ABSTRACT

# THE EMOTIONAL INTELLIGENCE PROFILES AND COGNITIVE MEASURES OF NURSE ANESTHESIA STUDENTS IN THE SOUTHEASTERN UNITED STATES

by

Shawn Bryant Collins

Chair: Duane Covrig

ABSTRACT OF GRADUATE STUDENT RESEARCH

Dissertation

Andrews University

School of Education

Title: THE EMOTIONAL INTELLIGENCE PROFILES AND COGNITIVE MEASURES OF NURSE ANESTHESIA STUDENTS IN THE SOUTHEASTERN UNITED STATES

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Problem

Current nurse anesthesia program admissions requirements usually focus on high grade point averages, Graduate Record Examination (GRE) 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 believe these criteria may not be sufficient in predicting success and have suggested the use of such non-cognitive criteria as emotional intelligence (EI) measurements may be helpful. The purpose of this cross-sectional correlational study was to explore the relationship between emotional intelligence and personal and academic factors of nurse anesthesia students at three points in a program: matriculation, at one year of study, and in the last semester of

study and the relationship of these to clinical scores and national certification examination (NCE) scores.

## Method

An ex-post-facto cross-sectional study design was used to gather data at three critical times in nurse anesthesia (NA) programs to explore the relationships between emotional intelligence scores, preadmission demographics, clinical scores, and NCE scores. The online Mayer Salovey Caruso Emotional Intelligence Test (MSCEIT) instrument provided 15 individual EI scores for each subject. Descriptive statistics, factor analysis, correlation, multiple regression, and Q-factor analysis were used to describe and examine the statistical relationship between variables.

## Results

Data from 216 nurse anesthesia students from four accredited nurse anesthesia programs in the southeastern United States were used to create descriptive statistics, factor loadings, correlations, and multiple linear regressions. Descriptive data showed participants had a mean age of 31, were primarily Caucasian (85.1%), were about evenly distributed between the three cohorts, and had a mean acute care experience of 3.42 years. Preadmission overall GPA (OGPA) mean was 3.46, and science GPA (SGPA) mean was 3.42. The mean quantitative GRE score was 585, and the verbal GRE mean score was 496.

Separate factor analyses were done on the 17-item clinical instrument and the 15-item EI instrument. The clinical instrument factor analysis showed only three dimensions (technical skills, patient focused concepts, and resource management) were being

measured. The factor analysis of the EI instrument showed there were only two dimensions (EI experiential and EI reasoning) being measured on this sample. This corroborates the belief that the MSCEIT is a two-area measurement of EI.

Multiple regression was completed on preadmission scores, EI scores, and clinical scores in predicting NCE scores. After Bonferroni correction, three EI variables, Facilitation Task, Sensations Task, and Facilitating Branch, one academic variable, Nurse Anesthesia GPA, and one clinical variable, didactic transference, were predictive of NCE scores. Although not directly predictive of NCE scores, one preadmission variable, overall GPA, was predictive of the EI variables, academic variable, NA GPA, and the clinical variable, didactic transference.

Q-factor analysis was used to create profiles of first semester, one-year, and last semester nurse anesthesia students. It showed one EI type was consistent at each point in the program: the EI type, High Facial Reader/Low Emotional Manager, is very strong in perceiving others' emotions with a particular sensitivity to reading other people's facial expressions, tone of voice, and artistic expressions. This type is reported to be low in managing their own and others' emotions and therefore less likely to benefit by directing the emotions for long-term benefit and outcomes.

While interesting descriptively, the EI types and related profiling were not predictive of the following variables: NCE scores, OGPA, science GPA, NA GPA, GRE scores, and years of acute care experience.

## Conclusions

Several conclusions and recommendations can be made from this study. First, application of didactic knowledge to the clinical setting appears to be tied to success on

the NCE. In this study, the NA GPA, the Facilitating branch of EI, and the ability to transfer didactic knowledge to the clinical setting were predictive of NCE scores. The preadmission OGPA was predictive of all of these variables and should be considered a primary admission criterion.

Emotional intelligence measures therefore seem to provide some corroborating data for predicting success. However, this study provided only a first step to exploring the usefulness of EI in nurse anesthesia programming. In light of the finding in this study that transfer of didactic knowledge predicts NCE scores, it may be that more closely evaluating the clinical criteria as the student progresses through the NA program will help in predicting the student's success on the NCE.

This cross-sectional study was not longitudinal and could not show progress of 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 cross-sectional study, especially research that uses a longitudinal design. Longitudinal studies could examine EI changes in students over the course of their NA program. Longitudinal studies could also examine the EI makeup of students at application and admission and those who attrition from NA programs. Research could also focus on the effect of EI training within the NA curriculum and on how EI training affects student performance.

Andrews University

School of Education

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A Dissertation

Presented in Partial Fulfillment

of the Requirements for the Degree

Doctor of Philosophy

by

Shawn Bryant Collins

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APPROVAL BY THE COMMITTEE:

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# ACKNOWLEDGMENTS

Dedication is an understatement in the process of completing a dissertation, and while it takes dedication on the part of the researcher, I believe those around us and supporting us are the more dedicated. Regardless of how hard I unintentionally tried to push the envelope in the pursuit of my second doctorate, there has been no one more patient than my wife, Beverly. The endless hours she had to pick up the slack at home and drive the car while I read or wrote has not gone unnoticed, and I am eternally thankful to her. Thank you also to my children, Noah and Kendall, whom I know would like to have sat in my lap more or thrown the football another five minutes. You are the most precious legacy I have.

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# CHAPTER 1

## INTRODUCTION

Meeting the criteria for acceptance into some 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. In the United States, applications to nurse anesthesia (NA) programs far exceed available positions. To narrow the pool of applicants, NA program admission committees need to select individuals they believe will be successful not only in completing the programs but also in practicing nurse anesthesia. This screening process requires admission committees to devise methods and criteria for choosing candidates who will successfully complete the NA program. The primary cognitive criteria considered for admission to nurse anesthesia school typically include a candidate's Graduate Record Exam (GRE) scores, science grade point averages (SGPA), overall GPAs (OGPA), letters of recommendation, and completion of a number of years of acute care nursing experience.

Because of the significant financial, emotional, and personal impacts of taking the intensive NA programming and the negative effects high attrition rates have on both the program and the participants, determining the most successful candidates for a limited number of positions is very important. Reese (2002) raised a concern that current

admission criteria may not provide substantive data necessary for predicting student progression through nurse anesthesia programs.

So what kind or kinds of data may be missing from current admissions criteria? In his book *The Servant as Leader* Robert K. Greenleaf (1977) asks, "Has the leader a really good information base (both hard data and sensitivity to feelings and needs of people) and a reputation for consistently good decisions that people respect?" (p. 23). Greenleaf has an interest not only in developing servant-leaders but also in encouraging discriminative followers—people who "learn to discriminate among those who presume to serve them and identify the true servants whom they will follow" (p. 14). If nurse anesthetists are to be trained to become effective servant-leaders as well as discriminative followers, 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 admissions 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—a tool, for example, which may gauge a candidate's emotional intelligence (EI), an additional triangulation instrument in the admission officer's toolbox.

There is no research or technique describing the different EI types or even if there are different types at different stages. Therefore, one of the purposes of this research is to identify if there are different or common EI types, and if there are different or common types, that has implications for curriculum development or interventions.

My expectation was threefold. I believed emotional intelligence might be a non-academic measure useful to predict success. I had experiences where students with better

emotional skills survived the tough training and difficult personal setbacks and persevered through the program. Second, I thought emotional intelligence might be different at different stages in the program. As I ventured into this study, the possibility that certain types of emotional intelligence existed at different stages of the NA program led me to consider Q-factor analysis as a way to create and group profiles of students using their EI measures. Q-factor analysis was a technique that helps to identify possible common types among a group of individuals. Finally, I also had a hunch that EI scores and profiles may be related to clinical scores.

In addition to EI measures, I collected cognitive and clinical scores commonly used in admissions decisions and to gauge progress through the program. I collected these data because I had a hunch that EI was related to didactic and clinical success. The data provided in this study may be useful in offering another means to evaluate those who will be successful in NA programs.

This dissertation is divided into five chapters. Chapter 1 provides the background and statement of the problem, purpose of the study, research questions, rationale for the study, theoretical framework, significance of the study, definitions, assumptions, and hypotheses. This chapter also includes the assumptions, the delimitations, and a summary. Chapter 2 reviews literature related to (a) emotional intelligence theory and its relationship to education and professionalism, (b) history of nurse anesthesia education, (c) admission to nurse anesthesia programs, and (d) predicting student success. Chapter 3 (a) documents the research design with special focus on the quantitative Q-factor analysis, (b) outlines the research design, (c) describes the population and sample, (d) describes the study variables and instruments used, and (e) reviews the statistical analysis

used in the study. Chapter 4 presents (a) the data analysis of the cognitive measures and (b) the emotional intelligence profiles of nurse anesthesia students in the first semester, at one year, and in the final semester of the NA program. The final chapter discusses the findings and their implications and presents recommendations for practice and further research.

## Background of the Problem

That many students fail to complete nurse anesthesia programs is an ongoing problem with significant emotional and financial effects. Among the possible causes for students' attrition from nurse anesthesia programs, both inadequate socialization and stress may play a part (Waugaman & Aron, 2003). Waugaman and Aron state: "Educational and professional values may differ from individual cultural values that could facilitate or create conflict and difficulty for some groups in socializing into the profession" (p. 11).

Perhaps more critical in determining a student's completing a nurse anesthesia program is stress. Mathis (1993) 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 emotional intelligence (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 (2003) point out that the clinical component of nurse anesthesia 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.

According to Wildgust (1986), nurse anesthesia 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. Because the number of openings for incoming students into anesthesia programs is limited, maximizing the number of students who finish would be ideal. Mathis (1993) 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.

As reported by Haritos, Shumway, and Ellis (1995) and by Reese (2002), the purpose of the NA program admission process is to evaluate information that can predict an individual's potential for success in this intensive graduate program, but it has not been as successful as program directors (PD) would like. Typically, accredited NA programs use GRE scores, overall undergraduate GPA, science GPA, letters of recommendation, and a personal interview to predict who will successfully progress through a nurse anesthesia program. Nurse anesthesia program applicants normally submit an application containing GRE scores of 1000 or better, an overall minimum GPA of 3.0, and a minimum science GPA of 3.0. In addition, the accrediting body requires all applicants to have a minimum of 1 year of acute care (intensive care as interpreted by many programs)

experience as a nurse. Letters of recommendation and an in-person interview complete the admissions package (Haritos et al., 1995; Reese, 2002). Using these criteria, program directors are able to pare large applicant pools down to a manageable size. But attaining a manageable-sized group from the pool of applicants may fall short of reaching the goal of obtaining a set of students most likely to complete the course and gain success on the job.

As noted in the next chapter, Murden, Galloway, Reid, and Colwill (1978) point out that the success of students with high levels of maturity, personal integrity, academic achievement, motivation, or rapport emphasizes the need to consider an applicant's personal attributes, such as EI, as well as traditional cognitive factors. Burns (2009) claims that current admission criteria for NA students have limitations in that they fall short of screening for the multiple abilities required for a student to succeed in complex professional programs. Burns noted that "current requirements may not predict positive progression for students in nurse anesthesia programs" and "predicting positive academic progression for students based on the current prerequisites remains elusive" (p. 8). Burns suggests that research that examines innovative selection criteria merits further study and includes employing noncognitive selection criteria when determining applicant selection.

A weak link in the process of selecting candidates for a nurse anesthetist academic program can present problems. For example, some researchers point out that attrition of nurse anesthesia students negatively affects students, nurse anesthesia program viability, and consumers of healthcare (Andrews, Johansson, Chinworth, & Akroyd, 2006; Wilson, 2008). One of the problems with current selection processes may

be that cognitive ability is currently the primary consideration in evaluating applicants for professional health programs. Successful performance in clinical experiences requires proficiency not only in cognitive ability but also psychomotor skills and affective behaviors. As for non-cognitive abilities, some have wondered whether measures of emotional intelligence profiles might help in the process of describing who would be successful in progressing through and completing an NA program.

## Statement of the Problem

As noted above, current requirements in nurse anesthesia program admissions may not predict positive progression for students in nurse anesthesia programs. Numerous studies (Burns, 2009; Hulse et al., 2007; Lebeck, 2003; Reese, 2002) have shown that using the cognitive and subjective data alone may have little or no predictive value in determining success for nurse anesthesia students. Could it be that emotional intelligence profiles may, as non-cognitive factors, help in adding to and improving this processing?

## Purpose of the Study

The purpose of this study was to do a cross-sectional research to see whether certain distinctive emotional intelligence profiles of nurse anesthesia students are evident at each of the key stages of the NA program: matriculation, after 1 year, and in the last semester of study in four nurse anesthesia programs in the southeastern United States. The study also examined the relationship between cognitive measures used in admissions and throughout the program, EI constructs, and clinical evaluation scores. For this study, academic and clinical scores are the dependent variables, and the student's emotional

intelligence scores, undergraduate OGPA, undergraduate SGPA, years of acute care nursing experience, and GRE scores are the independent variables.

## Research Questions

The research questions that guided the study are:

1. What are the demographic and emotional intelligence profile(s) of NA students at matriculation, after 1 year, and at graduation?

2. What emotional intelligence variables, clinical variables, and cognitive variables correlate and/or predict NCE scores?

## Research Design

With one exception, all the studies performed to date on cognitive factors that affect the success of nurse anesthesia students have been quantitative studies (Reese, 2002). Only one study researched non-cognitive data, but this too was quantitative (Hulse et al., 2007).

The research design for this study is cross-sectional quantitative correlational. I selected this research design because the research objectives are to examine the relationship among variables from an exploratory perspective. The cross-sectional design also allowed me to get a larger sample. I used a quantitative correlational research method to examine the relationship between the independent variables (EI, overall GPA, SGPA, GRE scores, acute care nursing experience), and the dependent variables (academic and clinical scores) of students in nurse anesthesia programs.

I also used Q-factor analysis to create, simplify, and aggregate EI profiles of nurse anesthesia students using an ex post facto survey design. In the study being reported here

I used the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT V2.0) to cross-sectionally collect data on emotional intelligence of nurse anesthesia students at one specific point in time on three different classes in the NA program of study: matriculation, after 1 year of study, and in the last semester. I used the data from the MSCEIT V2.0 to determine whether there was a correlation between EI profiles, clinical variables, and academic variables of nurse anesthesia students. Other variables I examined in relation to nurse anesthesia student academic success included pre-admission GRE scores, overall GPA, science GPA, and years of acute care nursing experience. Variables examined in relation to nurse anesthesia student clinical success included 17 items from a clinical evaluation tool and two second-order clinical factors. I used a variety of appropriate statistical tools such as correlation and multiple regression to determine the characteristics that best describe the EI profile and successful graduation of nurse anesthesia students.

## Theoretical Framework

Emotional intelligence theory as set forth by Mayer, Salovey, and Caruso (2004) represented the basic theoretical framework for this study. As defined by Mayer et al. (2004), emotional intelligence is

> the capacity to reason about emotions, and of emotions to enhance thinking. It includes the abilities to accurately perceive emotions, to access and generate emotions so as to assist thought, to understand emotions and emotional knowledge, and to reflectively regulate emotions so as to promote emotional and intellectual growth. (p. 197)

EI from this theoretical perspective refers specifically to the cooperative interaction of cognitive intelligence and emotion (Ciarrochi, Cahn, & Caputi, 2000; Roberts, Zeidner, & Matthews, 2001).

Some research has demonstrated the use of emotional intelligence in successful leadership (Codier, Kooker, & Shoultz, 2008; Connolly, 2002; Cox, 2002; Gewertz, 2006), education (Parker, Austin, Hogan, Wood, & Bond, 2005; Parker, Summerfeldt, Hogan, & Majeski, 2004; Petrides, Frederickson, & Furnham, 2003; Petrides & Furnham, 2000; Qualter, Gardner, & Whiteley, 2007; Qualter, Whiteley, Hutchinson, & Pope, 2007), and professional work situations (Bellack, 1999; Bellack et al., 2001; Chabeli, 2006; Freshwater & Stickley, 2004; Gooch, 2006; Kerfoot, 1996; McQueen, 2004; Reeves, 2005; Strickland, 2000), all of which impact nurse anesthesia student education. Although these studies and others have provided valuable information on EI in relation to the education of nurses, I found no studies on the effect of emotional intelligence in the successful progression through and program completion of nurse anesthesia students.

The operating room environment in which nurse anesthesia students learn is stressful, and working as a team always involves emotions and feelings. The ability to successfully perceive emotions and use them to assist thought can be critical to successful patient outcomes and work environments. Because nurse anesthesia students spend great amounts of time in emotionally charged operating room environments, an emotional intelligence theory testing instrument may serve as a tool that could lead to successful student outcomes.

## Significance of the Study

Burns (2009), Lebeck (2003), and Reese (2002) have done research on the value of cognitive-related factors in predicting the success of nurse anesthesia students. However, non-cognitive factors such as personal interviews and recommendations have also been included in these studies. This inclusion of non-cognitive factors matches

Cadman and Brewer's (2001) assertion that because of the increasingly complex and pluralistic nature of nursing, nurses need a balance of cognitive and non-cognitive thinking. In light of Coleman and Brewer's assertion, it is understandable why some are raising concerns about including more focus on EI in admissions as well as in program progression and graduation.

As Greenleaf (1997) noted, a "really good informative base" includes "both hard data and sensitivity to feelings and needs of people" (p. 23). Current selection criteria for nurse anesthetist student candidates include critical hard data but neglect important affective information accessible through well-researched emotional intelligence tests.

As Burns (2009), Lebeck (2003), and Reese (2002) have pointed out, the traditional criteria for selecting students to be admitted to a nurse anesthesia study program have been shown to be inadequate in determining which nurse anesthesia students will successfully complete and graduate from a degree program. Determining the relationship of emotional intelligence profiles in successful nurse anesthesia student success and graduation represents information important to nurse anesthesia educational administrators. Nurse anesthesia programs transitioning from the master's degree to the doctor of nursing practice (DNP) degree require nursing leaders to formulate strategic planning including an examination of current admission criteria (Burns, 2009).

Studying the relationship of EI profiles of successful NA students at different key points in NA training may also provide data useful in better preparing students for program success and that may also, although indirectly, inform admission criteria and applicant selection. This approach to the selection process should lead to a better understanding of the relationship of admission criteria to academic progression and may

lead to a change in the selection process by nurse anesthesia administrators. As Burns (2009) notes, nurse anesthesia 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 nurse anesthesia programs.

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. Mayer and Kilpatrick (1994) suggested that emotionally intelligent people were better equipped to deal with the challenges of clinical nursing practice and independent study. Cadman and Brewer (2001) noted that individuals in professional nursing need to be able to blend and integrate both theory and practice. They believed students recruited into nurse anesthesia programs needed to be effective in both areas, and emotional intelligence may be a linking aspect in making that connection.

Hulse et al. (2007) suggest that by examining the possible reasons for attrition in NA programs, program directors may be able to identify students at risk of failure and also create procedures to minimize the number of students at risk of failure, and more importantly, to help those at risk. This may also be true of collected EI profiles of successful students. We may discover patterns that can be useful in creating interventional measures such as the development and implementation of emotional intelligence training that promotes success and reduces attrition.

As this exploratory study seeks to understand the relationships of some of these variables, the main driving concern is to find information useful to decrease attrition and increase retention. This is crucial to continue supporting the supply of certified registered

nurse anesthetists (CRNA) necessary for meeting societal healthcare needs (Beitz & Kost, 2006; Merwin, Stern, & Jordan, 2006, 2008; Wilson, 2008) and avoiding the detrimental financial and social impacts of attrition.

## Definition of Terms

Defining terms related to the independent and dependent variables for this study provide clarity for use.

*Acute Care Experience:* A variable required for admission consideration to nurse anesthesia programs. As defined by most NA programs, it involves at least 1 year of experience in the surgical, trauma, or medical intensive care units. Nurse anesthesia programs vary with the number of years as well as the type of acute care nursing experience required for admission, but only 1 year of acute care experience is required by the accrediting body (*Standards for accreditation of nurse anesthesia programs*, 2010).

*Certified Registered Nurse Anesthetist/Nurse Anesthetist:* An advanced practice registered nurse who has graduated from a nurse anesthesia program accredited by the Council on Accreditation of Nurse Anesthesia Educational Programs and who has passed the National Certification Exam (NCE).

*Clinicals/Clinical Practicum:* A specified period of time during which supervised students provide clinical anesthesia services to patients. Qualified and credentialed anesthesia practitioners provide student supervision. Passing of clinical courses is required for one to graduate from an accredited nurse anesthesia program.

*Emotional Intelligence:* The capacity to reason not only about emotions but also to utilize emotions to enhance thinking. It includes the abilities to accurately perceive emotions, to access and generate emotions so as to assist thought, to understand emotions

and emotional knowledge, and to reflectively regulate emotions so as to promote emotional and intellectual growth (Mayer et al., 2004).

*Overall Grade Point Average:* A variable required for admission consideration to nurse anesthesia programs. The OGPA is a calculated average of grades for all courses taken for all previous degrees. Minimum OGPA requirements are program-based (*Standards for accreditation of nurse anesthesia programs*, 2010). For the purposes of this study, a 4.0 scale will be used.

*Graduate Record Exam Scores:* A variable required for most NA programs for admission consideration to nurse anesthesia programs. The GRE represents a standardized examination used across educational disciplines for selection to graduate programs. If required, GRE minimum scores are program based (*Standards for accreditation of nurse anesthesia programs*, 2010).

*Graduation:* The satisfactory completion of academic and clinical coursework specified in the program curriculum *(Standards for accreditation of nurse anesthesia programs,* 2010*)*.

*Innovative Selection Criteria:* Defined as nontraditionally used variables that may serve to improve the process of selection to nurse anesthesia programs. Examples may include personality inventories, interview scores, and personal attributes.

*National Certification Exam (NCE):* The examination required for one to become certified as a nurse anesthetist. Only those who have successfully completed an accredited NA program are eligible to take the NCE.

*Science Grade Point Average:* A variable calculated from the OGPA required before a candidate is considered for admission to nurse anesthesia programs. Included in

the calculation are all science courses taken at the undergraduate or community college level. Courses usually include anatomy and physiology, chemistry, biochemistry, physics, and biology, but vary among programs. Minimum SGPA requirements are program-based (*Standards for accreditation of nurse anesthesia programs*, 2010). For the purposes of this study, a 4.0 scale will be used.

*Success:* Refers to meeting all the requirements necessary to progress through an accredited nurse anesthesia program. Placement on clinical or academic probation would indicate a lower success rate.

*Traditional Selection Criteria:* Defined as the variables most commonly used and considered for admitting an applicant to nurse anesthesia programs. The variables include the OGPA, SGPA, GRE scores, and acute care nursing experience.

## Assumptions

This study has four assumptions:

1. As all NA programs are accredited by the Council on Accreditation of Nurse Anesthesia Programs (COA), the nurse anesthesia coursework is similar among all NA programs, and thus senior NA GPAs are comparable.

2. Clinical evaluation processes are similar among the participating NA schools.

3. Prerequisite minimum OGPAs are equivalent even though there may be slight variations in courses that make up the prerequisite minimum OGPA among the admitted nurse anesthesia students.

4. Participants will answer questions honestly.

## Delimitations

This study included only students who were accepted into an accredited NA program, thus representing a more homogeneous group than those not accepted. Assuming EI is tested as a part of the interview process, this suggests later studies can look at the EI profiles of those accepted and those not accepted and compare the profiles. Furthermore, the only students studied were nurse anesthesia students from the southeastern United States.

## Summary and Organization

This chapter provided an overview of the study. Today's admission criteria do not predict successful academic progression for students entering nurse anesthesia programs (Reese, 2002). Graduate school attrition is costly not only to students, programs, and universities, but also to consumers of healthcare (Andrews et al., 2006).

In meeting these challenges, an examination of current admission criteria can assist nurse anesthesia education leaders in refining program admission guidelines (Reese, 2002). Understanding common EI profiles of nurse anesthesia students by using an emotional intelligence screening tool, the nurse anesthesia profession may gain viable candidates who progress to graduation, thereby meeting increased societal healthcare demands in the form of a larger pool of nurse anesthesia providers (Horton, 2007; Wilson, 2008).

Chapter 2 will review the literature relevant to pre-admission variables for nurse anesthesia programs. The chapter continues by examining emotional intelligence theory and its relation to academic and professional success. Because few studies exist aimed at examining the relationship of admission criteria to academic progression for students in

nurse anesthesia programs, the chapter will provide a historical perspective of nurse anesthesia education, attrition from graduate programs with the resultant effect on students, programs, and societal healthcare needs, and exploration of currently used variables for admission. The contextual framework of emotional intelligence theory and its effect on successful nurse anesthesia graduates and in turn admission criteria underlies the leadership charge for the study. Chapter 3 is devoted to the methodology of the study, including the research design, description of the population, the study variables, instruments used, and statistical analysis used. Chapter 4 analyzes and presents the data gathered from the MSCEIT instrument and NA programs. The concluding chapter 5 presents a summary of the study and offers conclusions and implications based on the findings.

# CHAPTER 2

# LITERATURE REVIEW

## Introduction

Nurse anesthesia programs are 24 to 36 months in length, intense, and require high levels of cognitive intelligence. At the same time, nurse anesthesia students also require a significant quality of interpersonal skills, as students are required to balance their own needs with the needs of the patient, the attending CRNA, the attending anesthesiologist if one is present, the operating room staff, the program faculty, and the surgeon. Admission to nurse anesthesia programs is a very competitive process. Because of the limited number of openings in nurse anesthesia programs and because attrition rates affect financing and accreditation, anesthesia programs have searched for ways to predict how to choose candidates who will be successful anesthesia students during the grueling process they are put through over 24 to 36 months of full-time training (Boytim, 2005; Burns, 2009; Hulse et al., 2007; Lebeck, 2003; Reese, 2002).

Current admission criteria for nurse anesthesia programs reflect traditional variables thought to be useful in determining the best candidate for acceptance. In the past 15 years, a wealth of studies showed there is no predictive value for nurse anesthesia student success in terms of OGPA, GRE scores, and other factors related to intelligence quotients (IQ) (Gunn, 1991; Horton, 2007; Reese, 2002). However, researchers have

given very little study of the non-cognitive skills that influence the success and capacity for successful interactions, especially the role of emotional intelligence in understanding the success of NA students.

The purpose of this chapter is to review the literature on (a) emotional intelligence theory and how emotions work from a physiologic standpoint, (b) nurse anesthesia program history and structure, and (c) profiles of student success.

## Emotional Intelligence

Historically, organizations have based hiring and training on test scores that measure cognitive intelligence. Traditionally defined as an IQ, cognitive intelligence tests represent attempts to indicate one's capacity to learn, understand, recall, and solve problems. Starting in the latter part of the 20th century, an understanding of what constitutes an intelligence evolved, so that researchers today consider certain aspects of intelligence that go beyond the cognitive components (Gordon, 2010, August). One of the non-cognitive areas of intelligence explored in the literature in the last 40 years is emotional intelligence.

Moss (2005) stated that people have known intuitively for some time that success is not directly attributable solely to the kind of intelligence measured by IQ tests. This leads to a desire to find other types of intelligence that impact success—in particular emotional intelligence. Emotional intelligence rather than IQ is believed by many to be the determinant of who advances most quickly within an organization (Weisinger, 1998). Neuwirth (1999) said that although cognitive intelligence as measured by IQ is important in success, no matter how intelligent one may be, if a person cannot interact in a meaningful way with others, the results are less than optimal.

In recent years psychologists and others have identified many kinds of intelligence. According to Mayer and Caruso (1999), psychologists consider an intelligence to be an ability that must meet three criteria to be considered a true intelligence: (a) a correlation criterion, (b) a developmental criterion, and (c) a conceptual criterion. A correlational criterion involves defining a set of abilities that can be moderately correlated with one another. A developmental criterion requires that tested abilities develop with age and experience—a construct based on the groundbreaking work by Binet and Simon at the beginning of 20th century (Fancher, 1985, p. 71). A conceptual criterion involves demonstration of actual mental abilities, not just the desire to possess those abilities.

The most commonly discussed intelligence is cognitive intelligence (as measured by IQ tests), which has been in vogue for 100 years. In the 1970s from his work on creativity, Howard Gardner (1983) introduced the concept of multiple intelligences (verbal linguistic, logical mathematical, visual/spatial, musical/rhythmic, bodily/kinesthetic, naturalist, intrapersonal, interpersonal, and existential). More recently Goleman and others (Goleman, 1998; Goleman, Boyatzis, & McKee, 2002), in describing intelligences, have promoted Social and Emotional intelligence.

Emotional intelligence qualifies as an intelligence because it has an actual demonstration of ability, which is further divided by Mayer, Salovey, and Caruso (2000, 2002) and Mayer and Caruso (1999) along a continuum from lower, basic skills to higher, more complex skills (Moss, 2005). The theory of EI meets these criteria, and thus can be classified as an intelligence.

Although cognitive intelligence has been the dominant focus for 100 years, emotional intelligence is a relatively new concept in comparison with cognitive intelligence and in research. Supporters of emotional intelligence (EI) theory (Mayer et al., 2004) have postulated that the information value of emotions can make thinking more intelligent, and that EI is distinguishable from other mental skills, such as verbal–propositional intelligence, which operates primarily on "cold" cognitive processes. These same researchers also have said EI is conceptually and empirically distinct from temperament and personality traits, such as neuroticism.

Researchers have noted that emotional intelligence represents a set of core competencies for identifying, processing, and managing emotions that enable nurse leaders to cope with daily demands in a knowledgeable, approachable, and supportive manner (Goleman et al., 2002; Matthews, Zeidner, & Roberts, 2007). Some have said that an underlying assumption within emotional intelligence 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 (George, 2000; Salovey & Sluyter, 1997).

Although EI started as a study of social behavior, Moss (2005) stated: "EI has blossomed into a measurable, predictable pattern of thought and action that influences decision making and success in relationships" (p. ix). Moss also noted that although EI has become so relevant that many books have been written on the topic as it relates to leadership, nursing leadership and EI present a special situation. In nursing, emotions are common in the frontline work, where decisions involve tough choices on a regular basis.

The concept of EI has both detractors and supporters. Some feel that EI is nothing more than personality traits with many conflicting and unvalidated definitions. For example, Waterhouse (2006) is troubled that there seem to be many conflicting constructs of EI. On the other hand, Cherniss, Extein, Goleman, and Weissberg (2006) have defended the many constructs of EI by stating:

> At this early stage of the theory's development, the generation of several versions of EI theory is a sign of vitality in the field, not a weakness. IQ theory has, likewise, had multiple versions—Guilford, Cattell, Wechsler, and Sternberg notable among many others. In fact, after nearly 100 years of research and theory, there still is not a consensus about what IQ is or the best way to measure it. Expecting such a consensus for EI, especially at this stage of the theory's development, seems to be holding it to a different standard. (p. 239)

Numerous studies have examined the relationship between EI and two sets of older constructs: cognitive ability and personality. These authors have noted further that

> although some studies have suggested that EI adds nothing new, the preponderance of published research indicates that EI does in fact represent a set of abilities that are distinct from either IQ or the "Big Five" personality traits (openness to novel experience, conscientiousness, extraversion vs. introversion, agreeableness, and neuroticism). (Cherniss et al., 2006, p. 240)

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, Salovey, Caruso, and Sitarenios (2003) have argued that the weight of the evidence now supports the claim that EI is distinct from IQ, personality, or related constructs.

Although EI is a recent theory, and therefore still at an early stage in development and hypothesis testing, its newness does not call for us to trash it. Theory building

continues through successive testable claims, resulting in more refined theories that become evidence-based. Cherniss et al. (2006) pointed out that EI theory is in this hypothesis-testing stage. Therefore, it is important to consider all the evidence.

## Brain Physiology and Emotions

Morrison (2008) described the connections between the brain's cognitive and emotional functions. Because the author was concise and authoritative, direct quotes are used for describing the physiology of the brain and its connection with EI.

> The two primary areas of the brain connected to emotions are the amygdala and the neocortex. Humans have a structure above the brainstem called the amygdala. The amygdala is part of the limbic system of the brain and is the specialist for emotional matters. If the amygdala is damaged or severed a person is unable to determine emotional consequences of events. This is called affective blindness. (Morrison, 2008, p. 977)

Goleman (1995) has described both the rational and emotional functions of the brain. The thinking or rational portion of the brain is the neocortex (Goleman, 1995). Although the neocortex is the thinking portion of the brain, the amygdala can take control. It is helpful to think of the amygdala as an alarm system in a home that sends out messages to the police or the fire department. When the brain's amygdala receives an alarm, it sends urgent messages to every part of the brain. The amygdala also triggers the body's flight-or-fight hormones, activates the cardiovascular system, and prepares the body for movement. In essence, it puts the brain on edge. It is also the storehouse of emotional memory.

