Original Article

A longitudinal study of emotional intelligence in graduate nurse anesthesia students

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A B S T R A C T

Objective: Emotional intelligence (EI) is an important component not only for success in the nurse anesthesia (NA) profession, but as a NA student as well. Using the ability-based EI model, the purpose of this was to examine the difference in EI between the first semester and last semester of NA training programs. **Methods:** First semester NA students completed the online Mayer-Salovey-Caruso Emotional Intelligence Test V2.0 EI instrument, and then the same students repeated the instrument in their last (7th) semester. **Results:** There was a statistically significant correlation between overall EI and long-term overall EI ($P = 0.000$), reasoning area and long-term reasoning area ($P = 0.035$), experiencing area ($P = 0.000$) and long-term experiencing area, perceiving branch and long-term perceiving branch ($P = 0.000$), using and long-term using branch ($P = 0.000$), and the managing branch and long-term managing branch ($P = 0.026$). The correlation between the understanding branch and the long-term understanding branch was not statistically significant ($P < 0.157$). The paired sample t-test demonstrated no statistically significant change ($n = 34$) in overall EI, the two areas scores, or the four-branch scores between the first semester and the last semester of a NA training program. **Conclusions:** This longitudinal study shows the lack of EI change in NA students over time. Thus, no change in EI occurs as a result of transitioning through a NA program based on the accrediting body's standardized curriculum, but the results helped the researcher provide useful data to inform future research on the use of EI measures as predictors of NA program success.

Key words: Emotional intelligence, nurse anesthesia, student registered nurse anesthesia, anesthesia, training, stress

Introduction

The nurse anesthesia (NA) profession is one that demands practitioners to be highly intelligent, self-aware individuals that are able to think critically on an everyday basis. Nurse anesthetists work independently, but are required to interact closely with other health-care professionals in order to provide the best care for patients. Emotional intelligence (EI) is a relatively new term described in the literature that has been found to be a common factor in the presence of leadership, the ability to work well with others, and critical thinking.

Research has presented evidence that it might be beneficial for the NA profession to involve EI as a factor in the recruitment of graduate NA students.[1] While studies have shown the importance of EI in student registered nurse anesthetists (SRNAs), there is a lack of research regarding the development of EI after matriculation in a NA program.[1] If EI is imperative in order to produce nurse anesthetists that are effective leaders who work well in the presence of stress, it can be argued that the development of such skills would be beneficial among graduate NA programs. Current research also shows that there is a lack

of EI training in graduate NA programs. As a step toward that goal, the purpose of this longitudinal study was to determine whether the EI of graduate NA students changes over the course of their respective programs without specific EI training. Determining whether or not there is an increase in EI over the course of NA programs will provide guidance as to whether or not EI training needs to be included in NA programs.

The term EI — as defined by Salovey and Mayer[2] — is "The ability to monitor one's own feelings and emotions, to discriminate among them and to use this information to guide one's thinking and actions." Their model of EI is now known as an ability-based EI model. The other models of EI that dominate the literature are trait (personality) based, of which Bar-On is the most recognized, and mixed-model, made popular by Dr. Daniel Goleman with his book "Emotional Intelligence." For the purpose of this study, the Mayer and Salovey ability-based model was used. Mayer *et al.*'s model conceptualized EI as a set of abilities that could be measured using a performance test known as the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT). Their model describes EI as a set of four skills:
(1) Perceiving emotions,
(2) Using emotions to facilitate thinking,
(3) Understanding emotions, and
(4) Managing emotions.[3]

Literature review

In professional practice educational programs like nursing, a great deal of education occurs not in the classroom, but in the clinical setting. Mathis[4] states, "Stress has been implicated as affecting success in the academic and clinical arenas. As an adaptation to change, stress may enhance or hinder performance" (p. 58). Could it be that an NA student's EI profile helps determine how he or she handles stress? In keeping with the belief that the degree of stress and the individual's ability to cope with it are the determining factors in success in the academic and clinical arenas, Waugaman and Aron[5] presented evidence that the clinical component of NA educational programs starts 6-12 months after matriculation, and that stress is typically highest during this period. The resulting stress may be a turning point at which a student decides to continue, to drop out, or to accept dismissal.

The NA profession is one that is involved in high-stress situations. High-stress situations involve the need to think critically in order to provide the best patient care. In a survey of Certified Registered Nurse Anesthetists (CRNAs) and NA education faculty, Wong and Oiaowu[6] found that SRNAs, who are able to make decisions and work well

under stress were more likely to provide safe anesthesia. Studies have shown that nurses with higher EI are more apt to deal with stressful situations and demonstrate better well-being and overall job satisfaction[7] Schutte *et al.*[8] found that individuals with high EI were more successful in solving problems and completing cognitive tasks.

