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# Cognitive empathy of osteopathic students: a longitudinal study with data comparisons to the Project in Osteopathic Medical Education and Empathy (POMEE)

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## Abstract

**Context:** Establishing an empathic bond of trust with patients is a characteristic that physicians need, because patients feel that physicians are more caring if they sense that they are empathetic. Former cross-sectional studies have shown an erosion of cognitive empathy as medical students progress through their education.

**Objectives:** This study aims to measure the changes in student cognitive empathy as they progress through their undergraduate osteopathic medical education. Cognitive empathy scores are compared to the nationwide norms established by the Project in Osteopathic Medical Education and Empathy (POMEE) study by Mohammadreza Hojat, PhD, and colleagues.

**Methods:** During orientation to medical school, and at the beginning of each subsequent academic year, and just before graduation, the graduating classes of 2017–2019 participated in this longitudinal study by filling out the Jefferson Scale of Empathy-Student Version (JSE-S). A total of 345/459 Osteopathic Medical Student (OMS) I-IV students (75.2% of the graduates) filled out the forms for all five time points. Desired specialty choice and sex were also collected. Specialty choice was divided into Core and Non-Core groups. Core specialties are “people-oriented” and have a large amount of patient contact and continuity of care, while Non-Core specialties are “technical- or procedure-oriented”

and have little or no patient contact and/or continuity of care.

**Results:** Men selecting Non-Core specialties had significant drops in JSE-S scores ( $p=0.001$ ); whereas men who selected the Core specialties did not have a significant decrease. For women, there was no significant drop in JSE-S scores for those selecting either Core or Non-Core specialties. When compared to POMEE norm data, none of the Campbell University School of Medicine students had JSE-S scores that were above the 50th percentile.

**Conclusions:** Students selecting Core specialties do a better job of maintaining their cognitive empathy, which aids their ability to establish an empathic bond of trust with patients, when compared to students who desire Non-Core specialties. JSE-S scores not above the POMEE 50th percentile is concerning and indicate either a curricular change to better enhance empathic communication skills and/or better applicant selection.

**Keywords:** cognitive empathy; Jefferson scale of empathy; JSE; medical education; osteopathic students; POMEE

No one disputes that forming an empathic bond of trust with patients is an essential trait that physicians need to possess because it increases patient satisfaction and compliance and enhances outcomes [1–3]. Over the past several decades, there has been an increased interest in determining the empathic nature of medical students and how cognitive empathy changes as they progress through their undergraduate medical education [4–7]. Cognitive empathy, regarding health professional education and patient care, is defined by Hojat and colleagues [8] as “predominantly a *cognitive* (as opposed to affective or emotional) attribute that involves *understanding* (as opposed to feeling) of the patient’s pain, experiences, concerns, and perspectives combined with a capacity to *communicate* this understanding and an *intention to help*” (italics by Hojat et al. [8]).

Cognitive empathy can be measured via the widely used Jefferson Scale of Empathy-Student version (JSE-S)

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developed by Hojat et al. [4]. Three cross-sectional studies have used the JSE-S to examine cognitive empathy in osteopathic students [9–11]. To date, there are no longitudinal studies examining cognitive empathy among osteopathic students at a single medical school. However, the nationwide Project in Osteopathic Medical Education and Empathy (POMEE), using the JSE-S, is currently collecting longitudinal cognitive empathy data on most osteopathic medical schools in the United States [5]. This current longitudinal study was designed to examine cognitive empathy in the 2017–2019 graduating classes of osteopathic medical students. These data will be compared to the POMEE study.

## Methods

This longitudinal study was reviewed and approved by the Institutional Review Board of Campbell University (IRB #30). During orientation to medical school, the classes of 2017–2019 ( $n=459$ ) were given a short PowerPoint presentation describing the study, and the students were then asked to voluntarily participate in this longitudinal study. The main author collected the paper consent forms. Part of the total cohort participated at all five time points ( $n=345/459$ ; i.e., 75.2 % of the graduates, consisting of 176 women [51 %] and 169 men [49 %]).