Joseph LeDoux (1998), a neuroscientist, was the first to establish the role of the amygdala in the emotional functions of the brain. The amygdala can start to take control of a person's actions while the neocortex is still deciding on a course of action. The

relationship between the amygdala and the neocortex is at the heart of EI. LeDoux's research indicated that sensory signals picked up by the eyes or ears are relayed to the amygdala before they are sent to the neocortex. This finding explains why emotions sometimes overwhelm rationality.

According to one group of researchers, many have responded too readily and in haste to social and emotional circumstances in ways they later have regretted. This is possible because the amygdala can initiate a response before it is fully registered by the neocortex. It was once thought, before the development of advanced imaging techniques, that the neocortex first received the signal and that it was then forwarded to the amygdala, which produced an emotional response. The conclusion to be drawn from the above points seems to be that decision-making should be improved in those who have developed their emotional intelligence because rational thought processes have emotion at their core (Humphrey, Curran, Morris, Farrell, & Woods, 2007).

Goleman (1995) refers to emotional explosions as neural hijackings. This hijacking occurs instantly, generating fear and rage before the thinking part of the brain can rationally decide what to do. Fortunately, humans do have a damper switch that modulates the surges—it is located in the prefrontal lobe of the neocortex. This area brings analytical thinking and rationality to emotions, thus helping to avoid explosive reactions. Finally, Goleman has suggested that we have two brains, two minds and two kinds of intelligence: rational and emotional. For the purposes of this study, emotional intelligence will be the focus.

## Emotional Intelligence Models

Clarke (2006) has described three models of emotional intelligence that have dominated the literature to date: ability, mixed, and trait (personality). Mayer and Salovey's (1993) original ability or performance-based model is seen as a cogent set of abilities and defines EI as "the ability to monitor one's own and other's emotions, to discriminate among them, and to use the information to guide one's thinking and actions" (p. 433).

According to the Mayer, Salovey, and Caruso's (2000, 2002; Mayer & Caruso, 1999) ability-based emotional intelligence model (Figure 1), EI has four ascending steps or levels. Level one calls for identifying emotions. Level two brings into play facilitation—contrasting emotions both with each other and with thoughts and sensations. Level three involves both understanding emotions and reasoning about interactions among emotional states. Level four, the highest level, has to do with a capacity for managing emotions—including not only the ability to calm oneself after experiencing a negative emotion such as misdirected anger but also the ability to help alleviate excessive anxiety of another person. According to the model, a higher level cannot be achieved before all lower levels are mastered.

The mixed ability model of EI is comprised of both personality traits and abilities used to perceive and manage emotions. Bar-On (1997) defined the most developed of the mixed ability models. Bar-On defined EI as "an array of non-cognitive capabilities, competencies, and skills that influence one's ability to succeed in coping with environmental demands and pressures" (p. 3). This model focuses on what Bar-on refers to as emotional-social intelligence (ESI).

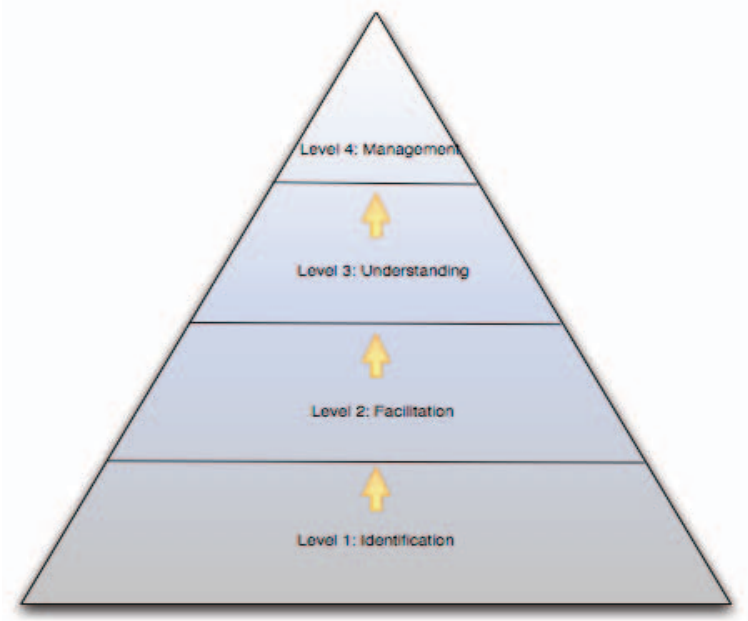


Figure 1. Ability-based EI Model.

Goleman and his colleagues popularized the trait, or personality-based, model (Cherniss et al., 2006), which remains the furthest from giving a distinct focus on EI abilities (Clarke, 2006). Goleman (1998) defined this as "being able to motivate oneself and persist in the face of frustrations, to control impulse and delay gratification, to regulate one's moods and keep distress from swamping the ability to think, and to empathize and to hope" (p. 34).

Zeidener, Roberts, and Matthews (2004) have pointed out that of these three models, the mixed-ability and trait models in particular have come under increased and intense criticism in terms of the ambiguity and the tools used to measure them. Clarke (2006) has said that a number of studies have demonstrated that the mixed-ability and trait EI models fail to qualify as an intelligence based on conceptual and correlational grounds. On the one hand, because emotional intelligence has been criticized for being

poorly defined, not measurable, and overblown in terms of importance, and though enthusiasm about emotional intelligence grows, some writers caution that embracing emotional intelligence concepts uncritically may be premature (Freshwater & Stickley, 2004; Vitello-Cicciu, 2003). On the other hand, however EI may be defined, writers such as Goleman (1998) view emotional intelligence as "separate from cognitive intelligence (measured by IQ tests) and complementary to academic intelligence (measured by academic performance)" (p. 317). While debate will probably continue, for this study, I view EI as a measurable ability-based intelligence that plays an integral role in progression through educational and professional settings.

## Emotional Intelligence in Nursing Leadership and Education

Many may claim that health care is one of the most emotionally charged occupational fields. In keeping with this view, one team of writers suggested that the nature of nursing requires nurses to be emotionally intelligent (Bulmer Smith, Profetto-McGrath, & Cummings, 2009). Perhaps not surprisingly, then, increasingly some view EI as having a potential role in medicine, nursing, and other health care disciplines, for both personal mental health and professional practice.

Birks, McKendree, and Watt (2009) have identified stress as being high for students in health care courses, and this is especially true in NA programs. As some writers have noted, emotional intelligence involves the accurate processing of emotionally relevant information (e.g., facial expressions as defined by the MSCEIT) and the ability to use emotions in reasoning in order to solve problems (Brackett, Rivers, Lerner, Salovey, & Shiffman, 2006).

Moss (2005) stated that there are some leadership terms that are classic, including these: “visionary thinking,” “strategy,” “communication skills,” and “teamwork,” so when people consider these leadership qualities, they need to remember that there is an inseparable emotional side to these terms. Accordingly, one needs to be aware of the emotional side to nursing leadership. In nursing, the emotional side is sometimes referred to as empathy. Mayer and Caruso (1999) reported that overall EI scores correlate with self-report empathy.

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 (Austin, Evans, Magnus, & O'Hanlon, 2007). Troubleshooting patient problems in the operating room environment is usually done in a small-group environment made up of the student, CRNA, anesthesiologist, and 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.

Several authors affirm that understanding and recognizing emotion is a high-order nursing practice skill based on the notion that emotional intelligence is vital to practice (Bellack, 1999; Bellack et al., 2001; Chabeli, 2006; Freshwater & Stickley, 2004; Gooch, 2006; Kerfoot, 1996; McQueen, 2004; Reeves, 2005; Strickland, 2000). This assertion is focused on an assumption that understanding, detecting, and conveying emotion is pivotal to a profession that requires sensitivity within relationships.

Evans and Allen (2002) 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. Evaluation of the data also showed correlation between emotional intelligence and both gender and ethnicity.

A study by Walker (2006) on 1,205 undergraduate students at a 4-year, research-intensive university found that there is a significant relationship between emotional intelligence and academic success in college. Walker's research showed positive correlations between emotional intelligence scores and gender, ethnicity, ACT score, and grade point average, number of terms completed, and number of hours failed within the first four semesters. The conclusion of the research suggests that there is indeed a significant relationship between emotional intelligence and academic success in college.

Emotional intelligence is moldable and has many beneficial aspects in terms of personal, societal, and social aspects when incorporated into higher education (Cohen, 1999; Topping, Holmes, & Bremmer, 2000). Studies have shown that when the students of primary and secondary schools are taught about emotional intelligence, they show fewer problems with emotional or behavioral issues, which in turn lead to more effective learning (Caplan et al., 1992; Cohen, 1999).

Likewise, it has been found that the incorporation of emotional intelligence classes into the curriculum results in higher scores on standardized achievement tests (Hawkins, Von Cleave, & Catalano, 1991). 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 (Cohen, 1999; Goleman, 1995).

Vandervoort (2006) 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" (p. 6). Vandervoort demonstrated that by increasing emotional intelligence, 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 emotional intelligence to important areas of practice such as clinical decision-making (Chabeli, 2006), collegial relationships (Cummings, Hayduk, & Estabrooks, 2005), clinical environment, knowledge utilization (Edgar et al., 2006) and inter-professional relationships at multiple levels (Carson, Carson, Fontenot, & Burdin, 2005; Cummings et al., 2005). Two things resonate throughout the literature dealing with emotional intelligence: (a) the effect and consideration of emotion, which is viewed as an essential component of critical decisions, and (b) the notion that emotional intelligence 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 (Facione & Facione, 1996). 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 (Evans & Allen, 2002; Freshwater & Stickley, 2004; Gooch, 2006).

Critical thinking skills are also extremely important in the nurse anesthesia practitioner. There is speculation that emotion might be a powerful motivator for quality decision-making, and considering emotion may propel decision-makers to expand and reconsider their reasoning, and therefore to think critically (Akerjordet & Severinsson, 2007; Chabeli, 2006). Zimmerman and Phillips (2000) 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 (Vitello-Cicciu, 2002).

For students, nursing education is an emotional as well as intellectual experience and this experience has the potential to profoundly affect students' ability to retain knowledge and to think critically (Chabeli, 2006). Students must think critically and this process involves managing and balancing emotions (Chabeli, 2006; Freshwater & Stickley, 2004). On the one hand, increases in stress levels erode mental abilities and make people less emotionally intelligent (Yang & Gu, 2007). On the other hand, studies have shown that negative stress consequences in nurses and nursing students can be avoided by utilizing emotional intelligence (Ramesar, Koortzen, & Oosthuizen, 2009). This is especially true in nurse anesthesia programs in which students are constantly under high levels of stress.

CRNAs 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" (Wright, 2009, p. 21). 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 (Mayer et al., 2000, 2002). 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 (Druskat, 2001; Goleman, 1998). Goleman (1998) 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 (2008) 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)

Nurse anesthesia education is highly stressful. According to Perez and Carroll-Perez (1999), "some stress motivates students, but excess stress leads to failure and unhappiness. While stress cannot be eradicated from the practice of anesthesia, it can be managed, especially when its signs are recognized early" (p. 79). An added component of stress for nurse anesthesia students is the transition from expert acute care nurse to that of a novice graduate nurse anesthesia student (Perez & Carroll-Perez, 1999). In this situation, NA students are caught between two worlds: that of an expert critical care nurse and that of being a student. Mailloux (2006) found that nursing students' perceptions of empowerment had a positive effect on their perceptions of autonomy, another requisite of NA program graduates. Empowerment could come in the form of emotional intelligence.

Self-awareness is a key skill in handling stress, as are emotional intelligence competencies, such as stress management and adaptability. A lack of emotional intelligence in such a stressful environment as an operating room means possible failure

and this can have an impact on one's future (Bar-On, 1997; Goleman, 1998). Individuals with higher emotional clarity have fewer negative emotional responses and intrusive thoughts after an acute stressor, which enables them to adapt more readily to the experience (Ramos, Fernandez-Berrocal, & Extremera, 2007). The regulation of emotion can smooth many aspects of organizational and employee life (Grandey, 2000), including stress reduction, and by extension, the stress reduction of a nurse anesthesia student.

## Emotional Intelligence in Professional Success

In 1995, United States Air Force (USAF) recruiters were suffering from high rates of first-year turnover. In their efforts to increase recruiter retention, the USAF used Multi-Health System's (MHS) EQ-i assessment of EI to study the differences between successful and unsuccessful recruiters. Using the findings from the study, the USAF developed a pre-employment screening system that led to a 92% reduction in first-year turnover and resulted in $2.7 million in training cost savings in the first year alone (Gordon, 2010, August). Gordon (2010, August) continued by relating that "many organizations today are realizing that there are more than just soft benefits to EI in the workplace" (p. 72). In addition to revealing soft benefits such as higher employee engagement and teamwork, research is showing that accurate EI testing can also have solid and measurable benefits with real bottom-line results such as lower training costs and increased retention (Gordon, 2010, August).

The Council on Accreditation of nurse anesthesia educational programs believes that the development of communication skills is important in the education of nurse anesthetists. The COA's Standards for Accreditation of Nurse Anesthesia Programs states that accredited programs must demonstrate that graduates have the skills,

knowledge, and competencies in communication so they can effectively communicate with people who influence patient care. Nurse anesthesia students must be able to use appropriate verbal, nonverbal, and written communication in the delivery of perianesthetic care (*Standards for Accreditation of Nurse Anesthesia Programs*, 2010).

Some authors have suggested that a higher EI may be linked to competency in interpersonal and communication skills—which may contribute to better patient care and clinician outcomes (Gewertz, 2006). A study by Shapiro and Lie (2004) suggested that successful communication requires a complex process involving perceiving emotions, managing one's own reactions, and using emotion to facilitate future performance.

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 (Codier et al., 2008). Understanding self and having a positive self-image can overcome barriers to effective independent functioning, a critical component in professional roles (Evans & Allen, 2002), especially in nurse anesthesia. 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.

A survey of executives by Connolly (2002) showed that executives disliked and even terminated individuals who lacked EI qualities. The same study showed that 80% of nurse executives and 60% of the business executives admitted to removing someone from a management position because of a lack of EI (Connolly, 2002). Competency in emotional intelligence provides a framework by which to better define emotional maturity. Emotional intelligence can be useful for developing interpersonal skills and

personal management effectiveness, as well as providing a work environment that is productive and healthy (Cox, 2002). A study by Connolly (2002) indicated that an employee's emotional intelligence is twice as important as that employee's technical performance and cognitive abilities. This finding is especially important to nurse anesthesia programs, for the current NA program curriculum focuses mostly on didactic (cognitive) and clinical (cognitive and technical) performance.

A study by Arora et al. (2010) showed that higher EI is positively associated with more compassionate and empathetic patient care (patient care), higher-scoring assessments of knowledge (medical knowledge), and effective coping with organizational pressures and leadership (practice-based learning and improvement, and systems-based practice). Furthermore, EI also contributed to improved teamwork and doctor–patient communication (interpersonal and communication skills, and professionalism).

Another study suggested that a nurse's ability to identify emotions in others was actually enhanced when nurses worked with critically ill patients (Vitello-Cicciu, 2002). This may have to do with the intensity of emotions on acute care units, something that translates to the operating room environment. As current students and future anesthesia providers, NA students take care of critically ill patients on a regular basis. By applying emotional intelligence skills to the critical-thinking, decision-making process, anesthesia professionals receive assistance in perceiving what is being felt by themselves and others. They can use that information to learn what is causing the feeling, which in turn may help them solve a particular problem (Moss, 2005).

Carson and Carson (1998) stated that

> those individuals most likely to become career committed tend to be emotionally intelligent, which translates into being a self-starter, controlling one's emotions, being

> insightful about personal decision-making processes, understanding and empathizing with the psychological needs of others, and networking. These five dimensions encompass and correspond remarkably well to proposed career metacompetencies being developed in the literature. Because these metacompetencies are being advanced as precursors to occupational success under the new career paradigm, it follows that individuals who possess a high degree of emotional intelligence will be career committed. (p. 204)

Although some people may attempt to separate emotions from the workplace, emotions and the workplace are inseparable because as humans people carry emotions wherever they go (Moss, 2005). Goleman, Boyatzis, and McKee (2001) provided a wide array of reasons for the positive link between emotional intelligence and individual work success. Schutte, Schuettpelz, and Malouff (2000) found differences among individuals who received moderately difficult as well as very tough problems to solve. Individuals with high emotional intelligence were more successful than individuals with low emotional intelligence in solving many problems and completing cognitive tasks.

Murden et al. (1978) found that medical students considered by admissions interviewers to have high levels of maturity, personal integrity, academic achievement, 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 maturity, personal integrity, academic achievement, motivation, or rapport 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, personal and cognitive attributes are equally important. Moss (2005) went as far as to state that any nursing role can be enhanced by the development

of emotional intelligence skills. EI involves knowing one's own feelings and using them to make good decisions while having empathy for others. EI also includes social skills, which foster getting along with other people. Moss (2005) posited that in order for health care to move forward, conflict must be resolved so that the result is cost-effective high-quality patient care. By having EI, a person is able to manage distressing moods and control impulses in circumstances involving conflict (Goleman, 1995; Goleman et al., 2002).

In summary, Mayer and Caruso (1999) define EI as an intelligence. Clearly, emotional intelligence plays a role in nursing leadership, education, and professional success. Nurse anesthesia students take care of critically ill patients on a regular basis and are under tremendous amounts of stress. The dependence of EI on stress management and the educational process plays an integral role in nurse anesthesia student success and progression. To help make clear the potential role of EI profiles in NA educational programs and student success, in the next section I will review the history of NA educational programs and the admissions process.

## Historical Perspective

### Accreditation of Nurse Anesthesia Programs

In 1952, the U.S. Commissioner of Education formally listed the American Association of Nurse Anesthetists (AANA) as the agency responsible for the accreditation of nurse anesthesia programs. Because of criteria revisions made in 1975, accreditation responsibilities were transferred to the autonomous Council on Accreditation (COA). In 1985, the Council on Post-Secondary Education (succeeded by the Commission on Recognition of Postsecondary Accreditation [CORPA]) provided

additional accreditation authority to the COA (Bankert, 1989). In 1997, the Council for Higher Education Accreditation (CHEA) assumed CORPA's recognition functions (Reese, 2002).

Although under the umbrella of the AANA, the COA is fiscally autonomous and represents the interests of and is represented by public entities in accrediting NA programs. All NA programs must meet the accreditation requirements set forth by the COA. Nurse anesthesia programs housed in schools of nursing must also meet the requirements of accreditation by the National League for Nursing's accrediting body, the Commission on Collegiate Nursing Education (CCNE). Only nurse anesthesia students who graduate from COA-accredited NA programs are eligible to take the National Certification Exam.

## Evolution of Nurse Anesthesia Curriculum

According to Reese (2002), initially, NA programs were based in individual hospital anesthesia departments. Local anesthesia practitioners would give the lectures following a day in the operating room with hands-on experience. In the 1960s, programs started to transition to baccalaureate programs following university-based curriculums. By 1987, all NA program applicants were required to have a bachelor's degree to be considered for admission.

Some NA programs, however, maintained certificate-granting programs through the 1990s. To better reflect the competence, skills, and knowledge of advanced practice nurses, the 1995 Pew Health Professions Commission (Finocchio, Dower, McMahon, & Gragiiola, 1995) suggested major reforms in entry-into-practice requirements. Their

recommendation led to the 1998 COA requirement that students graduate with a master's degree.

Finally, in 2004 the American Association of Colleges of Nursing (AACN), which is the umbrella organization for the autonomous accrediting agency Commission on Collegiate Nursing Education (CCNE), recommended that all advanced practice nursing programs progress to the Doctor of Nursing Practice as the terminal degree by 2015 (Lenz, 2005). For this reason, the American Association of Nurse Anesthetists (AANA) initiated a task force to study the proposed change for nurse anesthesia education (Horton, 2007). Subsequently, the AANA adopted the proposal prompting the initiation of the practice doctorate for nurse anesthesia graduates (AANA, 2010). The COA has concurred with the AACN's practice doctorate requirement, but has mandated a compliance date of 2025 for NA programs. Increased educational rigor associated with doctoral education reinforces the need for examination of current variables required for entry to nurse anesthesia programs that emphasize successful academic progression.

## Admission to Nurse Anesthesia Programs

Admission to a nurse anesthesia program is very competitive and applicants must be chosen from pools of highly qualified applicants. Nurse anesthesia program faculty need to be able to predict with some certainty those who will be successful in completing the NA program. It would be extremely beneficial to NA programs if a reliable method were devised for preventing student losses resulting from academic or clinical failures. Central to this process would be a way of predicting the applicant's ability to deal with stress and the ability to make correct decisions within stressful situations.

Although admission processes vary somewhat among NA programs, certain criteria are similar, most of which are based on objective measures from the cognitive domain. These measures include overall OGPA, science GPA, GRE scores, years of clinical experience, and kind of acute care experience. Some of the subjective data used in NA program admissions processes include a personal interview, personal recommendations, and personal statements. However, interview performance has not been a reliable predictor of clinical performance. For example, one study found that there was no significant difference ($p<.05$) in the attrition rates between universities that perform interviews versus those that do not for physical therapy students (Levine, 1986).

The commonly used non-cognitive admission criteria used by nurse anesthesia programs is the personal interview. However, the personal interview is not without its pitfalls. Personal interviews have been shown to have a lack of predictive value, and nurse anesthesia literature suggests this in that the literature is lacking (Reese, 2002). A study by Haritos et al. (1995) showed that 97% of nurse anesthesia programs required personal interviews as part of the admissions process. Of the respondents, none could clearly identify the factors being measured in the interview and there was a lack of common methodology. Furthermore, Clayton, Lypek, and Connelly's (2000) questionnaire sent to military CRNAs and program directors showed that 29% of respondents considered an interview to be "of minimal importance."

The lack of predictive value of personal interviews shows that some other non-cognitive measure needs to be explored in assisting with the determination of successful nurse anesthesia student progression to graduation. Nurse anesthesia program personal interviews tend to be 15-30 minutes in duration. Clayton et al. (2000) felt that such a short interview is unrealistic in determining a candidate's true characteristics. Reese (2002) stated

that "notwithstanding the lack of research on the validity of interviews, most admissions committees apparently accept them as a means of assessing applicants' non-cognitive attributes and possibly for validating information gained by other means (i.e. letters of reference, personal statement)."

Although the current pre-admission criteria allow faculty to narrow a large applicant pool, these selection criteria do not ensure positive progression and graduation for students selected (Burns, 2009). Failing to meet academic and clinical guidelines required for continued progression to program completion places students in jeopardy. In some cases, dismissal follows persistent poor academic or clinical performance (Burns, 2009).

Studies have shown, however, that cognitive criteria as a general rule lack value in predicting success for nurse anesthesia students. Lebeck (2003) in her study of student factors and their success on the NCE concluded that few correlations existed between cognitive data and passing rates on the NCE, and that any correlations were mild at best. Lebeck's study did not take into account dismissal rates for clinical reasons.

Burns (2009) revealed that statistically significant relationships appear to exist between the admission criteria and academic progression. Findings also indicated that a combination of the independent variables, specifically the OGPA and SGPA, might predict academic progression. A study of undergraduate nursing students showed that although OGPA may be effective in predicting successful cognitive performance, it is less effective at capturing other, less tangible qualities that are also critical to nursing practice success (Suliman, 2010). Burns (2009) concluded that further research that includes an examination of cognitive and non-cognitive (such as EI) admission criteria may offer greater assistance in predicting academic progression for nurse anesthesia

students. The results of the current study could lead to further study on EI and its use in the admissions process.

The results of a study by Burns (2009) suggested that the five most important characteristics for successful nurse anesthesia students, in descending order, are (a) critical thinking, problem solving/reasoning skills in patient care environment, (b) ability to respond appropriately in emergency situations, (c) ability to function in stressful environments or during impending deadlines, (d) ability to stay calm/poised in emergency situations, and (e) a sense of personal responsibility/accepting accountability for one's own actions. All of these characteristics are facets of emotional intelligence as defined by Mayer et al. (2004)—the distinguishing features of which are reviewed later in this chapter.

Of all the studies on predicting success for nurse anesthesia students, only one in the literature describes factors outside of cognitive abilities. Hulse et al. (2007) studied both cognitive and non-cognitive factors that may predict success of nurse anesthesia students in an Army graduate nurse anesthesia program. Other than demographic data, the non-cognitive factors the researchers studied included anxiety levels and locus of control. The cognitive factors in the study lacked predictive value for success. Hulse et al. (2007) concluded that students with higher trait anxiety levels were half as likely to succeed as were those with lower trait anxiety scores. Furthermore, students with a more external locus of control (students feeling that outside factors are responsible for their own success) were two times more likely to succeed. I found no studies that examined EI as a factor in determining nurse anesthesia student progression to graduation.

## Research on Profiling Student Success

Mayer and Kilpatrick (1994) suggested that emotionally intelligent people are more likely to be able to cope with the stresses of clinical nursing practice. Therefore, as Cadman and Brewer (2001) pointed out,

> if attrition rates for student nurses are to be reduced then we must ensure that those recruited to study programs can demonstrate clear potential to achieve effective outcomes in both practice and theory. The presence of emotional intelligence could prove a useful indication for success in both spheres. (p. 323)

Determining successful profiles of nurse anesthesia students could help in decreasing attrition rates. Successful nurse anesthesia education is not only important to the students' professional success after graduation, but is also important for NA programs. Retention rates in higher education are important to the financial bottom line in the university setting. A study by Dosch, Jarvis, and Schlosser (2008) made the point that "educators must maintain quality standards and graduate only those with strong, demonstrated knowledge and skills. Economically, attrition results in waste of money, time, and effort for both the student and the institution" (p. 277).

A study by Dosch, Kremsreiter, and Graham (2011) indicated that of 2,129 students enrolled in nurse anesthesia programs with a projected graduation of 2007, 189 (9%) did not complete the program. The most common reasons for attrition were withdrawal, dismissal for poor classroom performance, leave of absence, and dismissal for clinical reasons. The authors concluded that every loss represents a waste of individual and institutional resources. Understanding attrition will guide improvement of admissions and curriculum.

Additionally, dismissals can result in interpersonal or legal conflict, ending in personal, financial, and emotional trauma. Higher education is challenging in many

ways, and failure to adapt to the demands of higher education is often cited as a cause of withdrawal from a course (Qualter, Whiteley, Morley, & Dudiak, 2009), which in turn affects retention and attrition rates.

Qualter et al. (2009) found that in various fields of education students with higher levels of EI are more likely to progress to year 2 of study. The authors also pointed out that students who show an increase in EI are more likely to persist with their studies. Furthermore, several authors found that individual differences in EI have been shown to correlate with both general academic achievement and academic withdrawal (Parker et al., 2005; Parker et al., 2004; Petrides et al., 2003; Petrides & Furnham, 2000; Qualter, Gardner, et al., 2007; Qualter, Whiteley, et al., 2007).

Writers have discussed and debated at length about the selection of nurse anesthesia students and the importance of a wide variety of intrinsic or internal factors that may help predict a student's success in NA programs. Some say that the key to success in medicine, and by its nature nurse anesthesia, is related to cognitive intelligence (Lievens, Coetsier, De Fruyt, & De Maeseneer, 2002). Others have argued that qualities such as empathy and effective communication and interpersonal skills are equally important (Lieberman, Stroup-Benham, & Peel, 1998). Empathy, effective communication, and interpersonal skills are components of EI, and Cadman and Brewer (2001) reported believing that the admissions process needs to include a determination of emotional intelligence as they "could be a reliable predictor of success in both clinical nursing practice and academic study" (p. 321).

Emotional intelligence has also been shown to be a predictor of success in the workplace. Diana Durek, a consultant with a company that provides emotional

intelligence consultation for the United States Air Force, stated: "IQ by itself is not a strong predictor of workplace performance. While many professions require a certain degree of cognitive ability, once one is in a given role, EI becomes the better predictor of success" (Gordon, 2010, August, p. 73). This is corroborated by Nooryan, Gasparyan, Sharif, and Zoladl (2011), who concluded that the ability to effectively deal with emotions in the workplace assists in coping with stress and education in emotional intelligence decreased anxiety in physicians and nurses, a finding corroborated by Montes-Berges and Augusto (2007) on EI's importance in coping with stress in nursing. Another study by Weng et al. (2011) 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 (Montes-Berges & Augusto, 2007).

In 2001, McManus (2001) suggested that selection should aim at a small number of personality characteristics that may be predictive of future professional behavior. Factors influencing a student's ability to succeed in the classroom and persist despite challenges receive considerable attention from scholars, educators, and public officials. The factors gaining the most attention are academic (cognitive), including standardized test scores (GRE) and undergraduate grade point average (GPA). This academic model of success supports intellectual reasoning, rationality, competition, and objectivity at the expense of emotions, practice, and application (Jaeger & Eagan, 2007).

Finally, Bulmer-Smith et al. (2009) suggested that

> student nurses could be screened for emotional competence prior to admission or taught how to deal with difficult or revealing emotional information in practice. The potential uses for emotional intelligence concepts in nursing practice are vast. This literature search suggests that understanding emotional information is likely beneficial to patient outcomes. Building the emotional intelligence skills of students could potentially improve students' competencies related to learning stress, initial and

> future decision-making, and could impact clinical learning situations. Teaching emotional intelligence skills to students might ease student nurse transition into practice and improve future nurse retention in the workplace. (p. 1632)

Finally, nurse anesthesia training requires ongoing clinical evaluation of students by CRNA preceptors. According to Grewal and Davidson (2008), future studies could link students' EI scores with evaluations from colleagues and staff.

## Assessing Emotional Intelligence at Admission

The path to emotional intelligence competency is not merely to add a few courses on communication or interpersonal skills to an already intense program like nurse anesthesia training. Studies have shown that learning emotional intelligence skills takes time and a lot of effort (Cadman & Brewer, 2001; Goleman, 1998). Cadman and Brewer (2001) stated that "emotional intelligence cannot be developed quickly enough through interpersonal skills training and therefore, it is essential that nurse educators create assessment strategies that will identify emotional intelligence at recruitment" (p. 321).

There are several reasons why most EI training programs are not successful in creating lasting change (Goleman, 1998). First, the training does not assess readiness for change in each individual. Leadership and managing change literature identifies the need for a person to be ready for change before change can take place. Second, time is not spent on following through with practice and feedback. Utilization of a mentor or coach can help a person to avoid falling back into old habits (Goleman, 1998), which lends toward faculty training on emotional intelligence in order to effectively mentor the student. According to Cadman and Brewer (2001), "it is questionable whether enough positive role models exist for student nurses to enable them to develop these higher level

emotional skills" (p. 323). Cadman and Brewer (2001) concluded that it, therefore, seems rational to assess the students for already existing emotional abilities.

If shown to correlate positively with nurse anesthesia program success, the link between EI and academic and professional success may lead to the addition of EI training for NA faculty and students in NA programs or the use of EI in NA program admission criteria. Although change may not be easy, applying Kotter's (1996) change theory may help in making the transition.

Change theory (Kotter, 1996) incorporates concepts significant for nurse anesthesia leaders required for addressing challenges related to refining admission variables, thereby promoting the potential success for student progression in nurse anesthesia programs. Nurse anesthesia leaders interested in promoting academic progression for nurse anesthesia students and faced with traditionally accepted admission criteria would do well to make use of the best up-to-date information available, including information about emotional intelligence. Change initiatives within educational environments remain pivotal for promoting organization, faculty, and student achievement and success.

People change their actions not because they receive an analysis that may shift their thinking but because a truth resonated within them and influenced their feeling (Kotter, 1996). When an ideal is found and communicated, that ideal can influence the emotions that drive others to action (Moss, 2005). This aspect of sharing a vision also supports Mayer, Salovey, and Caruso's (Mayer et al., 2000, 2002) concept of a skill for using emotion to facilitate thought.

As nurse anesthesia programs transition from the master's degree to the doctoral degree as the required education for practice, a plan for the change will necessarily include addressing admission criteria. Zimmerman (2004) fostered the use of a roadmap when planning change. Changing current admission criteria for selection to nurse anesthesia programs emphasizes the need for leaders to use a viable plan when planning, implementing, and evaluating the change process (Zimmerman, 2004). However, before initiating change in admission criteria for students applying to nurse anesthesia programs, having enough data to support the change remains essential. Data-driven change initiatives further enhance buy-in for all parties of interest (Shriberg, 2007).

## Summary

One can argue that in order for people to take advantage of their cognitive intelligence (IQ) to the maximum, they also need emotional intelligence. If people turn others off with abrasive behavior, remain unaware of how they present themselves, are unaware of the emotional state of others, or cave in under minimal stress, their high IQs may go unnoticed. The human brain processes not only thought, but also emotion. In the prefrontal lobe where cognition takes place, the amygdala acts as a rudder for the emotions.

Psychologists consider an intelligence to be an ability that must meet three criteria to be considered a true intelligence, and emotional intelligence satisfies all three requirements to be considered an intelligence. The stronger the EI abilities, the greater the chances for success in both academic and professional situations. The more emotional and social sense one has, the easier it is for one to go efficiently and productively about life. Although emotional intelligence is a relatively new theory, it

appears to be a promising team member. Of the three EI models, ability, mixed, and trait, I chose to use the ability-based model because the mixed and trait models have been too controversial in the literature. The ability-based model has four levels: (a) identifying emotions, (b) facilitation, (c) understanding, and (d) management.

