



Evaluating and Exploring Variations in Surgical Resident Emotional Intelligence and Burnout

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OBJECTIVE: Surgery resident burnout rates are on the rise, ranging from 50% to 69%. Burnout is associated with increased risk of error and poorer patient satisfaction. Emotional intelligence (EI) is defined as the capacity to be aware of, control, and express one's emotions, and to handle interpersonal relationships judiciously and empathetically. We seek to evaluate the correlation between EI and burnout temporally as a potential target for education. This may allow us to utilize objective measures to reduce burnout among our residents.

DESIGN: A prospective study of general surgery residents at a single institution was performed via self-reporting assessments on personal demographics, the Maslach Burnout Inventory (MBI), and the Scale of Emotional Functioning: Health Service Provider at 3 separate time-points.

SETTING: A medium sized academic medical center in Tennessee approved to graduate 6 chief residents per year.

PARTICIPANTS: All general surgery residents PGY1 to PGY5 including preliminary residents were given the assessment tools and the option of participating. Research residents were excluded.

RESULTS: A total of 86 assessments were completed, including 15 residents who completed all 3 assessments. Changes in the personal achievement (PA) portion of the MBI had the strongest correlation with temporal changes in EI with a Pearson correlation coefficient of 0.606 and 0.616 (p 0.017 and 0.015, respectively). Of the 3 subscales of the MBI, residents had moderate or severe emotional exhaustion for 62% of responses, 73% for depersonalization, and 37% for PA. All categories examined (emotional exhaustion, depersonalization, PA, and EI) saw improvement in scores across 3 administrations.

CONCLUSIONS: Improvements in burnout and EI scores were seen across 3 administrations of surveys without any intervention. In the future, assessing PA may have the highest potential to evaluate burnout indirectly. Designing a curriculum for EI may assist with preventing burnout. (J Surg Ed 76:628–636. © 2018 Published by Elsevier Inc. on behalf of Association of Program Directors in Surgery.)

KEY WORDS: Professional burnout, Emotional intelligence, Depersonalization, Graduate medical education, Internship and residency

COMPETENCIES: Professionalism, Interpersonal and Communication Skills

The Accreditation Council for Graduate Medical Education and the American Board of Surgery (ABS) have specifically designed targets to address competency prior to graduation for residents in technical skills as well as professional skills, including wellness and burnout. This includes a professional milestone subcategory entitled “Maintenance of Resident Physical and Emotional health.” An ideal graduate level from this subcategory is defined as follows: A resident that promotes a healthy work environment, a resident that recognizes and appropriately addresses personal health issues in other members of the health care team, and a resident that is proactive in modifying schedules or intervening in other ways to assure that those caregivers under his or her supervision maintain personal wellness and do not compromise patient safety.¹

Burnout is a serious threat to a healthy work environment. Administrators of graduate medical education training programs are motivated to better understand its origins, correlates, and strategies that might be implemented to reduce its negative effects. Nationally, general surgery residents are experiencing levels of burnout at the alarming rate of 40% to 69%.²⁻⁴ Burnout is defined as a syndrome characterized by a loss of enthusiasm for

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work (emotional exhaustion [EE]), feeling of cynicism (depersonalization [DP]), and a low sense of personal accomplishment (PA).⁵ Maslach et al. have developed a commonly utilized assessment tool that focuses on these 3 domains. In their manual, they cite evidence from the medical field suggesting negative outcomes from burnout such as job turnover, low morale, personal dysfunction, insomnia, increased use of alcohol and drugs, and marital and family problems.⁶ West et al. have demonstrated that a 1-point improvement in burnout score can be associated with decreased medical error.⁷

