMT, osteopathic manipulative treatment; OR, odds ratio.

One limitation of this study is sample size. Of the sample size of 600 NYIT-COM students, 364 participated. A larger sample size would allow for greater statistical power. Another limitation is an innate age bias because the majority of medical students, in our experiences, are aged in their 20s and 30s. Because the application of the results of this study would be within the osteopathic medical education system, where the majority of students are in their 20s and 30s, this bias does not affect the results. There is a self-selection bias within our participant pool as well. All first- and second-year students were given the opportunity to participate. Those who participated chose to do so and may have done so because of their interest in OMT. They may have also elected to have early clinical exposure to OMT because of their positive perception of OMT. This choice could cause the results to be positively skewed.

**Future Studies**

To determine the full effect of clinical exposure to OMT and to establish a cause-and-effect relationship, we would administer this survey to the incoming first-year class before various exposure opportunities. Once the opportunities for these exposures have occurred, we would again administer the survey. By examining the

changes in participants’ perception of OMT after OMT clinical exposures, we could assess how exposure affects perceptions. In addition, if OMT clinical exposures were added to the osteopathic medical curriculum, studies could be performed to track participants’ potential change in overall perception of OMT.

**Conclusion**

Early clinical exposure to OMT during or before the basic science years (years 1 and 2) was associated with positive perception of OMT. Although the association does not mean that there is causation, the findings have the potential to alter the osteopathic medical school curriculum to include early OMT clinical exposures, which can aid in students’ understanding, attitude, perceived scope, and intended future practice. If future studies yield similar results, they would provide a foundation for osteopathic medical schools to encourage or require clinical exposure to OMT before or during the preclinical years. This exposure could take the form of a pre-admission requirement of shadowing a physician who performs OMT or as a part of the preclinical curriculum. In the long term, these changes to the osteopathic medical school curriculum may lead to more physicians using OMT in clinical practice.



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## Author Contributions

Student Doctor Vazzana and Drs Yao, Jung, and Terzella all provided substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; drafted the article or revised it critically for important intellectual content; and gave final approval of the version of the article to be published.

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