The homogeneity of the nurse anesthesia applicant pool and the lack of solid data that suggests predictive value of cognitive factors emphasize the potential importance of non-cognitive data (Hulse et al., 2007) such as EI. Current research demonstrates a tangible link between a student's emotional intelligence scores and that student's likelihood of succeeding in both college and professional environments. 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. Studying emotional intelligence, and its relevance to nurse anesthesia student success, could lead to its use in the selection process or inclusion in NA school curriculum to maximize student learning, retention, and academic achievement.

# CHAPTER 3

# METHODOLOGY

## Introduction

As director of a nurse anesthesia program, I am is keenly aware of Burns's (2009) observation that determining the best candidates for admission to nurse anesthesia programs based on the current admission criteria remains a challenge for nurse anesthesia program administrators and faculty. Using the current selection criteria including OGPA, SGPA, GRE scores and acute care experience may not provide enough information essential for predicting student progression through nurse anesthesia programs (Reese, 2002).

In order to test my expectations and understand if and how EI plays a role in the education of nurse anesthesia students, a first step was the use of a cross sectional study (Creswell, 2008) to determine the predominant emotional intelligence profiles at one specific point in time of three classes of nurse anesthesia students—at matriculation, after one year, and in the last semester of study—at the same point in time in four nurse anesthesia programs in the southeastern United States. In chapter 3, I present the research method for the study including the rationale for the quantitative design. Discussion of the method as well as alternative methods explains why the design is appropriate for the research goals. A discussion of the population, sample, variables, data

collection procedures, internal and external validity, data analysis, and limitations completes chapter 3.

## Research Design

The research method for the current study used Q-factor analysis to determine EI profiles of nurse anesthesia students using an ex post facto survey design. Ex post facto (correlational) research quantifies and examines a relationship between variables (Houser, 2008; MacNee & McCabe, 2008). By comparison, an experimental design involves manipulation of the independent variable and use of a control group (Russell, 2005).

I made no manipulation of the independent variables or use of a control group for the study. I selected a quantitative correlational research design because the research objectives are to examine the relationship among variables. A quantitative correlational research method was used to examine the relationship between the independent variables (EI, GPA, SGPA, GRE scores, acute care nursing experience) and the dependent variables (matriculation, clinical evaluation, and graduation) of students in nurse anesthesia programs. Because quantitative correlational research design shows a relationship or predicts relationships between variables, the design is appropriate for the current study (Coughlan, Cronin, & Ryan, 2007; Polit & Beck, 2008).

## Description of the Population

The sample included all SRNAs from four accredited nurse anesthesia programs at universities in the southeastern United States, providing a potential sample of 225

students. As defined by Creswell (2008), there is a need for commonly defined characteristics shared by individuals or groups when selecting a population for study.

After receiving Institutional Review Board (IRB) approval, I gave subjects from each participating university's nurse anesthesia program the opportunity to participate. The NA program directors who agreed to participate gave me student access after I received approval from their respective IRBs. The sample is a purposive sample, and includes all current students in each program regardless of matriculation date. Purposive sampling is used when respondents are chosen based on some special purpose, and in this case, the purpose was to measure the EI of nurse anesthesia students.

## Variables

I organized the variables for this study into the following categories: (a) the participant demographic variables, (b) participant cognitive/academic variables, (c) emotional intelligence area scores and branch scores as the independent variables, and (d) academic and clinical scores as the dependent variables at one specific point in time for three different NA classes: at matriculation, after one year in the program, and in the last semester of studies.

### Participant Demographic and Cognitive Variables

I collected the following demographic data (see Table 1) about the participants and compared these variables with each other, the EI scores, EI profile, and clinical evaluation scores from a standardized instrument.

Table 1

*Operationalization of the Demographic Variables*

| Variable | Conceptual Definition | Instrumental Definition | Operational Definition |
|---|---|---|---|
| Age | The actual whole number of years alive as of last birthday | List age in years on survey instrument | The actual number in years |
| Gender | The sex of the participant. | Gender<br>A. Male<br>B. Female | Male = 0<br>Female = 1 |
| Ethnicity | This refers to the participant's belonging to a social group that has a common national or cultural tradition. | A. Asian<br>B. Black<br>C. Caucasian/White<br>D. Hispanic/Latino<br>E. Other | Caucasian = 1<br>Black = 2<br>Hispanic/Latino = 3<br>Asian = 4<br>Other = 5<br>These were used for descriptive purposes only. Not used in regressions. |
| Number of years of acute care RN experience | This refers to the number of years employed full-time as a registered nurse in an acute care setting. | The number of full-time years you worked as a registered nurse in an acute care setting | The actual number of years |
| Anesthesia Program Attending | This refers to the nurse anesthesia program the student is enrolled in at the time of participation. | The given nurse anesthesia program | Program #1 = 1 yes, 0 no<br>Program #2 = 1 yes, 0 no<br>Program #3 = 1 yes, 0 no<br>Program #4 = 1 yes, 0 no |
| Time in program | From the start of the anesthesia program (matriculation) to graduation. | < 6 months<br>12-18 months<br>Last semester | < 6months = 1<br>12-18 months = 2<br>Last semester = 3 |
| Pre-admission overall GPA | This is the cumulative OGPA prior to graduate school. Grade point averages (GPA) are on a 4.0 scale. | Program reported data | Actual OGPA |

Table 1—*Continued.*

| Variable | Conceptual Definition | Instrumental Definition | Operational Definition |
|---|---|---|---|
| Pre-admission Science GPA | This GPA includes didactic chemistry, physics, biology, microbiology, and anatomy and physiology grades prior to graduate school. Grade point averages (GPA) are on a 4.0 scale. | Program reported data | Actual SGPA |
| GRE Scores | Graduate Record Exam scores (GRE) will be used as one of the two measures of cognitive intelligence. The GRE consists of three scores: verbal, quantitative and analytical. The verbal and quantitative sections are scored on a scale of 200-800, for a possible maximum total score of 1600. The score for the analytical writing section is graded on a six-point scale. | Analytical score<br>Quantitative score<br>Verbal score | Actual scores |
| NA Graduation GPA | This is the student's GPA at graduation from an accredited NA program. Grade point averages (GPA) are on a 4.0 scale. | Program reported data | Actual NA GPA |
| NCE Score | This is the total score from the National Certification Examination (NCE), taken by graduates of accredited NA programs | National Board on Certification and Recertification of Nurse Anesthetists (NBCRNA) Report to Program Directors | Actual score |

Table 1—*Continued.*

| Variable | Conceptual Definition | Instrumental Definition | Operational Definition |
|---|---|---|---|
| Clinical Score | The clinical evaluation instrument is composed of questions that assess a student's clinical acumen. Questions are focused on several key areas related to the development and progress of the student, and include such things as patient assessment and anesthetic plan, didactic transfer of knowledge to clinical practice, perianesthetic management. The score on the clinical evaluation instrument is completed on each student by the clinical coordinator of each anesthesia program. While this instrument is typically used for daily clinical evaluations, for the purposes of this study it will be used to cross-sectionally clinically evaluate the nurse anesthesia students at one year and in the last semester. | All participating schools used the same instrument. The instrument evaluates 15 clinical performance skills using a Likert scale with scores of 1 to 4:<br>1. Consistently performs a thorough pre-operative and post-operative evaluation on each patient as appropriate<br>2. Synthesizes a comprehensive care plan for patients in all ASA physical status categories<br>3. Consistently utilizes critical thinking skills in applying didactic knowledge to clinical cases<br>4. Uses sound clinical judgment when managing routine, advanced, and emergency cases<br>5. Readily achieves mastery of new skills and procedures<br>6. Synthesizes perioperative data to make safe adjustments in care<br>7. Serves as a resource person for airway and ventilatory management of patients | For items 1-16:<br>1 = Failing<br>2 = Below Expectations<br>3 = Meets Expectations<br>4 =Above Expectations<br><br>For item 17:<br>1 = Below Expectations<br>2 = Average<br>3 = Above Expectations<br>4 = Exceptional |

Table 1—*Continued.*

| Variable | Conceptual Definition | Instrumental Definition | Operational Definition |
|---|---|---|---|
| | | 8. Recognizes and appropriately responds to complications that occur in the perioperative period<br>9. Demonstrates efficiency<br>10. Validates and critiques own performance<br>11. Independently communicates with all anesthesia, operating room, and surgical personnel<br>12. Treats patients respectfully<br>13. Handles stress management appropriately<br>14. Works within the budgetary and accreditation goals of the O.R./Anesthesia department<br>15. Identifies and takes appropriate action when confronted with equipment-related malfunctions<br>16. Follows standard precautions for safety and infection control<br>17. Overall evaluation in comparison to peers' | Actual scores |

Table 1—*Continued.*

| Variable | Conceptual Definition | Instrumental Definition | Operational Definition |
|---|---|---|---|
| Emotional Intelligence scores | MSCEIT. Valid and reliable instrument for measuring emotional intelligence. There are a total of 15 scores generated by the MSCEIT. | Of the several scores generated by the MSCEIT, the first is a total (overall) EI score. The total EI score comprises two area scores (experiential and strategic), four abilities (branches) including perceiving emotions, facilitating thought, understanding emotions, and managing emotions, and eight task scores—faces, pictures, sensations, facilitation, blends, changes, emotion management, and emotional relations. | Actual scores |

## Emotional Intelligence Variables

According to Mayer et al.'s (2002) ability-based model, emotional intelligence variables are composed of 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 2).

Table 2

*Operationalization of the EI Variables*

| | Area Scores | Branch Scores | Task Scores |
|---|---|---|---|
| Overall EI | Experiential | Perceiving | Faces |
| | | | Pictures |
| | | Facilitating | Sensations |
| | | | Facilitation |
| | Strategic | Understanding | Blends |
| | | | Changes |
| | | Managing | Emotion Management |
| | | | Emotional Relations |

### Instrumentation

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 (Brackett & Mayer, 2003). The use of ability-based tests of EI may help counteract this problem (Grewal & Davidson, 2008). The Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) is a 141-item ability-

based measure that has good estimates of validity and reliability (Mayer et al., 2002) and generates five scores per individual: one for each branch plus an overall EI score.

The MSCEIT is an objective ability-based scale that was designed over a 12-year period to measure how well people perform tasks and solve emotional problems. It is unique because it is an ability-based scale, not the more common self-report as is used in the trait-based EI model. The MSCEIT, unlike customary self-report instruments, asks participants task-oriented questions that focus on the four EI branch abilities. An example of this can be found in the first branch, perceiving emotions, which asks participants to rate their level of feeling (Mayer et al., 2003).

Each research participant accessed the online MSCEIT at the website www.mhs.com/msceit. I maintained confidentiality by using a predetermined participant code number, group number, and password. The responses were collected in the MHS's database. I accessed the confidential scores and reports online.

The administrator of the MSCEIT instrument, Multi-Health Systems, Inc. (MHS), offers several options for scoring of the instrument. The scoring options include collection of the results and correction for age, gender, and/or ethnicity. The two available options for scoring the MSCEIT are the General Consensus Criterion or Expert Consensus. General Consensus Criterion methodology compares responses to the norm developed by more than 5,000 respondents who have taken the test. Expert Consensus Scoring compares responses to the average of responses from 21 international experts (Mayer et al., 2002). According to Mayer et al. (2002), from a theoretical standpoint "it seems likely that those agreeing with the general scoring will seem more conventional in their emotional intelligence, while those who agree with the experts may be more

thoughtful and sophisticated in their emotional reactions" (p. 20). The authors state that more research is coming in order to determine which scoring method is more appropriate, but they also recommend that most users employ the General Consensus scoring method. Therefore, for this study I used the General Consensus method.

Using the scores provided by MHS, I made no correction for age, gender, or race. Of the several scores generated by the MSCEIT, the first is a total EI score. The total EI score comprises two area scores (experiential and strategic), four abilities (branches) including perceiving emotions, facilitating thought, understanding emotions, and managing emotions, and eight task scores. The two area and four branch scores are described as follows.

Two area scores were generated: Experiential Emotional Intelligence Quotient (EIQ) and Strategic Emotional Intelligence Quotient. Experiential EIQ assesses the ability to perceive, respond, and manipulate emotional information without necessarily understanding it. Strategic EIQ assesses the ability to understand and manage emotions without necessarily perceiving feelings well or fully experience them (Mayer et al., 2002).

The four branch scores are determined by categorization of specific questions related to aspects of emotional intelligence (Mayer et al., 2002). The four branches are (a) Perceiving Emotions, (b) Facilitating Thought (or Using Emotion), (c) Understanding Emotions, and (d) Managing Emotions.

The score for the first branch, Perceiving Emotions, involves the ability to perceive and express emotions. Being able to perceive others' emotions requires the ability to perceive emotions within oneself as well as reading other people's facial

expressions, tone of voice, and artistic expressions. The score for the second branch, Facilitating Thought, involves the ability to use one's emotions in cognitive tasks for solving problems creatively. Facilitating thought involves a measure of how emotions can contribute to cognitive activities such as problem-solving, reasoning, decision-making and creativity. Emotions can also play a role in creating positive or negative perspectives.

Understanding emotions is the third branch score and measures the knowledge of complex emotions and how emotions combine and change over time (Mayer et al., 2002) and transition from one phase to another. This branch score also measures the ability to label emotions and categorize them into related groups. The fourth branch score measuring emotional intelligence is Managing Emotions. The ability to manage emotions involves thinking about how one feels and to allow oneself to feel the emotion rather than repressing it. The ability to direct the emotions into effective behavior for the long-term is also a component of this branch. The ability to manage emotions is also the ability to intelligently integrate the data of emotions in order to develop strategies that help to achieve a positive outcome. By grouping some of the same questions into different categories, area scores can be developed.

The MSCEIT is further broken down into eight task scores. There are two task scores to measure each of the four branches of EI. Mayer et al. (2004) described the eight branches as follows:

> Branch 1, Perceiving Emotions, is measured through (a) Faces, for which participants are asked to identify the emotions in faces and (b) Pictures, for which participants are asked to identify the emotions conveyed by landscapes and designs. Branch 2, Using Emotions to Facilitate Thought, is measured by (c) Sensations, for which participants compare emotions to other tactile and sensory stimuli and (d) Facilitation, for which participants identify the emotions that would best facilitate a type of thinking. Branch

> 3, Understanding Emotions, is measured through (e) Changes, which tests a person's ability to know under what circumstances emotional intensity lessens and increases and how one emotional state changes into another and (f) Blends, which asks participants to identify the emotions that are involved in more complex affective states. Branch 4, Managing Emotions, is measured through (g) Emotion Management, which involves presenting participants with hypothetical scenarios and asking how they would maintain or change their feelings and (h) Emotion Relationships, which involves asking participants how to manage others' feelings so that a desired outcome is achieved. (p. 200)

I used the total emotional intelligence score, the two area scores, the four branch scores, and the eight task scores for the purposes of this study. The total score is a culmination of the four branches. To develop this guideline, MHS placed scores on a bell-curve identifying a score of 100 as the average score with a standard deviation of 15. An average score means that one's emotional intelligence is similar to the score of most other people. MHS developed a qualitative descriptor for ranges of scores on the MSCEIT. For example, a score of 130 or higher is considered to have "Significant Strength." A score in the range of 120-129 is "Strength." "Competent" describes scores in the range of 110-119. A score of 115 is in the 84th percentile. A score in the range of 100-109 is called "High Average Score." A score in the range of 90-99 is considered a "Low Average Score." A person obtaining a score of 70-89 should "Consider Improvement." Those scoring 69 or less are categorized as "Consider Development" (Mayer et al., 2002).

Although the ability-based measures are less criticized than self-report measures of emotional intelligence on which trait EI testing is based, ability-based measures are not without their problems. One of the main problems encountered with the ability-based tests is the definition of a correct answer. Traditional IQ tests historically seem to have justification for correct answers. The correct answers follow general guidelines and have

formal systems for explaining the correctness of the answers. EI tests have no such system, and therefore have to rely on potentially inaccurate scoring systems, most of which include expert or consensual scoring (Zeidner, Shani-Zinovich, Matthews, & Roberts, 2005). Another problem exists in the ability-based scoring system of the emotional recognition component. Recognition of one's own emotions is a critical component of ability-based EI, and involves high degrees of introspection, which leads us back to self-report. Mayer et al. (2000) stated that, as yet, there is no satisfactory answer to this problem.

Similar to other tests of EI, studies using the MSCEIT in health-care settings are few (Grewal & Davidson, 2008). However, a study involving nurses showed positive correlations ($p \leq .05$) between clinical performance level and EI scores (Codier et al., 2008).

Mayer et al. (2004) have demonstrated that the MSCEIT can be objectively scored and its foundations reliably measured. Rossen and Kranzler (2009) stated that "the pattern of correlations (convergent and discriminant) that have been reported between the MSCEIT and other measures are generally logical and consistent with theory" (p. 60). Additionally, moderate but significant correlations have been found between the MSCEIT and measures of cognitive ability (Verbal SAT, $p<.001$, $r=0.32$) and two of the Big 5 personality dimensions (Agreeableness and Intellect, $p<.05$, $r=0.24$), suggesting that EI is related to but distinguishable from intelligence and personality (Bastian, Burns, & Nettleneck, 2005; Brackett & Mayer, 2003; Brackett, Mayer, & Warner, 2004).

Scores on the MSCEIT have been found to correlate with important behavioral outcomes. Positive correlations have been reported with academic achievement (math scores $p<.05$, $r=0.48$) (Lyons & Schneider, 2005; Zeidner et al., 2005), psychological well-being (Brackett & Mayer, 2003; Lopes, Salovey, & Strauss, 2003) and peer attachment (Lopes et al., 2004; Lopes et al., 2003), among others; and negative correlations have been reported between the MSCEIT and deviant and maladaptive behavior, such as cigarette, drug, and alcohol use ($p<.05$, $r=-0.13$) (Brackett et al., 2004; Trinidad & Johnson, 2002). Mayer et al. (2004) asserted that the evidence proves the validity of the MSCEIT as a measure of EI and the importance of EI as a psychological construct.

## Validity

*Face Validity*: If a test *appears* to measure what it is supposed to measure to the person who is taking it, it has face validity. The MSCEIT test has predictive validity and is a good estimate of reliability (Pusey, 2000). Discriminant validity was explained by Mayer et al. (2004) this way, all at a $p<.05$ level of significance or lower:

> When the MSCEIT was correlated with several other measures of self-reported EI such as the Bar-On EQ-i, the Scale of Emotional Intelligence, or the Occupational Personality Questionnaire 32-Emotional Intelligence Scale, it correlated ($p<.05$, $r$ = .21, .18, and -.31) with them, respectively, indicating weak overlap of ability-based and self-report tests, as expected (Brackett & Mayer, 2003). The Levels of Emotional Awareness Scale is a rater-evaluation system for a person's integrative complexity in perceiving emotion. That scale, also, is only slightly correlated with the MSCEIT, ($p<.05$, $r$ = .15), with a sample of 105 (Ciarrochi, Caputi, & Mayer, 2003). The MSCEIT is also only weakly associated with meta-experience measures of mood, which are sometimes considered an index of self-perceived EI, ($p<.05$, $r$ = .01 to .15) (Lopes, Salovey, & Straus, 2003) and ($p<.05$, $r$ = .29). (Gohm & Clore, 2002, p.95)

The MSCEIT norm was based on a sample of 5,000 North American respondents (Mayer et al., 2002). The test was standardized using general consensus methodology,

meaning the one answer that is considered correct by the majority of people. Studies have shown the general consensus approach predicted criteria at the highest level when compared to expert consensus and target judgment methodologies. An expert consensus system refers to a system in which experts judge which answers are correct and the judgments are averaged. A target scoring method involves a reader who judges the emotion of an author writing about himself.

*Content Validity*: If a test's items are systematically drawn from the areas that the test is supposed to measure, it is considered to have *content* validity (Mayer et al., 2002). Because the MSCEIT is operationalizing the ability model of emotional intelligence, the MSCEIT should measure the ability to identify emotions in persons and objects; the ability to generate emotion and use it to solve problems; the ability to understand emotional causes and complexity; and the ability to manage emotion to enhance growth. Cherniss (2010) made the point that of all the available measures of EI, the MSCEIT has the strongest support for its content validity in that "its subtests conform closely to the basic definition of EI," and it is "most like an IQ test in which the test taker must answer a number of multiple choice questions for which there is one correct answer for each question" (p. 117).

*Concurrent and Predictive Validity*: What is emotional intelligence, and the MSCEIT related to? Contrary to the claims in the popular press, Mayer et al. (2002) believe that emotional intelligence is not "twice as important as IQ" (p. 38). Indeed, Mayer et al. state that they know of no psychological variable that is that powerful a predictor. 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 ($p<.05$, $r=0.50$), deviancy ($p<.05$, $r=-0.20$), and academic performance ($p<.05$, $r=0.47$) (Mayer et al., 2002; Mayer, Roberts, & Barsade, 2008).

## 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 $r(1985) = .93$ for general and .91 for expert consensus scoring. The two Experiencing and Strategic Area score reliabilities are $r(1998) = .90$ and .90, and $r(2003) = .88$ and .86 for general and expert scoring, respectively (Mayer et al., 2003). A study by Palmer, Gignac, Manocha, and Stough (2005) showed that general consensus and expert consensus determined scores were highly correlated ($r=.97$), replicating the relationship between the two scoring methods previously reported by Mayer et al. (2003) (i.e., $r=.98$). Moreover, there was a strong relationship between the pattern of intercorrelations based on the two scoring criteria ($r=.93$), further illustrating the relatively high degree of correspondence between them.

According to Mayer et al. (2003),

> the four branch scores of Perceiving, Facilitating, Understanding, and Managing Cronbach's alpha range between $\alpha_c = .76$ to .91 for both types of reliabilities. The individual task score reliabilities ranged from a low of $\alpha_c = .55$ to a high of .88. However scored, reliability at the total scale and area levels was excellent. Reliability at the branch level was very good, especially given the brevity of the test. (p. 101)

Table 3 presents the MSCEIT area and branch reliability as found in Mayer et al. (2002).

Table 3

*MSCEIT Area and Branch Reliability*

| **MSCEIT Reliability** | | |
|---|---|---|
| *Score* | *General* | *Expert* |
| Total MSCEIT | 0.93 | 0.91 |
| Experiential Area | 0.90 | 0.90 |
| Perceiving Branch | 0.91 | 0.90 |
| Facilitating Branch | 0.79 | 0.76 |
| Strategic Area | 0.88 | 0.86 |
| Understanding Branch | 0.80 | 0.77 |
| Managing Branch | 0.83 | 0.83 |

## Procedures

Before approaching research candidates, I first approached Andrews University for IRB approval. I then contacted by email and phone the program directors for four nurse anesthesia programs in the southeastern United States. The NA program directors verbally agreed to participate pending IRB approval. After the program directors agreed to participate, the proposal was submitted to the IRB for each nurse anesthesia program's university.

I visited each school, presented the study, and answered questions the nurse anesthesia student participants at the four schools may have had. To improve the student response rate, an incentive choice of either $150 cash or an 8GB iPod© Nano Multitouch was provided to one student from each participating school. I had a neutral party draw randomly the name of a student from each school.

Each participant received a packet of information containing an informed consent form (Appendix A) and a demographic form (Appendix E), both of which were completed and returned to me. The demographic data form collected data on age, gender,

ethnicity, and program site. The demographic data form also asked for name and email address. I used email addresses to contact the students who were randomly selected for the incentive award at each school. I collected the Informed Consent Form and Demographic Data Form from the participants.

Besides the informed consent form and a demographic form, the information packet also included two other items: the student's copy of the Informed Consent Form and instructions for completing the online emotional intelligence test (Appendix C). Students kept these two items for their information and reference.

At each site, program directors received the Independent Variable Form (Appendix F) used to collect GRE scores, pre-admission overall and science GPAs, final nurse anesthesia program GPAs, years of pre-admission acute care nursing experience, and NCE scores to the program director at each site. The program director or their designee at all of the schools returned the completed Independent Variable Form and the clinical evaluation tool (Appendix B).

Students could complete the emotional intelligence test online, at a place and time of their convenience. Students received a deadline notice of 2 weeks for completing the emotional intelligence test. After 2 weeks, those who had not responded received an email reminder.

Once the test was completed the scores were immediately available to me online. I received email notification from the test company indicating test completion and the length of time the student took to complete the test. Scoring of the emotional intelligence test is explained in the instrumentation section earlier in this paper. After the deadline for completion of the test passed, one participant’s name from each school was randomly

drawn for the incentive reward. I contacted the winner from each school to determine their choice of incentive award and the chosen incentive award was delivered via the United States Postal Service.

## Data Sources

I retrieved emotional intelligence scores online after student submission. GRE scores, pre-admission OGPA, pre-admission SGPA, years of acute care nursing experience, and clinical scores were collected by each program director from the student's academic file after informed consent from the participant.

## Variable Measures

### Grade Point Averages

In accordance with the COA requirements, each school requires that a student complete a BS degree prior to admission to the nurse anesthesia program. Grade point averages (GPA) are on a 4.0 scale. Program directors collected the students' preadmission overall GPA and preadmission science GPA from the academic transcripts and sent them to me. These scores served as indicators of cognitive intelligence. The preadmission overall GPA was a calculated average of the grades received from all the undergraduate classes completed by the student at all of the different undergraduate schools that the student attended. Put simply, it is the overall GPA prior to graduate school. Pre-admission overall GPAs are commonly used by nurse anesthesia programs for admission decisions.

The final NA GPA for each student who graduated from the final semester of each nurse anesthesia program was forwarded to me by each nurse anesthesia program's

director using the Independent Variable Form. The NA GPA was then correlated with EI scores.

The SGPA was calculated by each program director using grades from any didactic chemistry, physics, biology, and anatomy and physiology course. This variable is referred to as the "Science GPA" for the purposes of this dissertation. Each of the schools require, or prefer, the students to have a minimum of 3.0 out of a 4.0 grade point average.

**Graduate Record Exam Scores**

I used the Graduate Record Exam (GRE) scores as one of the three measures of cognitive intelligence. The GRE consists of three scores: verbal, quantitative, and analytical writing. The verbal and quantitative sections are scored on a scale of 200–800, for a possible maximum total score of 1,600. The score for the analytical writing section is graded on a 6-point scale. When there were two or more sets of GRE scores in the student's file, I used the highest scores from each of the three categories and recorded the scores on the Independent Variable Form. The NA programs in this study recommend a combined quantitative and verbal score of at least 1,000 to be competitive in the admissions process.

**Clinical Evaluation Instrument**

Nurse anesthesia program clinical evaluation instruments are not standardized among NA programs. A lack of clinical instrument standardization suggests a lack of instrument validity, and a reason for factor analysis of the clinical instrument in this study.

For convenience, I used the clinical evaluation instrument (Appendix B) from one of the programs. I had a program faculty from each NA program that was responsible for clinical evaluations complete the clinical evaluation instrument on each student from two different cohorts: one year and in the last semester. The students in the first semester had not started clinical rotations and therefore did not receive a score. The completed clinical evaluation instruments were then sent back to the researcher by either password-protected PDF or by U.S. mail.

The clinical evaluation instrument measures clinical performance and is composed of questions that assess a student's clinical acumen. Questions are focused on several key areas related to the development and progress of the student, and include such things as patient assessment and anesthetic plan, didactic transfer of knowledge to clinical practice, perianesthetic management, communication skills/professionalism, and care and preparation of equipment. Scores are given on a Likert scale with 4 as above expectations and 1 as failure. The final question is an overall clinical impression in comparison to peers' scores.

**Emotional Intelligence Score**

I analyzed the total emotional intelligence score, as well as the two area scores, four branch scores, and eight task scores. A score of 100 is considered average. A score of 115 is about 1 standard deviation above the mean. I did not correct for any variables to allow the student's true performance to be analyzed (Mayer et al., 2002). I scored the tests by the General Consensus Criterion. A score of 167 was the maximum score possible with these scoring parameters.

### Data Collection

I took every precaution to protect the confidentiality of the participants' data. Precautions I took included: password-protected computer files and reporting results in aggregate form. Subgroups included age, gender, ethnicity, and program site. In protecting confidentiality and anonymity I did the following: (a) assigned an identifying number to each participant to maintain confidentiality, (b) stored the data in SPSS spreadsheets, (c) entered the demographic information, the clinical scores, GPA scores, GRE scores, and emotional intelligence scores into Excel spreadsheets, either by hand or by transferring them from another Excel database, (d) performed the correlation and regression analysis using Software Package for Social Sciences (SPSS), (e) used SPSS graphics to visually depict the results, (f) stored the paper data in a locked box, and (g) destroyed the papers after I reported the results.

## Statistical Analysis

### Q-factor Analysis

Q methodology and Q-factor analysis are multivariate mixed methodologies for grouping people based on their typologies (profiles). Q methodology is not simply a statistical technique, but is a methodology. Q-factor analysis also groups people, but it does not include the sorting of items into a grid as a means of measuring subjectivity. It is used to determine dimensions or profiles of people (Newman & Ramlo, 2010). For the purposes of this paper and study, I focused on Q-factor analysis in order to test my expectations that split group profiles from the same year would match and that clinical skills would be rated higher for students in their final semester versus one-year students.

I also used Q-factor analysis to test the hunch that EI profiles may be related to clinical scores.

According to Newman and Ramlo (2010), "Q-factor analysis groups people using data that may come from a variety of sources including interviews, observations, and demographic information" (p. 517). Although two people may have the same overall score (as in total EI score), they do not necessarily represent the same type or profile. Q-factor analysis uses the differences between z-scores to determine which items differentiate between types and agreement items across types.

Newman and Ramlo (2010) pointed out that "with Q-factor analysis, factors are not stable—they are sample specific. They are notoriously unstable" (p. 522). Splitting the sample in half may attenuate this effect, and therefore I ran Q-factor on a split sample to estimate the stability of the factors. Coupling the groupings with other statistical techniques allows researchers to extend beyond the information derived from simply grouping. Chi-squares could be used to investigate differences. In this study I used the groupings as predictor variables in linear regression models (Newman & Ramlo, 2010). The groupings in this study were used in linear regression models to predict NCE scores and clinical scores.

Q-factor analysis allows the creation of profiles that can be used to identify the underlying constructs that can assist in classifying people in a meaningful way. The profiles can also be used in evaluation purposes, which could include admission criteria. Using the types instead of all the individual variables that make up the type makes for efficiency. Q-factor analysis allows researchers to study stakeholders from different

perspectives. This is useful in program evaluation in an attempt to improve the effectiveness of the program (Newman & Ramlo, 2010).

> Q factor analysis assumes that data on a variable consists of common and unique parts. The common parts of all the variables define a common vector space. In addition, it is assumed that the unique parts of the variables are uncorrelated with each other or with their common parts. (Rummel, 1970, p. 104)

According to Waechter, Newman, and Nolte (1998), the Q-factor analysis "results in typologies, or profiles, and is appropriate for a multivariate research question such as: How many different profiles of people are there based on this set of variables?" (p. 61). A multivariate analysis implies that the stakeholders are attempting to look at the evaluation from different perspectives. According to Newman and Benz (1987), "If 'stakeholder' as a concept is multivariate, then techniques that are sensitive to a multidimensional framework are most capable of reflecting such dimensions" (p. 5). I generated descriptive and inferential statistics including means and ranges.

According to Newman and Ramlo (2010), Q-factor analysis is a quantitative approach used to identify profiles for qualitative purposes of descriptions in order to identify different perspectives at different institutions. A profile analysis, or Q-factor analysis, is a multivariate methodology used to identify underlying concepts and types of individuals and groups (Newman & Benz, 1987). This variation of factor analysis uses a matrix in which the subjects are in rows and the variables are in columns. This type of analysis results in profile types (Newman & Ramlo, 2010).

Q-factor analysis is a clustering procedure that correlates individual types (profiles or typologies) rather than traits, with the correlations reflecting the extent to which individuals perform similarly across measures (Morf, Miller, & Syrotuk, 1976; Rogers, 1995). Advantageously, a Q-factor analysis identifies the measures most

correlated with each factor (typology), and these measures are considered to be the defining features of a particular typology or profile.

I used Q-factor analysis to determine whether there is a group of interrelated emotional intelligence variables that is more dominant among graduating nurse anesthesia students. Advantages of Q-factor analysis include a reduction of the number of variables, by combining two or more variables into a single factor (type or typology). For example, the two area scores, four branch scores, and eight individual task scores of the MSCEIT could be combined into a single factor such as overall EI. Usually, in an item-by-people matrix, factors are selected by grouping related items. In the Q-factor analysis technique, the matrix is transposed and factors are created by grouping related people. Another benefit of Q-factor analysis is that identification of groups of inter-related variables can occur to show how they are related to each other.