One potential curricular component that may decrease burnout is knowledge about emotional intelligence (EI) and how it might be enhanced. EI is defined as the capacity to be aware of, control, and express one's emotions, and to handle interpersonal relationships judiciously and empathetically.⁸ EI has been linked to several relevant outcomes, including lower anxiety and depression, important work-based skills, stress regulation, and lower burnout.⁹⁻¹¹ Because of its relation to relevant skills, there has been increasing interest in evaluating EI as an objective marker for residency applications and milestone progression. A prior study among general surgery residents revealed a significant positive correlation between EI and wellness and resistance to burnout.¹² Also, according to Lindeman et al., EI was one of several variables that protected against burnout in surgery residents.¹³ However, more evidence is needed to help define the protective relationship of EI to burnout and the conditions under which it may provide a prophylactic effect. For example, Cofer and Lin each investigated the correlation between EI and resident performance and resident application qualities and failed to find a correlation between high EI and high performance.^{14,15} Thus, the exact nature of the relation between EI and burnout remains elusive, particularly how EI may be related to burnout over time.

METHODS

After obtaining Institutional Review Board (IRB) approval, investigators assessed surgery residents over time. With written consent, they anonymously recorded demographics, burnout levels, and EI at roughly 6-month intervals in January 2017, July 2017, and February 2018. Written consent was obtained at each administration and residents were given the option to participate in the study. To create anonymity, a random identification number was assigned to each resident upon their first administration and they kept this number for subsequent administrations. Evaluators were blinded to residents' identities. A separate administrative person not involved in the study provided the numerical assignment

and was available to remind the resident of their number on subsequent administrations if needed. Each assessment was recorded into a database. The consent contained information on assistance and contact numbers if testing raised personal concern and a need for support. Residents were also provided a contact number that would allow for retrieval of their scores while still maintaining anonymity. Additionally, the assessments were hand completed during orientation for the institution in July and at departmental meetings in January/February to help encourage participation. Incoming residents (surgery, OB/GYN, radiology, internal medicine, dentistry, family medicine, and anesthesiology) responded to the assessments, including the informed consent form, and were given the option of participating. Data are currently being collected on all years of training in those fields; however, the current study focuses on general surgery residents only.

The demographics assessment consists of 8 mandatory data points and 8 optional data points. Demographic data points were consistent for each administration. Mandatory components included age, gender, residency, preliminary vs categorical resident, marital status, and dependents. Optional demographic data points included potential components of wellness such as exercise regularity, religion, medical school curriculum centered on EI and burnout, spirituality, wellness practice, psychometric parameters, and if either parent was a physician. The authors elected to make the later demographic information optional in order to encourage participation from residents who may otherwise have declined due to the sensitive nature of those questions. Due to the wide variations of the definition of "wellness practices" the question was left undefined and residents decided whether or not they practiced wellness strategies on a regular basis.

The Maslach Burnout Inventory (MBI) was administered at each assessment. The 22-question version requires item responses within the categories of EE, DP, and personal accomplishment. Total scores for all questions were then categorized into low, medium, or high burnout. Psychometric properties from the MBI are generally good, but according to the Manual, the psychometrics for the Medical Form has not been determined yet.

Data used to assess EI were obtained from the Scale of Emotional Functioning: Health Service Provider (SEF:HSP; McCallum and Kirkpatrick, personal communication). The SEF:HSP is a trait-based self-report measure of EI and contains 3 scales: Emotional Awareness, Emotional Management, and Interpersonal Skills. Examinees respond to items using a 5-point Likert-type format. Positive and negative wording of items alternated to reduce response set. The current study served in part as a validation study for the SEF:HSP. In total, 3 versions of the SEF:HSP were administered. The first 2 administrations yielded "pilot"