The survey was given to the Osteopathic Medical Student (OMS) I students during their orientation to medical school (M1 time point on tables and the figure). This served as a baseline data point because the students had not yet taken any medical school classes. The OMS II-IV surveys were given during the first week of the sophomore, junior, and senior years, respectively (M2–M4 time points on tables and the figure). Therefore, the M2 time point reflects any changes in empathy scores that occurred after finishing the first basic science year of the curriculum, the M3 time point reflects any changes that occurred during the second basic science year, and so on. A final, fifth administration of the surveys was given several weeks before graduation (M4F time point on tables and the figure).

In addition to filling out the survey instrument, the students were asked to indicate their sex because the JSE-S is sex-sensitive, with women having significantly higher scores than men [12]. The students were also asked each time to choose which of 23 specialties they desired to enter. Each student was assigned a random ID number so that his or her data could be tracked throughout their undergraduate medical education. The survey instruments were hand-scored, and the data were entered into a password-protected Microsoft Excel spreadsheet by the main author. Statistical analyses were performed by Z.W.

## Instruments

The JSE-S is a well-established, 20-item self-report survey using a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree) to respond to the medical profession-oriented questions [4]. Scores can range from 20 to 140, with higher scores reflecting a higher level of cognitive empathy. The JSE-S has a Cronbach  $\alpha$  coefficient of 0.89 [4]. Nationwide osteopathic medical student norms ( $n=16,149$ ) have been calculated via the POMEE study [5].

Like previous studies by Newton and colleagues [13, 14], the 23 specialties were divided into five “Core” and 18 “Non-Core” specialties, with Core specialties representing those with a large amount of patient contact and/or continuity of care, i.e., “people-oriented,” and Non-Core specialties being represented by specialties that are more “procedure- or technology-oriented” and have minimal or no patient contact or continuity of care. Core specialties are defined as: Family and Internal Medicine, Ob/Gyn, Pediatrics, and Psychiatry. Examples of Non-Core specialties are Anesthesiology, Surgery, Diagnostic Radiology, Emergency Medicine, and Pathology. (A complete list of Core and Non-Core specialties is provided in Supplementary Material).

## Statistical analysis

The longitudinal dataset was analyzed using IBM SPSS version 26.0 software [15]. The dataset itself is comprised of both categorical (Doctor of Osteopathic Medicine [DO] Program Year, Class, Sex, Specialty Choice, Residency, and Core vs. Non-Core) and numerical variables (JSE-S). For the overall distributions of JSE-S scores, values for skewness ( $-0.739$ ) and for kurtosis (1.103) were determined to be within acceptable ranges so as to not violate underlying assumptions of normality [16]. Therefore, it was determined that the JSE-S data could be viewed as normally distributed, and that parametric methods were appropriate to use for analysis and thus provide the foundation for the results that follow.

## Results

The JSE-S empathy scores for the three matriculating classes were combined at each time point because there are no significant differences in the average scores for the entering osteopathic students.

## Cognitive empathy scores

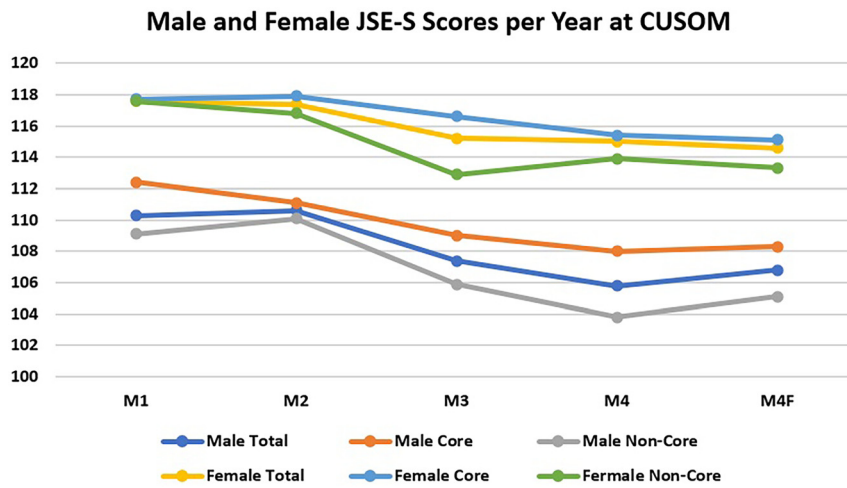
Table 1 and Figure 1 show the M1-M4F JSE-S scores. Entering Campbell University Jerry M. Wallace School of Osteopathic Medicine (CUSOM) medical students had an average JSE-S total score of  $114.01 \pm 10.74$ , which dropped to  $110.77 \pm 14.79$  (a 2.8 % decrease). The overall analysis of variance (ANOVA) model for the mean JSE-S differences across the levels of program year is significant overall ( $F=6.433$ ,  $p<0.001$ ), with statistically significant differences observed using Tukey’s honestly significant difference (HSD) between the M1 vs. M4 and the M2 vs. M4F years. There is no difference in the M1 vs. the M2 JSE-S total scores, with the first drop in JSE-S scores occurring after finishing the second year of the basic science curriculum (M3 time point); however, this difference is not significant ( $p=0.058$ ). The average M4 and M4F JSE-S scores are also similar, with only a minor numerical difference between the scores.