## Factor Analysis

Factor analysis was used to test the expectation that the EI instrument and the clinical instrument may not be measuring as many variables as they were created to evaluate. One of the major uses of factor analysis is data reduction. In essence, a large number of variables are grouped into a smaller number of factors. Factor analysis is a statistical tool that frequently is used for analyzing scores on large numbers of variables to determine whether there are any identifiable dimensions that can be used to describe the many variables under study. This is analogous to univariate approaches in which a mean, variance, or correlation coefficient is calculated to reduce individual scores on one or two values (Munro, 2004).

Factor analysis is one of the most important tools used for estimating the construct validity of the instrument. A factor is a group of items that may be said to belong together. A person who scores high in one variable likely will score highly on a variable in the same factor grouping, and vice versa. Such an item has high correlations with other items of the same factor and not so high correlations with items of different factors (Munro, 2004).

Factor analysis empirically looks at the concepts being measured. I ran factor analysis on the 17 subscales in the Clinical Evaluation Tool and applied it only to those students in the clinical portion of their curriculum (at year 1 and in the final semester). I also performed factor analysis on the 15 emotional intelligence scores, and applied it to all study participants. I have provided Eigenvalues and scree plots in chapter 4 in order to be clear regarding the chosen factors.

## Regression Analysis

I used regression analysis to test the hunch that emotional intelligence would add to the better discrimination of who would be successful and who would not be successful in NA programs based on the theory of EI. Also, I wanted to test the hunch that cognitive scores commonly used in admissions decisions and clinical scores in the program can gauge success in the program. Regression analysis is a useful technique that allows a prediction of outcomes based on known evidence and explains interrelationships among variables. It is also the general case of the least square solution (McNeil, Newman, & Fraas, 2011; Newman & McNeil, 1998). The accuracy of the prediction is based on the strength of the correlations between the predictors and the outcome measure (Munro, 2004).

I used bivariate regression analysis to determine the relationship between emotional intelligence and clinical performance and multiple regression analysis to determine the relationship between emotional intelligence and clinical performance, while controlling for gender and age. This form of statistical analysis is appropriate when there is a single criterion variable (Y) and multiple predictor variables (X) (Hinkle, Wiersma, & Jurs, 2003; McNeil et al., 2011). Multiple regressions allow flexibility in writing models to reflect the specific research questions and can also be used to test relationships between various types of variables, either categorical or continuous.

I changed the categorical and school site variables to dummy variables. For example, females = 1, and males = 0, and anesthesia program attending was program #1 = 1 for yes and 0 for no.

I used simple descriptive statistics to analyze all variables to assess whether there was sufficient variability in the responses of students. Variables with sufficient variability in responses were included in the regression analysis. These results appear in chapter 4.

I used standard statistical techniques to evaluate the results. For each estimate of correlation (e.g., correlation between clinical performance and emotional intelligence, between clinical performance and cognitive intelligence, etc.), statistical significance tests were assessed using *t*-tests. For tests of significance used to verify previous studies, I used the .05 probability level for rejecting the null hypotheses as is standard in educational studies.

For regressing variables new to the experimental process (e.g., emotional intelligence variables and clinical and EI factors), I used the 0.1 level of significance

because the consequences of rejecting a true null hypothesis seemed not so serious as to warrant a more stringent confidence level.

I assessed the results from multiple regression analysis by using *R*-square and beta coefficients to determine the explained variance and by using *F*-tests and *t*-tests to test significance.

## Limitations

This study represents an initial step in focused research to explore and describe emotional intelligence of nurse anesthesia students and the correlation between clinical and academic scores of nurse anesthesia students. I took into account program size and location of clinical experience in this study.

A limitation of this study included the accuracy of the cognitive data (GRE, overall GPA, and science GPA), as these data were recorded by program directors at each sample site. The GPA data could be confounded by the variability in undergraduate nursing education based on the nursing program each student attended. As a cross-sectional study examining different classes at different years in the program at the same point in time, I cannot say that the EI profile or scores of people changed, because it is not a longitudinal study. Self-reported variability in the number of years as an acute care nurse and type of acute care experience may preclude generalizing study results. For example, the experience of nurses working in an acute care unit in a small rural community hospital may differ from the experience of nurses working in an acute care unit in a large metropolitan teaching hospital. For these reasons, limitations exist regarding analysis of the independent variables for the study.

## Summary

The research design for the study was an exploratory cross-sectional analysis of nurse anesthesia students to determine their EI profile and correlate that profile with cognitive and clinical criteria. The sample included all SRNAs from four accredited nurse anesthesia programs at universities in the southeastern United States, providing a potential sample of 225 students.

The variables for this study were organized into the following categories: the participant demographic variables, participant cognitive/academic variables, emotional intelligence area scores and branch scores as the independent variables, and academic and clinical scores as the dependent variables at one specific point in time for three different NA classes: at matriculation, after 1 year in the program, and in the last semester of studies.

The EI measurements occurred at one specific point in time for each NA program, and measured students at matriculation, students after 1 year in the program, and students in their final semester of study. The EI instrument (MSCEIT) and the clinical instrument were factor analyzed. The research method for the current study used Q-factor analysis to determine EI profiles of nurse anesthesia students using an ex post facto survey design. Variables were correlated and regressed for predictive value.

# CHAPTER 4

# RESULTS

Q-factor analysis was used to develop emotional intelligence profiles of nurse anesthesia students at one specific point in time for three different NA classes—matriculation, after 1 year, and in the last semester of nurse anesthesia programs. The study also investigated the cognitive variables of nurse anesthesia students in relation to clinical evaluation measures measured at one specific point in time for two cohorts of NA students —after 1 year and in their final semester—and NCE scores for nurse anesthesia students in their final semester. The report of the results begins with descriptives for each variable, followed by correlations between cognitive variables and NCE scores, and clinical scores and NCE scores. A factor analysis was completed on the clinical scores and the emotional intelligence scores. Multiple regression analysis was performed to determine the best combination of variables to predict NCE scores and emotional intelligence.

The report of the results continues with the development of emotional intelligence profiles of nurse anesthesia students measured at one specific point in time for three different NA classes—matriculation, after 1 year, and in the last semester of nurse anesthesia programs. A Q-factor analysis was run to construct hypothetical profiles of

nurse anesthesia students at various points in a nurse anesthesia program based on the way actual subjects scored items on the MSCEIT instrument.

## Descriptives

I used a purposive sampling method to obtain responses from 216 participants from four nurse anesthesia programs in three states of the southeastern United States (Newman & McNeil, 1998). In this section, the descriptive results are shared for nurse anesthesia school and participant variables.

### Nurse Anesthesia School Descriptives

The descriptives of the schools from which the participants in this study are from are shown in Table 4. All nurse anesthesia programs in the study grant a Master's as a terminal degree, are 28 months in length, and participate in the semester-model. The range of students in the four programs when all three classes are matriculated is 39-67, with a mean of 54 students. The participant schools range from suburban to urban, with the population of the town or city where the school is located ranging from 83,393 to 731,424.

Table 4

*NA Program Descriptives*

| Variable | *n* | % |
|---|---|---|
| *NA School* | | |
| Program 1 | 39 | 18.1 |
| Program 2 | 51 | 23.6 |
| Program 3 | 59 | 27.3 |
| Program 4 | 67 | 31.0 |

## Description of Study Participants

The participants' demographics are listed in Table 5. Sixty-eight percent (*N*=147) of the participants were female, and 32% (*N*=69) were male. The participants represented a range of ethnicities (African American, 5.1%; Asian, 5.1%, Hispanic, 3.7%, Mixed, 1%), but were predominantly Caucasian (85.1%). The participants ranged in age from 23 through 52, and the mean age was 31. There were 79 students in the first semester, 69 students at 1 year, and 68 students in their final semester of the program.

In terms of acute care experience, participants had a range of 1 to 24 years of acute care experience prior to starting nurse anesthesia school, with a mean of 3.42 years. Of the participants, 81.5% of NA students had 5 years or less of preadmission acute care experience. The overall GPA range prior to admission was 2.90–4.0 with a mean of 3.46. The science GPA range prior to admission was 2.17–4.0 with a mean of 3.42. Although the range of science GPAs started at a lower range, a greater number of students matriculated with higher science GPAs than they did overall GPAs.

Preadmission GRE scores showed much higher percentages of students with greater quantitative scores when compared with verbal scores. Eleven students did not have complete GRE scores, and were excluded from any correlations examining GRE scores (*N*=205). The quantitative GRE prior to admission had a range of 300–800 and a mean of 585. The verbal GRE prior to admission had a range of 320–660 and a mean of 496, and the analytical GRE prior to admission had a range of 2.5–6.0 and a mean of 3.9.

Table 5

*Participant Descriptives*

| Variable | *n* | % |
|---|---|---|
| *Gender* | | |
| Male | 69 | 31.9 |
| Female | 147 | 68.1 |
| *Ethnicity* | | |
| African American | 11 | 5.1 |
| Asian | 11 | 5.1 |
| Caucasian | 184 | 85.2 |
| Hispanic | 8 | 3.7 |
| Other | 2 | 0.9 |
| *Age* | | |
| 23-25 | 29 | 13.4 |
| 26-28 | 68 | 31.5 |
| 29-31 | 50 | 23.2 |
| 32-34 | 22 | 10.2 |
| 35-40 | 26 | 11.6 |
| 41-45 | 11 | 5.2 |
| 46-50 | 8 | 3.8 |
| >50 | 2 | 0.9 |
| *Place in Program* | | |
| Matriculation | 79 | 36.6 |
| After 1st Year | 69 | 31.9 |
| Last Semester | 68 | 31.5 |
| *Years of Acute Care Experience* | | |
| 1-2 | 53 | 24.8 |
| 2-3 | 56 | 26.2 |
| 3-4 | 34 | 15.9 |
| 4-5 | 32 | 15.0 |
| 5-10 | 30 | 14.2 |
| >10 | 9 | 4.3 |

Table 5—*Continued.*

| | *Science GPA* | | *Overall GPA* | |
|---|---|---|---|---|
| | *n* | % | *n* | % |
| 2.11-2.20 | 1 | 0.5 | | |
| 2.21-2.30 | 3 | 1.4 | | |
| 2.31-2.40 | 3 | 1.4 | | |
| 2.41-2.50 | 1 | 0.5 | | |
| 2.51-2.60 | 1 | 0.5 | | |
| 2.61-2.70 | 3 | 1.4 | | |
| 2.71-2.80 | 5 | 2.3 | | |
| 2.81-2.90 | 6 | 2.8 | | |
| 2.91-3.00 | 18 | 8.3 | 6 | 2.8 |
| 3.01-3.10 | 12 | 5.6 | 11 | 5.1 |
| 3.11-3.20 | 9 | 4.2 | 21 | 9.7 |
| 3.21-3.30 | 18 | 8.3 | 25 | 11.6 |
| 3.31-3.40 | 17 | 7.9 | 30 | 13.9 |
| 3.41-3.50 | 23 | 10.6 | 35 | 16.2 |
| 3.51-3.60 | 22 | 10.2 | 30 | 13.9 |
| 3.61-3.70 | 11 | 5.1 | 17 | 7.9 |
| 3.71-3.80 | 22 | 10.2 | 15 | 6.9 |
| 3.81-3.90 | 11 | 5.1 | 13 | 6.0 |
| 3.91-4.00 | 30 | 13.9 | 13 | 6.0 |

| | *Quantitative GRE* | | *Verbal GRE* | |
|---|---|---|---|---|
| | *n* | % | *n* | % |
| 300-350 | 1 | 0.5 | 4 | 1.9 |
| 360-400 | 8 | 3.8 | 19 | 8.8 |
| 410-450 | 9 | 4.2 | 38 | 17.6 |
| 460-500 | 24 | 11.2 | 50 | 23.1 |
| 510-550 | 29 | 13.5 | 49 | 22.7 |
| 560-600 | 45 | 20.8 | 36 | 16.7 |
| 610-650 | 45 | 20.8 | 8 | 3.7 |
| 660-700 | 24 | 11.2 | 0 | 0 |
| 710-750 | 17 | 7.9 | 0 | 0 |
| 760-800 | 3 | 1.5 | 0 | 0 |

| | *Analytical GRE* | |
|---|---|---|
| | *n* | % |
| 2.5 | 3 | 1.4 |
| 3.0 | 17 | 7.9 |
| 3.5 | 57 | 26.4 |
| 4.0 | 77 | 35.6 |

Table 5—*Continued.*

| | *Analytical GRE* | |
|---|---|---|
| | *n* | % |
| 4.5 | 38 | 17.6 |
| 5.0 | 10 | 4.6 |
| 5.5 | 2 | 0.9 |
| 6.0 | 1 | 0.5 |

## Factor Analysis

Factor analysis was run to indentify the underlying constructs that make up the emotional intelligence scores and the clinical instrument scores. The emotional intelligence factor analysis identified two underlying constructs that were being measured out of 15 items, and three underlying constructs as being measured for the 17-item clinical instrument. The next section describes these factor analyses.

Factor analysis has not been done in previous studies with clinical or emotional intelligence variables. The eigenvalue for a given factor measures the variance in all the variables that are accounted for by that factor. The ratio of eigenvalues is the ratio of explanatory importance of the factors with respect to the variables. If a factor has a low eigenvalue, then it is contributing little to the explanation of variances in the variables and may be ignored as redundant with more important factors. Eigenvalues measure the amount of variation in the total sample accounted for by each factor.

The factor analysis ($N$=137) of the clinical instrument indicates that three concepts are being measured (Table 6). The first factor being measured is the student's ability to perform technical skills related to practice (Technical Skills), the second factor is the student's ability to relate to self and others (Patient Focused Concept), and the third

Table 6

*Factor Loadings for the Factor Analysis on the Clinical Instrument With the Full Scale Score (Rotated Component Matrix)*

| Item | Technical Skills | Patient-Focused Concepts | Resource Management |
|---|---|---|---|
| Pre/Post Assessment | .766 | .103 | .210 |
| Care Plan | .813 | .184 | .153 |
| Didactic Transference | .806 | .192 | .195 |
| Sound Clinical Judgment | .709 | .228 | .324 |
| Skill Mastery | .515 | .291 | .368 |
| Data Adjusted Care | .730 | .389 | .185 |
| Resource Person | .347 | .080 | .834 |
| Complication Response | .716 | .249 | .317 |
| Efficiency | .650 | .465 | .212 |
| Self Validation Critique | .342 | .716 | .228 |
| Communication | .288 | .721 | .201 |
| Patient Respect | .139 | .753 | .038 |
| Stress Management | .161 | .666 | .123 |
| Budget/Accreditation | .159 | .156 | .888 |
| Equipment | .401 | .345 | .571 |
| Standard Precautions | .421 | .376 | .416 |
| Peer Comparison | .768 | .434 | .229 |
| | Eigenvalue | | |
| Total Eigenvalue | 8.802 | 1.334 | 1.156 |
| % of Variance Explained | 32.080 | 18.640 | 15.710 |

factor is the student's ability to manage resources (Resource Management). These three factors explain 66% of the variance in the scale.

Factor loadings, also called component loadings in PCA, are the correlation coefficients between the variables (rows) and factors (columns). Analogous to Pearson's *r*, the squared factor loading is the percentage of variance in that indicator variable explained by the factor. To get the percentage of variance in all the variables accounted for by each factor, add the sum of the squared factor loadings for that factor (column) and divide by the number of variables. (*NOTE* the number of variables equals the sum of their variances as the variance of a standardized variable is 1). This is the same as dividing the factor's eigenvalue by the number of variables.

One rule of thumb for determining factor loadings in confirmatory factor analysis is that loadings should be .7 or higher to confirm that independent variables identified a priori are represented by a particular factor, on the rationale that the .7 level corresponds to about half of the variance in the indicator being explained by the factor. However, the .7 standard is a high one and real-life data may well not meet this criterion, which is why some researchers, particularly for exploratory purposes, will use a lower level such as .4 for the central factor and .25 for other factors call loadings above .6 "high" and those below .4 "low."

A scree plot is used to visually describe how many factors should be retained for analysis. How many factors should be retained for analysis using a scree plot? There is no clear answer, but there are a couple of rules of thumb.

One rule is to consider only those with eigenvalues over 1. Another rule of thumb is to plot all the eigenvalues in their decreasing order. The plot looks like the side of a

mountain, and "scree" refers to the debris fallen from a mountain and lying at its base. Eigenvalues and scree plots are used to show the reader that the clinical instrument was actually measuring only three factors, and the emotional intelligence instrument was actually measuring only two factors. Figure 2 presents a scree plot showing the reader that the clinical instrument was actually measuring only three factors.

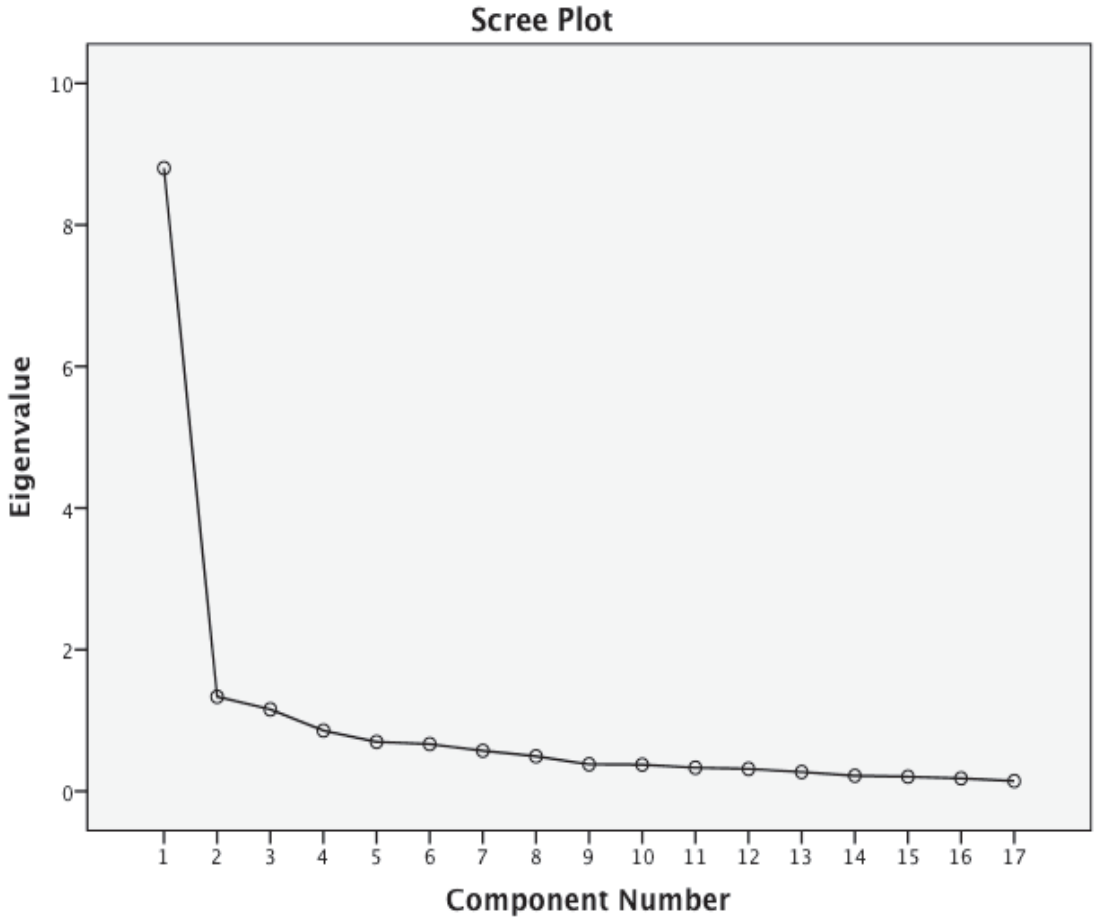


Figure 2. Scree plot of clinical evaluation tool factor analysis.

The factor analysis of the clinical instrument has revealed three clinical factor skills: Technical Skills, Patient Focused Concepts, and Resource Management. At this point the focus turns to emotional intelligence factor analysis.

The factor analysis of the EI scales (*N*=216) produced two factors (see Table 7), which is consistent with the theoretical framework of EI. This is empirical evidence supporting the underlying constructs the instrument developers indicate that the scale is measuring. The concepts being measured were based on the underlying area branch scores. The first concept being measured is EI Reasoning, and the second factor being measured is EI Experiential. These two factors explain 83% of the variance in the EI instrument.

Table 7

*Factor Loadings for the Factor Analysis on the Emotional Intelligence Instrument With the Full Scale Score (Rotated Component Matrix)*

| Item | EI Experiential | EI Reasoning |
|---|---|---|
| Perceiving | .892 | .110 |
| Facilitating | .844 | .187 |
| Understanding | .028 | .834 |
| Managing | .324 | .710 |
| Experiential Area | .981 | .168 |
| Strategic Area | .233 | .967 |
| EI Overall | .814 | .574 |
| | Eigenvalue | |
| Total Eigenvalue | 4.332 | 1.499 |
| % of Variance Explained | 47.030 | 36.260 |

Figure 3 presents a scree plot showing the reader that the emotional intelligence instrument was actually measuring only two factors.

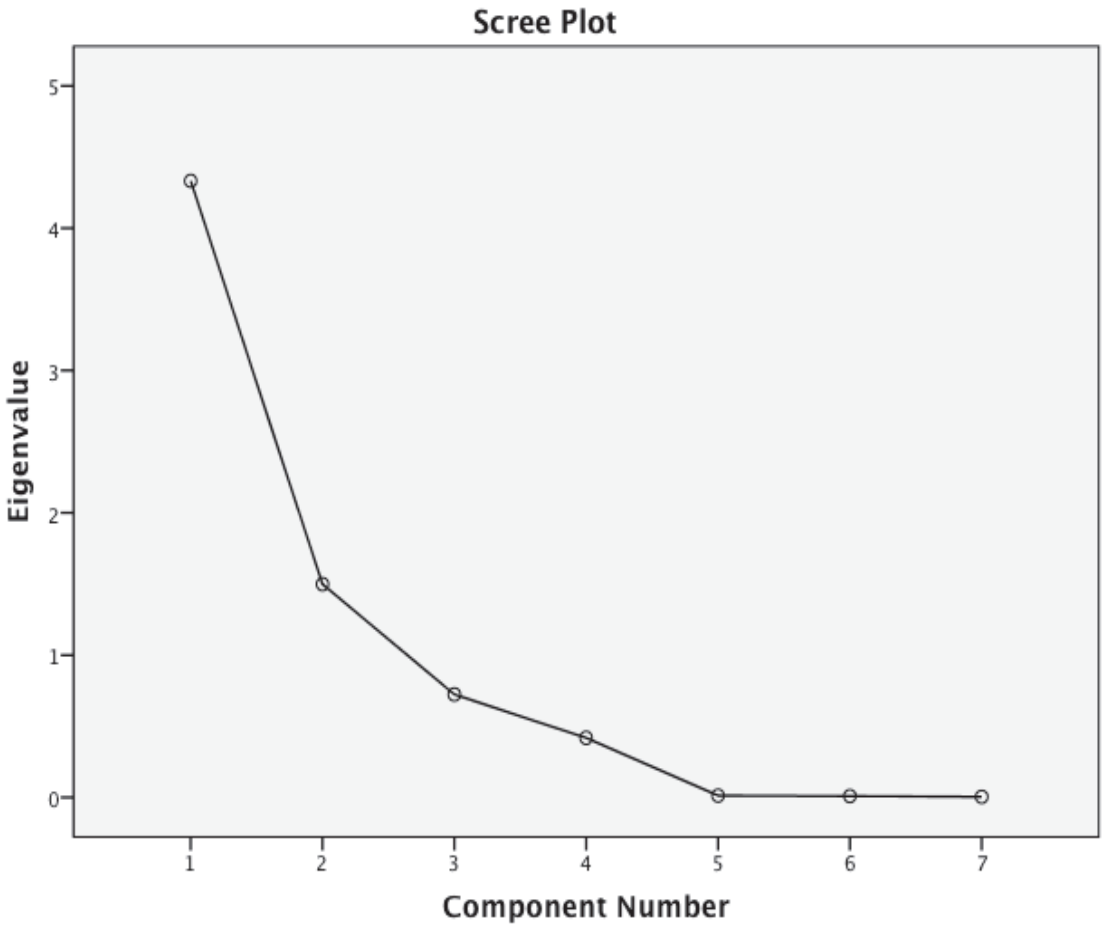


Figure 3. Scree plot of emotional intelligence factor analysis.

The three factors for the clinical instrument and the two factors for emotional intelligence will also be used as predictor variables in the regression equation for the cognitive variables.

## Correlations

Correlations refers to the relationship between two variables. In this section I report the correlations with each dependent variable (academic and clinical scores), and the student's emotional intelligence scores, undergraduate OGPA, undergraduate SGPA, years of acute care nursing experience, GRE scores, age, and gender as the independent variables for the study. Each correlation examines the relationship between a set of variables and the successful transition of nurse anesthesia students through the program, in this case by using NCE scores and clinical scores as indicators of success.

### Demographic Correlations

In this first section I explore the correlations between demographic variables and NCE scores. Of the 216 participants, 68 were in their last semester of their NA program, and of those, 65 graduated and were eligible to take the NCE.

### Academic Correlations

To compare with previous studies, I explored the correlations between academic scores (GRE scores, GPAs, years of acute care experience) and NCE scores. Academic variables that are significantly correlated to the NCE are as shown in Table 8. Bonferroni correction is used to control for Type I error buildup. The Bonferroni correction noted at the end of each table is the level of significance required to be equivalent to a .05 level of significance.

The NA GPA ($r$=.417, $p$=.001) is the most significant correlation with NCE scores. The verbal GRE ($r$=.288, $p$=.023) score is significant, but less so than the NA GPA, and is insignificant when Bonferroni correction is made. The analytical GRE,

quantitative GRE, and overall GPA are not significantly correlated with NCE scores, which is consistent with previous studies. The preadmission science GPA was not significantly correlated with NCE scores, which is a different finding from at least one previous study (Lebeck, 2003).

Table 8

*Correlations of NCE Scores to the Academic Independent Variables*

| Variable | Pearson *r* | Sig. (2-tailed) | *n* |
|---|---|---|---|
| Overall GPA | .201 | .108 | 65 |
| Science GPA | .132 | .296 | 65 |
| NA GPA | .417 | .001** | 65 |
| Quantitative GRE | .206 | .108 | 62 |
| Verbal GRE | .288 | .023* | 62 |
| Analytical GRE | .213 | .097 | 62 |

*Note*. When controlling for Type I error buildup (Bonferroni Correction), the *p* value has to be less than or equal to .0083.
*$p<.05$. **$p<.01$.

Table 9 explores the correlations between GPA variables and other independent variables. No GRE score was significantly correlated with any GPA. After Bonferroni correction, the overall GPA is significantly correlated with the science GPA ($r=.417$, $p=.001$), NA GPA ($r=.258$, $p=.003$), and negatively correlated with years of acute care experience ($r=-.205$, $p=.003$).

Overall GPA is also significantly correlated with the clinical instrument variables preoperative evaluation ($r=.353$, $p=.000$), care plan ($r=.310$, $p=.000$), didactic transference ($r=.400$, $p=.000$), clinical judgment ($r=.290$, $p=.001$), skill mastery ($r=.325$, $p=.000$), use of data to adjust care ($r=.403$, $p=.000$), acting as an airway resource ($r=.316$,

Table 9

*Correlations of GPA Scores to Other Independent Variables*

| Variable | Pearson *r* | Sig. (2-tailed) | *n* |
|---|---|---|---|
| | Overall GPA | | |
| Science GPA | .591 | .000** | 216 |
| NA GPA | .258 | .003** | 128 |
| Quantitative GRE | .099 | .158 | 205 |
| Verbal GRE | .107 | .127 | 205 |
| Analytical GRE | .077 | .274 | 205 |
| Years of Acute Care Experience | -.205 | .003** | 214 |
| Preop | .353 | .000** | 137 |
| Care Plan | .310 | .000** | 137 |
| Didactic Transference | .400 | .000** | 137 |
| Clinical Judgment | .290 | .001** | 137 |
| Skill Mastery | .325 | .000** | 137 |
| Data to Adjust Care | .403 | .000** | 137 |
| Airway Resource | .316 | .000** | 137 |
| Recognize/Respond Complication | .233 | .006** | 137 |
| Efficient | .292 | .001** | 137 |
| Valid Self Critique | .153 | .073 | 137 |
| Independent Communication | .103 | .233 | 137 |
| Patient Respect | .186 | .030* | 137 |
| Stress Management | .222 | .009** | 137 |
| Budget | .293 | .001** | 137 |
| Equipment | .357 | .000** | 137 |
| Standard Precautions | .260 | .002** | 137 |
| Peer Comparison | .418 | .000** | 137 |
| Technical Skills Factor | .418 | .000** | 137 |
| Resource Management Factor | .328 | .000** | 137 |
| Patient Focused Factor | .207 | .015* | 137 |
| Experiential Area Factor | .026 | .705 | 216 |
| Strategic Area Factor | .116 | .089 | 216 |
| | Science GPA | | |
| NA GPA | .109 | .221 | 128 |
| Quantitative GRE | -.031 | .656 | 205 |
| Verbal GRE | -.024 | .734 | 205 |
| Analytical GRE | -.036 | .613 | 205 |
| Years of Acute Care Experience | -.155 | .023* | 214 |
| Preop | .281 | .001** | 137 |
| Care Plan | .154 | .073 | 137 |

Table 9—*Continued.*

| Variable | Pearson *r* | Sig. (2-tailed) | *n* |
|---|---|---|---|
| | Science GPA | | |
| Didactic Transference | .219 | .010** | 137 |
| Clinical Judgment | .179 | .037* | 137 |
| Skill Mastery | .201 | .019* | 137 |
| Data to Adjust Care | .262 | .002** | 137 |
| Airway Resource | .263 | .002** | 137 |
| Recognize/Respond Complication | .207 | .015* | 137 |
| Efficient | .179 | .036* | 137 |
| Valid Self Critique | .141 | .101 | 137 |
| Independent Communication | .062 | .474 | 137 |
| Patient Respect | .181 | .034* | 137 |
| Stress Management | .106 | .217 | 137 |
| Budget | .252 | .003** | 137 |
| Equipment | .274 | .001** | 137 |
| Standard Precautions | .269 | .001** | 137 |
| Peer Comparison | .259 | .002** | 137 |
| Technical Skills Factor | .266 | .002** | 137 |
| Resource Management Factor | .277 | .001** | 137 |
| Patient Focused Factor | .153 | .073 | 137 |
| Experiential Area Factor | -.100 | .142 | 216 |
| Strategic Area Factor | -.015 | .824 | 216 |
| | NA GPA | | |
| Quantitative GRE | .069 | .448 | 123 |
| Verbal GRE | .013 | .888 | 123 |
| Analytical GRE | .107 | .238 | 123 |
| Years of Acute Care Experience | .031 | .724 | 128 |
| Preop | .270 | .006** | 103 |
| Care Plan | .392 | .000** | 103 |
| Didactic Transference | .531 | .000** | 103 |
| Clinical Judgment | .255 | .009** | 103 |
| Skill Mastery | .381 | .000** | 103 |
| Data to Adjust Care | .323 | .001** | 103 |
| Airway Resource | .212 | .032* | 103 |
| Recognize/Respond Complication | .265 | .007** | 103 |
| Efficient | .232 | .018* | 103 |
| Valid Self Critique | .133 | .180 | 103 |
| Independent Communication | .057 | .567 | 103 |
| Patient Respect | .032 | .746 | 103 |
| Stress Management | .139 | .163 | 103 |

Table 9—*Continued.*

| Variable | Pearson *r* | Sig. (2-tailed) | *n* |
|---|---|---|---|
| | NA GPA | | |
| Budget | .132 | .184 | 103 |
| Equipment | .148 | .136 | 103 |
| Standard Precautions | .285 | .004** | 103 |
| Peer Comparison | .389 | .000** | 103 |
| Technical Skills Factor | .429 | .000** | 103 |
| Resource Management Factor | .192 | .052* | 103 |
| Patient Focused Factor | .126 | .205 | 103 |
| Experiential Area Factor | .127 | .153 | 128 |
| Strategic Area Factor | .094 | .294 | 128 |

*Note.* When controlling for Type I error buildup (Bonferroni Correction), the *p* value has to be less than or equal to .0083.
*$p<.05$.  **$p<.01$.

*p*=.000), recognizing and responding to complications (*r*=.233, *p*=.006), efficiency (*r*=.292, *p*=.001), patient respect (*r*=.186, *p*=.030), budget (*r*=.293, *p*=.001), equipment (*r*=.357, *p*=.000), Standard Precautions (*r*=.260, *p*=.002), Peer Comparison (*r*=.418, *p*=.000), Technical Skills Factor (*r*=.418, *p*=.000), and Resource Management Factor (*r*=.328, *p*=.000). Overall GPA was not significantly correlated with the emotional intelligence factors.