data, i.e., these data were used primarily to inform development of the final instrument used for the correlational analyses showing the relation between EI and burnout reported in this study. SEF:HSP development was based on these pilot data and included calculation of item-scale correlation coefficients, factor analytic data, and scale reliabilities that informed item selection. The final version contains 39 items, selected from the original 69-item version based on their psychometric properties. Scale reliabilities from the first 2 administrations were high, ranging from 0.82 to 0.91. Only items with the highest correlation coefficients with their respective scale were retained, assuming factor loadings were appropriate. The items loaded as expected such that an item written for the Emotional Awareness scale yielded the highest loading on that scale, one written for the Emotional Management scale yielded the highest loading on that scale. The 3 administrations occurred at approximately 6-month intervals. For the third administration reliabilities for the SEF:HSP were 0.87, 0.83, and 0.81 for Emotional Awareness, Emotional Management, and Interpersonal Skills, respectively. Validity of the SEF:HSP was addressed by comparing scores on the SEF:HSP to those from the Profile of Emotional Competence,¹⁶ a well-established measure of EI. The correlation coefficient between the 2 composites is $r(55) = 0.74$, $p < 0.01$.

An a priori sample size calculation was conducted to determine statistical power for the proposed study. Using a proposed large effect size of $f = 0.50$, an alpha value of 0.05, a beta value of 0.20 (1 beta = power), 1 group of participants, 3 within-subjects observations of the outcome, a hypothesized correlation among the repeated measures of 0.5, and a nonsphericity correction of 1.0, it was found that $n = 11$ participants would provide 83.3% power. While evaluating the change in MBI score with the change in EI score, we calculated Pearson correlations to assess the relationship between the change in the combination of EE and DP (as they should have a positive correlation with EI) as well as the relationship between change in PA and EI.

The difference scores between the 3 within-subjects observations of each outcome were checked for normality using skewness and kurtosis statistics. Repeated-measures ANOVA was used to test for within-subjects main effects for each outcome. Mauchly's test was used to assess the assumption of sphericity and the Greenhouse-Geisser correction was used in the event that sphericity was violated. Significant main effects were further tested via a post hoc analyses using Tukey's test. Statistical significance was assumed at an alpha value of 0.05 and all analyses were conducted using SPSS Version 21 (IBM Corp., Armonk, New York).

RESULTS

Response rates across the 3 administrations are, respectively, $N = 30$ (96%), $N = 32$ (100%), and $N = 24$ (78%). For the longitudinal analyses, there are 15 residents that completed all administrations, 13 additional residents that completed 2 consecutive administrations, and 15 additional residents that completed only 1 administration. The study includes several residents who were preliminary surgery residents (8/year) and therefore only available for 1 or 2 administrations as well as chiefs who graduated (5/year) and were no longer available for testing. Demographics for these administrations are summarized in Table 1.

For the first round of testing across all levels, the mean EE score was 19 (moderate), the mean DP score was 12 (moderate), and the mean personal achievement (PA) score was 38 (moderate). When broken down by training levels, all 5 years had at least 1 component of moderate burnout with years PGY-2 and PGY-3 having severe DP scores. Thirty-two general surgery residents completed the second round of testing and across all levels the mean scores were EE 18 (moderate), DP 9 (moderate), and PA 40 (low). Only 1 PGY class had a mean in the severe range and that was the new PGY-4 residents, with a mean DP of 13. Of note, almost every resident in this class of new PGY-4 residents did experience an improvement in their score, although the mean was still within the severe range. Twenty-four general surgery residents completed the third administration and overall means were EE 15 (low), DP 8 (moderate), and PA 42 (low). On this third administration, none of the PGY classes had a mean in the severe burnout category.

When comparing results of all administrations for the total population effect, rather than at the individual level, a nonsignificant main effect was detected for EE across time, $F(2,13) = 2.84$, $p = 0.095$, $\eta^2 = 0.30$, power = 0.46. However, a significant decrease in EE was found between the second and third observations during subsequent post hoc testing, $p = 0.04$. A significant main effect was found for DP, $F(2,13) = 4.87$, $p = 0.026$, $\eta^2 = 0.43$, power = 0.70, and post hoc tests showed that there were significant decreases from the first observation to the second observation, $p = 0.02$, and from the first observation to the third observation, $p = 0.018$. There was not a significant decrease from the second observation to the third observation of DP, $p = 0.379$. Marginal means and 95% confidence intervals can be found in Table 2.

