



## AOA Critical Issues in Education

# Empathy Among Orthopaedic Surgery Trainees

Samir Sabharwal, MD, MPH, Carol Lin, MD, Joseph K. Weistroffer, MD, Dawn M. LaPorte, MD, and the Collaborative Orthopaedic Educational Research Group\*

**Background:** It has been postulated that the process of—and stresses associated with—medical training may cause a loss of empathy among trainees. Because empathy is considered an important value for clinicians and may even be associated with better patient outcomes, we assessed the empathy of orthopaedic surgery trainees and identified factors associated with empathy.

**Methods:** Between June and September 2020, an anonymous survey was distributed electronically to trainees in 23 Accreditation Council for Graduate Medical Education-accredited orthopaedic surgery residency programs via the Collaborative Orthopaedic Educational Research Group. The survey comprised the validated Short-Form 8-Item Empathy Quotient (EQ-8) questionnaire—scored on a scale of 0, least empathetic, to 16, most empathetic—and single-item measure of emotional exhaustion and depersonalization derived from the Maslach Burnout Index—scored using a frequency scale. In total, 438 of 605 (72%) trainees completed the survey. The scores were compared via one-way analysis of variance, with Bonferroni correction and Tukey post-hoc testing,  $\alpha = 0.05$ .

**Results:** The mean ( $\pm$ SD) EQ-8 score among respondents was  $11.3 \pm 3.3$ . Women scored significantly higher (mean,  $12.2 \pm 2.8$ ) than men (mean,  $11.2 \pm 3.3$ ) ( $p = 0.02$ ). Mean scores were significantly higher for trainees planning on a career in academic medicine ( $12.0 \pm 2.9$ ) than those intending to pursue private practice ( $10.9 \pm 3.3$ ) or those with a military commitment ( $10.4 \pm 3.4$ ) ( $p = 0.01$ ). An inverse relationship was found between EQ-8 scores and single-item Maslach Burnout Index measures in depersonalization and emotional exhaustion (both,  $p < 0.01$ ). No significant differences were found in EQ-8 scores across postgraduate year, program location, primary training setting, intended fellowship, relationship status, or whether they reported having children.

**Conclusions:** We found no association between postgraduate year and EQ-8 score. Women and those intending to pursue a career in academic medicine had significantly higher levels of empathy. A significant inverse relationship was found between burnout and empathy. Respondents with higher levels of emotional exhaustion and depersonalization had lower levels of empathy.

\*Additional members of the Collaborative Orthopaedic Educational Research Group are listed in a Note at the end of the article.

**Disclosure:** The **Disclosure of Potential Conflicts of Interest** forms are provided with the online version of the article (<http://links.lww.com/JBJSOA/A305>).

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## Introduction

Empathy—the ability to understand and communicate the understanding of another person’s perspective—has been frequently cited as an important value for clinicians, a foundation for providing thoughtful and compassionate patient care, and may be associated with better patient outcomes<sup>1-5</sup>. However, a growing body of work has suggested that the process of—and stresses associated with—medical training may result in an “erosion” of trainees’ empathy<sup>6-8</sup>. The relationship between empathy and “burnout” among healthcare workers has also been explored, showing lower empathy levels in burned out providers<sup>9-15</sup>.

We sought to investigate empathy among orthopaedic surgery trainees to assess whether empathy differs among trainees according to postgraduate years of training and whether factors such as training environment, personal characteristics, professional characteristics, workload, support, and burnout are associated with differences in empathy.

## Materials and Methods

### Survey Distribution

After obtaining institutional review board exemption, we developed a cross-sectional survey via a modified Delphi method in collaboration with all authors. We successfully piloted our survey among orthopaedic surgery trainees at the senior author’s institution. No substantial adjustments were made between the pilot survey and our final anonymous, 26-item Qualtrics survey (Appendix 1), which we distributed electronically via the Collaborative Orthopaedic Educational Research Group (COERG). The COERG is a consortium of academic orthopaedic surgeons with an interest in education research. COERG representatives from 23 Accreditation Council for Graduate Medical Education (ACGME)-accredited orthopaedic residency programs across the United States agreed to participate in this study and distributed our survey to 605 residents between June and September 2020. Survey recipients were asked to respond only once. Partially completed surveys were included in our analysis.