Male JSE-S scores dropped from an M1 score of  $110.26 \pm 11.06$  to the M4F score of  $106.77 \pm 15.35$

**Table 1:** Average M1–M4F male and female JSE-S scores for the 2017–2019 CUSOM cohorts.

DO program year	JSE-S								
	Male			Female			Total		
	n	Mean	Std. Dev.	n	Mean	Std. Dev.	n	Mean	Std. Dev.
M1	169	110.26	11.06	176	117.61	9.09	345	114.01	10.74
M2	169	110.55	11.97	176	117.36	10.19	345	114.02	11.59
M3	169	107.41	13.89	176	115.23	10.73	345	111.40	12.96
M4	169	105.82	14.27	176	114.96	11.20	345	110.48	13.57
M4F	169	106.77	15.35	176	114.60	13.16	345	110.77	14.79
Total	845	108.16	13.50	880	115.95	11.01	1,725	112.14	12.89

CUSOM, Campbell University Jerry M. Wallace School of Osteopathic Medicine; DO, Doctor of Osteopathic Medicine; JSE-S, Jefferson Scale of Empathy-Student Version.



**Figure 1:** M1 time point JSE-S scores were taken during orientation to medical school. M2–M4 time points were taken during the first week of years 2 through 4. The M2 time point would reflect any change in JSE-S scores after completing year 1 of medical school, the M3 time point after completing the second year of medical school, etc. The M4F time point JSE-s scores were taken just before graduation from CUSOM.

(3.2 % decrease). The overall ANOVA model for male JSE-S scores is statistically significant ( $F=4.261, p=0.002$ ), with the only significant differences being the M1 and M2 scores vs. M4 ( $p=0.02$  and  $0.01$ , respectively). Female JSE-S scores dropped from  $117.61 \pm 9.09$  to  $114.60 \pm 13.16$  (a 2.6 % decrease). The overall ANOVA model for female JSE-S scores is also statistically significant ( $F=2.957, p=0.019$ ); however, Tukey’s HSD was unable to detect any significant differences between the five levels of program year.

Overall, although the male JSE-S scores did not show a steady decline from M1 to M4F (a rebound occurred between the M4 and M4F time points respectively [ $105.82 \pm 14.27$  vs.  $106.77 \pm 15.35$ ]), the female JSE-S scores did exhibit a steady decline.

### JSE-S scores of all students selecting core vs. non-core specialties

Table 2 shows that students selecting a Core residency show a steady decline in M1-M4F JSE-S scores from  $115.55 \pm 9.60$  to  $112.29 \pm 14.79$ , representing a 2.8 % decrease. The overall ANOVA model is statistically significant ( $F=2.558, p=0.037$ ), although Tukey’s HSD once again failed to detect a difference between the five levels. Students who selected Non-Core specialties did not show a steady decline in JSE-S scores. The Non-Core JSE-S score increased from the M1 to the M2 time points, then dropped in the M3 and M4 time points before rebounding just before graduation at the M4F time point. This led to an overall drop in JSE-S scores from