For the PA analysis, a significant main effect was found, $F(2,28) = 5.47$, $p = 0.02$, $\eta^2 = 0.28$, power = 0.70. Post hoc testing found significant increases from observation 1 to observation 3, $p = 0.02$, and from observation 2 to observation 3, $p = 0.04$. There was not a significant

TABLE 1. Demographics

Administration #1 –Total Residents N = 30	Administration #2 –Total Residents N = 32	Administration #3 –Total Residents N = 24
Male: 21	Male: 24	Male: 18
Female: 9	Female: 8	Female: 6
Average age: 29.2	Average age: 29.1	Average age: 29.6
PGY level	PGY level	PGY level
1-13	1-13	1-10
2-6	2-6	2-5
3-4	3-6	3-4
4-3	4-4	4-3
5-4	5-3	5-1
Relationship status	Relationship status	Relationship status
Single: 10	Single: 12	Single: 6
Committed: 11	Committed: 11	Committed: 9
Married: 9	Married: 9	Married: 9
Exposure to EI	Exposure to EI	Exposure to EI
None = 12	None = 15	None = 6
Some: 17	Some: 14	Some: 16
A lot: 1	A lot: 3	A lot: 2
Physician parents	Physician parents	Physician parents
No: 23	No: 26	No: 20
Yes: 7	Yes: 6	Yes: 4
Spiritual	Spiritual	Spiritual
No: 9	No: 9	No: 6
Yes: 21	Yes: 23	Yes: 18
Exercise	Exercise	Exercise
None: 6	None: 4	None: 7
2×/week: 12	2×/week: 15	2×/week: 10
3-4×/week: 9	3-4×/week: 8	3-4×/week: 4
>4×/week: 2 (one chose not to answer)	>4×/week: 5	>4×/week: 3
Wellness	Wellness	Wellness
None: 9	None: 8	None: 3
Rarely: 7	Rarely: 10	Rarely: 10
Some: 6	Some: 11	Some: 6
Always: 5	Always: 3	Always: 5
No answer for 3		

increase from observation 1 to observation 2, $p = 0.10$. Finally, there was a significant main effect associated with EI across the 3 observations, $F(2,13) = 8.26$, $p = 0.001$, $\eta^2 = 0.56$, power = 0.91. Post hoc results showed significant increases in EI from observation 1 to observation 2, $p = 0.002$, and from observation 1 to observation 3, $p = 0.002$. A nonsignificant increase was found for observation 2 to observation 3, $p = 0.404$.

In order to address the relation between MBI, EI, and certain demographics, means and correlation coefficients were calculated. Across all 3 administrations there were minimal differences in MBI scores based on the demographics. There was a nonsignificant trend toward higher self-reported weekly exercise to correlate with lower levels of burnout. No other salient effects occurred.

After accounting for preliminary residents who moved onto other jobs, chief residents who graduated and a

handful of residents who did not participate in the subsequent 2 administrations, 15 residents remained and participated in the remaining 2 administrations. All but 3 residents saw an increase in their average rating score for each EI question between January and July (Table 3).

Results from the Pearson product moment correlation coefficients were used to evaluate the relation between changes in resident's combined EE and depersonalization scores and their change in average EI score. The correlation coefficient assessing change for the 15 residents who completed all 3 administrations and the 9 interns who completed 2 administrations was -0.740 ($p = 0.01$). Additionally, when comparing changes in the third dynamic portion of the MBI-PA to the change in EI, the Pearson correlation coefficient for the residents from the first to second administration was 0.606 ($p = 0.02$) and from the second to third was 0.612 ($p = 0.02$). These are demonstrated in Figures 1 and 2, respectively.