### Survey Questions

Our survey included questions regarding training environment (program location and primary training setting), personal characteristics (sex, relationship status, and whether they reported being parents [herein, “parental status”]), professional characteristics (postgraduate year in training, intended fellowship specialty, and intended career plan), and workload (in-house call volume and violation of ACGME duty hours). We also assessed self-identification as a mentor to junior trainees and endorsement of the belief that the respondent felt supported and that their opinion was valued within the department.

The survey comprised the validated Short-Form 8-Item Empathy Quotient (EQ-8) questionnaire and single-item measures of emotional exhaustion and depersonalization derived from the Maslach Burnout Index<sup>16-20</sup>. The EQ-8 was

developed as a short-form survey instrument according to a principal components factor analysis of the original 60-item Empathy Quotient questionnaire. The EQ-8 uses a modified Likert scale (“strongly agree,” “slightly agree,” “slightly disagree,” and “strongly disagree”) to render scores for each of the 8 questions. For the 4 affirmative items (in which agreement shows the more empathetic response), “strongly agree” renders 2 points, “slightly agree” renders 1 point, and other responses render 0 points. For the 4 reversal items (in which disagreement shows the more empathetic response), “strongly disagree” renders 2 points, “slightly disagree” renders 1 point, and other responses render 0 points. These individual item scores are summed to render the EQ-8 score, with 0 being the least empathetic to 16 being the most empathetic<sup>18,19</sup>. The single-item measures derived from the Maslach Burnout Index ask respondents to select their frequency of emotional exhaustion (“I feel burned out from my work”) and depersonalization (“Since starting residency, I have become more callous toward people”)<sup>20</sup>. In the original definition by Maslach and Jackson<sup>21</sup>, emotional exhaustion describes “feelings of being emotionally overextended and exhausted by one’s work” and depersonalization describes “an unfeeling and impersonal response towards recipients of one’s care or service.”

### Respondents

We received 438 responses (response rate, 72%). Respondents represented all years in training, all US program locations (Northeast, Southeast, Southwest, Midwest, and West) and all primary training settings (community, public university, private university, and military) (Table I). The most represented group was postgraduate year-1 trainees (24%). Most respondents reported training primarily in the public university setting (51%), and the most represented location was the Midwest (37%). Most respondents identified as men ( $n = 360$ , 82%), partnered/married ( $n = 279$ , 64%), and without children ( $n = 340$ , 78%). A wide range of intended fellowships and career plans were represented. The mean age of respondents was 29 years (range, 24 to 44; SD, 2.7).

### Statistical Analysis

Responses were imported from Qualtrics into SPSS Statistics, version 26.0, software (IBM) for analysis. EQ-8 scores were tabulated. The scores were compared via one-way analysis of variance, with Bonferroni correction and Tukey post hoc testing. For the single-item Maslach Burnout Index measures, F-testing for linearity and deviation from linearity was also conducted. Significance was defined as  $\alpha = 0.05$ .

## Results

The mean ( $\pm$ SD) EQ-8 score among all respondents was  $11.3 \pm 3.3$ . Distribution of EQ-8 scores showed a mild to moderate skew, with skewness of  $-0.54$  and kurtosis of  $-0.14$  (Fig. 1). No significant differences were found in EQ-8 scores for the following factors: program location, primary training setting, relationship status, parental status, postgraduate year,

