Current nurse anesthesia program admissions requirements usually focus on high grade point averages, Graduate Record Examination scores, number of years of acute care experience, and a personal interview to assist in predicting those who will succeed in these intensive academic and clinical programs. Some people believe these criteria may not be sufficient in predicting success and have suggested that the use of noncognitive criteria such as emotional intelligence measurements may be helpful. The purpose of this cross-sectional correlational study was to explore the relationship between emotional intelligence and academic factors of student registered nurse anesthetists at 3 points in a program—matriculation, at 1 year of study, and in the last semester of study—and the relationship of these to clinical scores and National Certification Examination scores. An ex post facto cross-sectional study design was used to gather data at 3 critical times in nurse anesthesia programs to explore the relationships between emotional intelligence scores, pre-admission demographics, clinical scores, and National Certification Examination scores. The online Mayer-Salovey-Caruso Emotional Intelligence Test instrument provided 15 individual emotional intelligence scores for each subject. The statistical relationship between variables was examined.

Keywords: Emotional intelligence, profiles, Q-factor, student registered nurse anesthetist

Meeting the criteria for acceptance into graduate school programs with limited student quotas can be challenging for graduate school candidates. Perhaps just as challenging for graduate school admission committees is setting standards for acceptance into those programs. Determining the most successful candidates is quite important, partly because of the substantial financial, emotional, and personal costs graduate students make while enrolled in a nurse anesthesia (NA) program and the negative effects that high attrition rates have on both the program and hospitals that need these graduates.

The stress of matriculating through an anesthesia program also complicates the student's ability to succeed. To narrow the pool of applicants, NA program admission committees attempt to select individuals they believe will be successful in completing their respective programs of study and eventually successfully practice as nurse anesthetists. To do this, the NA program admission committees have to devise suitable methods for choosing candidates who will successfully complete the NA program. Research has shown that current admission criteria may not provide substantive data necessary for predicting student progression through NA programs. The consistency of the NA applicant pool and the lack of solid data that suggest predictive value of cognitive factors raised the interest in finding other noncognitive data that might be useful in understanding and even predicting who might succeed in NA.

So what kind or kinds of data may be missing from current admission criteria? Could it be that the data missing from current admissions criteria have something to do with “sensitivity to feelings and needs of people”? Some researchers think so and propose that admission criteria need to include not only “hard data” such as grade point averages but also some way or ways to measure a candidate’s level of “sensitivity to feelings and needs” of the people around them. For example, a tool that may gauge a candidate’s emotional intelligence (EI) is an additional triangulation instrument in the admission officer’s toolbox.

One can argue that for people to take maximum advantage of their cognitive intelligence (things such as their intelligence quotient [IQ]), they first need EI. If people turn others off with abrasive behavior, remain unaware of how they present themselves, or struggle under minimal stress, no one will notice their high IQs. The stronger the EI abilities, the greater the chances for success.6 This seems to hold true also in educational pursuits in life. Research has demonstrated the use of EI in successful leadership, education, and professional work situations, all of which are understood to influence the success of graduate students involved in NA education.

Emotional intelligence is the ability to recognize emotions in self and others and the capacity to use those emotions to enhance emotional and intellectual growth and decision-making. However EI may be defined, writers such as Goleman10 view EI as “separate from cognitive intelligence (measured by IQ tests) and complementary to academic intelligence (measured by academic

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Researchers have noted that EI represents a set of core competencies for identifying, processing, and managing emotions that enable nurses to cope with daily demands in a knowledgeable, approachable, and supportive manner. An underlying assumption in EI theories is that using emotions in thinking and decision making can be a form of intelligence. This view assumes that joining emotions and cognition, when done well, facilitates decisions, manages emotions, improves relationships, and ultimately results in more intelligent decisions.

Increasingly, students are required to be active participants in directing their own educational success, and this is especially true with professional clinical issues. Mayer and Kipling suggested that emotionally intelligent people were better equipped to deal with the challenges of clinical nursing practice and independent study. Cadman and Brewer noted that individuals in professional nursing need to be able to blend and integrate both theory and practice. They believed students recruited into NA programs needed to be effective in both areas, and EI may be a linking aspect in making that connection.

