A Cross-Sectional Study of Emotional Intelligence in Military General Surgery Residents

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OBJECTIVE: Higher emotional Intelligence (EI) is linked to improved doctor-patient relationships, empathy, teamwork, communication skills, stress management, and leadership in medicine. This study analyzes the effects of age, postgraduate year (PGY), gender, and prior military experience on EI in military general surgery residents, and compares these to the general population and civilian surgery residents.

DESIGN: This is a retrospective, observational study. Results were analyzed using independent sample *t* test and linear regression to compare general surgery residents with the normative population and civilian general surgery residents.

SETTING: The general surgery department at Walter Reed National Military Medical Center, a single-center, academic institution.

PARTICIPANTS: All general surgery residents, PGY 1 to 6, were surveyed at the beginning of academic year, in June 2016.

RESULTS: There were no statistically discernable differences in global EI between male (n = 27) and female residents (n = 19), PGY, or prior military experience. Female general surgery residents show higher global EI, and both males and females scored higher in the self-control factor than the normative population. Mid-residency, there is a nonstatistically discernible dip in many factors and facets of EI.

CONCLUSIONS: Gender differences in EI present in the general population were not appreciated in our cohort of surgery residents, which confirms the results of previous studies. This may be due to the fact that general surgery residents are a more uniform group than the population at large. Additionally, our cohort of military surgery residents demonstrated similar global EI to civilian surgery residents. While PGY had no statistically discernable affect on global, facet, or factor EI, more studies are needed to longitudinally follow changes in EI over the course of surgery residency. (J Surg Ed 76:664–673. Published by Elsevier Inc. on behalf of Association of Program Directors in Surgery.)

KEY WORDS: emotional intelligence, general surgery residents, burn-out

COMPETENCIES: Patient Care, Professionalism, Interpersonal and Communication Skills

INTRODUCTION

Salovey and Mayer first defined the concept of emotional intelligence (EI) in the early 1990's as an "ability to monitor one's own and others' emotions, to discriminate among them, and to use this information to guide one's thinking and actions.[1]" Simply stated, it is the ability of one to recognize, understand their own and others' emotions, and utilize this information in their behaviors or decisions. Goleman popularized EI in the business literature and correlated EI with leadership, improved performance, academic success, increased productivity, and job satisfaction.[2–6] Additionally, higher EI has been correlated with greater self-efficacy in coping with stressful tasks and challenges.[7,8]

In recent years, there has been an increased interest in the medical literature because of the natural relationship between EI and many of the competencies that are required of physicians. A recent systematic review of the medical literature found that higher EI positively contributed to the doctor-patient relationship, empathy, teamwork and communication skills, stress

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management, organization, commitment, and leadership.[9] Additionally, higher resident EI is predictive of job satisfaction and psychological well-being, and is inversely correlated with signs of emotional exhaustion, depression, and burn-out.[10–13]

Despite these relationships, there is still much about EI in physicians that has not been defined. In the general population, males typically score higher in managing emotions, whereas females score higher in recognizing emotions.[14] EI also increases with age in the general population, and in business fields, EI increases over the course of training, likely due to the normal maturing process.[2–4] There is some data to suggest that EI may decrease in physicians during training,[15] but no studies have longitudinally tracked EI over the entire course of residency training. It is hypothesized that this decrease in EI may be due to depersonalization, desensitization, and burnout.[15]

Developing training and education during residency to enhance EI may be protective against burnout and improve psychological well-being. Many have called for the integration of EI into residency training programs, but the most effective way to do this has yet to be defined.[9,15–18] Before one can develop a program focused at enhancing EI, it is necessary to understand the baseline characteristics of the target population—surgical residents.

Additionally, there are no previous studies that evaluate whether military experience affects EI in surgery residents. There is a growing recognition in the military that many of the desired traits in Army Leadership Doctrine overlap significantly with EI traits.[19,20] The Army has even developed and implemented a Comprehensive Soldier Fitness program aimed at enhancing leadership and psychological health amongst soldiers.[21,22] Many of the features of this mandatory resilience training overlap with features of EI. Because of the teamwork, leadership training, and resilience skills that are fostered in the military, we hypothesized that surgical residents with military experience would have higher EI.