TABLE I Characteristics and EQ-8 Scores of Survey Respondents

Characteristic	N (%)	EQ-8 Score, Mean $\pm$ SD
Postgraduate year		
1	107 (24)	11.6 $\pm$ 3.1
2	83 (19)	11.1 $\pm$ 3.1
3	83 (19)	11.1 $\pm$ 3.6
4	72 (16)	11.6 $\pm$ 3.1
5	76 (17)	11.1 $\pm$ 3.1
6	14 (3.2)	12.6 $\pm$ 3.5
Not reported	3 (0.68)	
Program location		
Northeast	139 (32)	11.6 $\pm$ 3.2
Southeast	84 (19)	10.9 $\pm$ 3.4
Southwest	5 (1.1)	10.4 $\pm$ 5.3
Midwest	163 (37)	11.2 $\pm$ 3.2
West	45 (10)	12.0 $\pm$ 2.7
Not reported	2 (0.46)	
Primary training setting		
Community	78 (18)	11.7 $\pm$ 2.9
Public university	222 (51)	11.2 $\pm$ 3.4
Private university	128 (29)	11.5 $\pm$ 3.0
Military	8 (1.8)	11.1 $\pm$ 3.2
Not reported	2 (0.46)	
Sex		
Male	360 (82)	11.2 $\pm$ 3.3
Female	76 (17)	12.2 $\pm$ 2.8
Not reported	2 (0.46)	
Relationship status		
Single	151 (34)	11.2 $\pm$ 3.2
Partnered/married	279 (64)	11.5 $\pm$ 3.2
Separated/divorced	6 (1.4)	10.2 $\pm$ 5.2
Not reported	2 (0.46)	
Children		
Yes	95 (22)	11.3 $\pm$ 3.2
No	340 (78)	11.4 $\pm$ 3.2
Not reported	3 (0.68)	
Intended fellowship		
General practice	9 (2.1)	10.8 $\pm$ 3.1
Hand	41 (9.4)	10.6 $\pm$ 3.8
Pediatrics	16 (3.7)	11.2 $\pm$ 2.8
Oncology	5 (1.1)	10.8 $\pm$ 3.3
Spine	30 (6.8)	11.8 $\pm$ 3.9
Sports medicine	71 (16)	11.5 $\pm$ 2.9
Arthroplasty	55 (13)	10.8 $\pm$ 2.9
Foot and ankle	11 (2.5)	9.4 $\pm$ 3.4
Shoulder and elbow	13 (3.0)	12.3 $\pm$ 2.9
Trauma	30 (6.8)	11.7 $\pm$ 3.3
Undecided	144 (33)	11.7 $\pm$ 3.1

*continued*

TABLE I (continued)

Characteristic	N (%)	EQ-8 Score, Mean $\pm$ SD
$\geq 2$ Fellowships	11 (2.5)	11.5 $\pm$ 4.1
Not reported	2 (0.46)	
Career plans		
Academic medicine	153 (35)	12.0 $\pm$ 2.9
Private practice	228 (52)	10.9 $\pm$ 3.3
Military commitment	21 (4.8)	10.4 $\pm$ 3.4
Other	33 (7.5)	11.6 $\pm$ 3.4
Not reported	3 (0.68)	

\*EQ-8 = Short-Form 8-Item Empathy Quotient questionnaire.

and intended fellowship specialty (Table I). Women had significantly higher mean EQ-8 scores (12.2  $\pm$  2.8) than men (11.2  $\pm$  3.3) ( $p = 0.02$ ). In addition, those planning on a career in academic medicine had significantly higher mean EQ-8 scores (12.0  $\pm$  2.9) than those intending to pursue private practice (10.9  $\pm$  3.3) or those with a military commitment (10.4  $\pm$  3.4) ( $p = 0.01$ ).

In-house call volume (more than 4 calls/month) and the presence of >80 work hours/week, averaged over a month, were not significantly associated with differences in EQ-8 scores (Table II). Significantly higher EQ-8 scores were found among respondents who endorsed feeling supported outside of residency ( $p < 0.01$ ), who believed their opinion was valued within the department ( $p < 0.01$ ), and who self-identified as mentors to junior trainees and students ( $p = 0.02$ ) than those who did not.

A significant difference was found in EQ-8 scores regarding depersonalization and emotional exhaustion single-item Maslach Burnout Index measures (both,  $p < 0.01$ ; Table III). Linearity testing showed an inverse linear relationship between the domains of empathy and depersonalization (linearity  $p < 0.01$ , deviation from linearity  $p = 0.88$ ; Fig. 2) and emotional exhaustion (linearity  $p < 0.01$ , deviation from linearity  $p = 0.20$ ; Fig. 3).

## Discussion

The mean EQ-8 score for orthopaedic trainees (11.3) was higher than that of the general population (9.6  $\pm$  3.5) as reported by Loewen et al.<sup>18</sup>, derived from their initial validation cohort. Among our respondents, years in training and workload (regarding duty hour violations and in-house call burden) were not associated with differences in empathy, which contrasts previous work associating the process of medical training with a progressive “erosion” of trainees’ empathy<sup>6,8</sup>. We found a significant, inverse relationship between burnout (emotional exhaustion and depersonalization) and empathy. Respondents who identified higher levels of emotional exhaustion and depersonalization scored lower in empathy, indicating a potential target group for future interventions. Self-identification as a mentor to