After Bonferroni correction, the science GPA is significantly correlated with the overall GPA (*r*=.591, *p*=.000). Of interest is that unlike the overall GPA, in this sample there is no significant correlation between the science GPA and the NA GPA (*r*=.109, *p*=.221). After Bonferroni correction, Science GPA is significantly correlated with the clinical instrument variables Preop (*r*=.281, *p*=.001), Data to Adjust Care (*r*=.262, *p*=.002), Airway Resource (*r*=.263, *p*=.002), Budget (*r*=.252, *p*=.003), Equipment

($r$=.274, $p$=.001), Standard Precautions ($r$=.269, $p$=.001), Peer Comparison ($r$=.259, $p$=.002), Technical Skills Factor ($r$=.266, $p$=.002), and Resource Management Factor ($r$=.277, $p$=.001). Overall GPA was not significantly correlated with the emotional intelligence factors.

The NA GPA is significantly correlated with the overall GPA ($r$=.258, $p$=.003). Of interest is that unlike the overall GPA, there is no significant correlation between the science GPA and the NA GPA ($r$=.031, $p$=.724).

NA GPA is also significantly correlated with the clinical instrument variables Preop ($r$=.270, $p$=.006), Care Plan ($r$=.392, $p$=.000), Didactic Transference ($r$=.531, $p$=.000), Skill Mastery ($r$=.381, $p$=.000), Data to Adjust Care ($r$=.323, $p$=.001), Recognize/Respond Complication ($r$=.265, $p$=.007), Standard Precautions ($r$=.285, $p$=.004), Peer Comparison ($r$=.389, $p$=.000), and Technical Skills Factor ($r$=.429, $p$=.000).

## Clinical Correlations

I explored the correlations between clinical scores and NCE scores. After Bonferroni correction, no clinical variables were significantly correlated with NCE scores (Table 10).

## Emotional Intelligence Correlations

I explored the correlations between emotional intelligence scores and NCE scores. The independent variables that are significantly correlated to emotional intelligence scores are as shown in Table 11. No significant correlations were found between emotional intelligence scores and NCE scores.

Table 10

*Correlations of NCE Scores to the Clinical Independent Variables*

| Variable | Pearson *r* | Sig. (2-tailed) | *n* |
|---|---|---|---|
| Acute Care Experience | .092 | .464 | 65 |
| Preoperative Evaluation | .145 | .250 | 65 |
| Care Plan | .186 | .138 | 65 |
| Didactic Transference | .192 | .126 | 65 |
| Clinical Judgment | -.236 | .058* | 65 |
| Skill Mastery | -.048 | .703 | 65 |
| Data Care Adjustment | -.068 | .589 | 65 |
| Airway Resource | -.144 | .251 | 65 |
| RecRes Complications | .005 | .967 | 65 |
| Efficient | .123 | .330 | 65 |
| Valid Performance Critique | -.219 | .079 | 65 |
| Independent Communication | -.009 | .943 | 65 |
| Patient Respect | -.089 | .483 | 65 |
| Stress Management | .028 | .825 | 65 |
| Budget | -.140 | .267 | 65 |
| Equipment Malfunction | -.240 | .055* | 65 |
| Standard Precautions | -.130 | .301 | 65 |
| Peer Comparison | .065 | .609 | 65 |
| Technical Skill Factor Analysis | .048 | .701 | 65 |
| Patient Focused Factor | -.109 | .385 | 65 |
| Resource Management Factor | -.154 | .221 | 65 |

*Note*. When controlling for Type I error buildup (Bonferroni Correction), the *p* value has to be less than or equal to .0083.
*$p<.05$.  **$p<.01$.

Table 11

*Correlations of Emotional Intelligence Variables to the NCE Scores*

| Variable | Pearson *r* | Sig. (2-tailed) | *n* |
|---|---|---|---|
| Faces Task | -.125 | .321 | 65 |
| Facilitation Task | -.178 | .155 | 65 |
| Changes Task | .134 | .288 | 65 |
| Emotion Manage Task | .021 | .865 | 65 |
| Pictures Task | -.188 | .134 | 65 |
| Sensations Task | .006 | .961 | 65 |
| Blends Task | .086 | .494 | 65 |
| Social Manage Task | .119 | .345 | 65 |
| Perceiving Branch | -.151 | .228 | 65 |
| Facilitating Branch | -.064 | .615 | 65 |
| Understanding Branch | .114 | .366 | 65 |
| Managing Branch | .092 | .465 | 65 |
| Experiencing Area | -.129 | .307 | 65 |
| Reasoning Area | .133 | .292 | 65 |
| Overall EI | -.018 | .887 | 65 |
| EI Experiential Factor | -.103 | .416 | 65 |
| EI Reasoning Factor | .124 | .324 | 65 |

*$p<.05$.  **$p<.01$.

## Multiple Regression Analysis

Once correlations were determined, the data analysis moved to the search for combinations of student variables that can be used to predict performance on the NCE, predicting NA GPA scores using emotional intelligence scores, and year in program to predict emotional intelligence scores. Multiple linear regression is a statistical method that models the linear relationship between multiple independent variables (predictors) and the outcome of another variable (dependent variable). Multiple linear regressions were used in analyzing the variance in predicting from one variable to another and in covarying some of the variables to test the alternative hypotheses (McNeil et al., 2011).

Multiple linear regression was chosen because it is more flexible than traditional analysis of variance. With linear regression, one can write models that reflect the specific research question being asked. This model can replace most other statistical procedures (*t*-test, *F*-tests, etc.) and be used to test the majority of research hypotheses. A major benefit is that the generated $R^2$ coefficient allows one to estimate the amount of accounted-for variance on the criterion variable. Multiple linear regression allows for the use of multiple predictor variables whether continuous or categorical (McNeil et al., 2011). The .05 level of significance was used, as it was my view that the consequences of rejecting a true null hypothesis were not so serious as to warrant a more stringent confidence interval.

Multiple linear regressions were used to compute the relationship between numerous predictor variables including the 17 clinical variables, three clinical concepts, EI variables, two EI concepts, and the preadmission variables. These predictor variables were used to predict NA GPA and NCE scores. Select clinical variables were predictive of NCE scores, including Didactic Transfer ($p<.001$), Efficient ($p<.027$), Equipment Malfunction ($p<.035$), and Technical Skills Factor ($p<.050$).

Several of the EI variables were predictive of success on the NCE ($N=65$). After Bonferroni correction, the predictive items include Facilitation Task ($p<.002$), Sensations Task ($p<.005$), and EI Facilitation Branch ($p<.009$), but the model was not significant ($p=.161$). The regression was rerun with only the significant variables (Table 12) 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. The EI second

order factors do not predict any of the clinical individual items or any of the three clinical second-order factors.

Table 12

*Selected Emotional Intelligence Variables for Predicting NCE Scores*

| Variable | *b* | *t* | *p* |
|---|---|---|---|
| Facilitating Task | -4.527 | -2.857 | .006** |
| Sensations Task | -5.249 | -2.512 | .015** |
| Facilitating Branch | 7.178 | 2.558 | .013** |
| Reasoning Area | .347 | .786 | .435 |

| Model | $R^2$ | *Adj* $R^2$ | *df1/2* | FChange | *p* | Significant |
|---|---|---|---|---|---|---|
| | .152 | .096 | 4/60 | 2.697 | .039 | S |

*$p<.05$. **$p<.01$.

In looking at clinical variables in predicting NCE scores, one clinical variable was predictive of NCE scores (Table 13) after Bonferroni correction, Didactic Transfer ($p<.001$).

A closer look at the clinical variables predictive of NCE scores and the preadmission variables that predict them seems to indicate that the overall GPA is the only item that significantly predicts the clinical variables (Tables 14-17).

As depicted in Table 15, overall GPA is the only statistically significant preadmission variable that is predictive of clinical efficiency ($p<.004$), and is still significant after Bonferroni correction.

Table 13

*Selected Clinical Variables for Predicting NCE Scores and the Corresponding Regression Model*

| Variable | *b* | *t* | *p* |
|---|---|---|---|
| Preop | -17.503 | -.944 | .350 |
| Careplan | 22.285 | 1.317 | .194 |
| Didactic Transfer | 37.483 | 3.470 | .001** |
| Clinical Judgment | -22.186 | -1.444 | .156 |
| Skill Mastery | -20.814 | -1.645 | .107 |
| Data Adjust Care | -14.014 | -.873 | .387 |
| Recognize Respond Complications | 5.796 | .322 | .749 |
| Efficient | 36.058 | 2.276 | .027* |
| Valid Self Critique | -23.849 | -1.948 | .057 |
| Independent Communication | -.669 | -.058 | .954 |
| Patient Respect | .433 | .032 | .975 |
| Stress Management | -3.668 | -.303 | .763 |
| Budget | 25.937 | .699 | .488 |
| Equipment Malfunction | -33.692 | -2.174 | .035* |
| Standard Precautions | 11.218 | .795 | .431 |
| Peer Comparison | 9.536 | .831 | .410 |
| Resource Management | -16.127 | -.810 | .422 |
| Technical Skills Factor | 3.289 | 1.978 | .050* |
| Patient Focused Factor | -7.352 | -1.563 | .123 |
| Resource Management Factor | -15.655 | -1.732 | .088 |

| Model | $R^2$ | *Adj* $R^2$ | *df1/2* | FChange | *p* | Significant |
|---|---|---|---|---|---|---|
| | .478 | .290 | 17/6 | 2.534 | .006 | S |

*Note*. Significant variables account for unique variance when controlling for all other variables in the model. When controlling for Type I error buildup (Bonferroni Correction), the *p* value has to be less than or equal to .0025.
*$p<.05$. **$p<.01$.

Table 14

*Selected Academic Variables for Predicting Didactic Transfer and the Corresponding Regression Model*

| Variable | *b* | *t* | *p* |
|---|---|---|---|
| Overall GPA | .925 | 3.301 | .001** |
| Science GPA | -.116 | -.696 | .488 |
| Quantitative GRE | .000 | -.595 | .553 |
| Verbal GRE | .001 | .730 | .467 |
| Analytical GRE | .038 | .386 | .700 |
| Acute Care Experience | .007 | .398 | .691 |

| Model | $R^2$ | *Adj* $R^2$ | *df1/2* | FChange | *p* | Significant |
|---|---|---|---|---|---|---|
| | .118 | .074 | 6/127 | 2.694 | .017 | S |

*Note*. Significant variables account for unique variance when controlling for all other variables in the model. When controlling for Type I error buildup (Bonferroni Correction), the *p* value has to be less than or equal to .0083.
*$p<.05$. **$p<.01$.

Table 15

*Selected Academic Variables for Predicting Efficiency and the Corresponding Regression Model*

| Variable | *b* | *t* | *p* |
|---|---|---|---|
| Overall GPA | .742 | 2.945 | .004** |
| Science GPA | -.092 | -.615 | .540 |
| Quantitative GRE | -.001 | -1.320 | .189 |
| Verbal GRE | .001 | .969 | .334 |
| Analytical GRE | .070 | .794 | .429 |
| Acute Care Experience | .009 | .559 | .577 |

| Model | $R^2$ | *Adj* $R^2$ | *df1/2* | FChange | *p* | Significant |
|---|---|---|---|---|---|---|
| | .105 | .061 | 6/127 | 2.375 | .033 | S |

*Note*. Significant variables account for unique variance when controlling for all other variables in the model. When controlling for Type I error buildup (Bonferroni Correction), the *p* value has to be less than or equal to .0083.
*$p<.05$. **$p<.01$.

As depicted in Table 16, overall GPA is the only statistically significant preadmission variable that is predictive of troubleshooting equipment malfunctions, but is not significant after Bonferroni correction.

Table 16

*Selected Academic Variables for Predicting Equipment Malfunction and the Corresponding Regression Model*

| Variable | *b* | *t* | *p* |
|---|---|---|---|
| Overall GPA | .453 | 2.362 | .020* |
| Science GPA | .070 | .611 | .542 |
| Quantitative GRE | .000 | -.152 | .879 |
| Verbal GRE | .000 | .269 | .789 |
| Analytical GRE | -.086 | -1.288 | .200 |
| Acute Care Experience | .004 | .304 | .762 |

| Model | $R^2$ | *Adj* $R^2$ | *df1/2* | FChange | *p* | Significant |
|---|---|---|---|---|---|---|
| | .123 | .079 | 6/127 | 2.817 | .013 | S |

*Note*. Significant variables account for unique variance when controlling for all other variables in the model. When controlling for Type I error buildup (Bonferroni Correction), the *p* value has to be less than or equal to .0083.
*$p<.05$. **$p<.01$.

As depicted in Table 17, overall GPA is the only statistically significant preadmission variable that is predictive of technical skills factor, and is still significant after Bonferroni correction.

The only academic variable predictive of NCE scores when controlling for other academic variables was the NA GPA ($p<.008$) (Table 18), and is still significant after Bonferroni correction.

Table 17

*Selected Academic Variables for Predicting Technical Skills Factor and the Corresponding Regression Model*

| Variable | *b* | *t* | *p* |
|---|---|---|---|
| Overall GPA | 6.116 | 3.236 | .002** |
| Science GPA | -.179 | -.158 | .874 |
| Quantitative GRE | -.004 | -1.012 | .314 |
| Verbal GRE | .003 | .482 | .631 |
| Analytical GRE | .438 | .665 | .507 |
| Acute Care Experience | .075 | .638 | .525 |

| Model | $R^2$ | *Adj* $R^2$ | *df1/2* | FChange | *p* | Significant |
|---|---|---|---|---|---|---|
| | .132 | .089 | 6/127 | 3.079 | .008 | S |

*Note*. Significant variables account for unique variance when controlling for all other variables in the model. Bonferroni correction would indicate that the *p* value would have to be equal or lower than .0083.
*$p<.05$. **$p<.01$.

None of the EI variables are predictive of NA GPA (Table 19). The only preadmission variable significant for predicting NA GPA is the overall GPA ($p<.004$) (Table 20). Overall GPA is still significant after Bonferroni correction is made.

The EI second-order factors do not predict any of the clinical individual items or any of the three clinical 2nd order factors (Tables 21, 22, and 23).

Interestingly, certain clinical scores themselves are predictive of NCE scores. The only significant academic preadmission score predictor of technical skills is the overall GPA ($b=6.116$, $p<.002$) (Table 24). The predictive model for overall GPA and clinical technical skills is significant ($p=.000$), as well as for Patient-Focused Concept Scores ($p<.049$) (Table 25).

Table 18

*Selected Academic Variables for Predicting NCE Scores and the Corresponding Regression Model*

| Variable | *b* | *t* | *p* |
|---|---|---|---|
| Overall GPA | 12.720 | .486 | .629 |
| Science GPA | -.228 | -.013 | .990 |
| NA GPA | 53.642 | 2.735 | .008** |
| Quantitative GRE | .007 | .119 | .906 |
| Verbal GRE | .129 | 1.450 | .153 |
| Analytical GRE | 3.310 | .397 | .693 |
| Acute Care Experience | -.018 | -.014 | .989 |

| Model | $R^2$ | *Adj* $R^2$ | *df1/2* | FChange | *p* | Significant |
|---|---|---|---|---|---|---|
| | .174 | .161 | 1/63 | 13.285 | .001 | S |

*Note*. Significant variables account for unique variance when controlling for all other variables in the model. Bonferroni correction indicates that the *p* value would have to be equal or lower than .0083.
*$p<.05$. **$p<.01$.

Table 19

*Selected Emotional Intelligence Variables for Predicting NA GPA*

| Variable | *b* | *t* | *p* |
|---|---|---|---|
| Perceiving Branch | .004 | .389 | .698 |
| Facilitating Branch | .008 | .837 | .404 |
| Managing Branch | .002 | .500 | .618 |
| Experiential Area | -.017 | -.866 | .388 |
| Reasoning Area | -.024 | -.915 | .362 |
| Overall EI | .014 | .715 | .476 |
| Strategic Factor | .006 | .565 | .573 |

*$p<.05$. **$p<.01$.

Table 20

*Selected Cognitive Variables for Predicting NA GPA*

| Variable | *b* | *t* | *p* |
|---|---|---|---|
| Overall GPA | .306 | 2.970 | .004** |
| Science GPA | -.039 | -.594 | .554 |
| Quantitative GRE | -.006 | .038 | .970 |
| Verbal GRE | .000 | -.988 | .325 |
| Analytical GRE | .055 | 1.363 | .175 |
| Acute Care Experience | .004 | .608 | .544 |

| Model | $R^2$ | *Adj* $R^2$ | *df1/2* | FChange | *p* | Significant |
|---|---|---|---|---|---|---|
| | .096 | .050 | 6/122 | 2.064 | .063 | S |

*Note.* When controlling for Type I error buildup (Bonferroni Correction), the *p* value has to be less than or equal to .0083.
*$p<.05$.  **$p<.01$.

Table 21

*Selected EI Factors for Predicting Clinical Technical Scores*

| Variable | *b* | *SE* | *Beta* | *t* | *p* |
|---|---|---|---|---|---|
| Strategic Area Factor | .009 | .02 | .056 | .602 | .548 |
| Experiential Area Factor | .004 | .01 | .041 | .445 | .657 |

*$p<.05$.  **$p<.01$.

Table 22

*Selected EI Factors for Predicting Patient Focused Concept Scores*

| Variable | *b* | *t* | *p* |
|---|---|---|---|
| Strategic Area Factor | .004 | .729 | .467 |
| Experiential Area Factor | .000 | -.093 | .926 |

*$p<.05$.  **$p<.01$.

Table 23

*Selected EI Factors for Predicting Clinical Resource Management Scores*

| Variable | *b* | *t* | *p* |
|---|---|---|---|
| Strategic Area Factor | -.004 | -1.762 | .080 |
| Experiential Area Factor | .001 | .649 | .517 |

*$p$<.05. **$p$<.01.

Table 24

*Selected Other Factors for Predicting Clinical Technical Scores and the Corresponding Regression Model*

| Variable | *b* | *t* | *p* |
|---|---|---|---|
| Overall GPA | 6.116 | 3.236 | .002** |
| Science GPA | -.179 | -.158 | .874 |
| Quant. GRE | -.004 | -1.012 | .314 |
| Verbal GRE | .003 | .482 | .631 |
| Analytical GRE | .438 | .665 | .507 |
| Acute Care Experience | .075 | .638 | .525 |

| Model | $R^2$ | *Adj* $R^2$ | *df1/2* | FChange | *p* | Significant |
|---|---|---|---|---|---|---|
| | .175 | .169 | 1/135 | 28.634 | .000 | S |

*Note.* Significant variables account for unique variance when controlling for all other variables in the model. When controlling for Type I error buildup (Bonferroni Correction), the *p* value has to be less than or equal to .0083.
*$p$<.05. **$p$<.01.

Unlike the previous two models for predicting clinical technical factor and patient focused concept factor, overall GPA is not the predictor for clinical resource management factor. The negative predictors for clinical resource management factor are quantitative GRE ($b$=-.002, $p$<.015) and analytical GRE ($b$=-.175, $p$<.053), while the positive

predictor is verbal GRE ($b$=.002, $p$<.050) (Table 26). These are not significant when using Bonferroni correction.

Table 25

*Selected Other Factors for Predicting Patient Focused Concept Scores and the Corresponding Regression Model*

| Variable | *b* | *t* | *p* |
|---|---|---|---|
| Overall GPA | 1.491 | 1.992 | .049* |
| Science GPA | -.066 | -.148 | .883 |
| Quantitative GRE | -.001 | -.492 | .624 |
| Verbal GRE | .000 | .182 | .856 |
| Analytical GRE | .103 | .396 | .693 |
| Acute Care Experience | .022 | .472 | .638 |

| Model | $R^2$ | *Adj* $R^2$ | *df1/2* | FChange | *p* | Significant |
|---|---|---|---|---|---|---|
| | .052 | .005 | 6/127 | 1.104 | .364 | N |

*Note.* Significant variables account for unique variance when controlling for all other variables in the model. When controlling for Type I error buildup (Bonferroni Correction), the $p$ value has to be less than or equal to .0083.
*$p$<.05. **$p$<.01.

Table 27 presents a regression model for using the year in the NA program as a predictor of EI scores. There is a statistically significant negative predictor, EI Overall ($b$=-.147, $p$<.030), and statistically significant positive predictor reasoning area ($b$=.196, $p$<.038). These factors are not significant after Bonferroni correction, and the model is not significant ($p$=.112).

Table 26

*Selected Other Factors for Predicting Clinical Resource Management Scores and the Corresponding Regression Model*

| Variable | *b* | *t* | *p* |
|---|---|---|---|
| Overall GPA | .291 | 1.132 | .260 |
| Science GPA | .137 | .891 | .375 |
| Quantitative GRE | -.002 | -2.578 | .011** |
| Verbal GRE | .002 | 1.980 | .050* |
| Analytical GRE | -.175 | -1.951 | .053* |
| Acute Care Experience | -.009 | -.538 | .591 |

| Model | $R^2$ | *Adj* $R^2$ | *df1/2* | FChange | *p* | Significant |
|---|---|---|---|---|---|---|
| | .170 | .129 | 6/127 | 4.139 | .001 | S |

*Note.* Significant variables account for unique variance when controlling for all other variables in the model. When controlling for Type I error buildup (Bonferroni Correction), the *p* value has to be less than or equal to .0083.
*$p$<.05. **$p$<.01.

Table 27

*Year in Program for Predicting Emotional Intelligence Scores and the Corresponding Regression Model*

| Variable | *b* | *t* | *p* |
|---|---|---|---|
| EI Perceiving | -.002 | -.042 | .966 |
| EI Facilitating | .003 | .086 | .931 |
| EI Understanding | .019 | 1.350 | .179 |
| Experiencing Area | .080 | 1.210 | .228 |
| Reasoning Area | .196 | 2.100 | .038* |
| EI Overall | -.147 | -2.188 | .030* |
| Strategic Area Factor | -.047 | -1.296 | .197 |

| Model | $R^2$ | *Adj* $R^2$ | *df1/2* | FChange | *p* | Significant |
|---|---|---|---|---|---|---|
| | .054 | .022 | 7/215 | 1.694 | .112 | N |

*Note.* Significant variables account for unique variance when controlling for all other variables in the model. When controlling for Type I error buildup (Bonferroni Correction), the *p* value has to be less than or equal to .0071.
*$p$<.05. **$p$<.01.

Multiple regressions were also run on each year and group by types (1, 2, and 3) as described by Q-factor analysis. These regressions used the types as the predictor variable for cognitive scores (Overall GPA, Science GPA, QGRE, VGRE, AGRE), the clinical scores that were shown to be significant in predicting NCE scores (Didactic transference, Efficiency, Equipment malfunction, and Technical skills factor) (Tables 28-30), and the clinical factor scores. For clarity of reading, only the significant results are presented here in chapter 4. The level of significance for this section on Typology regression analysis is .10 because this is an exploratory study. After Bonferroni correction, none of these are significant at the .10 level.

Table 28

*Q-Factor Y2G1 Typology for Predicting Technical Skills Factor and the Corresponding Regression Model*

| Variable | *b* | *t* | *p* |
|---|---|---|---|
| Y2G1T1 | 3.717 | 1.857 | .073* |
| Y2G1T2 | -1.477 | -.714 | .481 |
| Y2G1T3 | -.127 | -.053 | .958 |

| Model | $R^2$ | *Adj* $R^2$ | *df1/2* | FChange | *p* | Significant |
|---|---|---|---|---|---|---|
| | .183 | .098 | 3/32 | 2.160 | .114 | N |

*Note.* For example, Y2G1T1 represents Year 2, Group 1 Type 1. Significant variables account for unique variance when controlling for all other variables in the model. When controlling for Type I error buildup (Bonferroni Correction), the *p* value has to be less than or equal to .033.
*$p<.10$. **$p<.05$.

Table 29

*Q-Factor Y2G1 Typology for Predicting Resource Management Factor and the Corresponding Regression Model*

| Variable | *b* | *t* | *p* |
|---|---|---|---|
| Y2G1T1 | .616 | 1.787 | .084* |
| Y2G1T2 | .227 | .638 | .529 |
| Y2G1T3 | -.273 | -.659 | .515 |

| Model | $R^2$ | *Adj* $R^2$ | *df1/2* | FChange | *p* | Significant |
|---|---|---|---|---|---|---|
| | .154 | .067 | 3/32 | 1.762 | .177 | N |

*Note.* Significant variables account for unique variance when controlling for all other variables in the model. When controlling for Type I error buildup (Bonferroni Correction), the *p* value has to be less than or equal to .033.
*$p<.10$.  **$p<.05$.

Table 30

*Q-Factor Typology for Predicting Technical Skills Factor and the Corresponding Regression Model*

| Variable | *b* | *t* | *p* |
|---|---|---|---|
| Y3G1T1 | -1.827 | -.921 | .365 |
| Y3G1T2 | -1.452 | -.732 | .470 |
| Y3G1T3 | -4.877 | -2.099 | .044** |

| Model | $R^2$ | *Adj* $R^2$ | *df1/2* | FChange | *p* | Significant |
|---|---|---|---|---|---|---|
| | .130 | .043 | 3/33 | 1.489 | .237 | N |

*Note.* For example, Y3G1T1 represents Year 3, Group 1 Type 1. Significant variables account for unique variance when controlling for all other variables in the model. When controlling for Type I error buildup (Bonferroni Correction), the *p* value has to be less than or equal to .033.
*$p<.10$.  **$p<.05$.

## Q-Factor Analysis

In addition to the two-factor analyses, a Q-factor analysis was run on the emotional intelligence that produced three types per group per year. Q-factor creates profiles of people by clustering people together who have similar profiles and can be used to compare with one another. Q-factor 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 what the instrument is measuring. Q-factor was chosen for this study because the purpose was to cluster people based on similar profiles. The Q-factor types will also be used as predictor variables and will be discussed in the following section.

Q-factor analysis was used to develop emotional intelligence profiles of nurse anesthesia students at one specific point in time for three different NA classes—matriculation, after 1 year, and in the last semester of nurse anesthesia programs. Q-factor analysis was performed using PQMethod. PQMethod is a statistical program tailored to the requirements of Q studies. Resulting factors can be rotated either analytically (Varimax) or judgmentally with the help of two-dimensional plots. Finally, following the selection of the relevant factors and 'flagging' the entries that define the factors (typologies), the analysis step produced an extensive report with a variety of tables on factor loadings, statement factor scores, and discriminating statements for each of the factors as well as consensus statements across factors (Schmolck, 2012). See Appendix D for the Q-factor analysis data-entry procedures.

Sometimes items do not load on a factor, or some items that do load do not make any sense. In other words, there is no correlation between person one and person two to make a type. Table 31 represents the number of students for each type in each year and group and the percentage that could not be typed for each year and group.

The variables included in the Q-factor analysis included all the emotional intelligence scores (overall EI, 2 area scores, 4 branch scores, and 8 task scores). The sample for each year was split into two groups to attenuate unstable factors and allow for use in linear regression models. There were three types created for each group of each year. Table 32 presents the descriptive statistics for each type by year and group.

Table 31

*Numbers and Percentages for Each Type*

| Year/Group/Type | N | % | Total N for Each Group | % Could Not Be Typed | % Variance Explained |
|---|---|---|---|---|---|
| Y1G1T1 | 10 | 25.6 | 39 | | 29 |
| Y1G1T2 | 10 | 25.6 | 39 | | 19 |
| Y1G1T3 | 6 | 15.4 | 39 | 33.3 | 16 |
| Y1G2T1 | 10 | 25.0 | 40 | | 28 |
| Y1G2T2 | 8 | 20.0 | 40 | | 19 |
| Y1G2T3 | 6 | 15.0 | 40 | 40.0 | 17 |
| Y2G1T1 | 9 | 27.3 | 33 | | 25 |
| Y2G1T2 | 8 | 24.2 | 33 | | 22 |
| Y2G1T3 | 5 | 15.2 | 33 | 33.2 | 19 |
| Y2G2T1 | 6 | 16.7 | 36 | | 20 |
| Y2G2T2 | 10 | 27.8 | 36 | | 26 |
| Y2G2T3 | 7 | 19.4 | 36 | 36.1 | 21 |
| Y3G1T1 | 8 | 23.5 | 34 | | 26 |
| Y3G1T2 | 8 | 23.5 | 34 | | 28 |
| Y3G1T3 | 5 | 14.7 | 34 | 38.3 | 18 |
| Y3G2T1 | 10 | 29.4 | 34 | | 26 |
| Y3G2T2 | 6 | 17.6 | 34 | | 18 |
| Y3G2T3 | 8 | 23.5 | 34 | 29.5 | 17 |

Table 32

*Descriptives for Types By Year and Group*

| Year/Group/Type | *n* | Mean |
|---|---|---|
| | *Gender* | |
| Y1G1T1 | | |
| Female | 8 | 80 |
| Male | 2 | 20 |
| Y1G1T2 | | |
| Female | 8 | 80 |
| Male | 2 | 20 |
| Y1G1T3 | | |
| Female | 3 | 50 |
| Male | 3 | 50 |
| Y1G2T1 | | |
| Female | 9 | 90 |
| Male | 1 | 10 |
| Y1G2T2 | | |
| Female | 4 | 50 |
| Male | 4 | 50 |
| Y1G2T3 | | |
| Female | 3 | 50 |
| Male | 3 | 50 |
| Y2G1T1 | | |
| Female | 5 | 56 |
| Male | 4 | 44 |
| Y2G1T2 | | |
| Female | 6 | 75 |
| Male | 4 | 25 |
| Y2G1T3 | | |
| Female | 4 | 80 |
| Male | 1 | 20 |
| Y2G2T1 | | |
| Female | 4 | 67 |
| Male | 2 | 33 |
| Y2G2T2 | | |
| Female | 8 | 80 |
| Male | 2 | 20 |
| Y2G2T3 | | |
| Female | 7 | 86 |
| Male | 1 | 14 |
| Y3G1T1 | | |
| Female | 5 | 63 |

Table 32—*Continued.*

| Year/Group/Type | *n* | Mean |
|---|---|---|
| | *Gender* | |
| Male | 3 | 37 |
| Y3G1T2 | | |
| Female | 5 | 63 |
| Male | 3 | 37 |
| Y3G1T3 | | |
| Female | 3 | 60 |
| Male | 2 | 40 |
| Y3G2T1 | | |
| Female | 7 | 70 |
| Male | 3 | 30 |
| Y3G2T2 | | |
| Female | 3 | 50 |
| Male | 3 | 50 |
| Y3G2T3 | | |
| Female | 7 | 88 |
| Male | 1 | 12 |
| | *Ethnicity* | *%* |
| Y1G1T1 | | |
| African American | 0 | 0 |
| Asian | 0 | 0 |
| Caucasian | 10 | 100 |
| Hispanic | 0 | 0 |
| Y1G1T2 | | |
| African American | 0 | 0 |
| Asian | 0 | 0 |
| Caucasian | 10 | 100 |
| Hispanic | 0 | 0 |
| Y1G1T3 | | |
| African American | 1 | 17 |
| Asian | 0 | 0 |
| Caucasian | 5 | 83 |
| Hispanic | 0 | 0 |
| Y1G2T1 | | |
| African American | 1 | 10 |
| Asian | 0 | 0 |
| Caucasian | 9 | 90 |

Table 32—*Continued.*

| Year/Group/Type | *Ethnicity* | *%* |
|---|---|---|
| Hispanic | 0 | 0 |
| Y1G2T2 | | |
| African American | 0 | 0 |
| Asian | 0 | 0 |
| Caucasian | 8 | 100 |
| Hispanic | 0 | 0 |
| Y1G2T3 | | |
| African American | 0 | 0 |
| Asian | 0 | 0 |
| Caucasian | 5 | 83 |
| Hispanic | 1 | 17 |
| Y2G1T1 | | |
| African American | 1 | 11 |
| Asian | 1 | 11 |
| Caucasian | 7 | 78 |
| Hispanic | 0 | 0 |
| Y2G1T2 | | |
| African American | 0 | 0 |
| Asian | 0 | 0 |
| Caucasian | 6 | 75 |
| Hispanic | 2 | 25 |
| Y2G1T3 | | |
| African American | 0 | 0 |
| Asian | 0 | 0 |
| Caucasian | 5 | 100 |
| Hispanic | 0 | 0 |
| Y2G2T1 | | |
| African American | 0 | 0 |
| Asian | 0 | 0 |
| Caucasian | 6 | 100 |
| Hispanic | 0 | 0 |
| Y2G2T2 | | |
| African American | 1 | 10 |
| Asian | 1 | 10 |
| Caucasian | 8 | 80 |
| Hispanic | 0 | 0 |
| Y2G2T3 | | |
| African American | 0 | 0 |
| Asian | 0 | 0 |