According to Wildgust,[9] NA students have many stressors, including didactic and clinical requirements, loss of income, relocation, and lack of time for family and personal life. In addition to the financial loss it represents, student attrition may reflect faulty judgment by program administrators concerning a student's projected capabilities and success. Mathis[4] notes that while individuals will drop out or be pushed out for various reasons, programs that can maximize the effectiveness of selection of who will most likely succeed may have an advantage. When students do not complete a program, for whatever reason, their positions are left vacant. This wastes openings that other applicants could have filled-who might have been able to complete the program.

One study that looks at empathy and EI suggested that there are limited associations between EI and academic performance, but asserted that group mean EI scores affected team functioning in a problem-based learning environment such as an operating room clinical environment. In other words, higher mean EI scores were positively related with performance in small-group problem-solving tasks.[10] Troubleshooting patient problems in the operating room environment is usually done in a small-group environment made up of the student, CRNA, anesthesiologist, and the surgeon. Austin *et al.* also found that those who are good at reading the emotions of others are perceived by their peers to be more effective in small groups.

Evans and Allen[11] 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 NA students 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 of the NA student.

There has been debate about what makes an effective leader in the healthcare setting. It is imperative that in order to provide excellent patient care, the nurse anesthetist step into a leadership role in the operating room. Cadman and Brewer[12] state that effective leadership involves the ability to motivate others, manage conflict, and communicate effectively with others, which are all traits of an EI person. It has been suggested that many of the key aspects of EI

required of nurse anesthetists, including self-awareness, open communication, optimism, and working well with others, can be attributed to effective nursing leadership.[13,14]

Some authors link EI to important areas of practice such as clinical decision-making,[15] collegial relationships,[16] clinical environment knowledge utilization[17] and inter-professional relationships at multiple levels.[16,18] Two things resonate throughout the literature dealing with EI:

a. The effect and consideration of emotion, which is viewed as an essential skill for critical decisions, and
b. the notion that EI is central to quality clinical decision-making. By utilizing a broad base of nursing knowledge, nurses make high-level critical decisions that directly impact patient care.[19]

Several researchers have claimed that emotions serve as key indicators of moral dimensions within a decision, and the implication is that emotions might contextualize decision-making and lead to more empathetic, patient-focused decisions.[11,20,21]

Emotional intelligence has also been shown to be a predictor of success in the workplace. This is corroborated by Nooryan et al.,[22] who concluded that the ability to effectively deal with emotions in the workplace assists in coping with stress and education in EI decreased anxiety in physicians and nurses, a finding corroborated by Montes-Berges and Augusto[23] on EI's importance in coping with stress in nursing. Another study by Weng et al.[24] found that higher EI was significantly associated with less burnout ($P < 0.001$) and higher job satisfaction ($P < 0.001$) among doctors. This finding was duplicated in nurses as well.[23]

Certified Registered Nurse Anesthetists must be prepared to effectively manage crises that occur in practice. "In the operating room environment, actions or inactions of just one team member can swiftly and very powerfully influence other parts of the system."[25] Therefore, effective teamwork in the clinical anesthesia realm is critical to achieving desired outcomes. Issues of personality or ethics arise which elicit emotional responses and must be dealt with. Understanding, not just acknowledging, the issues that arise requires emotional literacy.[26,27] The ability to work as a team member is especially important in the workplace today, and emotional aptitude can play a considerable role in effective team membership.[28,29] Goleman[29] 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. Morrison[30] stated that despite the significant increase in recognizing and understanding the role of EI in organizational behavior

and managing conflict, little research has been performed on assessing the EI competencies of registered nurses and whether there is a discernible relationship between these competencies and their conflict handling skills (p. 975).

A study involving nurses showed positive correlations between clinical performance levels and EI scores. Staff nurses on the professional clinical track (i.e., those pursuing advanced training and skills) demonstrated higher EI scores than did staff nurses not on the clinical track.[31] Understanding self and having a positive self-image can overcome barriers to effective independent functioning, a critical component in professional roles,[11] especially in NA.

Two studies[1,32] describe EI in NA students. The first study describes EI profiles in NA students and demonstrated that even though groups appeared to be somewhat homogeneous in comparison and makeup, processing the groups identifies EI differences between NA students. These differences helped make clear that even within a very specific field of work, there were different types of students. The second study demonstrated how EI might be useful in the admissions and selection process for NA programs. The second study also found that the Using (facilitating) branch of EI was predictive of National Certification Examination (NCE) scores.

Current longitudinal research on the development of EI over the span of educational programs varies. A study comparing the EI in graduate nursing and physical therapy students from the beginning of their professional education to the end of their first clinical experience showed no change in EI.[33] Benson et al.[34] found that nursing students had significant but small increases in EI only in the adaptability scale. No current literature involves the study of the EI of graduate NA students over the course of their programs.