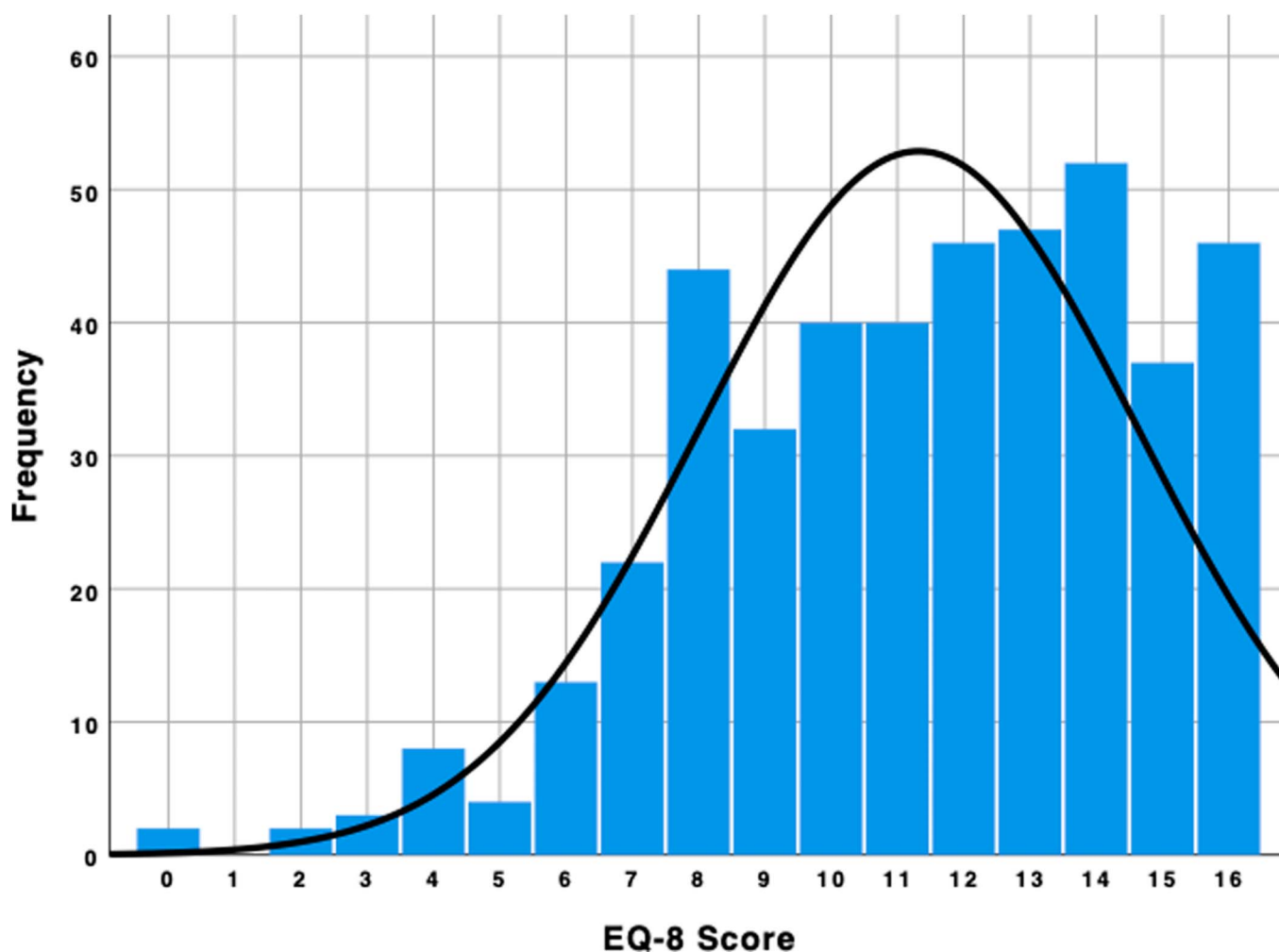


Fig. 1  
Histogram of EQ-8 score distribution among survey respondents. The mean ( $\pm$ SD) EQ-8 score among all respondents was  $11.3 \pm 3.3$ . Distribution of EQ-8 scores showed a mild to moderate skew, with skewness of  $-0.54$  and kurtosis of  $-0.14$ . EQ-8 = Short-Form 8-Item Empathy Quotient.

juniors, feeling supported outside of residency, and feeling that one's opinion was valued within the department were all significantly associated with higher empathy scores, supporting the value of engagement with work and development of an outside support system as protective factors. We also found that women and those intending to pursue academic careers had significantly higher empathy scores.

