


Article

Addressing Motivations and Barriers to Research Involvement during Medical School among Osteopathic Medical Students in the United States

Krista L. Jackson ^{1,2} , Oladipupo Ogunbekun ^{1,2}, Benjamin Nick ^{1,2}, Nicole Griffin ^{1,2}, Tyler Hamby ^{3,4} , Jake Herber ^{1,2}, Julia M. Hum ^{1,2}, Sarah Zahl ^{5,6} , Michael Baumann ⁷ and Jonathan W. Lowery ^{1,2,8,*} 

- ¹ Division of Biomedical Science, Marian University College of Osteopathic Medicine, Indianapolis, IN 46222, USA; kjackson466@marian.edu (K.L.J.); ogunbekun797@marian.edu (O.O.); bnick087@marian.edu (B.N.); ngriffin860@marian.edu (N.G.); jherber626@marian.edu (J.H.); jmhum@marian.edu (J.M.H.)
- ² Bone & Muscle Research Group, Marian University, Indianapolis, IN 46222, USA
- ³ Texas College of Osteopathic Medicine, University of North Texas Health Science Center, Fort Worth, TX 76107, USA; tyler.hamby@cookchildrens.org
- ⁴ Department of Research Operations, Cook Children's Health Care System, Fort Worth, TX 76104, USA
- ⁵ Division of Clinical Affairs, Marian University College of Osteopathic Medicine, Indianapolis, IN 46222, USA; szahl@marian.edu
- ⁶ Office of the Dean, Marian University College of Osteopathic Medicine, Indianapolis, IN 46222, USA
- ⁷ Department of Communication, College of Arts & Sciences, Marian University, Indianapolis, IN 46222, USA; mbaumann@marian.edu
- ⁸ Office of the Provost, Marian University, Indianapolis, IN 46222, USA
- * Correspondence: jlowery@marian.edu



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Abstract: Involvement in research is regarded as a high-impact educational practice, which, for medical professionals, is associated with sharpened critical thinking and life-long learning skills, greater appreciation for evidence-based medicine, and better clinical competence scores. However, there are limited data regarding the research experience and/or interest among osteopathic medical students in the United States despite a rapidly increasing enrollment and expansion of the number of osteopathic medical schools. Thus, we administered an electronic survey examining prior research experience, interests, and perceptions about research participation during medical school to four successive classes of incoming first-year osteopathic medical students. We also performed focus groups with rising third-year osteopathic medical students around the topic of perceived barriers to and potential enablers of promoting research participation. This yielded a survey addendum where first-year osteopathic medical students provided feedback on the likelihood of specific incentives/enablers to encourage participation in research during medical school. Overall, osteopathic medical students are interested in research, view research experience as valuable, and perceive research experience as beneficial to future career development. Students perceive that the primary barrier to involvement in research is a potential negative impact upon performance in coursework. Feedback on the likelihood of specific enablers/incentives was also garnered. Our findings from a single institution may have important implications in defining the prior experiences and perceptions held by first-year osteopathic medical students. Specifically, our study indicates that research experiences intentionally designed with (1) a strong likelihood of gaining a publication, (2) financial compensation, and (3) the opportunity for short-term involvement, a flexible time commitment, and/or a dedicated time period are most likely to encourage research participation by osteopathic medical students.

Keywords: undergraduate medical education; osteopathic medical school; research; students; survey; focus groups; barrier; enabler; incentive

1. Introduction

Involvement in research is regarded as a high-impact educational practice. For medical professionals, it is associated with sharpened critical thinking and life-long learning skills [1–4], greater appreciation for evidence-based medicine [5], and better clinical competence scores [6].

Additionally, medical students engaging in original research may obtain advantages in their professional pathways through stronger academic portfolios for United States (US) residency programs [7]—especially for more competitive programs—and stronger performance in required research projects during residency. Consistent with this, the accrediting body for colleges of osteopathic medicine (COMs) in the United States requires COMs to provide instruction in the basic scientific principles of research and support research involvement among students [8]. However, according to 2020 National Residency Match Program data, while 80% of allopathic medical students self-reported a research experience leading to a demonstrable product (e.g., publication, abstract, etc.), only 59% of osteopathic medical students do so [9]. This is notable because research by us and others indicates that the majority of osteopathic medical students express interest in clinical research [10–13]. Thus, it is important to identify osteopathic medical students' motivations for participating in research as well as the real and/or perceived barriers preventing participation in research during osteopathic medical school.