This study analyzes the EI of general surgery (GS) residents to evaluate the effects of postgraduate year (PGY), age, gender, and military experience, and examines differences in various facets of EI from the general population.

METHODS

This is a single institution retrospective analysis that was granted exemption by the Walter Reed National Military Medical Center Institutional Review Board. EI profiles, age, PGY, gender, and prior military experience, previously collected by the GS program administration, were provided to the investigators in a de-identified database. All GS residents who completed the EI assessment were included in the analysis for this study.

The EI questionnaire was administered by the program administration at the end of June, 2016 prior to the beginning of the new academic year. For the purpose of this study, each respective PGY corresponds to the academic year an individual would be starting on July 1, 2016. The Walter Reed National Military Medical Center GS residency program is a 6-year program, which includes a mandatory year of research between the third and fourth clinical years. Thus, subjects labeled PGY4 were preparing to begin research year after the completion of 3 clinical years, and those in the PGY5 group just finished their year of research and were preparing to return to clinical duties. While all residents in this study are active duty military, some individuals had previous, nonmedical time in the military before entering medical school or before finishing residency training. Prior military experience was defined as those who graduated from an undergraduate service academies, or had at least 1 year of active duty experience outside of undergraduate or graduate medical education.

The Trait EI Questionnaire (TEIque)[14]

EI was measured using the Trait EI Questionnaire (TEIque), which is a self-assessment of trait-based EI, with previously established validity evidence.[14,23] The TEIque contains 153 self-report items, each of which is assigned to 1 of 15 facets. Each facet, with the exception of adaptability and motivation (which contribute to global EI but do not load to any single factor), load to 1 of 4 factors (emotionality, self-control, sociability, well-being). The 4 factors, plus the adaptability and motivation facets contribute to the global trait EI (Fig. 1). Each item is ranked by respondents on a Likert-scale from 1 (disagree completely) to 7 (agree completely). A higher score represents a stronger trait in that facet or factor. The TEIque for each resident was scored by the department administration using the web-engine scoring algorithm provided by the assessment developers (www.psychometriclab.com).[24]

Data Analysis

Statistical analysis was performed using IBM SPSS Statistics Version 24. Comparisons in EI between the normative population and GS residents, and gender and military experience in GS residents were analyzed using independent sample *t* test. Fisher's exact test was used to analyze the significance of gender in the cohort of prior military residents. Effects of age and PGY on various aspects of EI were analyzed with linear regression. Correlations are reported as Pearson's R^2. Statistical significance was set at alpha <0.05 for all tests. Data

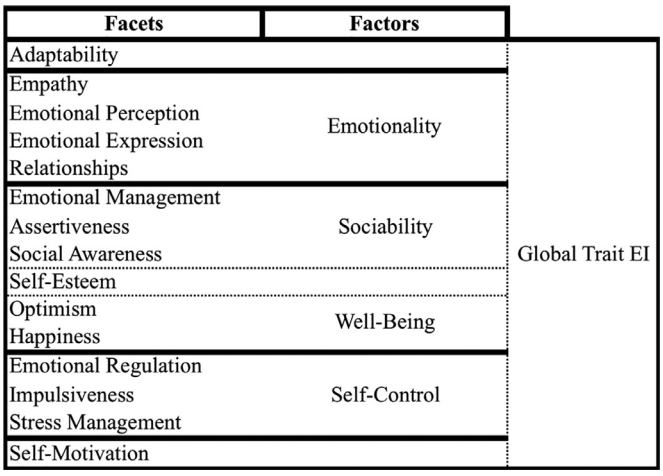

FIGURE 1. Facets and factors of global trait emotional intelligence.

presented represent mean ± standard deviation (SD) unless otherwise specified.