Multiple studies of the EQ-Short and original EQ have reported higher empathy scores among women<sup>16,17,19</sup>. In our cohort, the difference in scores between women and men, although significant, was smaller than the predicted model by Loewen et al.<sup>18</sup>. Gender was the factor with the strongest effect on EQ-8 scores in the initial validation cohort by Loewen et al., more so than age, education, and income. Women had a 1.7-point predicted difference in EQ-8 scores compared with men<sup>18</sup>. Interestingly, a longitudinal study of medical students in the United Kingdom found that female trainees experienced greater decreases in empathy<sup>20</sup>. This finding was not replicated by a similar study of American

medical students, which found similar patterns of decline in men and women<sup>6</sup>.

Also striking in our cohort was the difference in empathy found across respondents' intended career plans. Those intent on a career in academic medicine scored significantly higher than those planning on entering private practice or those with a military commitment. This finding is consistent with earlier work on the empathy-altruism hypothesis, which posits that higher levels of empathy promote "empathetic concern" toward others and further altruistic behaviors, such as knowledge sharing<sup>22-25</sup>.

Symptoms of burnout, specifically depersonalization and emotional exhaustion, were associated with lower empathy levels, whereas workload (in duty hour violations and volume of in-house calls) and years in training were not. A growing body of work has identified the inverse relationship between burnout and empathy, which our findings corroborate<sup>9-11,13-15</sup>. The fact that the duration in training was not associated with empathy differences in our cohort contrasts with previous work in medical trainees<sup>6-8,26</sup>. This finding may suggest that the

**TABLE II Responses Relating to Workload and Support, with Associated EQ-8 Scores\***

Survey Question	N (%)	EQ-8 Score, Mean ± SD
Are you currently taking >4 in-house calls per month?		
Yes	156 (36)	11.2 ± 3.3
No	280 (64)	11.5 ± 3.2
Not reported	2 (0.46)	
In the past year, have you ever worked >80 hours per week, averaged over a month?		
Yes	191 (44)	11.2 ± 3.3
No	245 (56)	11.5 ± 3.1
Not reported	2 (0.46)	
I feel supported by my residency program		
Agree	415 (95)	11.4 ± 3.2
Disagree	23 (5.3)	10.0 ± 4.2
I feel supported outside of residency†		
Agree	424 (97)	11.4 ± 3.2
Disagree	14 (3.2)	8.2 ± 4.8
I believe my opinion is valued within the department†		
Agree	389 (89)	11.6 ± 3.1
Disagree	49 (11)	9.5 ± 4.2
I am a mentor to junior trainees and students†		
Agree	418 (95)	11.4 ± 3.2
Disagree	20 (4.6)	9.6 ± 4.7

\*EQ-8 = Short-Form 8-Item Empathy Quotient questionnaire. †Indicates a significant difference between groups based on one-way analysis of variance testing ( $p < 0.05$ ), with Bonferroni correction.

described empathy decline occurs earlier in training, before trainees begin residency, or that qualities of orthopaedic surgery residents, as a subgroup, make them less susceptible to

empathy erosion than medical trainees as a whole. Comparative study of empathy among postgraduate trainees may shed further light on this.

**TABLE III Responses Relating to Depersonalization and Emotional Exhaustion Domains, Single-Item Maslach Burnout Index, with Associated EQ-8 Scores\***

Survey Question	N (%)	EQ-8 Score, Mean ± SD
Since starting residency, I have become more callous toward people†		
Never	71 (16)	12.3 ± 3.0
A few times a year or less	123 (28)	11.7 ± 3.0
Once a month or less	73 (17)	11.5 ± 3.0
A few times a month	89 (20)	11.1 ± 3.5
Once a week or more	79 (18)	10.3 ± 3.3
Not reported	3 (0.68)	
I feel burned out from my work†		
Never	39 (8.9)	12.0 ± 3.6
A few times a year or less	153 (35)	12.0 ± 3.0
Once a month or less	84 (19)	10.9 ± 3.1
A few times a month	89 (20)	10.7 ± 3.3
Once a week or more	69 (16)	10.9 ± 3.3
Not reported	4 (0.91)	

\*EQ-8 = Short-Form 8-Item Empathy Quotient questionnaire. †Indicates a significant difference between groups based on one-way analysis of variance testing ( $p < 0.05$ ), with Bonferroni correction.