In the present study, we administered an electronic survey examining prior research experience, interests, and perceptions about research participation during medical school to four successive classes of incoming first-year osteopathic medical students. We also performed focus groups with rising third-year osteopathic medical students around the topic of perceived barriers to and potential enablers for promoting research participation. This yielded a survey addendum where first-year osteopathic medical students provided feedback on the likelihood of specific incentives/enablers to encourage participation in research during medical school.

2. Methods

2.1. Main Survey

For our main survey, we used a descriptive survey study design to investigate the previous research experiences and current perceptions of research among first-year osteopathic medical students at Marian University College of Osteopathic Medicine (MU-COM) in Indianapolis, Indiana. The main survey instrument (Supplemental File S1), which was used in our prior publication [10], consisted of fifteen items: fourteen multiple-choice questions, with select questions allowing for participants to write in responses, and one question asking participants to input their age. Osteopathic medical students in the classes of 2022, 2023, 2024, and 2025 who had entered medical school three weeks earlier, were sent an email inviting them to voluntarily participate in an anonymous survey on research interests. The invitation provided basic information about the study as well as a statement indicating that submission of the survey by a student constituted informed consent. A hyperlink to the survey was provided at the end of the e-mail invitation. The survey was administered by the online survey service Qualtrics, which allowed for anonymous data collection and concealment of the participants' identities. The survey remained open for two weeks, after which the data were recorded. One reminder e-mail was sent on the last day of the survey. Incomplete responses were excluded from the analysis.

2.2. Focus Groups

Five semi-structured focus groups (one-hour duration each) were conducted with two cohorts of rising third-year students using open-ended discussion prompts in order to provide a convenience sampling of student perceptions. Third-year students were sent an email inviting them to voluntarily participate in focus groups along with basic information about the study and a hyperlink to a sign-up page. Participation was incentivized by providing lunch for participants and a raffle for one US\$25 gift card per session. The

focus groups were facilitated by pairs of second-year osteopathic medical students (KJJ and OO for the Class of 2021, BN and NG for the Class of 2023) who had been trained on best practices and strategies for focus group facilitation by SZ. Focus groups were audio-recorded and transcribed by a third-party vendor (Rev). Participant identity was protected by redaction and any statements that included student-specific information were de-identified prior to analysis. Transcripts were coded and analyzed for themes by the research team.

2.3. Survey Addendum

A one-question electronic survey addendum (Supplemental File S2) was generated for the class of 2025 and seamlessly administered at the end of the main survey. This contained a list of fifteen specific incentives/enablers aimed at encouraging participation in research during medical school. Respondents ranked items using a Likert scale from 1–5 as follows: (1) definitely will not; (2) probably will not; (3) might or might not; (4) probably will; (5) definitely will.

2.4. Statistical Analyses

Data were summarized in aggregate form by class and overall average. Where indicated in the text or figure legend, some items were analyzed by unpaired *t* test or linear regression.

2.5. Regulatory Compliance

This study was approved by the Institutional Review Board of Marian University (protocols S17.018 and S18.060).

3. Results

3.1. Participant Demographics

In this study, a total of 272 students participated from MU-COM (Table 1). Of the 272 students that responded, 56 (20.6%) were from the Class of 2022, 84 (30.9%) were from the Class of 2023, 58 (21.3%) were from the Class of 2024, and 74 (27.2%) were from the Class of 2025. The overall response rate was 45% (272 out of 604) while the response rate for each Class ranged from 37% to 56% (Table 1). The age of all students ranged from 21 to 34 years (Table 1). As shown in Table 2, for the majority of students (overall average: 71% per class; range: 60.8–83.9%), a baccalaureate degree was the highest degree earned with basic science the most prevalent field of study (overall average: 79% per class; range: 74.1–82.1%); seventy-eight students (27.8%) had a graduate or professional degree. One student reported a graduate certificate in lieu of a baccalaureate degree (Table 2). No students reported holding a PhD.

As indicated in Table 3, the majority of students across all four incoming classes reported participation in research before entering osteopathic medical school (overall average: 79.9% per class; range: 73.2–86.9%). Most of those with research experience (overall average: 62.7% per class; range: 57.4–65.5%) had published or presented their research findings (Table 3).