Birks et al have identified stress as being high for students in healthcare courses, and this is especially true in NA programs. Emotional intelligence involves the accurate processing of emotionally relevant information and the ability to use emotions in reasoning to solve problems. Evans and Allen asserted that those who can manage their own feelings while assessing and reacting to other people's emotions are particularly suited to the caring professions, one of which is nursing. Because student registered nurse anesthetists (SRNAs) practice in a problem-based team environment in which the student is presented with a clinical problem being negotiated by multiple people, EI may play an integral role in the decision-making process of the SRNA.

A study by Walker in 1,205 undergraduate students at a 4-year, research-intensive university found that there is a significant relationship between EI and academic success in college. Walker's research showed positive correlations between EI scores and gender, ethnicity, ACT score, and grade point average, number of terms completed, and number of hours failed in the first 4 semesters. The conclusion of the research suggests that there is indeed an important relationship between EI and academic success in college. It has been found that the incorporation of EI classes into the curriculum results in higher scores on standardized achievement tests. This provides evidence of a relationship between emotional and cognitive intelligence processes that were previously thought to be separate. The ability to understand ourselves and those around us assists us in solving problems and is a keystone to academic learning and success.

Vandervoort stated that “the inclusion of a focus on emotional intelligence as part of the standard college curriculum could lead to a variety of positive personal, social, and societal outcomes”. Vandervoort demonstrated that by increasing EI, the learning process may be improved, students may make better career choices with increased possibilities for professional success, and students have a better probability of personal and social adaptation.

Some authors link EI to important areas of practice such as clinical decision making, clinical environment, knowledge utilization, and interprofessional relationships at multiple levels. Although some people may attempt to separate emotions from the workplace, emotions and the workplace are inseparable because humans carry emotions wherever they go. Goleman et al provided a wide array of reasons for the positive link between EI and individual work success. Schutte et al found differences among individuals who received moderately difficult and very difficult problems to solve. Individuals with high EI were more successful than individuals with low EI in solving many problems and completing cognitive tasks.

Critical thinking skills are also extremely important for the nurse anesthetist. There is speculation that emotion might be a powerful motivator for high-quality decision making, and considering emotion may propel decision makers to expand and reconsider their reasoning, and therefore to think critically. Zimmerman and Phillips presented evidence that affective learning can actually encourage the ability to think critically. Management of emotion involves not only recognizing and understanding emotion but also using it to solve problems. For students, nursing education is an emotional and intellectual experience, and this experience has the potential to profoundly affect students’ ability to retain knowledge and to think critically. The process of critical thinking involves managing and balancing emotions. On the one hand, increases in stress levels erode mental abilities and make people less emotionally intelligent. On the other hand, studies have shown that negative stress consequences in nurses and nursing students can be avoided by using EI. This is especially true in NA programs in which students are constantly under high levels of stress.

Certified Registered Nurse Anesthetists must be prepared to effectively manage crises that occur in practice. This starts in the stressful operating room environment in which SRNAs learn. Effective teamwork in the clinical anesthesia realm is critical to achieving desired outcomes. Working as a team always involves emotions and feelings. Understanding, not just acknowledging, the issues that arise requires emotional literacy. Goleman suggested that to handle conflict effectively, underlying individual differences must be understood. He also speculated that high EI would enhance a person’s conflict-handling styles. Because SRNAs spend great amounts of time in emotionally charged operating room environments, an EI theory testing instrument may serve...
as a tool that could lead to successful student outcomes.

One study involving nurses showed positive correlations between clinical performance levels and EI scores. Understanding oneself and having a positive self-image can overcome barriers to effective independent functioning, a critical component in professional roles, especially in NA. It would appear that EI has the potential to deepen people’s understanding about a set of factors that are related to clinical performance and leadership.

Murden et al found that medical students considered by admissions interviewers to have high levels of maturity, personal integrity, motivation, or rapport were twice as likely to receive outstanding recommendations during their clinical rotations as would those previously considered as not having these attributes. These attributes, however, did not correlate with prior academic achievement. The success of students with high levels of these qualities emphasizes the need to consider an applicant’s personal attributes, such as EI, as well as traditional cognitive factors.