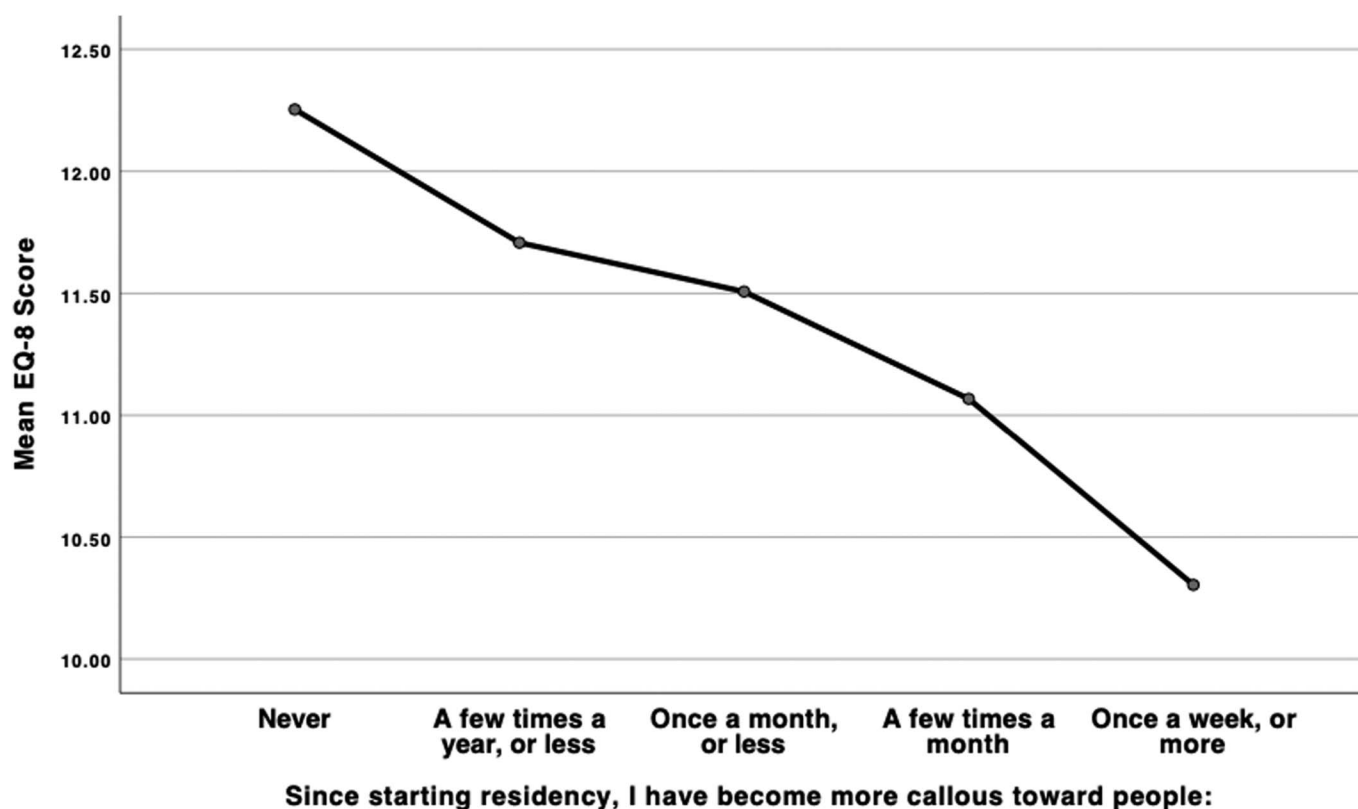


Fig. 2  
Means plot of EQ-8 scores and single-item Maslach Burnout Index depersonalization domain. The graph shows a significant, inverse relationship between depersonalization and empathy among survey respondents ( $p < 0.01$ ; linearity  $p < 0.01$ , deviation from linearity  $p = 0.88$ ). EQ-8 = Short-Form 8-Item Empathy Quotient.