RESULTS

Forty-six out of 50 (92%) GS residents completed the TEIque and were included for analysis. Demographics with regards to gender, age, prior military experience, and PGY are shown in Table 1. Twenty-seven male residents and 19 female residents completed the TEIque. The average age was 31.5 (range 26-45, SD ± 4.2). There were no statistically discernable differences in the mean age between the male and female residents ($p = 0.94$). More male residents had prior military experience than female residents. There were 16 residents in the PGY1 group, and all other year groups had between 4 and 8 residents. Three out of the 4 residents (75%) who did not complete the TEIque were in the PGY4 group.

Data for the normalized population have been previously published during development of the TEIque.[14] This population contains 759 males and 907 females (Total n = 1666). The average age of the normalized population was 29.6 (range 15.7-77, SD ± 11.94). There was no statistically discernable difference in the mean age between the GS resident population and normalized population ($p = 0.28$). Notably, only 18.9% of subjects in the normalized population have postgraduate degrees, while all subjects in this study possess doctoral degrees.

In the GS resident population, there were no statistically discernable differences between genders in global EI or any other factor or facet (Table 2). Both male and female GS residents score higher than the general population in the self-control factor (Males: 5.14 ± 0.51 vs 4.69 ± 0.74, $p = 0.002$; Females: 5.12 ± 0.6 vs 4.26 ± 0.76, $p < 0.001$; Figs. 2 and 3). Additionally, Female GS residents scored statistically discernably higher than the normative female population in global EI (5.14 ± 0.36 vs 4.82 ± 0.57, $p = 0.02$), the well-being factor (5.59 ± 0.59 vs 5.19 ± 0.83, $p = 0.04$; Fig. 2b), and the motivation facet (5.20 ± 0.56 vs 4.70 ± 0.81, $p < 0.01$).

When comparing the global EI of our population of military surgery residents to a previously published population of civilian residents in McKinley et al.,[25] there was no statistically discernable difference in global EI (5.09 ± 0.43 vs 5.21± 0.5, p=0.17) (Table 3). The sociability factor was significantly lower for the military population of surgery residents (5.18 ± 0.64 vs 4.83 ± 0.64, p=0.003), while there was no difference between other factors.

GS residents in our study with prior military experience had no statistically discernable difference in global EI when compared to the cohort without prior military experience (4.96 ± 0.51 vs 5.15 ± 0.38, $p = 0.17$; Table 4). There were more males (n = 12) than females (n = 3), in the prior military cohort that was almost statistically discernable ($p = 0.06$). There were no discernable differences in any of the 4 EI factors. However, GS residents with prior military experience scored statistically discernably lower EI than nonprior-service residents in both the impulse control and self-motivation facets (4.79 ± 0.79 vs 5.32 ± 0.57, $p < 0.001$; 4.57 ± 0.73 vs 5.31 ± 0.53, $p = 0.01$).

There were no statistically discernable correlations in age or PGY with global EI (Age: $R^2 = 0.008$, $p = 0.55$; PGY: $R^2 = 0.001$, $p = 0.84$), or any individual factor or facet (results not shown). There was an observed dip in

TABLE 1. General Surgery Resident Demographics

Gender	Male	Female	Total
N	27	19	46
Age (yrs)	31.6 ± 4.4	31.5 ± 4.2	31.5 ± 4.2
Prior military experience	12	3	15
PGY-1	9	7	16
2	5	3	8
3	3	3	6
4	3	1	4
5	4	2	6
6	3	3	6

PGY, post-graduate year.

the PGY3 resident class in several factors and facets including well-being, happiness, optimism, and motivation but these differences were not statistically discernable (Fig. 4).

DISCUSSION

EI encompasses many different skills required of successful physicians. One could argue that in the current era of medicine that emphasizes patient satisfaction, it has never been more important for physicians to communicate effectively with patients and colleagues. Additionally, there is a growing recognition that resident well-being and physician burn-out is widespread across all specialties, and should be addressed with education and support.[26,27] Finally, the Accreditation Council for Graduate Medical Education milestones require that residents not only have medical knowledge and technical skill, but show interpersonal and communication skills, coordinate teams, and professionally interact with colleagues in order to progress through residency.[28] EI is associated with all of these areas.