Because NA programs focus as much on clinical education as they do on academic preparation, noncognitive and cognitive attributes are equally important. Moss posited that for healthcare to move forward, conflict must be resolved so that the result is cost-effective, high-quality patient care.

The research already noted suggests that EI may have important relevance to SRNA success. Although these studies and others have provided valuable information on EI in relation to the education of nurses, no studies could be found on the effect of EI in the successful progression through and program completion of SRNAs. Emotional intelligence develops over time, changes throughout life, and can be improved through training. The potential for increasing EI makes EI even more interesting to educators. A wide body of research shows that through EI screening and/or coaching, student success can be improved and attrition rates curtailed, with a subsequent increase in retention rates.

A focus on EI could lead to a better understanding about the SRNA and may improve selection processes and NA school curriculums to maximize student learning, retention, academic achievement, and professional success. As Burns notes, NA program administrators are in a unique position to implement and support change initiatives consistent with professional needs. Refining the admission criteria may facilitate entry of students possessing personal characteristics that promise to support academic progression and retention in NA programs. This study explored the use of EI profiles and related those to other cognitive measures. The hope was that data from this cross-sectional study, which measured the EI of SRNAs at different stages of the NA program, could become useful in offering another means to evaluate and train those who are most likely to be successful in NA programs.

Methods

On receiving approval from each university’s institutional review board, a cross-sectional quantitative correlational study was conducted to collect EI data on graduate students in 4 NA programs in the southeastern United States. After informed consent was obtained, subjects from each participating university’s NA program were given the opportunity to participate in the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT version 2.0) online survey. The sample was a purposive sample, and included all current students in each of 4 NA programs in the southeastern United States. Purposive sampling is used when respondents are chosen based on some special purpose.

The MSCEIT was used to cross-sectionally collect data on the EI of SRNAs at 1 specific time point from 3 different classes in each NA program of study: matriculation, after 1 year of study, and in the last semester. Although self-report measures of EI are commonly used, research demonstrates that self-assessments of EI most likely reflect perceptions of emotional abilities rather than measures of the abilities themselves. The use of ability-based tests of EI may help counteract this problem.

The MSCEIT is a 141-item, ability-based measure that has good estimates of validity and reliability and generates 17 scores per individual: 1 overall score, 1 for each area, 1 for each branch, and 1 for each task. Scores on the MSCEIT have been found to correlate with important behavioral outcomes. Positive correlations have been reported with academic achievement (math scores $P < .05$, $r = 0.48$), psychological well-being, and peer attachment, among others, and negative correlations have been reported between the MSCEIT and deviant and maladaptive behavior, such as cigarette, drug, and alcohol use ($P < .05$, $r = -0.13$). Mayer et al asserted that the evidence proves the validity of the MSCEIT as a measure of EI and the importance of EI as a psychological construct.

The MSCEIT was administered to 216 SRNAs from 4 different NA programs in the southeastern United States between April and September 2011. Each research participant accessed the online MSCEIT at the website www.mhs.com/msceit. Confidentiality was maintained by using a predetermined participant code number, group number, and password. The responses were collected in MHS’s password-protected database. The confidential scores and reports were accessed online and cost the researcher $6 per student. The data from the MSCEIT version 2.0 were used to create EI profiles and to determine whether there was a correlation between EI profiles and NCE scores of SRNAs.
EI variables are composed of 2 area scores, each of which is subdivided into 2 branch scores for a total of 4 branch scores. Each branch score is subdivided into 2 task scores, for a total of 8 task scores (Table 1). The overall EI score was analyzed, as well as the 2 area scores, 4 branch scores, and 8 task scores. A score of 100 is considered average. A score of 115 is about 1 standard deviation above the mean. A score of 167 was the maximum score possible.

The data from the MSCEIT version 2.0 were used to determine whether there was a correlation between EI profiles and academic variables of SRNAs. Other variables examined in relation to SRNA academic success included preadmission Graduate Record Examination (GRE) scores, overall GPA, science GPA, and years of acute care nursing experience.