Table 1. Demographics of survey respondents. For respondents, percentage refers to the percentage of total respondents. For response rate, percentage refers to overall or each class year as indicated.

	Overall	Class of 2022 No. (%)	Class of 2023 No. (%)	Class of 2024 No. (%)	Class of 2025 No. (%)
Total Respondents	272	56 (20.6)	84 (30.9)	58 (21.3)	74 (27.2)
Response Rate	45%	37%	56%	39%	48%
Age Range, years	21–34	22–33	21–34	21–29	22–33

Table 2. Demographics of survey respondents. Percentages refer to within each column grouping with the exception of “respondents” where referring to the percentage of the average grouping.

	Average	Class of 2022 No. (%)	Class of 2023 No. (%)	Class of 2024 No. (%)	Class of 2025 No. (%)
Field of Bachelor’s Degree					
Applied science	3.4%	0 (0)	3 (3.6)	1 (1.7)	6 (8.1)
Basic science	79%	46 (82.1)	66 (78.6)	43 (74.1)	60 (81.1)
Social science	4.8%	4 (7.1)	1 (1.2)	4 (6.9)	3 (4.1)
Liberal Arts	2.9%	1 (1.8)	4 (4.8)	3 (5.2)	0 (0)
Other	9.6%	5 (8.9)	9 (10.7)	7 (12.1)	5 (6.8)
Highest Degree Earned					
Graduate Certificate	0.3%	0 (0)	1 (1.2)	0 (0)	0 (0)
Bachelor’s	71%	47 (83.9)	56 (66.7)	42 (72.4)	45 (60.8)
Master’s	27.8%	9 (16.1)	26 (31)	16 (27.6)	27 (36.5)
PhD	0%	0 (0)	0 (0)	0 (0)	0 (0)
Professional	1%	0 (0)	1 (1.2)	0 (0)	2 (2.7)

Table 3. Previous research experience among survey respondents. Percentages refer to within each column grouping.

Previous Research Experience	Average	Class of 2022 No. (%)	Class of 2023 No. (%)	Class of 2024 No. (%)	Class of 2025 No. (%)
Yes	79.9%	41 (73.2)	73 (86.9)	47 (81)	58 (78.4)
Published or presented	62.7%	26 (63.4)	47 (64.4)	27 (57.4)	38 (65.5)
Not published or presented	31.1%	13 (31.7)	23 (31.5)	15 (31.9)	17 (29.3)
No	20.1%	15 (26.8)	11 (13.1)	11 (19)	16 (21.6)

3.2. Research Interest and Perception of Opportunities

When asked if they were interested in participating in research during medical school, a majority of students (overall average: 70.6% per class; range: 53.5–82.8%) either expressed interest in or were currently doing research (Table 4). Just over a quarter of entering medical students ($n = 70$, 26.2%) also indicated that they might be interested in participating in research (Table 4). Nine students (overall: 3.2% per class; range: 0–5.4%) indicated no interest in research (Table 4).

We subsequently surveyed perceptions regarding research opportunities available during medical school (Table 4). Over half (overall: 53.2%; range: 50–58.3%) identified that there were “some” opportunities available at MU-COM. 26.3% (range: 22.4–28.6%) upgraded the extent of available opportunities to “many”. 20.1% (range: 14.3–25.9%) stated that they “don’t know” if research opportunities exist at MU-COM. One student (overall: 0.34%) perceived that there were no research opportunities available at MU-COM during medical school.

We expected that the majority of osteopathic medical students would be interested in clinical research; this was supported by the finding that an average of 88.2% of students per class (range: 85.7–93.2%) affirmed interest in clinical research (Table 5). As indicated in Table 5, this was followed by interest in basic science (overall average: 61.2% per class; range: 55.4–65.5%), anatomical research (overall average: 43.9% per class; range: 35.7–54.1%), social science (overall average: 38.7% per class; range: 30.4–44.8%), osteopathic manipulative medicine (overall average: 29.6% per class; range: 25.7–33.9%), translational research (overall average: 17.8% per class; range: 8.9–27.4%), applied science (overall average: 9.7% per class; range: 7.1–13.1%), and other (overall average: 1.7% per class; range:

0–3.6%). Regarding “other,” students listed genetic engineering, nutrition, orthopedics, neuro, and case studies as their research interests.