Table 32—*Continued.*

| Year/Group/Type | | | |
|---|---|---|---|
| | *Ethnicity* | | *%* |
| Caucasian | 7 | | 100 |
| Hispanic | 0 | | 0 |
| Y3G1T1 | | | |
| African American | 0 | | 0 |
| Asian | 2 | | 25 |
| Caucasian | 5 | | 62 |
| Hispanic | 1 | | 13 |
| Y3G1T2 | | | |
| African American | 0 | | 0 |
| Asian | 2 | | 25 |
| Caucasian | 6 | | 75 |
| Hispanic | 0 | | 0 |
| Y3G1T3 | | | |
| African American | 0 | | 0 |
| Asian | 1 | | 20 |
| Caucasian | 3 | | 60 |
| Hispanic | 1 | | 20 |
| Y3G2T1 | | | |
| African American | 0 | | 0 |
| Asian | 0 | | 0 |
| Caucasian | 10 | | 100 |
| Hispanic | 0 | | 0 |
| Y3G2T2 | | | |
| African American | 2 | | 33 |
| Asian | 0 | | 0 |
| Caucasian | 4 | | 67 |
| Hispanic | 0 | | 0 |
| Y3G2T3 | | | |
| African American | 0 | | 0 |
| Asian | 0 | | 0 |
| Caucasian | 8 | | 100 |
| Hispanic | 0 | | 0 |
| | *Age* | | |
| Y1G1T1 | 10 | 32.8 | 25-52 |
| Y1G1T2 | 10 | 30.2 | 25-50 |
| Y1G1T3 | 6 | 29.5 | 24-43 |

Table 32—*Continued.*

| Year/Group/Type | | | |
|---|---|---|---|
| | | *Age* | |
| Y1G2T1 | 10 | 27.1 | 24-38 |
| Y1G2T2 | 8 | 30.0 | 24-46 |
| Y1G2T3 | 6 | 26.2 | 24-48 |
| Y2G1T1 | 9 | 30.8 | 25-39 |
| Y2G1T2 | 8 | 33.1 | 26-52 |
| Y2G1T3 | 5 | 35.8 | 28-50 |
| Y2G2T1 | 6 | 28.2 | 26-31 |
| Y2G2T2 | 10 | 29.1 | 26-41 |
| Y2G2T3 | 7 | 29.9 | 25-40 |
| Y3G1T1 | 8 | 35.8 | 27-48 |
| Y3G1T2 | 8 | 30.9 | 26-40 |
| Y3G1T3 | 5 | 34.8 | 30-42 |
| Y3G2T1 | 10 | 31.3 | 25-37 |
| Y3G2T2 | 6 | 30.3 | 26-35 |
| Y3G2T3 | 8 | 27.6 | 25-30 |
| | | *Years of Acute Care Experience* | |
| Y1G1T1 | 10 | 2.80 | 2.0-4.0 |
| Y1G1T2 | 10 | 2.75 | 2.3-4.0 |
| Y1G1T3 | 6 | 2.25 | 2.0-3.0 |
| Y1G2T1 | 10 | 3.92 | 1.0-8.0 |
| Y1G2T2 | 8 | 3.88 | 1.0-14.0 |
| Y1G2T3 | 6 | 2.71 | 1.0-6.0 |
| Y2G1T1 | 9 | 2.94 | 1.0-8.0 |
| Y2G1T2 | 8 | 1.94 | 1.0-4.0 |
| Y2G1T3 | 5 | 3.60 | 1.0-5.0 |
| Y2G2T1 | 6 | 2.75 | 1.5-5.0 |
| Y2G2T2 | 10 | 3.20 | 1.5-6.0 |
| Y2G2T3 | 7 | 5.93 | 2.0-17.0 |
| Y3G1T1 | 8 | 5.13 | 1.0-13.0 |
| Y3G1T2 | 8 | 2.06 | 1.0-4.0 |
| Y3G1T3 | 5 | 3.90 | 1.0-12.0 |
| Y3G2T1 | 10 | 3.65 | 3.2-4.0 |
| Y3G2T2 | 6 | 3.67 | 3.0-4.5 |
| Y3G2T3 | 8 | 1.75 | 1.0-3.0 |
| | | *Overall GPA* | |
| Y1G1T1 | 10 | 3.427 | 3.08-3.77 |

Table 32—*Continued.*

| Year/Group/Type | | | |
|---|---|---|---|
| | | *Overall GPA* | |
| Y1G1T2 | 10 | 3.487 | 3.15-3.99 |
| Y1G1T3 | 6 | 3.528 | 3.24-3.95 |
| Y1G2T1 | 10 | 3.515 | 3.14-3.88 |
| Y1G2T2 | 8 | 3.449 | 3.01-3.86 |
| Y1G2T3 | 6 | 3.408 | 3.21-3.56 |
| Y2G1T1 | 9 | 3.536 | 3.26-3.91 |
| Y2G1T2 | 8 | 3.475 | 3.05-3.88 |
| Y2G1T3 | 5 | 3.408 | 3.05-3.88 |
| Y2G2T1 | 6 | 3.532 | 3.29-3.85 |
| Y2G2T2 | 10 | 3.530 | 3.24-3.93 |
| Y2G2T3 | 7 | 3.447 | 3.17-3.78 |
| Y3G1T1 | 8 | 3.330 | 3.04-3.80 |
| Y3G1T2 | 8 | 3.504 | 3.04-3.98 |
| Y3G1T3 | 5 | 3.342 | 3.02-3.60 |
| Y3G2T1 | 10 | 3.396 | 3.12-3.81 |
| Y3G2T2 | 6 | 3.282 | 3.12-3.46 |
| Y3G2T3 | 8 | 3.476 | 3.00-3.87 |
| | | *Science GPA* | |
| Y1G1T1 | 10 | 3.317 | 2.88-3.75 |
| Y1G1T2 | 10 | 3.269 | 2.25-4.00 |
| Y1G1T3 | 6 | 3.523 | 2.70-3.79 |
| Y1G2T1 | 10 | 3.504 | 3.00-4.00 |
| Y1G2T2 | 8 | 3.628 | 3.17-4.00 |
| Y1G2T3 | 6 | 3.483 | 3.25-3.60 |
| Y2G1T1 | 9 | 3.379 | 2.17-4.00 |
| Y2G1T2 | 8 | 3.444 | 2.56-4.00 |
| Y2G1T3 | 5 | 3.232 | 2.94-4.00 |
| Y2G2T1 | 6 | 3.548 | 3.25-4.00 |
| Y2G2T2 | 10 | 3.474 | 3.00-4.00 |
| Y2G2T3 | 7 | 3.264 | 2.40-3.80 |
| Y3G1T1 | 8 | 3.184 | 2.79-3.58 |
| Y3G1T2 | 8 | 3.636 | 3.00-4.00 |
| Y3G1T3 | 5 | 3.232 | 2.73-3.70 |
| Y3G2T1 | 10 | 3.504 | 2.87-4.00 |
| Y3G2T2 | 6 | 3.168 | 2.25-3.63 |
| Y3G2T3 | 8 | 3.486 | 2.81-4.00 |

Table 32—*Continued.*

| Year/Group/Type | | | |
|---|---|---|---|
| | | *Quantitative GRE* | |
| Y1G1T1 | 10 | 594 | 390-720 |
| Y1G1T2 | 10 | 605 | 410-740 |
| Y1G1T3 | 6 | 658 | 580-770 |
| Y1G2T1 | 10 | 593 | 440-770 |
| Y1G2T2 | 8 | 581 | 480-650 |
| Y1G2T3 | 6 | 555 | 470-650 |
| Y2G1T1 | 9 | 547 | 400-710 |
| Y2G1T2 | 8 | 561 | 400-680 |
| Y2G1T3 | 5 | 618 | 500-740 |
| Y2G2T1 | 6 | 623 | 580-670 |
| Y2G2T2 | 10 | 626 | 520-740 |
| Y2G2T3 | 7 | 572 | 500-650 |
| Y3G1T1 | 8 | 606 | 460-800 |
| Y3G1T2 | 8 | 542 | 450-680 |
| Y3G1T3 | 5 | 574 | 400-710 |
| Y3G2T1 | 10 | 608 | 430-710 |
| Y3G2T2 | 6 | 630 | 560-700 |
| Y3G2T3 | 8 | 605 | 470-710 |
| | | *Verbal GRE* | |
| Y1G1T1 | 10 | 495 | 350-590 |
| Y1G1T2 | 10 | 505 | 400-640 |
| Y1G1T3 | 6 | 494 | 370-650 |
| Y1G2T1 | 10 | 484 | 380-620 |
| Y1G2T2 | 8 | 401 | 320-450 |
| Y1G2T3 | 6 | 518 | 380-640 |
| Y2G1T1 | 9 | 525 | 460-600 |
| Y2G1T2 | 8 | 508 | 400-580 |
| Y2G1T3 | 5 | 540 | 460-620 |
| Y2G2T1 | 6 | 451 | 370-530 |
| Y2G2T2 | 10 | 495 | 400-600 |
| Y2G2T3 | 7 | 511 | 410-580 |
| Y3G1T1 | 8 | 480 | 400-580 |
| Y3G1T2 | 8 | 476 | 390-590 |
| Y3G1T3 | 5 | 536 | 410-610 |
| Y3G2T1 | 10 | 505 | 420-560 |
| Y3G2T2 | 6 | 508 | 450-550 |
| Y3G2T3 | 8 | 525 | 450-620 |

Table 32—*Continued.*

| Year/Group/Type | | | |
|---|---|---|---|
| | | *Analytical GRE* | |
| Y1G1T1 | 10 | 4.05 | 3.5-5.0 |
| Y1G1T2 | 10 | 4.25 | 1.5-5.0 |
| Y1G1T3 | 6 | 4.10 | 3.5-4.5 |
| Y1G2T1 | 10 | 4.05 | 3.5-4.5 |
| Y1G2T2 | 8 | 3.50 | 3.0-4.0 |
| Y1G2T3 | 6 | 3.92 | 3.0-5.0 |
| Y2G1T1 | 9 | 3.86 | 3.0-5.0 |
| Y2G1T2 | 8 | 4.00 | 3.5-5.0 |
| Y2G1T3 | 5 | 3.90 | 3.0-4.5 |
| Y2G2T1 | 6 | 4.25 | 3.5-4.5 |
| Y2G2T2 | 10 | 4.20 | 3.5-5.0 |
| Y2G2T3 | 7 | 3.64 | 3.0-4.5 |
| Y3G1T1 | 8 | 3.75 | 3.0-4.5 |
| Y3G1T2 | 8 | 3.56 | 2.5-4.0 |
| Y3G1T3 | 5 | 3.90 | 3.0-4.5 |
| Y3G2T1 | 10 | 3.75 | 3.5-4.5 |
| Y3G2T2 | 6 | 4.08 | 3.5-5.0 |
| Y3G2T3 | 8 | 3.81 | 3.5-4.5 |

*Note*. Y1G1T1 = Year 1, Group 1 Type 1; Y1G1T2 = Year 1, Group 1 Type 2; Y1G1T3 = Year 1, Group 1 Type 3; Y1G2T1 = Year 1, Group 2 Type 1; Y1G2T2 = Year 1, Group 2 Type 2; Y1G2T3 = Year 1, Group 2 Type 3; Y2G1T1 = Year 2, Group 1 Type 1; Y2G1T2 = Year 2, Group 1 Type 2; Y2G1T3 = Year 2, Group 1 Type 3; Y2G2T1 = Year 2, Group 2 Type1; Y2G2T2 = Year 2, Group 2 Type 2; Y2G2T3 = Year 2, Group 2 Type 3; Y3G1T1 = Year 3, Group 1 Type 1; Y3G1T2 = Year 3, Group 1 Type2; Y3G1T3 = Year 3, Group 1 Type 3; Y3G2T1 = Year 3, Group 2 Type 1; Y3G2T2 = Year 3, Group 2 Type 2; Y3G2T3 = Year 3, Group 2 Type 3.

## Year 1 Profiles

The Z-scores for the three types of Year 1 Group 1 are presented in Table 33. Type 1 people are high on Faces Task, EI Perceiving Branch, EI Overall, and EI Experiencing Area; Type 2 people are high on Faces Task, EI Experiencing Area,

Facilitation Task, and EI Overall; and Type 3 are high on Pictures Task, Emotion Management Task, EI Managing Area, and EI Perceiving Branch.

Type 1 people are low on Emotion Management Task, Sensations Task, EI Facilitating Branch, and EI Managing Branch. Type 2 people are low on Blends Task, Changes Task, EI Understanding Branch, and Sensations Task. Type 3 people are low on Facilitations Task, EI Facilitating Branch, Sensations Task, and EI Experiencing Area.

Table 33

*Q-factor Analysis Z-scores for Each, Type Year 1 Group 1*

| Statement | Type 1 Z-Scores (Rank) | Type 2 Z-Scores (Rank) | Type 3 Z-Scores (Rank) |
|---|---|---|---|
| Faces Task | 2.960 (1) | 1.303 (1) | 0.240 (6) |
| EI Perceiving Branch | 0.942 (2) | 0.550 (6) | 0.580 (4) |
| EI Overall | 0.505 (3) | 0.607 (4) | -0.402 (11) |
| EI Experiencing Area | 0.284 (4) | 0.928 (2) | -0.503 (12) |
| EI Understanding Branch | 0.194 (5) | -1.608 (13) | -0.346 (10) |
| Blends Task | 0.144 (6) | -1.893 (15) | -0.317 (9) |
| Changes Task | -0.080 (7) | -1.743 (14) | 0.570 (5) |
| EI Reasoning Area | -0.137 (8) | 0.071 (10) | 0.121 (8) |
| Social Mange Task | -0.280 (9) | 0.384 (8) | 0.200 (7) |
| Facilitation Task | -0.333 (10) | 0.703 (3) | -1.889 (15) |
| Pictures Task | -0.550 (11) | -0.049 (11) | 1.755 (1) |
| EI Managing Branch | -0.659 (12) | 0.440 (7) | 0.681 (3) |
| EI Facilitating Branch | -0.905 (13) | 0.552 (5) | -1.678 (14) |
| Sensations Task | -0.973 (14) | -0.561 (12) | -0.549 (13) |
| Emotion Manage Task | -1.112 (15) | 0.315 (9) | 1.536 (2) |

In describing the types for Year 1 Group 1, Type 1 might be called a High Facial Reader/Low Emotional Manager. The High Facial Reader/Low Emotional Manager is very strong in perceiving others' emotions with a particular sensitivity to reading other people's facial expressions, tone of voice, and artistic expressions. However, Type 1

High Facial Reader/Low Emotional Manager is low in managing their own and others' emotions and therefore unable to benefit by directing the emotions for long-term benefit and outcomes.

Type 2 might be called a High Facial Facilitator/Low Emotional Understander. While the number one EI statement for Type 2 is the Faces Task, it is not nearly as strong as it is in Type 1. Type 2 is also high on facilitation, which is a part of the experiential area, whereas Type 1 is low on facilitation. The additional component of facilitation allows participants to identify the emotions that would best facilitate a type of thinking. Therefore, Facial Facilitator/Low Emotional Understander captures the essence of this type. Type 2 High Facial Facilitator/Low Emotional Understander is low in understanding emotions and the task scores associated with it. A lack of understanding emotions with this type shows a lack of knowledge of complex emotions and how emotions combine and change over time and transition from one phase to another. This type also demonstrates a lack of the ability to label emotions and categorize them into related groups.

While both Types 1 and 2 were strong in experiential areas, Type 3 is equally strong in both experiential and strategic areas. Type 3 might be called a Highly Detached/Low Facilitator. The "Pictures Task" rates high in this type, which is closely related to Types 1 and 2's strength in Faces Task. This type, however, may be more abstract in preferring inanimate objects such as pictures of landscapes rather than observing another live person. The Highly Detached/Low Facilitator is also able to think about how one feels and to allow oneself to feel the emotion rather than repressing it and is also able to intelligently integrate the data of emotions in order to develop strategies

that help to achieve a positive outcome. Unlike Type 2, Type 3 Highly Detached/Low Facilitator is low in facilitating and therefore is less creative and less likely to problem solve and reason.

The greatest differences between types for Year 1 Group 1 are presented in Tables 47 through 49 (Appendix G). For types 1 and 2, the greatest differences existed between Blends Task (2.04), EI Understanding Branch (1.80), Changes Task (1.66), and Faces Task (1.66). For types 1 and 3, the greatest differences existed between Faces Task (2.72) and Facilitation Task (1.56). For types 2 and 3, the greatest differences existed between Facilitation Task (2.59), EI Facilitating Branch (2.23), and EI Experiencing Area (1.43). The greatest impact each statement makes for each type is listed in Appendix G, Table 50 (Type 1), Table 51 (Type 2), and Table 52 (Type 3).

The Z-scores for the three types of Year 1 Group 2 are presented in Table 34. Type 1 people are high on Faces Task, EI Experiencing Area, EI Perceiving, and EI Facilitating Area; Type 2 people are high on EI Managing Area, Emotion Management Task, Faces Task, and Social Management Task. Type 3 people are high on Emotion Management Task, EI Managing Area, Sensations Task, and Pictures Task.

Type 1 people are low on Changes Task, Blends Task, EI Understanding Branch, and EI Reasoning Area. Type 2 people are low on Facilitation Task, Blends Task, EI Facilitating Branch, and Understanding Branch. Type 3 people are low on Faces Task, Blends Task, EI Understanding Branch, and EI Perceiving Branch.

Table 34

*Q-factor Analysis Z-scores for Each Type, Year 1 Group 2*

| Statement | Type 1 Z-Scores (Rank) | Type 2 Z-Scores (Rank) | Type 3 Z-Scores (Rank) |
|---|---|---|---|
| Faces Task | 1.573 (1) | 0.923 (3) | -1.862 (15) |
| EIExpArea | 1.496 (2) | -0.116 (10) | -0.150 (8) |
| EI Perceiving Branch | 1.242 (3) | 0.816 (5) | -0.597 (12) |
| EI Facilitating Branch | 0.947 (4) | -1.102 (13) | 0.502 (6) |
| EI Overall | 0.699 (5) | 0.270 (8) | -0.339 (10) |
| Facilitation Task | 0.568 (6) | -1.978 (15) | 0.124 (7) |
| Sensations Task | -0.244 (7) | -0.167 (11) | 0.963 (3) |
| Emotion Manage Task | -0.260 (8) | 0.944 (2) | 1.585 (1) |
| Pictures Task | -0.263 (9) | 0.435 (6) | 0.839 (4) |
| EI Managing Branch | -0.596 (10) | 1.196 (1) | 1.351 (2) |
| Social Manage Task | -0.795 (11) | 0.858 (4) | 0.756 (5) |
| EI Reasoning Area | -0.840 (12) | 0.358 (7) | -0.298 (9) |
| EI Understanding Branch | -1.143 (13) | -0.928 (12) | -0.597 (12) |
| Blends Task | -1.165 (14) | -1.720 (14) | -1.296 (14) |
| Changes Task | -1.219 (15) | 0.211 (9) | -0.458 (11) |

Type 1 for Year 1 Group 2 has very similar strengths to Type 1 of Year 1 Group 1, and is also called a High Facial Reader/Low Emotional Manager. The High Facial Reader/Low Emotional Manager is very strong in perceiving others' emotions with a particular sensitivity to reading other people's facial expressions, tone of voice, and artistic expressions. However, Type 1 High Facial Reader/Low Emotional Manager for Group 2 has a poor knowledge of complex emotions and how emotions combine and change over time and transition from one phase to another.

Type 2 might be called a High EI Manager/Low Facilitator. The EI Manager/Low Facilitator is very strong in maintaining or changing their feelings

according to a given situation or managing others' feelings so that a desired outcome is achieved. At the same time, this type has a hard time identifying emotions.

Type 3 is almost identical to Year 1 Group 1 Type 3 and therefore called a Highly Detached/Low Facilitator. The Highly Detached/Low Facilitator is good at determining emotions from abstract pictures, is able to maintain or change their feelings according to the situation, and is also able to intelligently integrate the data of emotions in order to develop strategies that help to achieve a positive outcome. Unlike Type 2, Type 3 Highly Detached/Low Facilitator is low in facilitating and therefore is less creative and less likely to problem-solve and reason.

The greatest differences between types for Year 1 Group 2 are presented in Appendix G Tables 53 through 55. For Types 1 and 2, the greatest differences existed between Facilitation Task (2.55), EI Facilitating Branch (2.05), and EI Managing Area (-1.79). For types 1 and 3, the greatest differences existed between Faces Task (3.44), EI Managing Branch (-1.95), Emotion Management Task (-1.85), and EI Perceiving Branch (1.84). For types 2 and 3, the greatest differences existed between Faces Task (2.79), Facilitations Task (-2.10), and EI Facilitating Branch (-1.60).

The greatest impact each statement makes for each type is listed in Appendix G, Table 56 (Type 1), Table 57 (Type 2), and Table 58 (Type 3).

## Year 2 Profiles

The Z-scores for the three types of Year 2 Group 1 are presented in Table 35. Type 1 people are high on Faces Task, EI Perceiving Branch, EI Experiencing Area, and Emotion Management Task. Type 2 people are high on Pictures Task, Emotion Management Task, Blends Task, and EI Managing Branch. Type 3 people are high on

Emotion Managing Branch, Facilitations Task, Social Management Task, and Emotion Management Task.

Type 1 people are low on Changes Task, EI Understanding Branch, Blends Task, and Social Management Task. Type 2 people are low on EI Facilitating Branch, Facilitation Task, Sensations Task, and EI Experiencing Area. Type 3 people are low on Faces Task, EI Understanding Branch, Changes Task, and EI Perceiving Branch.

Table 35

*Q-factor Analysis Z-scores for Each Type, Year 2 Group 1*

| Statement | Type 1 Z-Scores (Rank) | Type 2 Z-Scores (Rank) | Type 3 Z-Scores (Rank) |
|---|---|---|---|
| Faces Task | 2.54 (1) | -0.28 (11) | -1.90 (15) |
| Facilitation Task | 0.02 (7) | -1.73 (14) | 1.18 (2) |
| Changes Task | -1.17 (15) | 0.18 (9) | -1.12 (13) |
| Emotion Manage Task | 0.36 (4) | 1.23 (2) | 1.15 (4) |
| Pictures Task | 0.20 (5) | 1.24 (1) | 0.46 (6) |
| Sensations Task | -0.46 (10) | -1.11 (13) | 0.03 (7) |
| Blends Task | 0.80 (13) | 1.09 (3) | -0.35 (10) |
| Social Manage Task | -0.73 (12) | 0.36 (7) | 1.17 (3) |
| EI Perceiving Branch | 1.52 (2) | 0.38 (5) | -0.96 (12) |
| EI Facilitating Branch | -0.24 (8) | -1.83 (15) | 0.52 (5) |
| EI Understanding Branch | -1.11 (14) | 0.21 (8) | -1.21 (14) |
| EI Managing Branch | -0.35 (9) | 0.79 (4) | 1.37 (1) |
| EIExpArea | 0.72 (3) | -0.99 (12) | -0.38 (11) |
| EI Reasoning Area | -0.63 (11) | 0.38 (6) | 0.02 (9) |
| EI Overall | 0.13 (6) | 0.08 (10) | 0.02 (9) |

In describing the types for Year 2 Group 1, Type 1 is very similar to Year 1 Group 2 Type 1 and therefore can be called a High Facial Reader/Low Emotional Manager. The High Facial Reader/Low Emotional Manager is very strong in perceiving others' emotions with a particular sensitivity to reading other people's facial expressions,

tone of voice, and artistic expressions. However, Type 1 High Facial Reader/Low Emotional Manager for Group 1 has a poor ability to know under what circumstances emotional intensity lessens and increases and how one emotional state changes into another. This type also has difficulty identifying the emotions that are involved in more complex affective states.

Type 2 is almost identical to the Year 1 Group 1 Type 3 and is a Highly Detached/Low Facilitator. Pictures Task rates high in this type, which is closely related to Types 1 and 2's strength in Faces Task. This type, however, may be more abstract in preferring inanimate objects such as pictures of landscapes rather than observing another live person. The Highly Detached/Low Facilitator is also able to think about how one feels and to allow oneself to feel the emotion rather than repressing it and is also able to intelligently integrate the data of emotions in order to develop strategies that help to achieve a positive outcome. Type 2 Highly Detached/Low Facilitator is low in facilitating and therefore is less creative and less likely to problem solve and reason.

Type 3 might be called a High EI Manager/Low Facial Reader. This name is appropriate for this type because this type has the ability to direct the emotions into effective behavior for the long-term and is adept at understanding how they would maintain or change their feelings in a given situation and how to manage others' emotions so that a positive outcome is achieved. Unlike many of the other types in any year, Type 3 Thinking EI Manager/Low Facial Reader is low in the ability to identify the emotions in the faces of others and the ability to know under what circumstances emotional intensity lessens and increases and how one emotional state changes into another.

The greatest differences between types for Year 2 Group 1 are presented in Appendix G, Tables 59 through 61. For Types 1 and 2, the greatest differences existed between Faces Task (2.82), Blends Task, (-1.88), Facilitation Task (1.75), EIExp Area (1.71), and EI Facilitating (1.58). For Types 1 and 3, the greatest differences existed between Faces Task (4.44), EI Perceiving (2.47), Social Management Task (-1.90), and EI Managing Area (-1.73). For Types 2 and 3, the greatest differences existed between Facilitation Task (-2.91), EI Facilitating (-2.35), and Faces Task (1.63).

The greatest impact each statement makes for each type is listed in Appendix G, Table 62 (Type 1), Table 63 (Type 2), and Table 64 (Type 3).

The Z-scores for the three types of Year 2 Group 2 are presented in Table 36. Type 1 people are high on EI Managing Branch, Emotion Management Task, Social Management Task, and Sensations Task. Type 2 people are high on Faces Task, EI Perceiving Branch, EI Experiencing Area, and EI Overall. Type 3 people are high on Facilitations Task, EI Facilitating Branch, Pictures Task, and EI Experiencing Area. Type 1 people are low on EI Understanding Branch, Blends Task, Changes Task, and Pictures Task. Type 2 people are low on Changes Task, EI Understanding Branch, Social Management Task, and EI Managing Branch. Type 3 people are low on Changes Task, EI Understanding Branch, Social Management Task, and Blends Task.

In describing the types for Year 2 Group 2, Type 1 is very similar in strengths to Year 2 Group 1 Type 3, and is called a High EI Manager/Low Emotion Understander. This type has the ability to direct the emotions into effective behavior for the long-term and is adept at how they would maintain or change their feelings in a given situation and how to manage others' emotions so that a positive outcome is achieved. Unlike many of

the other types in any year, Type 3 Thinking EI Manager/Low Emotion Understander is low in the knowledge of complex emotions, how emotions combine and change over time, and the ability to know under what circumstances emotional intensity lessens and increases and how one emotional state changes into another.

Table 36

*Q-factor Analysis Z-scores for Each Type, Year 2 Group 2*

| Statement | Type 1 Z-Scores (Rank) | Type 2 Z-Scores (Rank) | Type 3 Z-Scores (Rank) |
|---|---|---|---|
| Faces Task | 0.00 (9) | 2.47 (1) | -0.72 (11) |
| Facilitation Task | -0.92 (11) | 0.13 (6) | 2.01 (1) |
| Changes Task | -1.11 (13) | -1.16 (15) | -1.13 (15) |
| Emotion Manage Task | 1.50 (2) | -0.37 (8) | 0.59 (6) |
| Pictures Task | -0.95 (12) | 0.18 (5) | 0.76 (3) |
| Sensations Task | 0.61 (4) | -0.59 (11) | 0.64 (5) |
| Blends Task | -1.33 (14) | -0.52 (9) | -0.82 (12) |
| Social Manage Task | 1.37 (3) | -0.81 (13) | -0.87 (13) |
| EI Perceiving Branch | -0.07 (10) | 1.51 (2) | -0.37 (7) |
| EI Facilitating Branch | 0.36 (5) | -0.07 (7) | 1.73 (2) |
| EI Understanding Branch | -1.45 (15) | -0.84 (14) | -0.95 (14) |
| EI Managing Branch | 1.56 (1) | -0.81 (13) | -0.52 (9) |
| EI Experiencing Area | 0.09 (8) | 0.99 (3) | 0.72 (4) |
| EI Reasoning Area | 0.17 (7) | -0.54 (10) | -0.66 (10) |
| EI Overall | 0.17 (7) | 0.44 (4) | -0.41 (8) |

Type 2 is almost identical in strengths and weaknesses to Year 1 Group 2 Type 1 and Year 2 Group 1 Type 1, and therefore can be called a High Facial Reader/Low Emotional Manager. The High Facial Reader/Low Emotional Manager is very strong in perceiving others' emotions with a particular sensitivity to reading other people's facial expressions, tone of voice, and artistic expressions. However, Type 2 High Facial

Reader/Low Emotional Manager is low in managing their own and others' emotions and therefore unable to benefit by directing the emotions for long-term benefit and outcomes.

Type 3 might be called a Perceiving Concrete Thinker/Low Emotion Understander. The Perceiving Concrete Thinker/Low Emotion Understander is very strong in perceiving others' emotions with a particular sensitivity to reading other abstract expressions. This type is also adept at activities such as problem-solving, reasoning, decision-making, and creativity. Like other types in this group, Type 3 Perceiving Concrete Thinker/Low Emotion Understander is low in managing their own and others' emotions and therefore unable to benefit by directing the emotions for long-term benefit and outcomes.

The greatest differences between types for Year 2 Group 2 are presented in Appendix G, Tables 65 through 67. For Types 1 and 2, the greatest differences existed between Faces Task (-2.46), EI Managing Branch (2.37), Social Manage Task (2.18), and Emotion Manage Task (1.87). For Types 1 and 3, the greatest differences existed between Facilitation Task (-2.93), Social Manage Task (2.24), and EI Managing Branch (2.08). For Types 2 and 3, the greatest differences existed between Faces Task (3.19), Facilitation Task (-1.88), and EI Perceiving Branch (1.87).

The greatest impact each statement makes for each type is listed in Appendix G, Table 68 (Type 1), Table 69 (Type 2), and Table 70 (Type 3).

## Year 3 Profiles

The Z-scores for the three types of Year 3 Group 1 are presented in Table 37. Type 1 people are high on Changes Task, EI Reasoning Area, Social Management Task, and EI Understanding Branch. Type 2 people are high on Faces Task, EI Perceiving

Branch, EI Overall, and EI Experiencing Area. Type 3 people are high on EI Understanding Branch, Blends Task, Changes Task, and Facilitation Task.

Type 1 people are low on Facilitation Task, EI Facilitating Branch, EI Experiencing Area, and EI Perceiving Branch. Type 2 people are low on Sensations Task, Emotion Management Task, EI Managing Branch, and EI Facilitating Branch. Type 3 people are low on Sensations Task, EI Experiencing Area, Pictures Task, and EI Perceiving Branch.

Table 37

*Q-factor Analysis Z-scores for Each Type, Year 3 Group 1*

| Statement | Type 1 Z-Scores (Rank) | Type 2 Z-Scores (Rank) | Type 3 Z-Scores (Rank) |
|---|---|---|---|
| Faces Task | -0.74 (11) | 2.86 (1) | -0.79 (12) |
| Facilitation Task | -1.76 (15) | -0.09 (6) | 0.95 (4) |
| Changes Task | 1.32 (1) | -0.16 (8) | 1.12 (3) |
| Emotion Manage Task | 0.51 (7) | -1.14 (14) | 0.26 (6) |
| Pictures Task | -0.48 (10) | -0.32 (11) | -0.79 (13) |
| Sensations Task | -0.21 (9) | -1.21 (15) | -1.60 (15) |
| Blends Task | 0.78 (6) | -0.15 (7) | 1.58 (2) |
| Social Manage Task | 0.96 (3) | -0.30 (10) | -0.50 (10) |
| EI Perceiving Branch | -0.78 (12) | 1.14 (2) | -0.79 (12) |
| EI Facilitating Branch | -1.26 (14) | -0.65 (12) | -0.44 (9) |
| EI Understanding Branch | 0.90 (4) | 0.00 (5) | 1.63 (1) |
| EI Managing Branch | 0.88 (5) | -0.73 (13) | -0.21 (7) |
| EI Experiencing Area | -1.22 (13) | 0.48 (4) | -0.85 (14) |
| EI Reasoning Area | 1.12 (2) | -0.25 (9) | 0.89 (5) |
| EI Overall | -0.03 (8) | 0.53 (3) | -0.44 (8) |

In describing the types for Year 3 Group 1, Type 1 might be called a Highly Understanding Manager/Low Facilitator. Unlike any other type, this is highly strategic. The Understanding Manager/Low Facilitator has the ability to understand and manage

emotions without necessarily perceiving feelings well or fully experience them. Type 1 Understanding Manager/Low Facilitator is low in the ability to perceive, respond, and manipulate emotional information without necessarily understanding it.

Type 2 is almost identical in strengths and weaknesses to Year 1 Group 2 Type 1, Year 2 Group 1 Type 1, and Year 2 Group 2 Type 2, and therefore can be called a High Facial Reader/Low Emotional Manager. The High Facial Reader/Low Emotional Manager is very strong in perceiving other people's emotions with a particular sensitivity to reading other people's facial expressions, tone of voice, and artistic expressions. However, Type 2 High Facial Reader/Low Emotional Manager is low in the ability to manage their own and other people's emotions and therefore unable to benefit by directing the emotions for long-term benefit and outcomes.

Type 3 is unique to year 3 and can be called a High EI Understander/Low Experiencer. The High EI Understander/Low Experiencer is very knowledgeable in complex emotions and how emotions combine and change over time and transition from one phase to another. Type 3 High EI Understander/Low Experiencer is low in the ability to perceive another's emotions from visual stimuli and the ability to perceive, respond, and manipulate emotional information.