**Table 2:** Average M1–M4F Core vs. Non-Core JSE-S scores for the 2017–2019 CUSOM cohorts.

DO program year	Core – Non-Core								
	Core			Non-Core			Total		
	n	Mean	Std. Dev.	n	Mean	Std. Dev.	n	Mean	Std. Dev.
M1	152	115.55	9.60	193	112.80	11.44	345	114.01	10.74
M2	166	115.06	11.00	179	113.06	12.07	345	114.02	11.59
M3	193	113.32	12.30	152	108.97	13.40	345	111.40	12.96
M4	211	112.45	12.92	134	107.37	14.03	345	110.48	13.57
M4F	218	112.29	14.79	127	108.14	14.47	345	110.77	14.79
Total	940	113.55	12.51	785	110.44	13.14	1,725	112.14	12.89

CUSOM, Campbell University Jerry M. Wallace School of Osteopathic Medicine; DO, Doctor of Osteopathic Medicine; JSE-S, Jefferson Scale of Empathy-Student Version.

**Table 3:** Average M1–M4F Male Core vs. Non-Core JSE scores for the 2017–2019 CUSOM cohorts.

DO program year	JSE-S male core			JSE-S male Non-Core			JSE-S male total		
	n	Mean	Std. Dev.	n	Mean	Std. Dev.	n	Mean	Std. Dev.
M1	61	112.41	10.15	108	109.05	11.41	169	110.26	11.06
M2	69	111.14	10.90	100	110.14	12.70	169	110.55	11.97
M3	83	108.96	12.80	86	105.92	14.78	169	107.41	13.89
M4	83	107.95	14.18	86	103.76	14.12	169	105.82	14.27
M4F	89	108.25	16.09	80	105.13	14.41	169	106.77	15.35
Total	385	109.52	13.31	460	107.03	13.57	845	108.16	13.50

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112.80 ± 11.44 to 108.14 ± 14.47, representing a 4.1 % decline in Non-Core JSE-S scores. The overall ANOVA model is statistically significant ( $F=6.816$ ,  $p<0.001$ ), with M1 and M2 being statistically significant different than M4 and M4F respectively (M1 vs. M4, M4F:  $p=0.002$ ,  $p=0.015$ ; M2 vs. M4, M4F:  $p=0.001$ ,  $p=0.01$ ).

### Male vs. female JSE-S scores for students selecting core vs. non-core specialties

Table 3 and Figure 1 show that there is a decline in JSE-S scores for men selecting Core specialties from the M1 to the M4 time points, with a rebound at the M4F time point. The M1 male JSE-S scores declined from 112.41 ± 10.15 during orientation to 108.25 ± 16.09 just before graduation. This is a 3.7 % decline in JSE-S scores and is not significant, as determined by the overall ANOVA model ( $F=1.512$ ,  $p=0.198$ ). Just like the men selecting Core specialties, those men selecting Non-Core specialties also showed similar variations in JSE-S scores, with an increase from M1 to the M2 time point, a decrease at the M3 and M4 time points, and then a rebound at the M4F time point. The overall ANOVA model for Male Non-Core JSE-S scores is significant ( $F=3.788$ ,

$p=0.005$ ), with the only statistically significant difference between M2 and M4 time points, with scores of 110.14 ± 12.70 and 103.76 ± 14.12, representing a 5.8 % drop in JSE-S scores. This is significant under Tukey's HSD with  $p=0.011$ .

Table 4 and Figure 1 show the differences in JSE-S scores for women who select either Core or Non-Core specialties. For women selecting Core specialties, there is a very slight increase in JSE-S scores from the M1 to the M2 time points (117.65 ± 8.64 vs. 117.85 ± 10.25, respectively), followed by a steady decline to the M4F time point of 115.09 ± 13.17. This constitutes an overall 2.2 % M1 to M4F decline in female Core JSE-S scores and is not significant in terms of the overall ANOVA model ( $F=1.433$ ,  $p=0.222$ ). Those women selecting Non-Core specialties showed a decline in JSE-S scores M1 to the M3 time points (117.58 ± 9.59 to 112.94 ± 10.17, respectively), but then it rebounded for the M4 and M4F time points, for an M4F JSE-S Non-Core score of 113.28 ± 13.19. This results in an overall 3.9 % M1 to M4F decline in female Non-Core JSE-S scores. Although the overall ANOVA model is statistically significant ( $F=2.777$ ,  $p=0.027$ ), there are no significant differences between the pairwise comparisons of the program year level by Tukey's HSD. Overall, women selecting Non-Core specialties had drops in JSE-S scores that are almost twice that of women selecting Core