Our findings suggest that the effects of surgical residency on a trainee's empathy are not necessarily workload- or duration-dependent, but rather related to the processes of depersonalization and emotional exhaustion, which affect individual trainees to varying degrees. Burnout among orthopaedic surgeons and trainees has been the subject of a growing body of work but is largely focused on the prevalence and identification of risk factors rather than its impact on performance<sup>27-32</sup>. Internal medicine research has shown effectiveness of a targeted intervention, comprising stress management and resilience training, and is worth pursuing for the orthopaedic population<sup>33</sup>.

In addition, respondents who endorsed feeling supported outside of residency, who believed their opinion was valued within the department, and who self-identified as mentors to junior trainees and students all scored significantly higher in empathy than those who did not. This finding corroborates previous work showing the benefits of establishing social support systems and the importance of promoting engagement in and deriving meaning from work<sup>29,34,35</sup>.

#### Limitations

We believe ours is the first study to evaluate empathy among orthopaedic surgery trainees and the first to use the EQ-8 score

to assess empathy in physicians. We had a very high response rate at over 70%. However, with postgraduate year-1 trainees representing the largest group of respondents and with lower representation in later class years, selection bias may affect our results, especially if the more empathetic (or less burned out) trainees were more likely to respond. In addition to selection bias, the accuracy of our results may be undermined by response bias, particularly social desirability bias<sup>36</sup>. Respondents may tend to self-report to depict themselves as more empathetic and harder working. Although there may be a component of response bias, the finding that 44% reported working more than 80 hours per week, averaged over a month—when this number should be close to 0 (per ACGME requirements)—warrants attention by program leaders.

In addition, this survey was conducted during the COVID-19 pandemic, a period during which residency programs may have adopted modified programming, a deviation that may have affected how trainees responded to the questions<sup>37</sup>. Ours is a cross-sectional study. A longitudinal study tracking changes in empathy in individual respondents over time may more accurately determine whether erosion of empathy occurs during the course of orthopaedic training. Univariable analyses may discount the presence of confounding relationships and interactions between factors associated with