Gender Differences

This study contributes to the body of literature that attempts to better characterize EI in surgery resident physicians.[25,29–31] In the normative population, males score statistically discernably higher than females in global EI and the following factors (and facets): self-control (stress

TABLE 2. Emotional Intelligence in General Surgery Residents

Gender	Female	Male	p Value
N	19	27	
Global EI	5.14 ± 0.36	5.06 ± 0.48	0.56
Factors			
Emotionality	4.94 ± 0.58	5.16 ± 0.50	0.19
Sociability	4.77 ± 0.55	4.88 ± 0.70	0.56
Well-being	5.59 ± 0.59	5.51 ± 0.57	0.63
Self-control	5.12 ± 0.60	5.13 ± 0.51	0.93
Facets			
Empathy	5.13 ± 0.72	4.85 ± 0.74	0.21
Emotional Perception	5.13 ± 0.65	4.76 ± 0.83	0.12
Emotional Expression	4.59 ± 1.05	4.66 ± 0.94	0.82
Relationships	5.80 ± 0.38	5.51 ± 0.62	0.07
Emotional management	4.76 ± 0.62	4.94 ± 0.84	0.42
Assertiveness	4.82 ± 0.68	4.88 ± 0.81	0.78
Social awareness	4.73 ± 0.90	4.83 ± 0.77	0.71
Self-esteem	5.08 ± 0.83	5.19 ± 0.68	0.63
Optimism	5.72 ± 0.61	5.60 ± 0.66	0.52
Happiness	5.97 ± 0.66	5.74 ± 0.70	0.25
Emotional regulation	5.03 ± 0.94	5.19 ± 0.67	0.51
Impulsiveness (Low)	5.25 ± 0.44	5.08 ± 0.82	0.36
Stress management	5.08 ±0.78	5.14 ± 0.57	0.76
Self-motivation	5.20 ± 0.56	4.98 ± 0.77	0.30
Adaptability	4.74 ± 0.89	4.56 ± 0.74	0.46