**Table 4:** Average M1–M4F Female Core vs. Non-Core JSE-S scores for the 2017–2019 CUSOM cohorts.

DO program year	JSE-S female core			JSE-S female Non-Core			JSE-S female total		
	n	Mean	Std. Dev.	n	Mean	Std. Dev.	n	Mean	Std. Dev.
M1	91	117.65	8.64	85	117.58	9.59	176	117.61	9.09
M2	97	117.85	10.25	79	116.76	10.15	176	117.36	10.19
M3	110	116.60	10.86	66	112.94	10.17	176	115.23	10.73
M4	128	115.38	11.16	48	113.85	11.36	176	114.96	11.20
M4F	129	115.09	13.17	47	113.28	13.19	176	114.60	13.16
Total	555	116.35	11.11	325	115.26	10.81	880	115.95	11.01

CUSOM, Campbell University Jerry M. Wallace School of Osteopathic Medicine; DO, Doctor of Osteopathic Medicine; JSE-S, Jefferson Scale of Empathy-Student Version.

specialties, indicating that the cognitive empathy of women in Core specialties is better maintained throughout their undergraduate osteopathic training.

### CUSOM JSE-S scores vs. POMEE data

The JSE-S data in the current study can be compared to the nationwide cohort of US osteopathic medical students from 41 campuses that were published in POMEE Tables 2 and 4 (n=5,818) in the study by Hojat and colleagues [5].

When the CUSOM data are compared to the appropriate POMEE data tables, the combined men and women JSE-S scores (n=345) placed the CUSOM-entering students (M1 time point) at the 37th POMEE percentile. When the M1 male and female scores are separated, the men are at the 31st percentile, and the women are at the 41st percentile. After finishing the first basic science year (M2 time point), the combined male and female JSE-S score slightly increased to the 41st percentile; the M2 men are at the 38th percentile, and the women at the 44th percentile. All JSE-S percentiles dropped after completing the second basic science year (M3 time point). The combined M3 JSE-S score is at the 35th POMEE percentile; the male score is at the 32nd percentile, and the female score is at the 38th percentile. There is a further drop in POMEE percentile scores after finishing the first year of clinical rotations (M4 time point). The combined JSE-S score was at the 33rd percentile; the M4 male score is at the 29th percentile, and the female score is at the 36th percentile. After finishing the second year of clinical rotations (M4F time point), the male percentile rebounded from the 29th to the 35th percentile; however, the M4F female and combined scores did not change percentile rankings from the M4 time point (36th percentile), nor did the combined total ranking (33rd percentile). Note that none of the CUSOM percentile rankings are above the 50th percentile compared to the POMEE cohort, with the lowest ranking attributed to men after finishing their first year of

clinical rotations (i.e., the M4 time point; 29th percentile) and the highest ranking by women after finishing their first basic science year courses (i.e., M2 time point; 44th percentile). Both men and women had their lowest POMEE percentile rankings after finishing their first year of clinical rotations.

## Discussion

### Comparison to other osteopathic and allopathic studies

Some cross-sectional studies [9–11, 17, 18] show that some osteopathic or allopathic student JSE-S scores drop during medical education, especially after the third year of medical education. For osteopathic schools, McTighe and colleagues [11] revealed that third-year students had JSE scores that were significantly lower when compared to first- or second-year students (108.7 vs. 111.3 and 112.4, respectively; n=717; p<0.05). However, Calabrese and colleagues [9] also showed no significant declines in JSE scores in the third- and fourth-year osteopathic students when compared to their first- and second-year JSE-S scores (n=373; p=0.25). Kimmelman et al. [10] also did not show a significant decrease in JSE-S scores during undergraduate medical education (n=405; p=0.196). In contrast, our longitudinal data show that there are significant drops in cognitive empathy scores for men, but not women, over their four years of undergraduate osteopathic medical training. In agreement with other studies of osteopathic medical students, women have higher JSE-S scores than men [5, 7, 12].