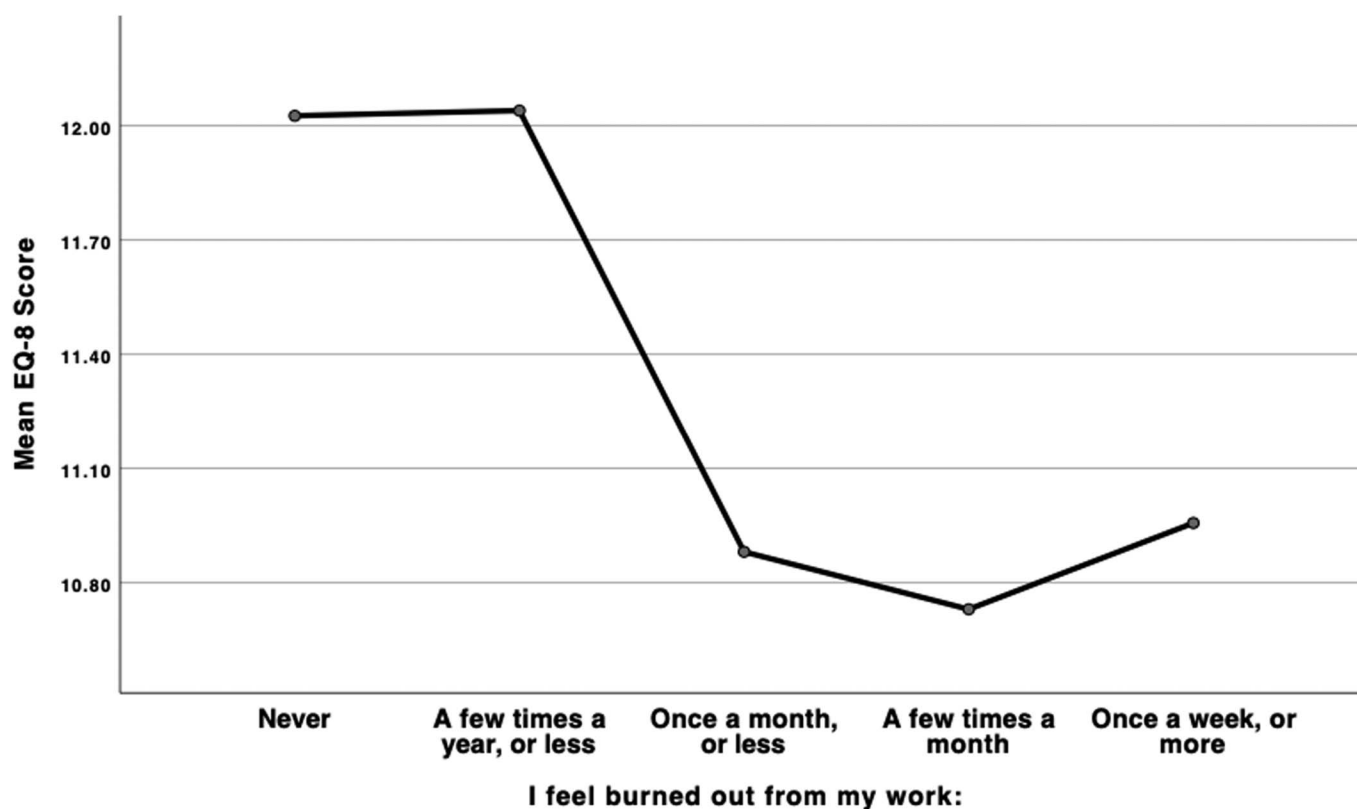



Fig. 3  
Means plot of EQ-8 scores and single-item Maslach Burnout Index emotional exhaustion domain. The graph shows a significant, inverse relationship between emotional exhaustion and empathy among survey respondents ( $p < 0.01$ ; linearity  $p < 0.01$ , deviation from linearity  $p = 0.20$ ). EQ-8 = Short-Form 8-Item Empathy Quotient.

empathy. Additional factors, such as indebtedness and program size, may also play a role in burnout and empathy, and we did not ask respondents about these factors.

### Conclusion

In our cohort of orthopaedic surgery trainees, women and those intending to pursue careers in academic medicine had higher levels of empathy. No differences in empathy were found across postgraduate years-in-training and regarding the volume of in-house calls or violation of duty hours. However, we found a significant inverse relationship between empathy and burnout in both depersonalization and emotional exhaustion domains. Trainees who felt supported outside of residency and who were more engaged with their programs (being a mentor to juniors, believing their opinions were valued within the department) had higher levels of empathy. This multicenter, cross-sectional study provides the groundwork for a longitudinal study of empathy in surgical trainees along the course of their training and an interventional study on the effect of targeted interventions, such as those relating to burnout prevention, cultivating resilience, and fostering an empathetic mindset. Future work may also include assessing attending physicians at various stages of their careers to assess empathy in the long term.

### Appendix

 Supporting material provided by the authors is posted with the online version of this article as a data supplement at [jbjs.org \(http://links.lww.com/JBJSOA/A306\)](http://links.lww.com/JBJSOA/A306). This content was not copy-edited or verified by JBJS. ■

NOTE: In addition to the authors listed on the title page, the Collaborative Orthopaedic Educational Research Group consists of Brent Ponce, MD, Ann Van Heest, MD, Paul Juliano, MD, Greg Grabowski, MD, Robert Wilson, MD, Brian Scannell, MD, Charles Carr, MD, Ryan Muchow, MD, Danny Wongworawat, MD, Kellie Leitch, MD, Joel Klana, MD, Charles Jobin, MD, Tessa Balach, MD, Melynn Harrington, MD, Greg Vrabec, MD, Raj Rajani, MD, Monica Kogan, MD, Sandra Klein, MD, Trent Guthrie, MD, Charles Pasque, MD, and Kim Templeton, MD.

Samir Sabharwal, MD, MPH<sup>1</sup>  
Carol Lin, MD<sup>2</sup>  
Joseph K. Weistroffer, MD<sup>3</sup>  
Dawn M. LaPorte, MD<sup>1</sup>

<sup>1</sup>Department of Orthopaedic Surgery, The Johns Hopkins University School of Medicine, Baltimore, Maryland

<sup>2</sup>Department of Orthopaedics, Cedars-Sinai Medical Center, Los Angeles, California

<sup>3</sup>Department of Orthopaedic Surgery, Western Michigan University, Kalamazoo, Michigan

Email for corresponding author: [dlaport1@jhmi.edu](mailto:dlaport1@jhmi.edu)

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