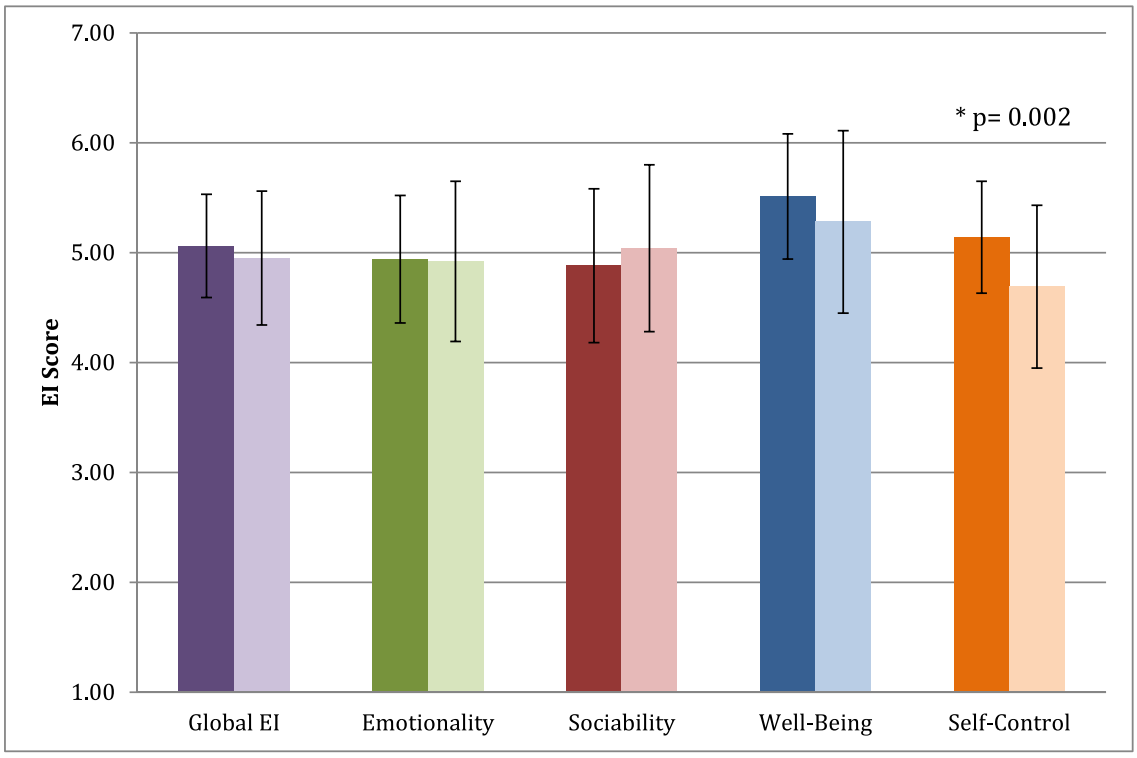

FIGURE 2. Male general surgery residents (dark bars) vs normative population (light bars).

management, self-control), sociability (assertiveness, emotional management, and social awareness), and the facet self-esteem. Females in the normative population score statistically discernably higher in the emotionality factor and all of its facets including relationships, empathy, emotional expression, and emotional perception.[14]

This study confirms the findings of previous studies, which demonstrate that there are no gender differences

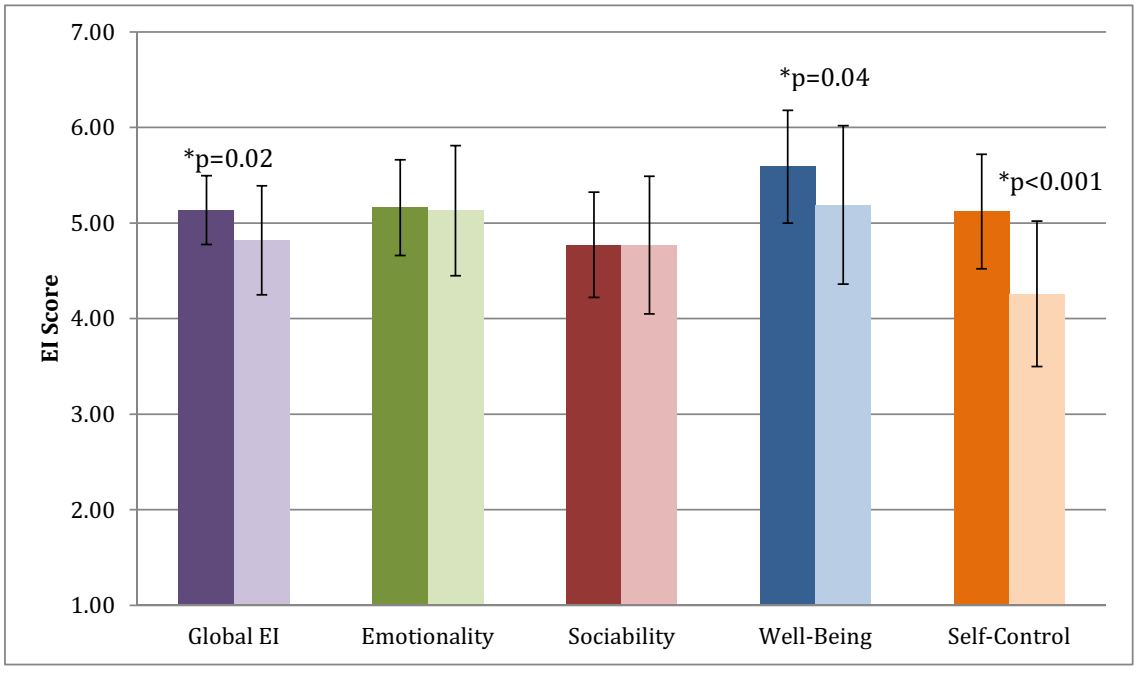

FIGURE 3. Female general surgery residents (dark bars) vs normative population (light bars).