Table 4. Interest in participating in research during osteopathic medical school and perception of research opportunities among survey respondents. For the type of research, participants were allowed to choose one or more factors. Percentages refer to within each column grouping.

Interested in Participating in Research	Average	Class of 2022 No. (%)	Class of 2023 No. (%)	Class of 2024 No. (%)	Class of 2025 No. (%)
Yes	66.7%	25 (44.6)	58 (69)	48 (82.8)	52 (70.3)
Maybe	26.2%	23 (41.1)	21 (25)	10 (17.2)	16 (21.6)
Currently participating	3.9%	5 (8.9)	1 (1.2)	0 (0)	4 (5.4)
No/No Response	3.2%	3 (5.4)	4 (4.8)	0 (0)	2 (2.7)
Do opportunities exist at MU-COM for students to participate in research during medical school?					
Yes, many	26.3%	16 (28.6)	23 (27.4)	13 (22.4)	20 (27)
Yes, some	53.2%	28 (50)	49 (58.3)	30 (51.7)	39 (52.7)
No	0.3%	0 (0)	0 (0)	0 (0)	1 (1.4)
Don't know	20.1%	12 (21.4)	12 (14.3)	15 (25.9)	14 (18.9)

Table 5. Types of research interests and perception of research opportunities in areas of interest among survey respondents. For the type of research, participants were allowed to choose one or more factors. Percentages refer to within each column grouping.

	Average	Class of 2022 No. (%)	Class of 2023 No. (%)	Class of 2024 No. (%)	Class of 2025 No. (%)
Type of research interest					
Clinical Research	88.2%	48 (85.7)	72 (85.7)	51 (87.9)	69 (93.2)
Basic Science	61.2%	34 (60.7)	53 (63.1)	38 (65.5)	41 (55.4)
Anatomical Research	43.9%	20 (35.7)	36 (42.9)	25 (43.1)	40 (54.1)
Social Science	38.7%	17 (30.4)	34 (40.5)	26 (44.8)	29 (39.2)
Osteopathic Manipulative Medicine	29.6%	19 (33.9)	22 (26.2)	19 (32.8)	19 (25.7)
Translational Research	17.8%	5 (8.9)	23 (27.4)	10 (17.2)	13 (17.6)
Applied Science	9.7%	4 (7.1)	11 (13.1)	6 (10.3)	6 (8.1)
Other	1.7%	0 (0)	3 (3.6)	1 (1.7)	1 (1.4)
Not interested in Research	2.6%	3 (5.4)	2 (2.4)	0 (0)	2 (2.7)
Do research opportunities exist at MU-COM in your area of interest?					
Yes, many	9.2%	3 (5.4)	12 (14.6)	5 (8.6)	6 (8.1)
Yes, some	35.4%	23 (41.1)	34 (41.5)	21 (36.2)	17 (23)
No	3.9%	3 (5.4)	1 (1.2)	2 (3.5)	4 (5.4)
Don't know	51.5%	27 (48.2)	35 (42.7)	30 (51.7)	47 (63.5)

A query regarding the availability of research opportunities at MU-COM in respondents' areas of interest during medical school yielded a significant shift in responses (Table 5). Approximately half of all respondents (overall: 51.5%; range: 42.7–63.5%) indicated that they “don't know” if such opportunities exist. 35.4% (range: 23–41.1%) believed there to be “some” research opportunities available at MU-COM in their area of interest. Only 9.2% (range: 5.4–14.6%) felt there were “many” such opportunities available. Meanwhile, 3.9% (range: 1.2–5.4%) perceived there to be no research opportunities in their area of interest available at MU-COM during medical school.