The greatest differences between types for Year 3 Group 1 are presented in Appendix G, Tables 71 through 73. For Types 1 and 2, the greatest differences existed between Faces Task (-3.60), EI Perceiving (-1.92), Emotion Manage Task (1.65), and EI Managing Branch (1.61). For Types 1 and 3, the greatest differences existed between Facilitation Task (-2.71), Social Manage Task (1.45), and Sensations Task (1.39). For

Types 2 and 3, the greatest differences existed between Faces Task (3.65), EI Perceiving Branch (1.93), Blends Task (-1.73), and EI Understanding Branch (-1.63).

The greatest impact each statement makes for each type is listed in Appendix G, Table 74 (Type 1), Table 75 (Type 2), and Table 76 (Type 3).

The Z-scores for the three types of Year 3 Group 2 are presented in Table 38. Type 1 people are high on EI Understanding Branch, Blends Task, Changes Task, and EI Reasoning Area. Type 2 people are high on Facilitation Task, Blends Task, EI Understanding Branch, and EI Facilitating Branch. Type 3 people are high on Faces Task, EI Perceiving Branch, EI Overall, and Facilitation Task. Type 1 people are low on EI Experiencing Area, EI Facilitating Branch, Sensations Task, and Pictures Task. Type 2 people are low on Emotion Management Task, Faces Task, EI Managing Branch, and Social Management Task. Type 3 people are low on Sensations Task, Pictures Task, Social Management Task, and Blends Task.

In describing the types for Year 3 Group 2, Type 1 is like Year 3 Group 1 Type 3, is unique to Year 3, and can be called a High EI Understander/Low Experiencer. The High EI Understander/Low Experiencer is very knowledgeable in complex emotions and how emotions combine and change over time and transition from one phase to another. Type 3 High EI Understander/Low Experiencer is low in the ability to perceive another's emotions from visual stimuli and the ability to perceive, respond, and manipulate emotional information.

Type 2 is unique from all other types and might be called a Highly Facilitating Understander/Low Facial Emotion Manager. The Highly Facilitating Understander/Low Facial Emotion Manager is good at identifying emotions that best facilitate a type of

thinking and can identify and understand complex emotions. This type is not very adept at identifying the emotions on another person's face or understanding how to maintain or change their feelings.

Table 38

*Q-factor Analysis Z-scores for Each Type, Year 3 Group 2*

| Statement | Type 1 Z-Scores (Rank) | Type 2 Z-Scores (Rank) | Type 3 Z-Scores (Rank) |
|---|---|---|---|
| Faces Task | -0.34 (9) | -1.25 (14) | 2.74 (1) |
| Facilitation Task | -0.77 (11) | 1.63 (1) | 0.46 (4) |
| Changes Task | 1.40 (3) | 0.38 (6) | -0.38 (10) |
| Emotion Manage Task | 0.66 (5) | -1.38 (15) | 0.27 (6) |
| Pictures Task | 0.79 (12) | 0.57 (5) | -0.94 (14) |
| Sensations Task | -0.95 (13) | -0.89 (11) | -1.66 (15) |
| Blends Task | 1.41 (2) | 1.33 (2) | -0.59 (12) |
| Social Manage Task | 0.17 (6) | -1.18 (12) | -0.87 (13) |
| EI Perceiving Branch | -0.64 (10) | 0.30 (8) | 0.68 (2) |
| EI Facilitating Branch | -1.21 (14) | 0.67 (4) | -0.49 (11) |
| EI Understanding Branch | 1.72 (1) | 1.10 (3) | -0.27 (9) |
| EI Managing Branch | 0.06 (7) | -1.21 (13) | -0.11 (8) |
| EI Experiencing Area | -1.30 (15) | 0.30 (8) | 0.33 (5) |
| EI Reasoning Area | 0.87 (4) | -0.39 (10) | 0.22 (7) |
| EI Overall | 0.30 (8) | 0.04 (9) | 0.62 (3) |

Type 3 is almost identical in strengths and weaknesses to Year 1 Group 2 Type 1, Year 2 Group 1 Type 1, Year 2 Group 2 Type 2, and Year 3 Group 1 Type 2 and therefore can be called a High Facial Reader/Low Emotional Manager. The High Facial Reader/Low Emotional Manager is very strong in perceiving others' emotions with a particular sensitivity to reading other people's facial expressions, tone of voice, and artistic expressions. However, Type 2 High Facial Reader/Low Emotional Manager 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.

The greatest differences between types for Year 3 Group 2 are presented in Appendix G, Tables 77 through 79. For Types 1 and 2, the greatest differences existed between Facilitation Task (-2.39), Emotion Manage Task (2.04), EI Facilitating Branch (-1.88), and EI Experiencing Area (-1.56). For Types 1 and 3, the greatest differences existed between Faces Task (-3.08), Blends Task (2.00), and EI Understanding Area (1.99). For Types 2 and 3, the greatest differences existed between Faces Task (-3.99), Blends Task (1.92), and Emotion Management Task (-1.65).

The greatest impact each statement makes for each type is listed in Appendix G, Table 80 (Type 1), Table 81 (Type 2), and Table 82 (Type 3). Several types were replicated throughout the groups and some years and are presented in Table 39.

## Conclusion

In this chapter, I presented the results from this study. The first part of the chapter included descriptive statistics on the sample. I proceeded by presenting the results of a factor analysis on the clinical instrument and the EI instrument. Next, I presented the results on correlations between multiple variables, followed by the results of multiple regression analysis on numerous variables. Finally, I presented the EI profiles of nurse anesthesia students derived from Q-factor analysis.

Table 39

*Named Types by Year and Group*

| Year/Group | Type Name | Common Threads |
|---|---|---|
| Y1G1 | | |
| | High Facial Reader/Low Emotional Manager | X |
| | High Facial Facilitator/Low Emotional Understander | * |
| | Highly Detached/Low Facilitator | Y |
| Y1G2 | | |
| | High Facial Reader/Low Emotional Manager | X |
| | High EI Manager/Low Facilitator | * |
| | Highly Detached/Low Facilitator | Y |
| Y2G1 | | |
| | High Facial Reader/Low Emotional Manager | X |
| | Highly Detached/Low Facilitator | Y |
| | High EI Manager/Low Facial Reader | * |
| Y2G2 | | |
| | High EI Manager/Low Emotion Understander | * |
| | High Facial Reader/Low Emotional Manager | X |
| | Perceiving Concrete Thinker/Low Emotion Understander | * |
| Y3G1 | | |
| | Highly Understanding Manager/Low Facilitator | * |
| | High Facial Reader/Low Emotional Manager | X |
| | High EI Understander/Low Experiencer | Z |
| Y3G2 | | |
| | High EI Understander/Low Experiencer | Z |
| | Highly Facilitating Understander/Low Facial Emotion Manager | * |
| | High Facial Reader/Low Emotional Manager | X |

*Note*. X, Y, Z corresponds to a replicated named type for each of the identified groups and years.
*Indicates Unique Type.

## Conclusions on Descriptive Statistics

In this chapter, the descriptive statistics for each variable were reported. Descriptives included the *n* and percentages for the participating NA programs and participants.

## Conclusions on Factor Analysis

A factor analysis was completed on the EI subscales (two factors extracted), and the Clinical Tool subscales (three factors extracted). For the clinical factor analysis, the first factor extracted is the student's ability to perform technical skills related to practice, the second factor extracted is the student's ability to relate to self and others (EI concepts), and the third factor extracted is the student's ability to be resource conscious. These three factors explain 66% of the variance in the clinical instrument.

For the EI factor analysis, the analysis is consistent with the theoretical framework of EI. This is empirical evidence supporting the underlying construct validity the instrument developers indicate the scale is measuring. The two factors being measured are based on the underlying EI area branch scores. The first factor being measured is EI Reasoning, and the second factor being measured is EI Experiential. These two factors explain 83% of the variance in the EI instrument.

## Conclusions on Correlations

Correlations for each set of variables were analyzed. This study found basically the same supporting data replicating previous studies (with minor differences), indicating the sample is the same due to similar findings. Bonferroni corrections were made for all correlations and multiple regressions to decrease Type I error.

In terms of cognitive variables, there was one variable (NA GPA) that was significantly related to NCE scores. Two cognitive variables and 19 clinical variables were significantly related to OGPA. None of the cognitive variables were significantly related to SGPA, but 16 of the clinical variables were significantly related to SGPA. None of the cognitive variables were significantly related to the NA GPA, but 13 of the clinical variables were significantly related to NA GPA.

In terms of clinical variables and NCE scores, two variables (Clinical Judgment and Equipment Malfunction) were significantly related to NCE scores. In terms of emotional intelligence variables, there were no significant correlations between emotional intelligence variables and NCE scores.

## Conclusions on Multiple Regression

I used multiple regression to test each hypothesis and reported the results. Nineteen hypotheses were tested with multiple regression, with models considered for regressions that showed any significant predictability without Bonferroni correction. Ten of the models were significant. Several of the EI variables were predictive of success on the NCE. The predictive items include Facilitation Task, Sensations Task, EI Facilitation Branch, and EI Reasoning Area with a resulting statistically significant model. The EI second-order factors do not predict any of the clinical individual items or any of the three clinical second-order factors. Four of the clinical variables—didactic transference, efficient, equipment malfunction, and technical skills factor—were significant predictors of NCE scores. The only preadmission variable significant for predicting these four clinical variables was the OGPA.

The only academic variable significantly predictive of NCE scores was the NA GPA. None of the emotional intelligence variables were significantly predictive of NA GPA, but one cognitive variable (OGPA) was significantly predictive of NA GPA. Additionally, OGPA was significantly predictive of Clinical Technical Skills and Clinical EI Concepts. There was a negative significant relationship between overall emotional intelligence of students in their first semester, students after their first year, and students in their final semester.

The final set of regression tests showed three significant predictions by year, group, and type of emotional intelligence. Y2G1T1 was significantly predictive of Technical Skills Factor and Resource Management Factor, but the corresponding models were not significant. The individual weight for Y3G1T3 was statistically significant in predicting Technical Skills Factor independent of the other factors, but the model was not significant.

## Conclusions on Q-factor Analysis

Q-factor analysis was performed and found three types for each of two groups for each of 3 years described descriptively. Replicated types are presented, with one type in particular in each group of each year (High Facial Reader/Low Emotional Manager). Each group of each year also has at least one unique type, whereas a new type is progressively introduced and repeated in successive years.

In the next and final chapter, the results are discussed and recommendations for practice and future research are shared.

# CHAPTER 5

# SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

## Introduction and Literature

This chapter contains a summary of the study, which includes a review of the literature, statement of problem, research design and procedures, and research hypotheses. It also provides a summary of the findings, a discussion and conclusions from this research, and recommendations for practice and further research.

## Background and Literature

Competition exists for admission to nurse anesthesia programs throughout the United States. As an example, the average ratio of applications to those accepted in the programs included in this study was greater than 5:1. A limited number of openings for prospective applicants requires identifying the best candidates most likely to succeed. Stress of matriculating through an anesthesia program also complicates the student's ability to succeed. To narrow the pool of applicants, nurse anesthesia (NA) program admission committees have to select individuals they believe will be successful in completing the programs and practicing nurse anesthesia. To do this the NA program admission committees have to devise suitable methods for choosing candidates who will successfully complete the NA program. The primary cognitive criteria considered for admission to nurse anesthesia school typically include Graduate Record Exam (GRE)

scores, science grade point averages (SGPA), overall GPAs (OGPA), letters of recommendation, and years of acute care nursing experience.

Determining the most successful candidates for a limited number of positions is very important because of the significant financial, emotional, and personal costs individuals make in taking the intensive NA programming and the negative effects high attrition rates have on both the program and hospitals that need these graduates. Reese (2002) raised a concern that current admission criteria may not provide substantive data necessary for predicting student progression through nurse anesthesia programs. The consistency of the nurse anesthesia applicant pool and the lack of solid data that suggests predictive value of cognitive factors raised the interest in finding other non-cognitive data (Hulse et al., 2007) that might be useful in understanding and even predicting who might succeed. Emotional intelligence (EI) was seen as a potential area.

Researchers have shown that emotional intelligence is an essential factor responsible for determining success in many areas of life (Arora et al., 2010; Austin et al., 2007; Benson, Ploeg, & Brown, 2010; Chabeli, 2006; Codier et al., 2008; Connolly, 2002; Cox, 2002; Evans & Allen, 2002; Gewertz, 2006; Vandervoort, 2006; Walker, 2006; Zimmerman & Phillips, 2000). Researchers also find that EI plays an important role in shaping the interaction between individuals and their work environment (Nooryan et al., 2011). One can argue that in order for people to take advantage of their cognitive intelligence (IQ) to the maximum, they first need emotional intelligence. If people turn others off with abrasive behavior, remain unaware of how they present themselves, or collapse under minimal stress, no one will notice their high IQs. The stronger the EI abilities, the greater the chances for success (Nooryan et al., 2011).

This seems to hold true also in educational pursuits in life. Current research demonstrates a tangible link between a student's emotional intelligence scores and that student's likelihood of succeeding in both college and professional environments. Emotional intelligence develops over time, changes throughout life, and can be improved through training (Bar-On, Maree, & Elioas, 2007; Goleman, 1998; Page & Page, 2003). This potential that EI can be improved makes it even more interesting to educators. A wide body of research (Bulmer Smith et al., 2009; Cadman & Brewer, 2001; Parker et al., 2005; Parker et al., 2004; Qualter et al., 2009; Robertson, 2007; Zysberg, Levy, & Zisberg, 2011) shows that through EI screening and/or coaching, student success can be improved, and attrition rates curtailed with a subsequent increase in retention rates.

The research noted above suggests that emotional intelligence may have important relevance to nurse anesthesia student success. This possibility motivated me to examine EI in NA students. I believed that a focus on EI could lead to more knowledge about the student and may improve selection processes or intervention work in NA school curriculum to maximize student learning, retention, and academic achievement. Knowing more about the EI levels of NA students has the potential to later inform reflective experiences, mentorship, modeling, creativity in the arts and sciences, developing self-awareness, empathy, relationships, journaling, exercise, and talking (Freshwater & Stickley, 2004).

My study therefore explored the use of emotional intelligence (EI) profiles and related those to other measures (cognitive, clinical, etc.) to understand those who were successful in nurse anesthesia educational programs. I hoped that data from this cross-sectional study, which measured emotional intelligence at different stages of the NA

program, could become useful in offering another means to evaluate those who are most likely to be successful in NA programs.

Given this objective, emotional intelligence theory literature was the central research guiding this study. Emotional Intelligence Theory as described by Mayer et al. (2004) represents the basic theoretical framework for this study. As defined by Mayer et al. (2004), emotional intelligence is

> the capacity to reason about emotions, and of emotions to enhance thinking. It includes the abilities to accurately perceive emotions, to access and generate emotions so as to assist thought, to understand emotions and emotional knowledge, and to reflectively regulate emotions so as to promote emotional and intellectual growth. (p. 197)

El from this theoretical perspective refers specifically to the cooperative interaction of cognitive intelligence and emotion (Ciarrochi et al., 2000; Roberts et al., 2001).

Some research has demonstrated the use of emotional intelligence in successful leadership (Codier et al., 2008; Connolly, 2002; Cox, 2002; Gewertz, 2006), education (Parker et al., 2005; Parker et al., 2004; Petrides et al., 2003; Petrides & Furnham, 2000; Qualter, Gardner, et al., 2007; Qualter, Whiteley, et al., 2007), and professional work situations (Bellack, 1999; Bellack et al., 2001; Chabeli, 2006; Freshwater & Stickley, 2004; Gooch, 2006; Kerfoot, 1996; McQueen, 2004; Reeves, 2005; Strickland, 2000), all of which influence nurse anesthesia student education. 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 emotional intelligence in the successful progression through and program completion of nurse anesthesia students.

## Summary of the Study

I organized and designed the study based on a literature review. In this section, the problem, purpose, and research question of the study are reviewed. The research hypothesis is enumerated, and the procedures that guided the data collection and analysis are reviewed.

### Problem

Given the literature review, the problem was that current requirements in nurse anesthesia program admissions could be improved to predict positive progression for students in nurse anesthesia programs, and EI promised to provide that improved perspective. Numerous studies (Burns, 2009; Hulse et al., 2007; Lebeck, 2003; Reese, 2002) have shown that using the cognitive and subjective data alone may have little or no predictive value in determining success for nurse anesthesia students. Emotional intelligence profiles may, as non-cognitive factors, help in adding to this processing.

### Purpose

The purpose of this cross-sectional quantitative correlational study was to see if there were certain emotional intelligence profiles of nurse anesthesia students at one specific point in time for three different NA classes: matriculation, after 1 year, and in the last semester of study in four nurse anesthesia programs in the southeastern United States. I also examined the relationship between academic measures used in admissions and throughout the program, EI constructs, and clinical evaluation scores. Academic and clinical scores are the dependent variables, and the student's emotional intelligence

scores, undergraduate OGPA, undergraduate SGPA, years of acute care nursing experience, and GRE scores are the independent variables for the study.

The major contributions of this study were substantiation or repudiation of previous dissertation findings on academic variables in terms of success on the NCE, new findings on clinical variables in predicting NCE success, and a description of emotional intelligence types of nurse anesthesia students at different points in an anesthesia program.

## Research Questions

The research questions that guided the study are:

1. What are the demographic and emotional intelligence profile(s) of NA students at matriculation, after 1 year, and at graduation?

2. What emotional intelligence variables, clinical variables, and cognitive variables correlate and/or predict NCE scores?

## Research Design and Procedures

The research design for this study is cross-sectional quantitative correlational. I selected this research design because the research objectives are to examine the relationship among variables from an exploratory perspective. The cross-sectional design also allowed me to get a larger sample. I used a quantitative correlational research method to examine the relationship between the independent variables (EI, GPA, SGPA, GRE scores, acute care nursing experience) and the dependent variables (matriculation, clinical evaluation, NA GPA, and NCE) of students in four nurse anesthesia programs in the southeastern United States.

I also used Q-factor analysis to create, simplify, and aggregate EI profiles of nurse anesthesia students using an ex post facto survey design. In the study being reported here I used the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT V2.0) to cross-sectionally collect data on emotional intelligence of nurse anesthesia students at one specific point in time on three different classes in the NA program of study: matriculation, after 1 year of study, and in the last semester. Emotional intelligence variables are composed of 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 40). The overall emotional intelligence score was analyzed, as well as the two area scores, four branch scores, and eight task scores. A score of 100 is considered average. A score of 115 is about 1 standard deviation above the mean. I did not correct for any variables to allow the student's true performance to be analyzed (Mayer, et al., 2002). I scored the tests by the General Consensus Criterion. A score of 167 was the maximum score possible with these scoring parameters.

I used the data from the MSCEIT V2.0 to determine whether there was a correlation between EI profiles, clinical variables, and academic variables of nurse anesthesia students. Other variables I examined in relation to nurse anesthesia student academic success included pre-admission GRE scores, overall GPA, science GPA, and years of acute care nursing experience. Variables examined in relation to nurse anesthesia student clinical success included 17 items from a clinical evaluation tool and two second-order clinical factors. I used a variety of appropriate statistical tools such as correlation

and multiple regression to determine the characteristics that best describe the EI profile and successful graduation of nurse anesthesia students.

Table 40

*Operationalization of the EI Variables*

| | Area Scores | Branch Scores | Task Scores |
|---|---|---|---|
| Overall EI | Experiential | Perceiving | Faces |
| | | | Pictures |
| | | Facilitating | Sensations |
| | | | Facilitation |
| | Strategic | Understanding | Blends |
| | | | Changes |
| | | Managing | Emotion Management |
| | | | Emotional Relations |

After Institutional Review Board (IRB) approval, subjects from each participating university's nurse anesthesia program were given the opportunity to participate in the MSCEIT electronic survey. The sample was a purposive sample, and included all current students in each of four nurse anesthesia programs in the southeastern United States. Purposive sampling was used when respondents are chosen based on some special purpose (Newman & McNeil, 1998).

The MSCEIT was administered to 216 nurse anesthesia students from four different NA programs in the southeastern United States between April and September 2011. The data from the MSCEIT V2.0 were used to create EI profiles and to determine

whether there was a correlation between EI profiles, clinical scores, and NCE scores of nurse anesthesia students.

The research method for the current study also used Q-factor analysis to determine EI profiles of nurse anesthesia students using an ex post facto survey design. Q-factor creates profiles of people by clustering people together who have similar profiles and can be used to compare with one another. Q-factor 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 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 NA students and determined whether a relationship existed between nurse anesthesia programs' preadmission criteria, EI profiles, and success in nurse anesthesia programs. Each of the variables was individually examined and compared to determine if a relationship to academic variables exists. Further, variables were examined to determine if one variable predicts a meaningful relationship as compared with the other variables.

Preadmission selection criteria, including the OGPA, SGPA, GRE scores, and the years of critical care nursing experience, as well as the student's current NA GPA, NCE score, and emotional intelligence represented the variables under study. Variables

examined in relation to nurse anesthesia student clinical success included 17 items from a clinical evaluation tool and two second-order clinical factors.

## Summary of Findings

This study examined the cognitive measures and emotional intelligence profiles of nurse anesthesia students in their first semester, after one year, and in the last semester of their nurse anesthesia program. The major findings of this study are described in the next two sections.

### Descriptive Statistics

The descriptive statistics (frequencies and means) reported in Table 41 describe the sample. Of 216 nurse anesthesia student participants, 69 (31.9%) represented male students and 147 (68.1%) represented female students. Frequencies and percentages were conducted on the current student by year in the program. Results found that most of the NA students (*n*=79; 36.6%) were in their first semester, *n*=69 (31.9%) were at one year, and *n*=68 (31.5%) were in their last semester. The participants represented a range of ethnicities (African American, 5.1%; Asian, 5.1%, Hispanic, 3.7%, Mixed, 1%), but were predominantly Caucasian (85.1%). The participants ranged in age from 23 through 52, with a mean age of 31.

In terms of acute care experience, participants had a range of 1 to 24 years of acute care experience prior to starting nurse anesthesia school, with a mean of 3.42 years. Of the participants, 81.5% of NA students had 5 years or less of preadmission acute care experience. The overall GPA prior to admission had a range of 2.90-4.0 and a mean of 3.46. The science GPA prior to admission had a range of 2.17-4.0 and a mean of 3.42.

Table 41

*Participant Descriptives*

| Variable | *n* | % |
|---|---|---|
| *Gender* | | |
| Male | 69 | 31.9 |
| Female | 147 | 68.1 |
| *Ethnicity* | | |
| African American | 11 | 5.1 |
| Asian | 11 | 5.1 |
| Caucasian | 184 | 85.2 |
| Hispanic | 8 | 3.7 |
| Other | 2 | 0.9 |
| *Age* | | |
| 23-25 | 29 | 13.4 |
| 26-28 | 68 | 31.5 |
| 29-31 | 50 | 23.2 |
| 32-34 | 22 | 10.2 |
| 35-40 | 26 | 11.6 |
| 41-45 | 11 | 5.2 |
| 46-50 | 8 | 3.8 |
| >50 | 2 | 0.9 |
| *Place in Program* | | |
| Matriculation | 79 | 36.6 |
| After 1st Year | 69 | 31.9 |
| Last Semester | 68 | 31.5 |
| *Years of Acute Care Experience* | | |
| 1-2 | 53 | 24.8 |
| 2-3 | 56 | 26.2 |
| 3-4 | 34 | 15.9 |
| 4-5 | 32 | 15.0 |
| 5-10 | 30 | 14.2 |
| >10 | 9 | 4.3 |

Table 41—*Continued.*

| | *Science GPA* | | *Overall GPA* | |
|---|---|---|---|---|
| | *n* | % | *n* | % |
| 2.11-2.20 | 1 | 0.5 | | |
| 2.21-2.30 | 3 | 1.4 | | |
| 2.31-2.40 | 3 | 1.4 | | |
| 2.41-2.50 | 1 | 0.5 | | |
| 2.51-2.60 | 1 | 0.5 | | |
| 2.61-2.70 | 3 | 1.4 | | |
| 2.71-2.80 | 5 | 2.3 | | |
| 2.81-2.90 | 6 | 2.8 | | |
| 2.91-3.00 | 18 | 8.3 | 6 | 2.8 |
| 3.01-3.10 | 12 | 5.6 | 11 | 5.1 |
| 3.11-3.20 | 9 | 4.2 | 21 | 9.7 |
| 3.21-3.30 | 18 | 8.3 | 25 | 11.6 |
| 3.31-3.40 | 17 | 7.9 | 30 | 13.9 |
| 3.41-3.50 | 23 | 10.6 | 35 | 16.2 |
| 3.51-3.60 | 22 | 10.2 | 30 | 13.9 |
| 3.61-3.70 | 11 | 5.1 | 17 | 7.9 |
| 3.71-3.80 | 22 | 10.2 | 15 | 6.9 |
| 3.81-3.90 | 11 | 5.1 | 13 | 6.0 |
| 3.91-4.00 | 30 | 13.9 | 13 | 6.0 |

| | *Quantitative GRE* | | *Verbal GRE* | |
|---|---|---|---|---|
| | *n* | % | *n* | % |
| 300-350 | 1 | 0.5 | 4 | 1.9 |
| 360-400 | 8 | 3.8 | 19 | 8.8 |
| 410-450 | 9 | 4.2 | 38 | 17.6 |
| 460-500 | 24 | 11.2 | 50 | 23.1 |
| 510-550 | 29 | 13.5 | 49 | 22.7 |
| 560-600 | 45 | 20.8 | 36 | 16.7 |
| 610-650 | 45 | 20.8 | 8 | 3.7 |
| 660-700 | 24 | 11.2 | 0 | 0 |
| 710-750 | 17 | 7.9 | 0 | 0 |
| 760-800 | 3 | 1.5 | 0 | 0 |

| | *Analytical GRE* | |
|---|---|---|
| | *n* | % |
| 2.5 | 3 | 1.4 |
| 3.0 | 17 | 7.9 |
| 3.5 | 57 | 26.4 |
| 4.0 | 77 | 35.6 |

Table 41—*Continued.*

| | *Analytical GRE* | |
|---|---|---|
| | *n* | % |
| 4.5 | 38 | 17.6 |
| 5.0 | 10 | 4.6 |
| 5.5 | 2 | 0.9 |
| 6.0 | 1 | 0.5 |

Although the range of science GPAs started at a lower range, a greater number of students matriculated with higher science GPAs than they did with overall GPAs. This sample is similar to Lebeck's (2003) sample, which had an overall GPA range of 2.5-4.0 with a mean of 3.44, and a science GPA range of 1.6-4.0 with a mean of 3.34.

Preadmission GRE scores showed much higher percentages of students with greater quantitative scores (75.7% above 500) when compared with verbal scores (43.1% above 500). Eleven students did not have complete GRE scores, and were excluded from any correlations examining GRE scores (*N*=205). The quantitative GRE prior to admission had a range of 300-800 and a mean of 585. The verbal GRE prior to admission had a range of 320-660 and a mean of 496, and the analytical GRE prior to admission had a range of 2.5-6 and a mean of 3.9. Again, this is similar to Lebeck's (2003) sample that had a quantitative GRE range of 200-760 with a mean of 520, and a verbal GRE range of 300-660 and a mean of 453. Lebeck's study used the old analytical GRE scoring system, and therefore cannot be compared to this sample.

## Primary Findings

Final nurse anesthesia GPA (NA GPA) is significantly correlated with ($r$ = .417, $p$<.001) and predictive of National Certification Examination (NCE) scores ($b$ = 53.642, $p$<.01), whereas overall GPA, science GPA, and GRE scores are not. While overall GPA is not correlated with NCE scores, it is significant that the overall GPA is the only preadmission variable that is predictive of the NA GPA ($b$ = .306, $p$<.005). The higher the overall GPA, the higher the NA GPA. So, the preadmission overall GPA might be considered indirectly related to NCE scores.

Overall GPA was significantly correlated with numerous items on the clinical tool, but not with any of the emotional intelligence scores. NA GPA also is significantly correlated with numerous clinical variables, so the better the student does academically in the NA program, the better they tend to do clinically.

In terms of predictability, after Bonferroni correction there was one clinical variable that was a positive predictor of NCE scores (Table 42)—didactic transference ($b$=37.483, $p$=.001). The only academic variable predictive of NCE scores while controlling for other academic variables was the NA GPA ($b$=53.642, $p$=.008). Overall GPA is the only preadmission variable that is significant in predicting the clinical variable and the NA GPA, both of which are significant in predicting NCE scores.

An interesting finding was that as students progressed further in the NA program, there was a statistically significant decrease in overall emotional intelligence ($b$=-.147, $p$=.030), but the model was not significant ($p$=.112).

Table 42

*Selected Clinical Variables for Predicting NCE Scores and the Corresponding Regression Model*

| Variable | *b* | *t* | *p* |
|---|---|---|---|
| Preop | -17.503 | -.944 | .350 |
| Careplan | 22.285 | 1.317 | .194 |
| Didactic Transfer | 37.483 | 3.470 | .001** |
| Clinical Judgment | -22.186 | -1.444 | .156 |
| Skill Mastery | -20.814 | -1.645 | .107 |
| Data Adjust Care | -14.014 | -.873 | .387 |
| Recognize Respond Comp. | 5.796 | .322 | .749 |
| Efficient | 36.058 | 2.276 | .027* |
| Valid Self Critique | -23.849 | -1.948 | .057 |
| Independent Communication | -.669 | -.058 | .954 |
| Patient Respect | .433 | .032 | .975 |
| Stress Management | -3.668 | -.303 | .763 |
| Budget | 25.937 | .699 | .488 |
| Equip. Malfunction | -33.692 | -2.174 | .035* |
| Standard Precautions | 11.218 | .795 | .431 |
| Peer Comparison | 9.536 | .831 | .410 |
| Resource Management | -16.127 | -.810 | .422 |
| Technical Skills Factor | 3.289 | 1.978 | .050* |
| Patient Focused Factor | -7.352 | -1.563 | .123 |
| Resource Manage. Factor | -15.655 | -1.732 | .088 |

| Model | $R^2$ | *Adj* $R^2$ | *df1/2* | FChange | *p* | Significant |
|---|---|---|---|---|---|---|
| | .478 | .290 | 17/6 | 2.534 | .006 | S |

*Note*. Significant variables account for unique variance when controlling for all other variables in the model. When controlling for Type I error buildup (Bonferroni Correction), the *p* value has to be less than or equal to .0025.
*$p<.05$. **$p<.01$.

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 43) 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 NA GPA. The EI second-order factors do not predict any of the clinical individual items or any of the three clinical second-order factors.

Table 43

*Selected Emotional Intelligence Variables for Predicting NCE Scores*

| Variable | *b* | *t* | *p* |
|---|---|---|---|
| Facilitating Task | -4.527 | -2.857 | .006** |
| Sensations Task | -5.249 | -2.512 | .015** |
| Facilitating Branch | 7.178 | 2.558 | .013** |
| Reasoning Area | .347 | .786 | .435 |

| Model | $R^2$ | *Adj* $R^2$ | *df1/2* | FChange | *p* | Significant |
|---|---|---|---|---|---|---|
| | .152 | .096 | 4/60 | 2.697 | .039 | S |

*$p$<.05. **$p$<.01.

In terms of emotional intelligence types, there are three types of people per class with one type that seems to be stable and replicable through the different years. The replicable type throughout the program is the High Facial Reader/Low Emotional Manager. The Highly Detached/Low Facilitator is present in first-semester students and

some of the second-year students, but not last-semester students. As students get into the third year, the High EI Understander/Low Experiencer type is replicated between both groups.

While interesting descriptively, the 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. While the Year 1 Group 1 Type 1 (Y2G1T1) is statistically predictive of technical skills factor and resource management factor, the model itself is not significant. Also, Year 3 Group 1 Type 3 (Y3G1T3) is statistically significant in predicting technical skills factor, but the model is not significant.

## Additional Findings

Factor analysis is a crucial tool for validating the structure of instruments. A factor is a group of items that may be said to belong together. A person who scores high in one variable likely will score highly on a variable in the same factor grouping, and vice versa. Such an item has high correlations with other items of the same factor and not so high correlations with items of different factors (Munro, 2004).

A meaningful finding with pragmatic applicability is that the clinical instrument measuring 17 items actually only measures three underlying constructs. This provides evidence that the clinical instruments may need to be refined.

Factor analysis of the MSCEIT shows that, with my data, the instrument measures only two constructs. My factor analysis corroborates the belief that the MSCEIT is a two-area measurement of EI. As such my study provides empirical evidence supporting the underlying constructs the instrument developers indicate the scale is measuring.

## Interpretations

### Emotional Intelligence

With this exploratory study I have started the knowledge base of EI related to NA students. My 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 43). These types should be considered emotional intelligence types, but people can be typed in other ways (e.g., cognitive data) and should be considered for future research related to affective domain. The emotional intelligence profiles do change from year to year, with Highly Detached/Low Facilitator present in years 1 and 2, and High EI Understander/Low Experiencer present only in year 3. However, one type in particular, High Facial Reader/Low Emotional Manager, is consistently present in each group and year.