Q-factor analysis was used to create, simplify, and aggregate EI profiles of SRNAs using an ex post facto survey design. Q-factor analysis creates profiles of people by clustering people together who have similar profiles, which can be used to compare with one another. Q-factor analysis puts people together based on the shape of their distribution and is predictive of how people relate to and understand each other. Q-factor is very sample specific and tends to be unstable. Splitting the sample attenuates this effect and was done in this study. There are other types of factor analysis such as R, P, and S. For example, R-factor analysis clusters items together and tells the construct that the instrument is measuring. Q-factor analysis was chosen for this study because the purpose was to cluster people based on similar profiles. The Q-factor types were also used as predictor variables.

The study described the EI profiles of SRNAs and determined whether a relationship existed between NA programs’ preadmission criteria, EI profiles, and success in NA programs. Each of the variables was individually examined and compared to determine if a relationship to academic variables existed. Furthermore, variables were examined to determine if one variable predicts a meaningful relationship compared with the other variables.

Results
Of 216 SRNA participants, 69 (31.9%) were male students and 147 (68.1%) were female. Frequencies and percentages were conducted on the current student by year in the program. Results found that most of the SRNAs (n = 79, 36.6%) were in their first semester, 69 (31.9%) were at 1 year, and 68 (31.5%) were in their last semester. The participants represented a range of races and ethnicities (African American, 5.1%; Asian, 5.1%; Hispanic, 3.7%; and mixed, 1%), but were predominantly white (85.1%). The participants ranged in age from 23 through 52 years, with a mean age of 31 years. Participants had a range of 1 to 24 years of acute care experience before starting NA school, with a mean of 3.42 years. Of the participants, 81.5% of SRNAs had 5 or fewer years of preadmission acute care experience. The overall GPA before admission had a range of 2.90 to 4.0 and a mean of 3.46. The science GPA before admission had a range of 2.17 to 4.0 and a mean of 3.42.

Several of the EI variables were predictive of success on the NCE (n = 65). The regression containing all EI variables had predictive items, including Facilitation Task (P < .002), Sensations Task (P < .005), EI Facilitating Branch (P < .009), and EI Reasoning Area (P < .050), but the model was not significant (P = .161). The regression was rerun with only the significant variables (Table 2), with a resulting statistically significant model (P < .039). This is likely to inflate type I error rates; therefore, one should replicate these findings in future studies. None of the EI variables were predictive of GPA in the NA program.

In terms of EI types, there were 3 types of people per class, with 1 type that seemed to be stable and rep-
licable through the different years. The replicable type throughout the program was the High Facial Reader/Low Emotional Manager. The Highly Detached/Low Facilitator was present in first-semester students and some of the second-year students, but not last-semester students. As students got into the third year, the High EI Understander/Low Experiencer type was replicated between both groups. Although interesting descriptively, the EI types are not predictive of the following dependent variables: NCE scores, overall GPA, science GPA, NA GPA, GRE scores, and years of acute care experience.

**Discussion**

This exploratory study has started the knowledge base of EI related to SRNAs. This research suggests possible heuristic value that may help to identify different types of people in a group, even though groups appeared to be somewhat homogeneous in comparison and makeup. These differences helped make clear that even within a very specific field of work, there were different types of students (Table 3). These types should be considered EI types, but people can be typed in other ways (eg, cognitive data) and should be considered for future research related to the affective domain. The EI profiles were different between the first 2 cohorts and the third-year cohort, with Highly Detached/Low Facilitator present in years 1 and 2, and High EI Understander/Low Experiencer present only in year 3. However, 1 type in particular, High Facial Reader/Low Emotional Manager, is consistently present in each group and year. This consistent type shows that all SRNAs in this study tend to be very strong in perceiving others' emotions, with a particular sensitivity to reading other people's facial expres-

<table>
<thead>
<tr>
<th>Variable</th>
<th>b</th>
<th>t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facilitating Task</td>
<td>-4.527</td>
<td>-2.857</td>
<td>.006&lt;sup&gt;a&lt;/sup&gt;</td>
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<tr>
<td>Sensations Task</td>
<td>-5.249</td>
<td>-2.512</td>
<td>.015&lt;sup&gt;a&lt;/sup&gt;</td>
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<tr>
<td>Facilitating Branch</td>
<td>7.178</td>
<td>2.558</td>
<td>.013&lt;sup&gt;a&lt;/sup&gt;</td>
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<tr>
<td>Reasoning Area</td>
<td>0.347</td>
<td>0.786</td>
<td>.435</td>
</tr>
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</table>

**Table 2. Selected Emotional Intelligence Variables for Predicting National Certification Examination Scores**

Abbreviation: Adj, adjusted.