TABLE 3. Comparison of EI in Civilian vs Military Surgery Residents

Surgery Resident Population	Civilian[25]	Military	p Value
N	85	46	
Global EI	5.21 ± 0.50	5.09 ± 0.43	0.17
Factors			
Emotionality	5.24 ± 0.70	5.03 ± 0.55	0.08
Sociability	5.18 ± 0.64	4.83 ± 0.64	0.003
Well-being	5.59 ± 0.74	5.54 ± 0.58	0.69
Self-control	4.98 ± 0.66	5.12 ± 0.54	0.22

in global EI in resident populations.[25,29–32] While previous studies have shown no differences in gender among surgery residents in global EI (using a variety of different tools to assess EI), the population of surgery residents in McKinley et al.[25] did demonstrate gender differences in the facets of impulse control (lower in males) and stress management (higher in males). While this difference was not observed in our overall population, the residents with prior military experience had lower impulse control and self-motivation. The prior military experience cohort trended towards significantly more males (as above), so it is possible that gender had at least partial influence on the impulse control facet.

Even with the differences in 2 facets observed in the McKinley and prior-military cohort, this study provides further evidence that on the whole, gender plays less of a role in resident populations than in the normative population, which has statistically discernable difference in gender for global EI, 3 out of 4 factors, and 10 out of 15 facets.

We agree with previous hypotheses for the decreased variation in gender for surgical residents[23]: (1) GS residents are a more homogenous group of people than the general population; (2) GS residents have self-selected to become physicians and then surgeons, so it is possible that people with the same EI traits have self-selected into the field; (3) GS residents have all gone through similar training, so perhaps some aspects of EI are being implicitly trained throughout medical school and residency.

Interestingly, we found that male *and* female GS residents score higher than the general population in the self-control factor, which is comprised of stress management, low impulsiveness, and emotional regulation facets. One could argue that effective stress management, ability to manage one's emotions in stressful situations and ability to effectively control impulsive behaviors are desirable and necessary attributes for those training in GS. We hypothesize that the higher scores in self-control for surgery residents likely a combination of baseline characteristics of those who self-select into GS, and also characteristics that have been implicitly fostered in those that have successfully progressed through medical school and residency.

Age

Previous studies have been mixed in regards to association of age with EI in resident physicians.[29,31] This study found no correlation between age and any aspect of EI. This may be due to the relative narrow range of resident ages (26-45 years), or perhaps higher levels of burnout and depression in residency counteract the observed increase in EI with age in other fields. This hypothesis is not explored in this study, and more research is needed in this area.

TABLE 4. General Surgery Resident Emotional Intelligence With Respect to Prior Military Experience

Prior Military Experience	Yes	No	p Value
N	15	31	
Global EI	4.96 ± 0.51	5.15 ± 0.38	0.17
Factors			
Emotionality	4.98 ± 0.53	5.06 ± 0.57	0.65
Sociability	4.72 ± 0.76	4.89 ± 0.58	0.40
Well-being	5.46 ± 0.66	5.58 ± 0.54	0.54
Self-control	4.93 ± 0.72	5.23 ± 0.41	0.08
Facets			
Impulsiveness (Low)	4.79 ± 0.79	5.32 ± 0.57	<0.001
Self-motivation	4.57 ± 0.73	5.31 ± 0.53	0.01