3.3. Perceived Importance and Benefits of Research Participation

Osteopathic medical students were also queried as to the importance and benefits of participating in research while in osteopathic medical school (Table 6). An overwhelming majority of students (overall average: 97.3% per class; range: 96.4–98.8%) indicated some level of importance and 50.2% indicated that research participation was “very” or “extremely” important (range average: 41.1–62.1%). Only seven students (2.7% overall) indicated that research participation during medical school was “not important.” Regarding the benefits of participating in research during medical school (Table 6), a majority of students (overall average: 95.3% per class; range: 94–96.6%) believed that research participation would enhance their competitiveness in residency applications. This was followed by an opportunity to interact with current faculty (overall average: 78.9% per class; range: 73.8–82.8%), to deepen understanding of curricular concepts (overall average: 68% per class; range: 62.2–71.4%) and to develop skills for conducting research as a physician (overall average: 67.1% per class; range: 60.7–74.1%). Some students (overall average: 3.5% per class; range: 1.8–4.8%) reported other benefits, including the following: understanding foundational research concepts & the benefits of research on career/medical field; advancing medical research; helping to answer specific questions; becoming an expert in one area; critical thinking skills; relate to others in the medical field; and further understanding of research & biological processes. Only one respondent indicated that research participation produced no benefit.

Table 6. Survey respondents’ perceptions of the importance and benefits of participating in research during osteopathic medical school. For the perceived benefits, participants were allowed to choose one or more factors. Percentages refer to within each column grouping.

	Average	Class of 2022 No. (%)	Class of 2023 No. (%)	Class of 2024 No. (%)	Class of 2025 No. (%)
Importance of participating in research experience					
Extremely important	18.5%	7 (12.5)	18 (21.4)	13 (22.4)	13 (17.6)
Very important	31.7%	16 (28.6)	22 (26.2)	23 (39.7)	24 (32.4)
Moderately Important	37.4%	23 (41.1)	35 (41.7)	16 (27.6)	29 (39.2)
Slightly important	9.7%	8 (14.3)	8 (9.5)	4 (6.9)	6 (8.1)
Not important	2.7%	2 (3.6)	1 (1.2)	2 (3.5)	2 (2.7)
Benefits of participating in research					
Enhancing competitiveness for residency slots	95.3%	53 (94.6)	79 (94)	56 (96.6)	71 (95.9)
Engaging with faculty members	78.9%	43 (76.8)	62 (73.8)	48 (82.8)	61 (82.4)
Deepening understanding of curricular concepts	68%	40 (71.4)	57 (67.9)	41 (70.7)	46 (62.2)
Developing skills for doing research as a physician	67.1%	34 (60.7)	53 (63.1)	43 (74.1)	52 (70.3)
Other	3.5%	1 (1.8)	4 (4.8)	2 (3.5)	3 (4.1)
No benefit	0.3%	0 (0)	1 (1.2)	0 (0)	0 (0)

3.4. Potential Barriers Preventing and Enablers Encouraging Research Participation

Osteopathic medical students were also asked to choose one or more factors that might prevent them from participating in research during medical school (Table 7). We expected that their prevailing concern would be a possible negative impact upon performance in coursework; indeed, an overwhelming majority of students (overall average: 86.7% per class; range: 79.7–91.4%) expressed this concern. Relatively fewer students indicated that a preference for other extracurricular activities (overall average: 26.5% per class; range: 19–36.5%) might be a reason to not participate in research. Lack of opportunity for a specific kind of research was a less prevalent concern (overall average: 13% per class; range: 10.8–14.3%). Some students (overall average: 10.9% per class; range: 8.1–14.9%) reported additional concerns. A majority of these concerns revolved around the constraints of the time commitment involved in research. Other key concerns included a prior lack of experience, uncertainty on how to get involved, and a general lack of interest in research itself. Intriguingly, two students listed apprehension about the possibility of not gaining a publication from their research efforts as a concern.

Table 7. Survey respondents' perceptions of the reasons to not participate in and possible enablers to encourage participating in research during osteopathic medical school. Participants were allowed to choose one or more factors. Percentages refer to within each column grouping.

	Average	Class of 2022 No. (%)	Class of 2023 No. (%)	Class of 2024 No. (%)	Class of 2025 No. (%)
Reasons to not participate					
Concern about academic performance	86.7%	49 (87.5)	74 (88.1)	53 (91.4)	59 (79.7)
Prefer other extracurricular activities	26.5%	15 (26.8)	20 (23.8)	11 (19)	27 (36.5)
Lack of opportunity for a specific kind of research	13%	8 (14.3)	11 (13.1)	8 (13.8)	8 (10.8)
Other	10.9%	6 (10.7)	8 (9.5)	5 (8.1)	11 (14.9)
Not applicable	6.2%	5 (8.9)	6 (7.1)	2 (3.5)	4 (5.4)
Possible enablers					
Monetary compensation	81.9%	40 (71.4)	74 (88.1)	48 (82.8)	63 (85.1)
Extra credit	61%	39 (69.6)	47 (56)	35 (60.3)	43 (58.1)
Specific type of research	39.7%	20 (35.7)	31 (36.9)	28 (48.3)	28 (37.8)
Other	9.4%	3 (5.4)	5 (5.6)	5 (8.6)	13 (17.6)
Nothing	5.1%	5 (8.9)	3 (3.6)	2 (3.5)	1 (1.4)