Materials and Methods

On receiving approval from each university's institutional review board, a longitudinal quantitative correlational study was conducted to collect EI data on graduate students in three 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 MSCEIT V2.0 online survey. The sample was a purposive sample and included all first-semester students. Purposive sampling is used when respondents are chosen based on some special purpose.[35] The same students were asked to complete the MSCEIT V2.0 again in the last semester of their 28-month program.

Validity

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.[36] The use of ability-based tests of EI may help counteract this problem.[37] The MSCEIT is a 141-item ability-based measure that has good estimates of validity and reliability.[27] In considering the "construct validity" issue, it is useful to keep in mind that there are several different models of EI (e.g., trait and ability) that now are being studied, and each has been measured in a different way. The amount of research support for divergent and incremental validity differs for each of these models and measures. Nevertheless, Mayer et al.[38] have argued that the weight of the evidence now supports the claim that EI is distinct from IQ, personality, or related constructs. There are a number of studies that are in the field, but those that have been completed suggest that the MSCEIT offers additional predictive validity for outcomes such as pro-social behavior ($P < 0.05$, $r = 0.50$), deviancy ($P < 0.05$, $r = -0.20$), and academic performance ($P < 0.05$, $r = 0.47$).[27,39]

Reliability

The MSCEIT has two sets of reliabilities depending upon whether a general or expert scoring criterion is employed. Two sets of reliability measures are needed because reliability analyses are based on participants' scored responses at the item level, and scores at the item level vary depending upon whether responses are compared against the general or expert criterion. The MSCEIT full-test split-half reliability is $r(1985) = 0.93$ for general and 0.91 for expert consensus scoring. The two experiencing and strategic area score reliabilities are $r(1998) = 0.90$ and 0.90, and $r(2003) = 0.88$ and 0.86 for general and expert scoring, respectively.[38] A study by Palmer et al.[40] showed that the general consensus and expert consensus determined scores were highly correlated ($r = 0.97$), replicating the relationship between the two scoring methods previously reported by Mayer et al.[38] (i.e., $r = 0.98$). Moreover, there was a strong relationship between the pattern of intercorrelations based on the two scoring criteria ($r = 0.93$), further illustrating the relatively high degree of correspondence between them.

Emotional intelligence variables are composed of one overall score, which is divided into two area scores, each of which is subdivided into two branch scores for a total of four branch scores. Each branch score is further subdivided into two task scores, for a total of eight task scores (Table 1). The overall EI score was analyzed, as well as the two area scores, and the four branch scores. The task scores were

not included in this study. 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.

Scores on the MSCEIT have been found to correlate with important behavioral outcomes. Positive correlations have been reported with academic achievement (math scores $P < 0.05$, $r = 0.48$),[41] psychological well-being[36] and peer attachment,[42] among others; and negative correlations have been reported between the MSCEIT and deviant and maladaptive behavior, such as cigarette, drug, and alcohol use ($P < 0.05$, $r = -0.13$).[43] Mayer et al.[27] 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 NA first semester students ($n = 62$) in 2012, and again in the last semester of their 28-month program ($n = 34$) in 2014. Each research participant accessed the online MSCEIT at the website www.mhs.com/msceit. Confidentiality was maintained 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 per test.

The study determined whether a relationship existed between NA students' EI scores in the first and last semesters of their program without any intervention other than their normal curriculum and training. Further, EI scores in the first semester were examined to determine if they predict EI at the end of their 28-month training program.

Results

Of 62 first semester NA student participants, 34 participated in their last semester. Dropout may have occurred for several reasons, including attrition from a program of study or a declination to participate in the second testing. 10 (29.4%) represented male students and 24 (70.6%) represented

Table 1: Operationalization of the EI variables			
	Area scores	Branch scores	Task scores
Overall EI	Experiencing	Perceiving	Faces
			Pictures
		Using	Sensations
			Facilitation
	Reasoning	Understanding	Blends
			Changes
		Managing	Emotion management
			Emotional relations
EI: Emotional intelligence			

female students. The participants represented a range of ethnicities (African American, 2.9%; Asian, 5.8%, Hispanic, 5.8%, Mixed, 1%), but were predominantly Caucasian (85.5%). The participants ranged in age from 25 to 52, with a mean age of 30.

As would be expected, the paired sample correlations (Table 2) demonstrated there was a statistically significant correlation between overall EI and long-term overall EI ($P = 0.000$), reasoning area and long-term reasoning area ($P = 0.035$), experiencing area ($P = 0.000$) and long-term experiencing area, perceiving branch and long-term perceiving branch ($P = 0.000$), using and long-term using branch ($P = 0.000$), and the managing branch and long-term managing branch ($P = 0.026$). The correlation between the understanding branch and the long-term understanding branch was not statistically significant ($P < 0.157$). The paired sample t-test (Table 3) demonstrated no statistically significant change ($n = 34$) in overall EI, the two areas scores, or the four-branch scores between the first semester and the last semester of a NA training program.