* Significant (P < .05).

<table>
<thead>
<tr>
<th>Year (Y)/group (G)</th>
<th>Type name</th>
<th>Common threads&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y1G1</td>
<td>High Facial Reader/Low Emotional Manager</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>High Facial Facilitator/Low Emotional Understaner</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>Highly Detached/Low Facilitator</td>
<td>Y</td>
</tr>
<tr>
<td>Y1G2</td>
<td>High Facial Reader/Low Emotional Manager</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>High EI Manager/Low Facilitator</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>Highly Detached/Low Facilitator</td>
<td>Y</td>
</tr>
<tr>
<td>Y2G1</td>
<td>High Facial Reader/Low Emotional Manager</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Highly Detached/Low Facilitator</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>High EI Manager/Low Facial Reader</td>
<td>*</td>
</tr>
<tr>
<td>Y2G2</td>
<td>High EI Manager/Low Emotion Understaner</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>High Facial Reader/Low Emotional Manager</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Perceiving Concrete Thinker/Low Emotion Understaner</td>
<td>*</td>
</tr>
<tr>
<td>Y3G1</td>
<td>Highly Understanding Manager/Low Facilitator</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>High Facial Reader/Low Emotional Manager</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>High EI Understaner/Low Experiencer</td>
<td>Z</td>
</tr>
<tr>
<td>Y3G2</td>
<td>High EI Understaner/Low Experiencer</td>
<td>Z</td>
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<tr>
<td></td>
<td>Highly Facilitating Understaner/Low Facial Emotion Manager</td>
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</tr>
<tr>
<td></td>
<td>High Facial Reader/Low Emotional Manager</td>
<td>X</td>
</tr>
</tbody>
</table>

**Table 3. Named Emotional Intelligence Types by Year and Group**

Abbreviation: EI, emotional intelligence.

* X, Y, and Z correspond to a replicated named type for each of the identified groups and years. Asterisk indicates Unique Type.
(Source: Published dissertation, Shawn Collins.)
sions, tone of voice, and artistic expressions. However, this consistent type is low in managing their own and other's emotions and therefore unable to benefit by directing the emotions for long-term benefit and outcomes.

In addition to creating types of profiles that could be useful in examining variability in a SRNA population, the current study showed a statistically significant difference in overall EI between students at the beginning, middle, and completion of these 4 NA programs. Overall, those in the last semester of their programs had lower EI scores than those at matriculation and 1 year of study ($b = −.147$, $P = .030$), but the model was not significant ($P = .112$). Because this study was cross-sectional, the lower overall EI scores may be related to the individuals themselves and not their programs or their progression through the programs.

Although there is no EI study on SRNAs to compare the results of this study with, this finding is in contrast to a finding by Benson et al.⁴³ which showed a statistically significant positive linear association ($P < .05$) between years in the program and higher EI functioning in baccalaureate nursing students. The current study also showed that some components of EI were correlated with or predictive of NCE scores. Future longitudinal studies would need to be done to examine other possible factors.

It could be that if EI training were incorporated into the NA curriculum, increased EI may play more of a role in predicting NCE scores and determining the role of stress in the intensive training of an NA program. Nooryan et al.⁴³ concluded that the ability to effectively deal with emotions in the workplace assists in coping with stress and education in the form of decreased anxiety in physicians and nurses, a finding corroborated by Montes-Berges and Augusto⁴⁶ on EI's importance in coping with stress in nursing. A study by Holahan and Moos⁴⁷ demonstrated that EI reduces stress and predicts 66% of key success factors in healthcare. In other words, healthcare providers scoring high in EI are far more effective in a number of key performance areas, including stress management.