We also surveyed osteopathic medical students about the potential incentives that might encourage them to participate in research during medical school (Table 7). An overwhelming majority indicated a positive perception toward monetary compensation (overall average: 81.9% per class; range: 71.4–88.1%) and extra credit in coursework (overall average: 61% per class; range: 56–69.6%). Some students (overall average: 39.7% per class; range: 35.7–48.3%) reported that an opportunity for a specific type of research might encourage their participation. Relatively few students (overall average: 5.1%; range: 1.4–8.9%) reported none of the listed incentives would encourage them to participate in research during medical school.

3.5. Focus Groups on Perceived Barriers and Potential Enablers to Research Participation

To enhance our understanding of osteopathic medical students' perceptions of research, we carried out a series of voluntary focus groups with rising third-year students. This time point in training was an advantageous opportunity for examining how perceptions may be influenced by the conclusion of preclinical coursework prior to initiating clinical clerkships and how those perceptions may have shifted throughout their preclinical experience. Three focus groups and two focus groups (average attendance of seven per session) were held with the Class of 2021 and Class of 2023, respectively. Focus groups with the Class of 2022 were not possible due to restrictions of the COVID-19 pandemic. The focus groups were facilitated by rising second-year students (KLJ, OG, BN, NG) and formatted to be open-ended discussions around the topic of perceived barriers to and potential enablers for promoting research participation by osteopathic medical students. Analysis of the transcripts from these sessions identified several broad themes, some of which are outlined in Table 8.

Table 8. Representative themes identified from focus groups with rising third-year osteopathic medical students.

Themes
Desire for earlier and more intentional connections with faculty to match research interests
Interest in educational/instructional overview of research process before getting started
Guidance/instruction about integrating research with other activities to help with time management and prioritization of research
Mentor's style and availability are one of the most important factors to research success
A desire for allowing students to shape their own research experience with mentor's guidance
A strong desire in gaining publication(s)
Some students are intrinsically motivated to participate in research while others are not

3.6. Likelihood of Specific Incentives/Enablers to Encourage Research Participation

Using the thematic information gleaned from focus groups, we designed a survey addendum for the Class of 2025 to gather feedback on the likelihood of specific incentives/enablers to encourage students to participate in research during medical school. This quantitative approach helped address the potential impact of reflexivity, sample size, convenience sampling, and other confounding variables on the semi-structured focus groups. Respondents were allowed to rate each item on a Likert scale from "definitely will not" through "definitely will." This revealed striking differences between students who affirmed interest or were currently participating versus those who indicated they might be interested in participating in research during medical school (Table 9). For instance, each potential incentive/enabler was scored higher among those students who affirmed interest or were currently participating in research as compared to those who indicated potential interest. Among the former group, the highest-ranked incentive/enabler (mean: 4.64; mode: 5) was "strong likelihood of gaining a publication," whereas, among the latter group, this incentive/enabler ranked third (mean: 3.81; mode: 4). For students affirming interest in or currently participating in research, four other items also had a mode of five (Table 9). In contrast, the highest-ranked incentive/enabler (mean: 4; mode: 4) for those who indicated potential interest in participating in research was "opportunity for flexible time commitment during research involvement" and no item had a mode of five.

Table 9. Class of 2025 feedback on the likelihood of certain incentives/enablers to encourage participation in research during medical school. Respondents ranked items using a Likert scale from 1–5 as follows: (1) definitely will not; (2) probably will not; (3) might or might not; (4) probably will; (5) definitely will. SD, standard deviation.