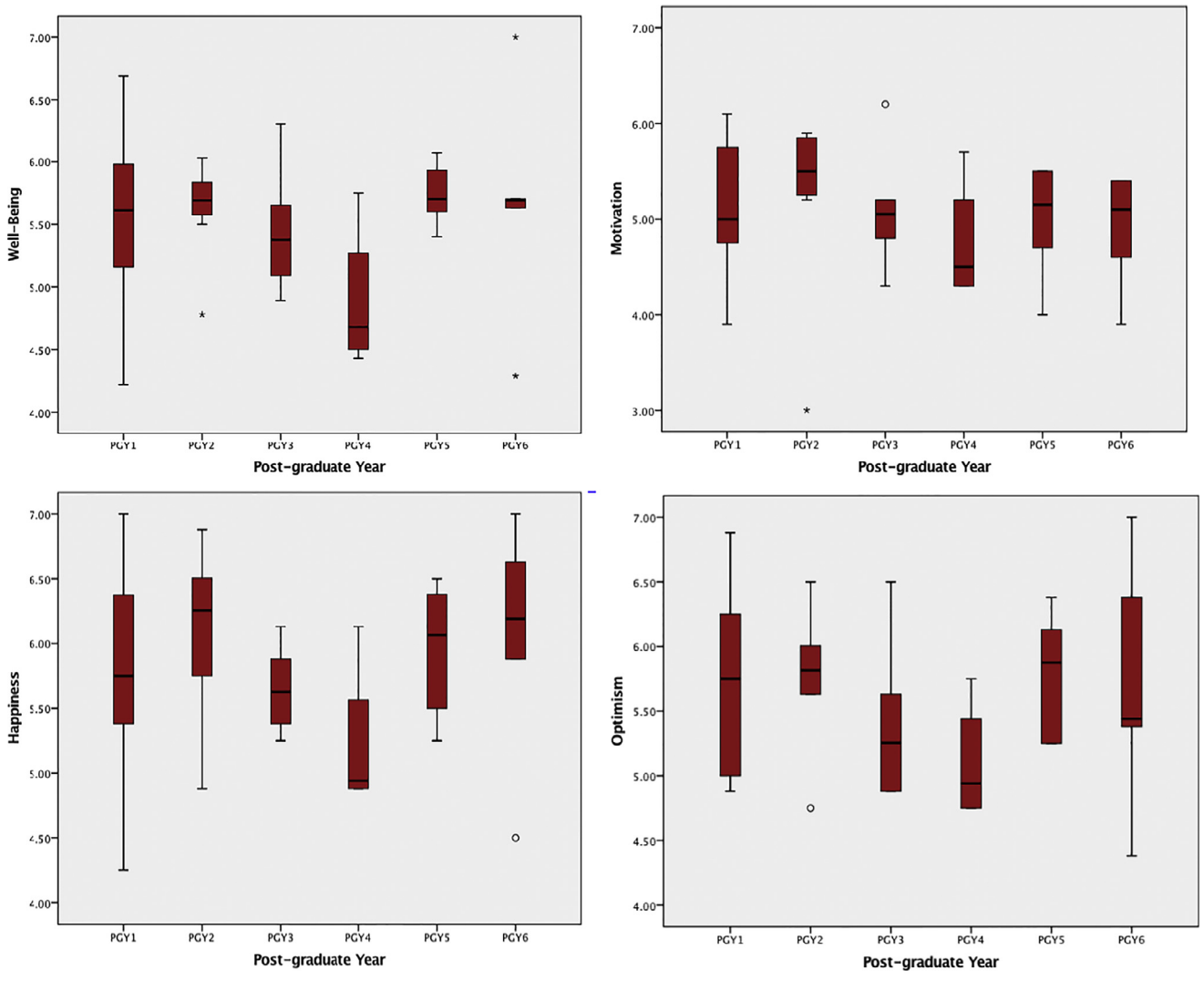

FIGURE 4. Emotional intelligence factors and facets with respect to postgraduate year (PGY).

Military Experience

This study is unique in that all the participants are active duty military. Core principles of military leadership doctrine include communication, adaptability, building effective teams, establishing trust, and developing others, all of which overlap with concepts described in EI.[19] While there have been many dissertations and peer-reviewed papers highlighting the importance of EI in military leaders and leaders of effective military teams, there are no studies to our knowledge that have compared EI of military members to counterparts in civilian-equivalent jobs or at similar points in career trajectory.[33–38]

While there was no statistically discernable difference between the civilian residents in McKinley et al.,[25] the military residents in this study had discernably lower sociability factor. While there are many potential confounders in comparing these populations of residents, this is the first attempt to our knowledge to compare EI of military members to civilian counterparts in any field. Perhaps the decreased sociability seen in the military residents is a factor of the program, institution, intrinsic factors of the residents themselves, or some other confounder, but it may be an area worth further investigation.

While all of the participants in this study are in the military, the majority of participants had no military experience outside of their medical school or residency training. Because the *military* leadership, teamwork, and resiliency is less overt in military medical training than a typical military unit, we hypothesized that military experience outside of undergraduate or graduate

medical education would have a significant impact on EI. We found no differences in global EI or any of the 4 factors between prior-service and nonprior-service GS residents. Residents with prior military experience scored statistically discernably lower with impulse control and self-motivation. As previously discussed, the difference in impulse control could be at least partially influenced by gender. Perhaps also, the presence of many extrinsic motivating factors in the military such as an abundance of regulation, including dress, personal appearance and fitness standards, could account for lower intrinsic motivation in this cohort.