Another study, by Weng et al.,⁴⁸ found that higher EI was significantly associated with less burnout ($P < .001$) and higher job satisfaction ($P < .001$) among doctors. This finding was duplicated in nurses as well.⁴⁶ If, as shown in the EI types described in this study, students throughout the NA curriculum are able to recognize emotions but unable to manage their emotions and the emotions of those around them, training on emotion management during the curriculum may lead to better outcomes, including better stress management.

Interestingly, the EI variables significantly predictive of NCE scores, as seen in Table 2, all come from the same line of thought in the EI construct (see Table 1). The 2 task scores are negatively correlated, meaning the ones who score low in these tasks then scored higher on the NCE. However, SRNAs who scored higher on the Facilitating Branch overall also scored higher on the NCE. Most of the SRNA EI profiles are weak in the facilitating area, so this might suggest that further research and/or training in this area may be beneficial to SRNAs.

Students accepted to NA programs can be considered a homogeneous group with similar characteristics and limited variability. As a homogeneous group, it is harder to find statistical significance. Despite this, based on the study findings, data analysis, and the review of the literature, 3 conclusions can be made about the study and data, and recommendations for both practice and research can be provided.

First, there was a possible heuristic value that may help to identify different types of people in a group, even though groups appeared to be somewhat homogeneous in comparison and makeup. Second, the EI profiles were different between NA classes, with Highly Detached/Low Facilitator present in years 1 and 2, and High EI Understander/Low Experiencer present only in year 3. However, 1 type in particular, High Facial Reader/Low Emotional Manager, was consistently present in each group and year. Finally, SRNAs who scored higher on the Facilitating Branch overall also scored higher on the NCE.

**Conclusion**

The results of this study have practical implications for SRNAs and NA educators. The present study identified a preliminary need for NA leaders to examine EI types of SRNAs, with possible future use of EI as admission criteria or inclusion of EI training in the NA curriculum. Finally, as a noncognitive factor with potential use in the NA program admission process, the present study established emotional profiles of SRNAs in the first semester, at the first year, and in the last semester of study.

The data obtained from this study could be used to guide research in several directions. Although it is too early to consider using EI as an admission criterion, the EI Facilitating Branch score shows promise in predicting NCE scores. Direct recommendations for research resulting from this study include the following: (1) conduct further research on the EI type that best predicts success on the NCE, (2) conduct EI research in SRNAs starting at matriculation and determine correlations and predictability of students who leave the program, (3) conduct research on EI scores of applicants not accepted to NA programs and compare the EI scores with those of accepted applicants, and (4) conduct further research to examine changes in SRNA EI scores and profiles over the course of the program (longitudinal studies).

Making appropriate admission decisions based on competitive application processes, in combination with the escalating costs of graduate education and the current economic crisis, and efforts by educational leaders to minimize attrition remain pivotal.⁴⁹ Reese⁴ states that today's admission criteria require refinement to promote...
the likelihood of successfully completing the curriculum and becoming productive clinicians and leaders in the profession. Hulse et al. also point out that a lack of cognitive factor predictive value suggests that noncognitive factors may play a role in predicting success.

This research begins a base of knowledge on EI in relation to SRNAs. The existence of EI profiles may be useful as a preliminary study of EI in SRNAs. This study found that there were unique EI profiles for each SRNA by year, with 1 EI profile consistent throughout. Several EI variables are predictive of NCE scores. Although this study did not establish that EI is the most important tool for determining which students should be admitted to NA programs, it did reinforce the suggestion that EI can be an important additive tool in the selection process. The current study represents new evidence to support traditionally used cognitive data related to admissions; it also raised questions about the usefulness of EI as a non-cognitive measure. Consistent with other studies, nurse anesthetists need both cognitive intelligence and EI to be the most successful they can possibly be.

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**AUTHOR**

Shawn Collins, CRNA, DNP, PhD, is program director of the Western Carolina University Nurse Anesthesia and DNP Programs, Asheville, North Carolina. Email: shawncollins@wcu.edu.

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