Possible Enablers	Affirmed Interest or Currently Participating			Potential Interest		
	Mean	SD	Mode	Mean	SD	Mode
Strong likelihood of gaining a publication	4.6	0.6	5	3.8	0.8	4
Opportunity for flexible time commitment during research involvement	4.4	0.7	5	4	0.6	4
Opportunity for short-term involvement in research projects	4.1	0.9	5	3.9	0.7	4
Availability of a dedicated period of time to be involved in research	4.1	0.9	5	3.6	1.0	3
Opportunity for a dual degree program (such as DO/MS, DO/PhD, etc.)	3.2	1.5	5	2.2	1.3	1
Financial compensation	4.3	0.7	4	3.5	0.6	3
A formalized Distinction in Research designation	4.1	0.8	4	3.3	0.9	4
Opportunity for a specific kind of research (certain topic area, clinical, translational, etc.)	4.0	0.8	4	3.4	0.9	3
Availability of a ‘point person’ for connecting students with available research opportunities	3.9	0.8	4	3	1.0	3
Likelihood of travel opportunities to conferences, meetings, etc.	3.6	1.1	4	3.1	1.0	3
Transcript credit	3.5	1.0	4	3	0.8	3
Improved communication of available research opportunities	3.8	0.9	3	2.9	0.8	3
Improved research facilities and instrumentation	3.5	1.1	3	2.4	0.7	3
Instruction in ‘how to do research’	3.5	1.1	3	3.4	0.9	3
Opportunity for funding of student-initiated research projects	3.3	1.0	3	2.4	0.6	2

We were intrigued by the findings with regard to the opportunity for a dual-degree program. As shown in Table 9, this item ranked the lowest among all the items for both students affirming interest or currently participating in research (mean: 3.18) and those indicating potential interest (2.19) but was statistically different between these groups (Figure 1). That said, for the former group, this item had a mode of five (Table 9) and a relatively large standard deviation while it had a mode of one for the latter group (Table 9). Given that some respondents already held graduate degrees, we hypothesized this might influence the perception of a dual-degree program. On average, however, this was not supported by the data as there was no statistically significant difference in mean score between those students with or without graduate degrees (Figure 2). We also performed linear regression to examine if age influenced respondents’ scoring of the dual-degree program item, however, for both students affirming interest in or currently performing research and those who expressed potential interest, this was not statistically significant

(affirmed interest or currently participating: $R^2 = 0.012$, $F(1.54) = 0.66$, $p = 0.422$; potential interest: $R^2 = 0.018$, $F(1.14) = 0.25$, $p = 0.624$).

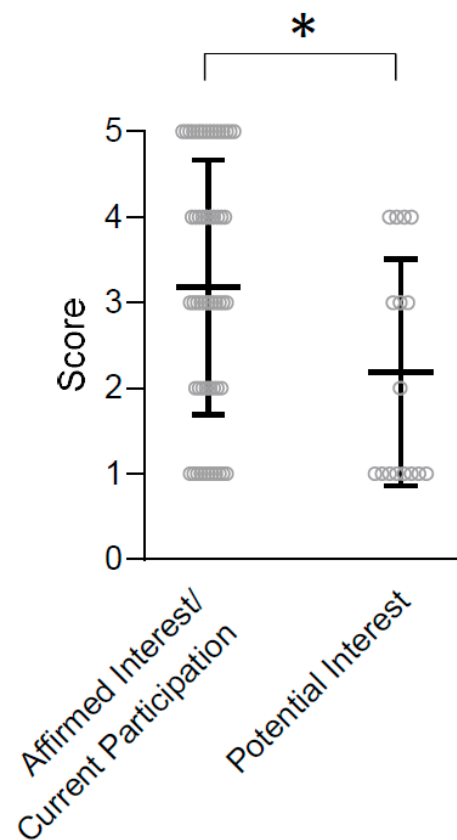


Figure 1. Ranking for dual-degree program among students affirming interest or currently participating in research and those indicating potential interest. Individual responses are indicated by open circles. Lines represent mean \pm standard deviation. * indicates $p < 0.05$ by unpaired t test.