TABLE 2. Marginal Means and Confidence Intervals

Outcome	Administration 1	Administration 2	Administration 3	p Value
EE	19.27 (15.02-23.52)	18.00 (13.50-22.50)	15.27 (10.64-19.89)	0.095
DP	12.00 (9.03-14.98)	9.27 (6.77-11.77)	8.27 (5.21-11.33)	0.026
PA	38.13 (35.41-40.86)	40.27 (37.60-42.94)	41.93 (39.33-44.54)	0.020
EI	3.69 (3.54-3.83)	3.91 (3.75-4.06)	3.96 (3.80-4.12)	0.005

TABLE 3. Demonstrates the Percent Change Per Assessment in Emotional Intelligence Over Three Consecutive Assessments for 15 Individual Residents

Emotional Intelligence—Longitudinal data: 3 Administrations			
	Change in Average EI Question Between 1st and 2nd Administration	Change in Average EI Question Between 2nd and 3rd Administration	
Resident 1	0.36	0.01	
Resident 2	0.30	-0.16	
Resident 3	0.60	0.09	
Resident 4	0.02	0.26	
Resident 5	0.42	-0.32	
Resident 6	-0.16	0.27	
Resident 7	0.26	0.03	
Resident 8	-0.08	-0.26	
Resident 9	0.39	0.47	
Resident 10	0.12	-0.03	
Resident 11	0.58	-0.14	
Resident 12	-0.03	0.28	
Resident 13	0.14	0.18	
Resident 14	0.22	-0.12	
Resident 15	0.20	0.17	

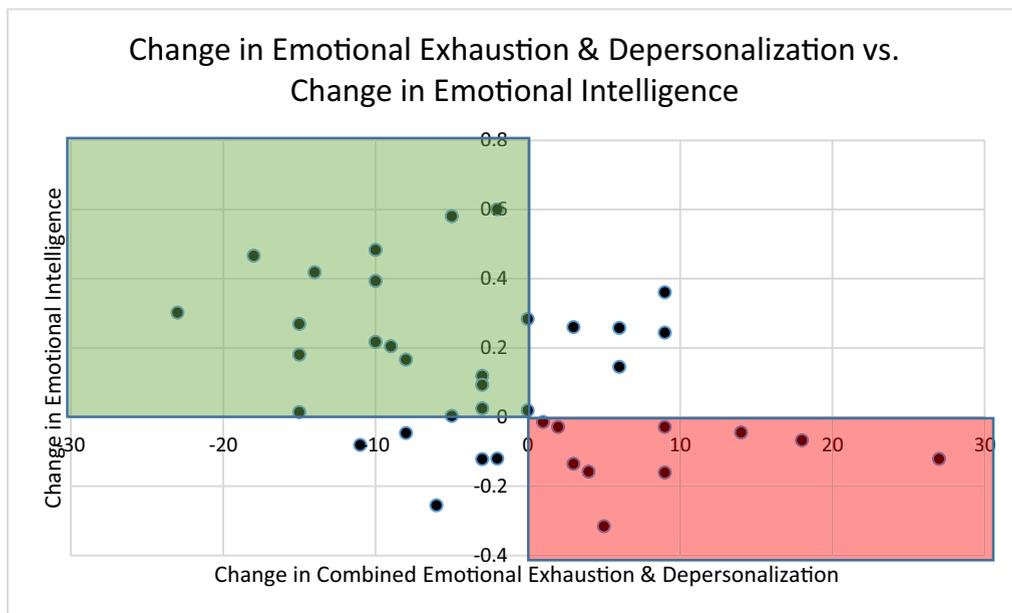


FIGURE 1. Correlation between combined changes in emotional exhaustion and depersonalization as plotted against changes in emotional intelligence.