Men or women who select Core, (people-oriented) specialties do not have significant decreases in their JSE-S scores as they progress through medical school. In contrast, combined male and female students who select Non-Core (technical- or procedure-oriented) specialties have significantly lower JSE-S scores as they progress through medical school. This significant decrease can be attributed to male JSE-S scores,

when segregated from female scores. This agrees with other studies that show that students who select people-oriented specialties in allopathic or osteopathic schools have higher JSE-S scores than those who do not [19–22]. Hojat and colleagues [19] showed that students interested in primary care specialties had significantly higher JSE-S scores than students who desired to enter procedure- or technical-oriented specialties ( $n=422$ ;  $p<0.01$ ). This result was substantiated by studies by Chen et al. [20], who showed that students selecting people-oriented specialties had significantly higher JSE-S scores than students selecting technology-oriented specialties ( $n=1,162$ ;  $p<0.05$ ), and by Hojat et al. [22], who showed the same results regardless of the year of medical school ( $n=10,751$ ;  $p<0.001$ ). Dehning and colleagues [21] showed that psychiatrists, who have considerable patient contact and continuity of care, had significantly higher JSE scores than surgeons who have little continuity of care ( $n=106$ ,  $p<0.0006$ ). The study by Kimmelman and colleagues [10] shows a significant difference in osteopathic JSE-S scores regarding specialty selection between those that are people-vs. technology-oriented (110.3 vs. 105.6, respectively.  $n=415$ ;  $p=0.29$ ).

As discussed previously, there are numerous studies that have examined JSE-S scores in allopathic schools, and the osteopathic JSE-S data in this study agree with those studies in that JSE-S scores decline throughout the 4 years of undergraduate medical education [12, 17, 18]. In many of the studies, the greatest decline in JSE-S scores occurred after the completion of the first year of clinical rotations [11, 18, 23]. Most likely, the decline can be attributed to the pressures of finally treating actual patients, longer work/study hours, depersonalization/burnout [24], and deidealization [25].

Another factor that may have impacted JSE-S scores is the anxiety of studying and taking Step 1 board examinations. Most students take the board examinations during the summer between their second and third years. The data reveal that there is no significant drop in the M3 JSE-S scores, which are obtained at the start of the third year, when compared to the M2 time point taken at the start of the second year. A similar finding was seen in an allopathic longitudinal study in which there was no significant drop between the M2 and the M3 time points [13]. This indicates that the stress of taking board examinations does not have a significant impact on JSE-S scores.

### Desired specialty choice

As the current data show, the decline in cognitive empathy scores is greatest for those students who desire to enter Non-Core specialties for their residencies. However, there is the possibility that those students who wanted to go into

Non-Core specialties did not get their Non-Core specialty match and, instead, had to take a residency in a Core specialty. Consequently, the Core M4F JSE-S scores may be slightly depressed. A previous publication examined this possibility and showed that many students decide on what they want to specialize by the start of their clinical rotations in the third year [14]. However, there are students who change their mind after their first year of clinical rotations. At the start of the fourth year, 18.6 % (64/345) of students changed what they desired as a specialty. Of those, 28 switched from a Non-Core to a Core specialty, with Family Medicine and Internal Medicine being the most popular choices (12 and 10 students, respectively). The other students who switched their desired specialty were 17 who changed within the Core specialties, 13 who switched their Non-Core specialty choice, and 6 who switched from a Core to a Non-Core specialty.