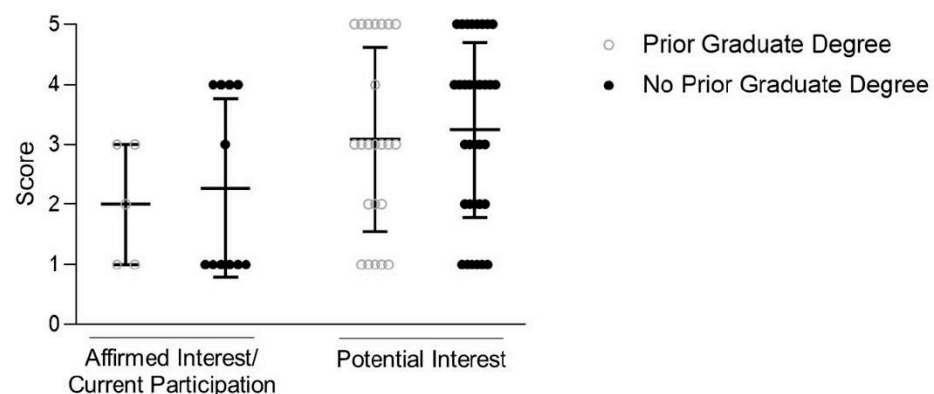


Figure 2. Ranking for dual-degree program among students with or without a prior graduate degree. Results are separated by students affirming interest or currently participating in research and those indicating potential interest. Individual responses are indicated by open circles. Lines represent mean \pm standard deviation.

4. Discussion

Our findings have important implications in defining the prior experiences and perceptions held by first-year osteopathic medical students. That said, we recognize that the generalizability of this study is potentially limited by several factors, including (1) its 45% overall response rate per class, (2) our ability to perform longitudinal studies at

only one COM, (3) our reliance on self-reported information, and (4) the potential for regional and/or institution-specific factors (such as admissions practices). While these factors—which are beyond the scope of our current study—and other important considerations such as reflexivity may influence the findings, our results are remarkably consistent with prior results using the same survey instrument at four additional COMs in other regions of the US. [10,11] Thus, we cautiously generalize our findings and interpret them in the context of undergraduate osteopathic medical education overall.

This study advances our previous work in which we examined research experience and attitudes toward research among first-year osteopathic medical students across five locations of four COMs. Here, examining four successive cohorts of first-year students, our findings are strikingly similar to our earlier work with the vast majority of students reporting prior research experience (79.9% overall average) and affirming interest in participating in research during medical school (70.6% overall average). The majority of students (88.2% overall average) reported interest in clinical research and/or basic science research (61.2% overall average), which is consistent with our prior report and several additional reports [10–13] Additionally, approximately one-third of students (29.6% overall average) reported interest in osteopathic manipulative medicine research, which is also similar to our prior report. [10] An overwhelming majority of students hold the perception that involvement in research during medical school is important (97.3% overall average), with more than half reporting it is “very” or “extremely” important. The primary benefits that students perceive to be garnered from involvement in research are as follows: enhanced competitiveness in residency applications (95.3%), opportunity to interact with faculty (78.9%), deepening of curricular concepts (68%), and developing skills for conducting research as a physician (67.1%). Students perceive that the primary barrier to involvement in research is a potential negative impact upon performance in coursework (86.7%) with no other potential barrier being affirmed by a majority of students.

To add greater understanding to the perceptions held by students, we carried out a series of focus groups with third-year osteopathic medical students, which identified several broad themes that were utilized for designing a survey addendum to gather feedback on the likelihood of specific incentives/enablers to encourage students to participate in research during medical school. Strikingly, responses to specific incentives/enablers differed greatly between students who affirmed interest or were currently participating in research as compared to those indicating potential interest. Moreover, across all items, the score was consistently higher among those affirming interest or currently participating. To us, this suggests that intrinsic motivation has a strong influence on the perception of additional motivators. In other words, students who are interested in research participation may be further encouraged to do so but students who are uncertain are less likely to be encouraged to participate. For those affirming interest or already participating, the strongest incentive/enabler was a “strong likelihood of gaining a publication.” That said, both groups of students responded favorably to research experiences with an opportunity for short-term involvement, a flexible time commitment, and/or a dedicated time period. Taken together, these findings are consistent with the primary expressed concern of a potential negative impact upon coursework by (a) limiting the time involved in research while (b) increasing the likelihood of a demonstrable outcome.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/educsci12060407/s1>, Supplemental File S1: Main Survey; Supplemental File S2: Survey Addendum.

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Data Availability Statement: The data associated with this study will be made available upon reasonable request.

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