While there are likely fewer confounders in comparing the sub-cohort of prior-service with nonprior-service residents than in comparing our population to other civilian populations, all of the residents have had some basic military training which often includes principles of leadership, resilience, teamwork, etc. This is not the same as comparing completely civilian residents with military residents. Additionally, the overall sample size of the prior-service residents is small so definitive conclusions about the effects of prior military experience on surgical resident EI cannot be made.

Postgraduate Year

While we found no statistically discernable difference in PGY and global EI, or any particular facet or factor, there was an interesting trend in our mid-training, PGY3 residents that scored lower on many factors and facets (Fig. 3). Some of these facets are those that could be logically linked with emotional exhaustion, burnout, or depression. In our population, the dip corresponded with the residents at the end of the third clinical year of training with more "expected" scores for the residents in the following year of training who had just finished a year of research with limited or no clinical responsibilities. This is similar to a mid-training, downtrend seen in the EI of emergency medicine residents in a recent study by Papanagnou et al.[39]

The sample size for each individual year group is small in both our study and this study in ER residents, so it is difficult to determine if this trend was just an anomaly of the individuals in these particular PGY groups, or if it could perhaps also identify a point during training where residents are at risk for poor psychological well-being.[39] We believe this area deserves further attention for research. One could hypothesize this decrease in EI represents resident burnout, which is extinguished after a short separation from focused clinical duties. No previous studies have tracked EI over the course of an entire residency program. Future directions will be targeted at examining this trend over time and with a larger sample size of residents.

Limitations

This is a single institutional study; therefore, some observations may be unique to our population of residents. Particularly, the presence and timing of a required research year may skew results and make them less generalizable to all GS residents. The single institutional nature of our study also limits our sample size especially in respect to the prior military service cohort of residents. Based on our sample size, there was 80% power to detect differences in gender of 0.57 and to appreciate an effect of military experience of 0.71. Our study was only powered to detect moderate to large effects of gender and military experience. Increasing the sample size would improve this limitation. Our study was also underpowered to analyze the differences of gender in the cohort with prior military service.

This is cross-sectional study that does not follow residents longitudinally making definitive conclusions about 1 particular PGY group in comparison with another PGY group challenging. Each year group has only a small number of residents, so again increasing the sample size would help power the study to detect significant differences in the different PGY groups.

The TEIque is a measure of trait-based EI and thus the TEIque assessment is a self-report of these characteristics. Some theorists believe that EI should be viewed as a competency or "intelligence" that is better measured by an ability-based assessment. This study, however, was intended to characterize EI traits in a population of GS residents; therefore, a trait-based assessment of EI is appropriate. Once EI training or education has been implemented, a mixed model or ability-based assessment of EI may be more appropriate to measure the effects of intervention.

The TEIque is also based on a Likert-scale. As with any Likert-scale, it is difficult to know the real life impact of small differences in scores. For example, what behaviors or mentality does a person with a 4.5 in managing emotions demonstrate that a person with a 4.0 does not? Correlating EI scores with other validated measures of depression, well-being, job satisfaction, communication, etc. could help better define these questions.

CONCLUSIONS

Differences in EI observed in the general population with respect to gender and age are not apparent in our population of GS residents. This is likely due to the homogeneity of residents in age, training, and baseline characteristics that draw people into choosing a career in both medicine and surgery. The military status of our residents did not have a significant impact on global

compared to civilian residents or the prior-service resident cohort. While PGY did not have a statistically discernable effect on EI, the dip in EI mid-residency should be investigated further with a larger study population and longitudinal tracking of EI traits of the course of an entire surgery residency.

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SUPPLEMENTARY INFORMATION

Supplementary data associated with this article can be found in the online version at https://doi.org/10.1016/j.jsurg.2018.10.013.