At the M4F time point, when data was collected just before graduation, 8.4 % (29/345) of the graduates went into residencies that were not their first choice. Once again, the largest change occurred from graduates entering their Core vs. their desired Non-Core residencies (15/29). Seven of those graduates entered an Internal Medicine residency, and five entered Family Medicine, while the others entered Ob/Gyn, Pediatrics, or Psychiatry. Five graduates changed their Core residency choice, eight changed their Non-Core choice, and one student changed from a Core to a Non-Core residency (Pediatrics to Neurology). The main reasons for changing their specialty choices from a Non-Core to a Core residency at the M4 and M4F time points were advice from their clinical advisors combined with the fact their board scores were not competitive enough for the Non-Core specialties they desired to enter, e.g., Dermatology, Ophthalmology, and Plastic Surgery. Nevertheless, any decline in cognitive empathy, regardless of what residency they entered, can impact the effectiveness of student-doctors or physicians communicating with their patients, because it has been shown that physicians with higher amounts of perceived cognitive empathy have patient interactions that lead to better clinical outcomes [1–3].

### Comparison to the POMEE data

It is concerning that the JSE-S data show that the combined cohort of male and female medical students entering CUSOM do not rank any higher than the 37th percentile when compared to the norms established by the POMEE study ( $n=10,751$ ) [5]. The lowest percentile score was for men selecting Non-Core specialties (25th percentile) after finishing their first year of clinical rotations. The highest

percentile score for men (44th percentile) occurred after they finished their first year of basic science courses. The highest score for women (44th percentile) occurred three times and was for those entering Core specialties after finishing their first basic science year and after finishing both of their clinical rotation years. This indicates that the women who desired Core specialties were better able to maintain their cognitive empathy skills, especially when compared to their male classmates who preferred Non-Core specialties. This supports the research by Bylund and Makoul [26] and Roter et al. [27], who found that female physicians spend more time with their patients, engage in more communication with increased amounts of perceived empathy ( $n=249$ ;  $p<0.05$ , and a meta-analytic review in which  $n=870$ ;  $p<0.001$ , respectively). The current data show that CUSOM students, when compared to the POMEE cohort, have lower JSE-S scores than their counterparts across the United States. This is a clarion call for any osteopathic medical school with lower POMEE JSE-S scores to closely examine their curriculum to help bolster the cognitive empathic skills of their students before they enter clinical rotations. Therefore, it will be valuable to better educate clinicians on the importance of empathic communication skills, especially those who are preceptors in the clinical rotations.

## Limitations

One limitation of this study is that it was performed at a single osteopathic medical school. Another potential limitation is although the participation rate was very high for students who filled out all five time points (75.2% of the entire cohort), it is possible that those who did fill out the surveys did so because they may have a greater prosocial attitude vs. those who preferred not to fill out the survey forms [28]. Thus, it is possible that the reported CUSOM JSE-S data may be slightly skewed toward higher scores vs. if all students had participated for all five time points. Another limitation is that these data were collected before the CUSOM curriculum and clinical rotations had to be adjusted because of COVID-19. Therefore, comparisons to any empathy research data collected during or after the pandemic need to take this into consideration when comparing those results to the current study.

## Conclusions

These data show that male JSE-S scores significantly drop from the M1 to the M4F time point, whereas female JSE-S

scores do not significantly decrease. This indicates that female students have a better ability to communicate and relate to patients and that this is especially true for those students selecting Core “people-oriented” specialties vs. those who entered Non-Core residencies.

It is concerning that none of the CUSOM JSE-S scores are above the 50th percentile, as compared to the thousands of osteopathic students across the United States who participated in the POMEE study, with the lowest ranking attributed to both men and women after finishing their first year of clinical rotations (i.e., the M4 time point). This warrants an examination of the current curriculum to enhance students’ cognitive empathy skills for future patient interactions and the need to better educate clinical preceptors.

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**Research ethics:** This study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). Campbell University IRB #30; reviewed and approved the study.

**Informed consent:** Informed consent was obtained from all individuals included in this study, or their legal guardians or wards.

**Author contributions:** Both authors provided substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data. Dr. Newton drafted the article and revised it critically for important intellectual content. Dr. Vaskalis provided statistical support and gave final approval of the version of the article to be published. Both authors have accepted responsibility for the entire content of this manuscript and approved its submission.

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**Supplementary Material:** This article contains supplementary material (<https://doi.org/10.1515/jom-2023-0014>).