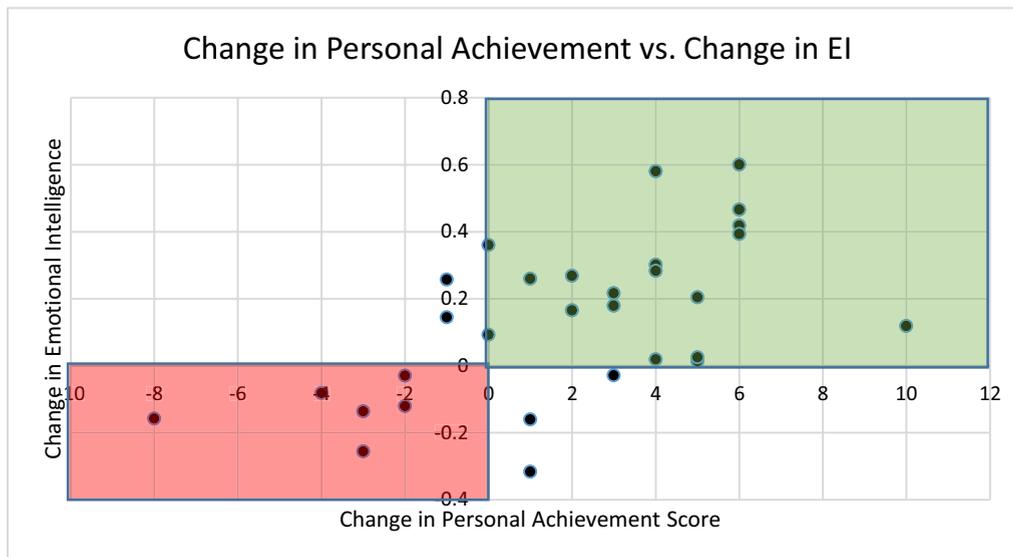


FIGURE 2. Change in personal achievement score plotted against the change in raw average emotional intelligence score.

DISCUSSION

In recent years, the goals of increasing resident wellness and burnout minimization have become increasingly important to medical educators.^{17,18} Burnout rates are approaching 69% for residents and the Accreditation Council for Graduate Medical Education has instituted the use of milestones to ensure residencies are addressing the education of physicians holistically and not just the technical aspects. In our study across all administrations to surgery residents, moderate or severe scores were noted for 62% of responses for EE, 73% of responses for DP, and 37% of responses for PA.

An objective for this study as it moves forward is to evaluate the relationship between EI and burnout over the continuum of residency as currently we only have a snapshot in time of their training. From the results of the first burnout assessment in January 2017, it appeared that there was a sharp increase in DP for house officers in years 2 and 3; however, cautious interpretation is necessary because of the small sample size. The highest point of attrition nationally appears to be within the first 2 years.¹⁹ This would make sense as EE and DP are high and PA is low during this time. Chief residents (PGY-5) had the lowest level of burnout as a whole, which could be attributed to feelings of accomplishment associated with having obtained jobs or fellowships already.

In our study, we saw improvement in burnout across all 3 administrations. Trends we expected to be associated with the training year have not materialized over the 3 assessments, perhaps due to

Money's assertion that burnout can be attributed to both situation and personality among surgeons.²⁰ Despite the fact that scores improved across each administration, no institutional curricular changes were implemented during the time of the assessment. So, the trend may have occurred because of the Hawthorne effect; residents knew they were being studied; and more particularly they may have become sensitized to the effects of burnout and the potential benefits of increasing awareness of their EI as a function of taking the EI and burnout scales.

The longitudinal data allowed a comparison of changes in MBI alongside changes in EI. PA scores yielded the strongest correlation coefficients with EI among the MBI dynamics measured, perhaps because of the introspective nature of the study. As surgical residents, the general public would expect that residents would exhibit high levels of PA, having achieved a highly desirable (and difficult to obtain) career. Recognizing their own achievement takes introspection, likewise EI also requires significant introspection so it is not surprising that those 2 categories correlated strongest.

In regards to timing, there was a slight change in the timing of administration for the winter administration. The first administration occurred at the beginning of January, prior to the surgical in-training ABSITE exam. The third administration occurred at the beginning of February, just after the ABSITE exam. This could explain small differences in burnout, but we would not expect such a large change from the first to the third administration with only the timing as it relates to the ABSITE exam.