Discussion

This longitudinal study expanded the knowledge of EI as it relates to NA students. In the first study on EI as it relates to NA students, Collins et al. identified that there were unique EI profiles for each NA student by year, with one EI profile consistent throughout.[32] Further, several EI variables are predictive of NCE scores.[1] The knowledge gained from this study looked at EI from a longitudinal

Table 2: EI variables correlation

Pair	n	Correlation	P
Overall	34	0.570	0.000**
Experiencing area	34	0.573	0.000**
Reasoning area	34	0.363	0.035*
Perceiving branch	34	0.591	0.000**
Using branch	34	0.584	0.000**
Understanding branch	34	0.248	0.157
Managing branch	34	0.380	0.026*

*$P < 0.05$, **$P < 0.01$. EI: Emotional intelligence

Table 3: EI Paired samples *t*-test

Pair	df	P
Overall EI (FS/LS)	33	0.792
Experiencing area (FS/LS)	33	0.807
Reasoning area (FS/LS)	33	0.492
Perceiving branch (FS/LS)	33	0.742
Using branch (FS/LS)	33	0.252
Understanding branch (FS/LS)	33	0.461
Managing branch (FS/LS)	33	0.916

FS: First semester, LS: Last semester, EI: Emotional intelligence, df: Degree of freedom

perspective as opposed to the previously published cross-sectional perspective.

The data presented show that EI scores in the first semester of an NA program correlate with the EI scores in the last semester. However, when controlling for individual differences, there is no statistically significant difference in EI between the beginning and end of a 28-month NA program. For practical purposes, there is no change in EI. McNeil et al.[44] state that if the $P > 0.25$, then one can accept the null hypothesis. Because the P values are so high in this study (Table 3), we can assume there is no difference in EI. Therefore, the authors are 95% confident that the null hypothesis is accepted and there is no difference in EI between the first semester and the last semester of a NA training program.

Even though current evidence suggests that there are links between EI and effective leadership, increased academic performance, and increased clinical performance, there is a lack of EI training in graduate NA programs. Although there may be some EI skills that are being learned between the beginning and end of a NA training program, this research demonstrates those differences are not measurable. It seems skills required to change EI are not being taught in NA programs. One would therefore not expect any change.

Although there is no longitudinal EI study on NA students to compare this study's findings with, the finding that EI does not change over the course of a NA program is in contrast to a finding by Benson et al.[45] They demonstrated a statistically significant positive linear association ($P < 0.05$) between number of years in a Baccalaureate nursing program and higher EI functioning.

Incorporating training on emotion management during the NA curriculum may lead to better outcomes, including better stress management. A study conducted with graduate students in public administration found that by the end of their programs, those students that had received EI training on average had higher EI scores than those in the non-EI curriculum sections.[46] Dugan et al.[47] found that resident physicians and faculty participating in an EI training program on average had an increase in EI scores from baseline pretraining to posttraining 1-year later. Another study by Weng et al.[24] found that higher EI was significantly associated with less burnout ($P < 0.001$) and higher job satisfaction ($P < 0.001$) among doctors. This finding was duplicated in nurses as well.[23]

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.[1] Nooryan *et al.*[22] 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 Augusto[23] on EI's importance in coping with stress in nursing. A study by Holahan and Moos[48] demonstrated that EI reduces stress and predicts 66% of key success factors in health care. In other words, health care providers scoring high in EI are far more effective in a number of key performance areas including stress management.

Increasingly, students are required to be active participants in directing their own educational success, and this is especially true when professional clinical issues are in play. This increases the stress experienced by the student. Mayer and Kilpatrick[49] suggested that emotionally intelligent people were better equipped to deal with the challenges of clinical nursing practice and independent study. Cadman and Brewer[12] 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. Further research is needed to determine if the addition of EI training to a NA program would result in a measurable change in EI.

Students accepted to NA programs can be considered a homogenous 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, conclusions can be made about the study and data, and recommendations for both practice and research can be provided.

Limitations

This study represents a progression in focused research to explore and describe EI of NA students. A limitation of this study was that even though the NA programs came from the same geographical region, the similarities of the study populations (which allows for a smaller sample size) served to limit variability in responses.

Conclusion

This study has expanded the knowledge base of EI related to NA students. While the literature demonstrates that EI is an important concept in nursing and stress management, this research suggests possible heuristic value that may

help to identify the need for inherent EI training in an NA program, as simply progressing through the program does not increase EI.

This longitudinal study shows the lack of EI change in NA students over time, but helped the researcher provide useful data to inform future research on the use of EI measures as predictors of NA program success. Future research could build on this longitudinal study, especially research that uses an interventional EI training design. Further longitudinal studies could also examine the EI makeup of students at application and admission and those who attrition from NA programs.

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