We also felt it was important to keep the administrations clustered together, that is, if someone's first assessment happened to be in February it would be kept with all February administrations and not analyzed as part of "administration #1." At our institution in the winter time, many residents will enter the hospital before the sun rises and leave after the sun sets, many will also miss the benefits of being near family for the holiday season, so we felt it would be best served by keeping administrations grouped temporally. These findings are inconsistent with those of Lindeman et al. That is, these results suggest that both burnout and EI are somewhat fluid and can change in a positive direction across the academic year. The Lindeman et al. study reported that burnout was highest at the beginning and end of the academic year, but that EI remained stable. In this study, we operationalize EI and burnout in surgical residents and focused on defining the relation between the 2 over time instead.

While not reaching statistical significance, some demographic trends occurred; for example, residents who self-reported exercising more than 4 times per week experienced lower levels of burnout across the board. Perhaps these residents do not suffer from burn out so they prioritize time and energy to devote to self-care through exercise. Alternatively, perhaps because these residents exercise, and may find more balance in their life to handle the stresses of the job, they experience fewer effects of burnout. Studies examining the effects of exercise among residents and its relation to burnout find positive benefits to exercise and one study recommend an "on-call" workout for orthopedic surgery residents.^{21,22} Evaluating the effects of providing this opportunity should be explored.

LIMITATIONS

All surgery residents at the institution had the opportunity to participate in at least 1 assessment during the study period; however, out of the 20 residents that were able to complete all 3 assessments, excluding the new interns who were not present for the initial administration or the graduating chiefs, only 15 (75%) did. The discrepancy between the number of residents that participated and the number available for all 3 administrations is due to the number of preliminary residents involved in our program (approximately 8/year). The study is ongoing; however, the relatively low participant involvement limits internal and external validity. In addition, generalizability is limited because participants were recruited from only 1 institution and from a single subspecialty of medicine. It is possible that differences in

residency subspecialty may be identified as the study continues. In the demographic portion of the study, the authors failed to include race/ethnicity because the authors assumed burnout would be ubiquitous among surgical residents despite ethnicity. In retrospect, this could potentially have an impact and the authors will be amending the demographic data for future administrations.

Results should be interpreted in light of the Hawthorne effect; according to this phenomenon, individuals modify an aspect of their behavior in response to their awareness of being observed. In this study, the residents could not be blinded to the topics under consideration as the consent form contained goals of the study and offered participants the opportunity to view their results (and obtain help if desired). While there is some data to support "learning the exam,"²³ no residents ever approached the coordinator to determine their MBI or EI scores, despite the fact that they were informed of the confidential nature of the results.

As this study is being conducted in conjunction with the development of a healthcare specific EI tool, we were unable to compare composite nationally norm-based standard scores and instead relied on raw score averages. The EI scale was still being refined but has since undergone validation with the PEC as mentioned in the "Methods" section. Although the EI and MBI measures were counterbalanced, it is possible that intertest variability created an unforeseen effect on EI assessment scores.

Finally, a further limitation of the study includes the fact that there was no opportunity on the forms for residents to self-report current social stressors, work-life issues, or rotation difficulties that might contribute to their burnout. In the future, there will be space provided for these data.

CONCLUSION

Our data confirm an inverse relationship between EI and burnout. In addition, EI may be fluid. This raises the possibility that EI may be valuable in residency curriculum implementation with potential for lowering burnout levels. Through our longitudinal study, we will continue to study variables that contribute to EI and burnout and the relation between the 2. Already, we are in the process of including all residencies and fellowships in the study and intend to recruit additional residencies for a broader assessment. If the trend continues, we hypothesize that surgical program administrators may not need to spend huge sums of money or time focusing on resident wellness in order to see benefit. In fact, simple

“interventions,” including raising awareness of the relationship between EI and burnout, informing residents of the primary characteristics of both, and monitoring residents twice a year may raise sensitivity, and be sufficient to provide a lasting benefit. Finally, results of this study may provide additional insights into residency attrition/noncompletion rates, which could aid recruitment strategies.

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SUPPLEMENTARY INFORMATION

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