The consistent type, the High Facial Reader/Low Emotional Manager type, shows that all NA students in this study tend to be very strong in perceiving others' emotions with a particular sensitivity to reading other people's facial expressions, tone of voice, and artistic expressions. However, High Facial Reader/Low Emotional Manager 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 NA student population, the current study showed a statistically significant difference in overall EI in students at the beginning, middle and completion of these four

Table 44

*Named Types by Year and Group*

| Year/Group | Type Name | Common Threads |
|---|---|---|
| Y1G1 | | |
| | High Facial Reader/Low Emotional Manager | X |
| | High Facial Facilitator/Low Emotional Understander | * |
| | Highly Detached/Low Facilitator | Y |
| Y1G2 | | |
| | High Facial Reader/Low Emotional Manager | X |
| | High EI Manager/Low Facilitator | * |
| | Highly Detached/Low Facilitator | Y |
| Y2G1 | | |
| | High Facial Reader/Low Emotional Manager | X |
| | Highly Detached/Low Facilitator | Y |
| | High EI Manager/Low Facial Reader | * |
| Y2G2 | | |
| | High EI Manager/Low Emotion Understander | * |
| | High Facial Reader/Low Emotional Manager | X |
| | Perceiving Concrete Thinker/Low Emotion Understander | * |
| Y3G1 | | |
| | Highly Understanding Manager/Low Facilitator | * |
| | High Facial Reader/Low Emotional Manager | X |
| | High EI Understander/Low Experiencer | Z |
| Y3G2 | | |
| | High EI Understander/Low Experiencer | Z |
| | Highly Facilitating Understander/Low Facial Emotion Manager | * |
| | High Facial Reader/Low Emotional Manager | X |

*Note*. X, Y, Z corresponds to a replicated named type for each of the identified groups and years.
*Indicates Unique Type.

NA programs. Overall, those in the last semester of their programs had lower EI scores than those at matriculation and one year of study. Because this study was cross-sectional, the lower overall EI scores may be related to the individuals themselves and not their programs nor their progression through the programs. Although there is no EI study on NA students to compare this with, this finding is in contrast to a finding by Benson et al. (2010) that 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. (2011) concluded that the ability to effectively deal with emotions in the workplace assists in coping with stress and education in emotional intelligence decreased anxiety in physicians and nurses, a finding corroborated by Montes-Berges and Augusto (2007) on EI's importance in coping with stress in nursing. A study by Holahan and Moos (1991) demonstrated that emotional intelligence reduces stress and predicts 66% of key success factors in health care. In other words, health care providers scoring high in emotional intelligence are far more effective in a number of key performance areas including stress management.

Another study by Weng et al. (2011) 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 (Montes-Berges & Augusto,

2007). 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 42 all come from the same line of thought in the EI construct (Table 40). The two task scores are negatively correlated, meaning the ones who score low in these tasks then scored higher on the NCE. However, NA students who scored higher on the Facilitating branch overall also scored higher on the NCE. Most of the NA student 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 NA students.

## Cognitive Data

Burns (2009) found that preadmission OGPA, SGPA, GRE, and the number of years of critical care experience were individually correlated to the NA GPA and academic status, but the overall GPA and SGPA remained the most predictive of the NA GPA and student academic status. This study corroborated Burns's (2009) finding in that the OGPA was statistically significant in predicting NA GPA, and thus indicates that the sample is from the same population.

This study went further in finding that the NA GPA predicts NCE scores, but the other variables Lebeck (2003) mentions as being significant in predicting the NCE, particularly the science GPA, did not hold true in this study. Because Lebeck and I drew from two different samples, there may be some variability that I do not account for, but the variables Lebeck and I collected data on are similar as noted earlier. The sample

differences occur from a geographic perspective. Lebeck's sample was from a national distribution of NA programs.

All programs in this study were 28 months in length, whereas Lebeck's sample had only 33% of NA programs in this category. Lebeck's sample had 41% of NA programs that were 24 months in length, which currently is rare for the program length. The added program length translates into a greater number of hours that could affect NAGPA. Like the findings in this study, Burns (2009) and Lebeck (2003) showed that GRE scores hold no predictive value in predicting NA student progress or success.

The finding that NA GPA is the only academic variable predictive of NCE scores when controlling for other academic variables (Table 45) may indicate the need for NA programs to incorporate a comprehensive pass/fail exam in the final semester of the NA program. A pass/fail exam, while administered late in the program, may be another tool that maximizes NA program NCE pass rates with regard to NA students who have been at constant risk of academic failure during the NA program. Such an exam might be predictive of NCE scores, but further research would need to be done in this area. With overall GPA being the only preadmission variable predictive of NA GPA ($b = .306$, $p<.005$), it may need to be given more weight in the admissions process.

## Clinical Findings

For accreditation purposes, the COA requires that NA students demonstrate competence in a variety of clinical indicators (*Standards for accreditation of nurse anesthesia programs*, 2010). To accomplish this, NA schools perform regular clinical evaluations of the student's clinical progress. Previous studies have not explored clinical evaluation in relation to academic outcomes.

Table 45

*Selected Academic Variables for Predicting NCE Scores and the Corresponding Regression Model*

| Variable | *b* | *t* | *p* |
|---|---|---|---|
| Overall GPA | 12.720 | .486 | .629 |
| Science GPA | -.228 | -.013 | .990 |
| NA GPA | 53.642 | 2.735 | .008** |
| Quantitative GRE | .007 | .119 | .906 |
| Verbal GRE | .129 | 1.450 | .153 |
| Analytical GRE | 3.310 | .397 | .693 |
| Acute Care Experience | -.018 | -.014 | .989 |

| Model | $R^2$ | *Adj* $R^2$ | *df1/2* | FChange | *p* | Significant |
|---|---|---|---|---|---|---|
| | .174 | .161 | 1/63 | 13.285 | .001 | S |

*Note*. Significant variables account for unique variance when controlling for all other variables in the model. Bonferroni correction would indicate that the *p* value would have to be equal or lower than .0083.
*$p<.05$. **$p<.01$.

Although NA programs use different tools for different evaluations, many are similar, as all NA schools have to meet the same COA standards for reaccreditation. This study's finding on the clinical instrument shows that many NA programs may be measuring only three clinical constructs (Table 46). This finding is consistent with a lack of clinical instrument validity among NA programs, and is a finding that needs to be followed up on. NA programs could learn from other clinical professional training programs such as physical therapy that use a national standardized clinical evaluation instrument.

Clinical evaluation findings statistically significant in positively predicting NCE scores include the ability to transfer didactic knowledge to the clinical setting ($p<.001$),

efficiency ($p<.027$), the ability to troubleshoot equipment ($p<.035$), and technical skills factor ($p<.050$). Nurse anesthesia educators may consider the feasibility of clinical instructional methods that are grounded in anesthesia-specific task analyses.

Cognitive task analysis has been used to train operators of complex systems to develop the cognitive and decision-making skills necessary to manage the chaos of complex environments (Kaempf, Klein, Thordsen, & Wolf, 1996; Perkins & Grotzer, 1997) such as the operating room environment. It may be that more closely evaluating these clinical criteria as the student progresses through the NA program will help in predicting the student's success on the NCE.

While there are four clinical variables predictive of NCE scores, an important applicable finding in this study is the predictive value of preadmission overall GPA of all four clinical factors: the ability to transfer didactic knowledge to the clinical setting ($p<.001$), efficiency ($p<.004$), the ability to troubleshoot equipment ($p<.020$), and technical skills factor ($p<.002$). The regression models for overall GPA predicting all four of these clinical variables were also statistically significant.

In combination with the earlier described finding of overall GPA being correlated with and predictive of NA GPA, which in turn is predictive of NCE scores, the statistically predictive value of overall GPA of these clinical variables and the models (the ability to transfer didactic knowledge to the clinical setting ($p=.017$), efficiency ($p=.033$), the ability to troubleshoot equipment ($p=.013$), and technical skills factor ($p=.008$) lends greater weight to the need to favor overall GPA as the predominant preadmission criteria to NA programs.

Table 46

*Factor Analysis on the Clinical Instrument with the Full Scale Score (Rotated Component Matrix)*

| Item | Technical Skills | Patient Focused Concepts | Resource Management |
|---|---|---|---|
| Pre/Post Assessment | .766 | .103 | .210 |
| Care Plan | .813 | .184 | .153 |
| Didactic Transference | .806 | .192 | .195 |
| Sound Clinical Judgment | .709 | .228 | .324 |
| Skill Mastery | .515 | .291 | .368 |
| Data Adjusted Care | .730 | .389 | .185 |
| Resource Person | .347 | .080 | .834 |
| Complication Response | .716 | .249 | .317 |
| Efficiency | .650 | .465 | .212 |
| Self Validation Critique | .342 | .716 | .228 |
| Communication | .288 | .721 | .201 |
| Patient Respect | .139 | .753 | .038 |
| Stress Management | .161 | .666 | .123 |
| Budget/Accreditation | .159 | .156 | .888 |
| Equipment | .401 | .345 | .571 |
| Standard Precautions | .421 | .376 | .416 |
| Peer Comparison | .768 | .434 | .229 |
| | Eigenvalue | | |
| Total Eigenvalue | 8.802 | 1.334 | 1.156 |
| % of Variance Explained | 32.080 | 18.640 | 15.710 |

## Limitations

Five limitations of this study can be acknowledged before proceeding to conclusions and recommendations. The first limitation of the study was the cross-sectional design. Although the data support changes in EI, as a cross-sectional design, my findings may not permit the conclusion that EI scores change over the 28 months of the program based on different participants, as they may have been different to begin with. Second, 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. The third limitation of this study is the possible inaccuracy of the cognitive data (GRE, overall GPA, and science GPA). A different individual at each school sent these data to me and were not collected by myself, so there may be discrepancies. The fourth limitation was that the GPA data could be confounded by the variability in undergraduate nursing education based on the nursing program each student attended. The fifth limitation was the variability in the number of years as an acute care nurse and type of acute care experience that may preclude generalizing study results. For example, the experience of nurses working in an acute care unit in a small rural community hospital may differ from the experience of nurses working in an acute care unit in a large metropolitan teaching hospital. For these reasons, limitations exist regarding analysis of the independent variables for the study.

## Conclusions and Recommendations

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, seven conclusions can be made about the study and data, and recommendations for both practice and research can be provided.

## Conclusions

1. I found 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.

2. The emotional intelligence profiles are 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, one type in particular, High Facial Reader/Low Emotional Manager, is consistently present in each group and year.

3. NA students who scored higher on the Facilitating Branch overall also scored higher on the NCE.

4. NA GPA is significantly correlated with and predictive of NCE scores, whereas overall GPA, science GPA, and GRE scores are not correlated with or predictive of the NA GPA.

5. Factor analysis of the 17-item clinical instrument demonstrated only three constructs were being measured. These constructs can be described as Technical Skills, Patient Focused Concepts, and Resource Management.

6. Clinical evaluation finding statistically significant in positively predicting NCE scores is the ability to transfer didactic knowledge to the clinical setting ($p<.001$, $r=.192$)

7. While overall GPA is not itself predictive of NCE scores, it is the only preadmission variable that correlates with and predicts NA GPA and the clinical variable

(the ability to transfer didactic knowledge to the clinical setting), both of which are predictive of NCE scores.

## Recommendations for Practice

The results of this study have practical implications for NA students and nurse anesthesia educators. The present study identified a preliminary need for nurse anesthesia leaders to examine emotional intelligence types of NA students, with possible future use of EI as admission criteria or inclusion of EI training in the NA curriculum. Identifying the best criteria for selection to nurse anesthetist programs based on evidence rather than using traditional variables demonstrates movement toward best practice in education beginning with the admission process.

Findings from the current research revealed that a significant relationship exists between the preadmission overall GPA and the student's current NA GPA. NA GPA is the only statistically significant cognitive predictor of NCE scores. A recommendation for NA students is to focus on both academic and clinical learning to be successful. This includes testing as well as application of the didactic knowledge to the clinical setting. Finally, as a noncognitive factor with potential use in the NA program admissions process, the present study established emotional profiles of nurse anesthesia students in the first semester, at the first year, and in the last semester of study.

Direct recommendations for practice resulting from this study include:

1. Retain the preadmission overall GPA as the primary criteria for selection to nurse anesthesia programs.

2. Revise the clinical instrument so that it is measuring more than three constructs. Test any new instrument with a factor analysis for validity purposes.

3. Consider using the EI Facilitating Branch score as an admission criterion. The EI facilitating branch contains the EI variables statistically significant in predicting NCE scores.

4. Consider eliminating the GRE as admission criteria for nurse anesthesia graduate programs. This may need to be based on the recommendation noted below for needed research on the new GRE scoring format.

5. Based on the literature review, consider employing noncognitive selection criteria such as EI in the admissions process.

## Recommendations for Research

My data could be used to guide research in several directions. This study found two EI types (Year 1, Group 1, Type 1 [Y2G1T1] and Year 3, Group 1, Type 3 [Y3G1T3]) show predictive value for clinical scores that are predictive of NCE scores. Further research could explain what they would do to use these two types related to clinicals. Further EI research is needed from a longitudinal perspective to see how EI changes from the beginning of a NA program to the end of an NA program. Pre-post research could be done to determine if EI training affects successful transition through the program, clinical success, and NCE scores.

Direct recommendations for research resulting from this study include:

1. Conduct research on the new GRE format in relation to academic and clinical NA student success.

2. Conduct further research on the emotional intelligence type that best predicts success on the NCE.

3. Conduct EI research on NA students starting at matriculation and determine correlations and predictability of students who attrition from the program.

4. Conduct research on EI scores of applicants not accepted to NA programs and compare the EI scores to those accepted.

5. Further research is needed to examine changes in NA student EI scores and profiles over the course of the program (longitudinal studies).

## Summary

Making appropriate admission decisions based on competitive application processes, in combination with the escalating cost of graduate education and the current economic crisis, efforts by educational leaders to minimize attrition remains pivotal (Andrews et al., 2006). Reese (2002) 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. (2007) also point out that a lack of cognitive factor predictive value suggests that noncognitive factors may play a role in predicting success.

This study explored EI as a way of profiling nurse anesthesia students to find patterns for potential movement within NA programs. Historically programs relied on cognitive data in determining admission to the NA program and I wanted to know if EI could help in understanding how NA students work in intensive NA programming.

I found that there were unique profiles for each NA student by year, with one EI profile consistent throughout. Several EI variables, clinical variable, and the NA GPA are predictive of NCE scores. The preadmission overall GPA, while not predictive of NCE scores, is predictive of the NCE-predicting EI variables, clinical variables, and the

NA GPA. Factor analysis of the 17-item clinical tool showed it was measuring only three items and needs revision.

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 emotional intelligence can be an important additive tool in the selection process. The current study represents new evidence to support both traditionally used cognitive data related to admissions; it also raised questions about the usefulness of EI as a strong non-cognitive measure. However, it did find that defining an EI type may be useful in understanding of success of students in different aspects of nurse anesthesia programs and on NCE scores.

The existence of possible profiles may be useful as a preliminary study of EI in NA students. This research begins a base of knowledge on EI in relation to nurse anesthesia students. Leaders and followers need both cognitive and emotional intelligence to be the most successful they can possibly be.

I started the paper with the question: "So what kinds of data may be missing from current admission criteria?" And the answer? The research reported above seems to suggest a clear answer: tests of emotional intelligence.

APPENDIX A

INFORMED CONSENT FORM

Andrews University

School of Education

## Informed Consent Form for Nurse Anesthesia Students

**Title:** THE EMOTIONAL INTELLIGENCE PROFILES AND COGNITIVE MEASURES OF NURSE ANESTHESIA STUDENTS IN THE SOUTHEASTERN UNITED STATES

**Purpose of Study:** The purpose of the proposed study will be to determine the predominant emotional intelligence profiles of nurse anesthesia students at four nurse anesthesia programs in the southeastern United States.

**Inclusion Criteria:** In order to participate, I recognize that I must be an adult 18 years or older, of sound mind, and must be a nurse anesthesia student in an accredited nurse anesthesia program.

**Procedures:** The participant agrees to grant researcher access to preadmission data, final program GPA, and National Certification Examination test scores. The participant will complete a nurse anesthesia data form, and complete a 30-minute online instrument.

**Risks and Discomforts:** There are no physical or emotional risks to my involvement in this study.

**Benefits/Results:** I accept that I have the possibility of being randomly selected to receive a choice of either $150 or an 8GB iPod Nano Multitouch for my participation, and that by participating, I will help the researcher arrive at a better understanding of how emotional intelligence influences nurse anesthesia student success.

**Voluntary Participation:** I understand that my involvement in this study is voluntary and that I may withdraw my participation at any time without any pressure, embarrassment, or negative impact on me. I also understand that my participation is confidential and that no other person other than the researcher will have access to my identifying data. Once all the scores have been matched, all identifying data will be removed. I understand the researcher will have access to my race, gender, years of acute care experience, GPA, GRE, and clinical evaluation scores.

**Contact Information:** In the event that I have any questions or concerns with regard to my participation in this research project, I understand that I may contact either the researcher, Shawn Collins at shawncollins@wcu.edu or at 828-230-8515, or his advisor, Dr. Duane Covrig, professor in Leadership at covrig@andrews.edu (269-471-3475). I may retain this email for my own records.

**Participant Agreement:** I am competent and sign this informed consent document understanding that I will not share information with other parties who are not part of the study.

Sincerely,

Shawn Collins, DNP, CRNA

Participant's Name and Signature _____ Date _____

APPENDIX B

CLINICAL EVALUATION TOOL

# Clinical Evaluation Tool

## I. Patient Assessment and Anesthetic Plan

1. Consistently performs a thorough pre-operative and post-operative evaluation on each patient as appropriate

| Above Expectations | Meets Expectations | Below Expectations | Failing |
|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ |

2. Synthesizes a comprehensive care plan for patients in all ASA physical status categories

| Above Expectations | Meets Expectations | Below Expectations | Failing |
|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ |

## II. Didactic Transference to Clinical Practice

1. Consistently utilizes critical thinking skills in applying didactic knowledge to clinical cases

| Above Expectations | Meets Expectations | Below Expectations | Failing |
|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ |

## III. Perianesthetic Management

1. Uses sound clinical judgment when managing routine, advanced, and emergency cases

| Above Expectations | Meets Expectations | Below Expectations | Failing |
|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ |

2. Readily achieves mastery of new skills and procedures

| Above Expectations | Meets Expectations | Below Expectations | Failing |
|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ |

3. Synthesizes perioperative data to make safe adjustments in care

| Above Expectations | Meets Expectations | Below Expectations | Failing |
|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ |

4. Serves as a resource person for airway and ventilatory management of patients

| Above Expectations | Meets Expectations | Below Expectations | Failing |
|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ |

5. Recognizes and appropriately responds to complications that occur in the perioperative period

| Above Expectations | Meets Expectations | Below Expectations | Failing |
|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ |

## IV. Communication Skills/Professional Role

1. Demonstrates efficiency

| Above Expectations | Meets Expectations | Below Expectations | Failing |
|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ |

2. Validates and critiques own performance

| Above Expectations | Meets Expectations | Below Expectations | Failing |
|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ |

3. Independently communicates with all anesthesia, operating room, and surgical personnel

| Above Expectations | Meets Expectations | Below Expectations | Failing |
|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ |

4. Treats patients respectfully

| Above Expectations | Meets Expectations | Below Expectations | Failing |
|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ |

5. Stress management is appropriate

| Above Expectations | Meets Expectations | Below Expectations | Failing |
|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ |

## V. Care and Preparation of Equipment

1. Works within the budgetary and accreditation goals of the O.R./Anesthesia department

| Above Expectations | Meets Expectations | Below Expectations | Failing |
|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ |

2. Identifies and takes appropriate action when confronted with equipment related malfunctions

| Above Expectations | Meets Expectations | Below Expectations | Failing |
|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ |

3. Follows standard precautions for safety and infection control

| Above Expectations | Meets Expectations | Below Expectations | Failing |
|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ |

## VI. Overall evaluation in comparison to peers

| Exceptional | Above Expectations | Average | Below Expectations |
|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ |

APPENDIX C

MSCEIT PARTICIPANT DIRECTIONS

**DIRECTIONS**

Program XXX 1st Year Class of 2013

Go to https://www.mhsassessments.com

Code: 9670-001-301

Password: srna1

# APPENDIX D

## DESCRIPTION OF Q-FACTOR ANALYSIS DATA ENTRY PROCEDURES

In order to perform a Q-factor analysis, data must be placed into a two-dimensional matrix with the row representing the score of a given participant and the column representing the variables being measured. For this study, the emotional intelligence scores needed to be grouped on the matrix between -5 and +5. To do this ranges of scores were assigned a matrix number as follows, with each task, branch, area, and overall score assigned a statement number:

46-55 = -5

56-65 = -4

66-75 = -3

76-85 = -2

86-95 = -1

96-105 = 0

106-115 = 1

116-125 = 2

126-135 = 3

136-145 = 4

146-155 = 5

Each participant had a created matrix. The question number corresponding to the assigned scale score was used to create the matrix. For example, participant 4 of Year 1 Group one had a matrix that looked like this:

| -5 | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 4 | 3 | 10 | 2 | 1 | |
| | | | | | 8 | 5 | 15 | 9 | | |
| | | | | | 12 | 6 | | 13 | | |
| | | | | | | 7 | | | | |
| | | | | | | 11 | | | | |
| | | | | | | 14 | | | | |

| Item # | | Person 4 |
|---|---|---|
| 1 | Faces Task | 4 |
| 2 | Facilitation Task | 3 |
| 3 | Changes Task | 1 |
| 4 | Emotion Manage Task | 0 |
| 5 | Pictures Task | 1 |
| 6 | Sensations Task | 1 |
| 7 | Blends Task | 1 |
| 8 | Social Manage Task | 0 |
| 9 | EI Perc | 3 |
| 10 | EI Facilit | 2 |
| 11 | EI Understand | 1 |
| 12 | EI Managing | 0 |
| 13 | EI ExpArea | 3 |
| 14 | EI ReasArea | 1 |
| 15 | EI Overall | 2 |

With the information classified in this way, a two-mode factor analysis could be performed. The Q-factor analysis was performed using a free program called PQMethod. Each person's matrix distribution was entered one at a time by hand. Because the software is DOS based it doesn't understand Excel spreadsheets. Data had to be entered in the format such that, once the software is told how the distribution is set (-5 to 5) and the number of boxes under each number (1 1 1 1 2 3 2 1 1 1 1), the researcher entered the statement numbers for each of the number for the range (e.g. there would be nothing entered for -5 because there were no statements that were placed there… etc).

In each case Principal Components (PCA) and Varimax rotation was used. Autoflagging was used in PQMethod's PQRotate but then the researcher changed

flagging based upon inspection (e.g. if the autoflag flagged person 3 for factor 3 because it had a loading of 0.71 but there was 0.46 loading on factor 1 I unflagged that person so that they weren't represented by either factor. The autoflagging is just a ballpark kind of algorithm and sometimes it overlooks what we might call dirty loadings.

Finally, after selecting the relevant factors and 'flagging' the entries that define the factors, the analysis step produces an extensive report with a variety of tables on factor loadings, statement factor scores, discriminating statements for each of the factors as well as consensus statements across factors.

APPENDIX E

DEMOGRAPHIC FORM

Andrews University

School of Education

**Demographic Form for Nurse Anesthesia Students**

**Title:** THE EMOTIONAL INTELLIGENCES AND COGNITIVE MEASURES OF NURSE ANESTHESIA STUDENTS IN THE SOUTHEASTERN UNITED STATES

**Name:** _____

**Email:** _____

**Anesthesia Program Attending:** _____

**Age:** _____

**Gender:** **Male** _____ **Female**_____

**Ethnicity:** _____

**Time in program:** _____**<6 months** _____**12-18months** _____**Last semester**

APPENDIX F

INDEPENDENT VARIABLE FORM

EI Dissertation Data Form

| Name | OGPA | SGPA | GRE Q/V/A | # Years Acute Care | NA GPA | NCE |
|---|---|---|---|---|---|---|
| **3rd Year** | | | | | | |
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| **1st year** | | | | | | |
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# APPENDIX G

## APPENDIX OF Q-TYPOLOGIES

Table 47

*Descending Array of Differences Between Types 1 and 2 – Year One Group 1*

| Statement | Type 1 | Type 2 | Difference |
|---|---|---|---|
| Blends Task | 0.144 | -1.893 | 2.037 |
| EI Understanding Branch | 0.194 | -1.608 | 1.802 |
| Changes Task | -.008 | -1.743 | 1.663 |
| Faces Task | 2.960 | 1.303 | 1.657 |
| EI Perceiving Branch | 0.942 | 0.550 | 0.393 |
| EI Overall | 0.505 | 0.607 | -0.103 |
| EI Reasoning Area | -0.137 | 0.071 | -0.208 |
| Sensations Task | -0.973 | -0.561 | -0.412 |
| Pictures Task | -0.550 | -0.049 | -0.501 |
| EI Experiencing Area | 0.284 | 0.928 | -0.644 |
| Social Manage Task | -0.280 | 0.384 | -0.664 |
| Facilitation Task | -0.333 | 0.703 | -1.036 |
| EI Managing Branch | -0.659 | 0.440 | -1.100 |
| Emotion Manage Task | -1.112 | 0.315 | -1.428 |
| EI Facilitating Branch | -0.905 | 0.552 | -1.457 |

Table 48

*Descending Array of Differences Between Types 1 and 3 – Year One Group 1*

| Statement | Type 1 | Type 3 | Difference |
|---|---|---|---|
| Faces Task | 2.960 | 0.240 | 2.720 |
| Facilitation Task | -0.333 | -1.889 | 1.556 |
| EI Overall | 0.505 | -0.402 | 0.907 |
| EI Experiencing Area | 0.284 | -0.503 | 0.787 |
| EI Facilitating Branch | -0.905 | -1.678 | 0.773 |
| EI Understanding Branch | 0.194 | -0.346 | 0.540 |
| Blends Task | 0.144 | -0.317 | 0.462 |
| EI Perceiving Branch | 0.942 | 0.580 | 0.362 |
| EI Reasoning Area | -0.137 | 0.121 | -0.258 |
| Sensations Task | -0.973 | -0.549 | -0.424 |
| Social Manage Task | -0.280 | 0.200 | -0.480 |
| Changes Task | -0.080 | 0.570 | -0.650 |
| EI Managing Branch | -0.659 | 0.681 | -1.340 |
| Pictures Task | -0.550 | 1.755 | -2.305 |
| Emotion Manage Task | -1.112 | 1.536 | -2.649 |

Table 49

*Descending Array of Differences Between Types 2 and 3 – Year One Group 1*

| Statement | Type 2 | Type 3 | Difference |
|---|---|---|---|
| Facilitation Task | 0.703 | -1.889 | 2.592 |
| EI Facilitating Branch | 0.552 | -1.678 | 2.230 |
| EI Experiencing Area | 0.928 | -0.503 | 1.431 |
| Faces Task | 1.303 | 0.240 | 1.063 |
| EI Overall | 0.607 | -0.402 | 1.010 |
| Social Manage Task | 0.384 | 0.200 | 0.184 |
| Sensations Task | -0.561 | -0.549 | -0.012 |
| EI Perceiving Branch | 0.550 | 0.580 | -0.030 |
| EI Reasoning Area | 0.071 | 0.121 | -0.050 |
| EI Managing Branch | 0.440 | 0.681 | -0.240 |
| Emotion Manage Task | 0.315 | 1.536 | -1.221 |
| EI Understanding Branch | -1.608 | -0.346 | -1.262 |
| Blends Task | -1.893 | -0.317 | -1.575 |
| Pictures Task | -0.049 | 1.755 | -1.804 |
| Changes Task | -1.743 | 0.570 | -2.313 |

Table 50

*Distinguishing Statements for Type 1 - Year 1 Group 1*

| Statement | Type 1 Z-Scores (Rank) | Type 2 Z-Scores (Rank) | Type 3 Z-Scores (Rank) |
|---|---|---|---|
| Faces Task | 2.960 (1)* | 1.303 (1) | 0.240 (6) |
| EI Experiencing Area | 0.284 (4)* | 0.928 (2) | -0.503 (12) |
| EI Understanding Branch | 0.194 (5) | -1.608 (13) | -0.346 (10) |
| Changes Task | -0.080 (7) | -1.743 (14) | 0.570 (5) |
| Facilitation Task | -0.333 (10)* | 0.703 (3) | -1.889 (15) |
| Pictures Task | -0.550 (11) | -0.049 (11) | 1.755 (1) |
| EI Managing Branch | -0.659 (12)* | 0.440 (7) | 0.681 (3) |
| EI Facilitating Branch | -0.905 (13)* | 0.552 (5) | -1.678 (14) |
| Emotion Manage Task | -1.112 (15)* | 0.315 (9) | 1.536 (2) |

$p<.05$.
*Indicates significance at $p<.01$.

Table 51

*Distinguishing Statements for Type 2 - Year 1 Group 1*

| Statement | Type 1 Z-Scores (Rank) | Type 2 Z-Scores (Rank) | Type 3 Z-Scores (Rank) |
|---|---|---|---|
| Faces Task | 2.960 (1) | 1.303 (1)* | 0.240 (6) |
| EI Experiencing Area | 0.284 (4) | 0.928 (2)* | -0.503 (12) |
| Facilitation Task | -0.333 (10) | 0.703 (3)* | -1.889 (15) |
| EI Facilitating Branch | -0.905 (13) | 0.552 (5)* | -1.678 (14) |
| Emotion Manage Task | -1.112 (15) | 0.315 (9)* | 1.536 (2) |
| Pictures Task | -0.550 (11) | -0.049 (11) | 1.755 (1) |
| EI Understanding Branch | 0.194 (5) | -1.608 (13)* | -0.346 (10) |
| Changes Task | -0.080 (7) | -1.743 (14)* | 0.570 (5) |
| Blends Task | 0.144 (6) | -1.893 (15)* | -0.317 (9) |

$p<.05$.
*Indicates significance at $p<.01$.

Table 52

*Distinguishing Statements for Type 3 - Year 1 Group 1*

| Statement | Type 1 Z-Scores (Rank) | Type 2 Z-Scores (Rank) | Type 3 Z-Scores (Rank) |
|---|---|---|---|
| Pictures Task | -0.550 (11) | -0.049 (11) | 1.755 (1)* |
| Emotion Manage Task | -1.112 (15) | 0.315 (9) | 1.536 (2)* |
| Changes Task | -0.080 (7) | -1.743 (14) | 0.570 (5) |
| Faces Task | 2.960 (1) | 1.303 (1) | 0.240 (6)* |
| EI Understanding Branch | 0.194 (5) | -1.608 (13) | -0.346 (10) |
| EI Overall | 0.505 (3) | 0.607 (4) | -0.402 (11)* |
| EI Experiencing Area | 0.284 (4) | 0.928 (2) | -0.503 (12)* |
| EI Facilitating Branch | -0.905 (13) | 0.552 (5) | -1.678 (14)* |
| Facilitation Task | -0.333 (10) | 0.703 (3) | -1.889 (15)* |

$p<.05$.
*Indicates significance at $p<.01$.

Table 53

*Descending Array of Differences Between Types 1 and 2 – Year 1 Group 2*

| Statement | Type 1 | Type 2 | Difference |
|---|---|---|---|
| Facilitation Task | 0.568 | -1.978 | 2.546 |
| EI Facilitating Branch | 0.947 | -1.102 | 2.048 |
| EI Experiencing Area | 1.496 | -0.116 | 1.612 |
| Faces Task | 1.573 | 0.923 | 0.650 |
| Blends Task | -1.165 | -1.720 | 0.556 |
| EI Overall | 0.699 | 0.270 | 0.429 |
| EI Perceiving Branch | 1.242 | 0.816 | 0.426 |
| Sensations Task | -0.244 | -0.167 | -0.077 |
| EI Understanding Branch | -1.143 | -0.928 | -0.215 |
| Pictures Task | -0.263 | 0.435 | -0.698 |
| EI Reasoning Area | -0.840 | 0.358 | -1.197 |
| Emotion Manage Task | -0.260 | 0.944 | -1.204 |
| Changes Task | -1.219 | 0.211 | -1.430 |
| Social Manage Task | -0.795 | 0.858 | -1.653 |
| EI Managing Branch | -0.596 | 1.196 | -1.793 |

Table 54

*Descending Array of Differences Between Types 1 and 3 – Year 1 Group 2*

| Statement | Type 1 | Type 3 | Difference |
|---|---|---|---|
| Faces Task | 1.573 | -1.862 | 3.435 |
| EI Perceiving Branch | 1.242 | -0.597 | 1.838 |
| EI Experiencing Area | 1.496 | -0.150 | 1.646 |
| EI Overall | 0.699 | -0.339 | 1.038 |
| EI Facilitating Branch | 0.947 | 0.502 | 0.445 |
| Facilitation Task | 0.568 | 0.124 | 0.444 |
| Blends Task | -1.165 | -1.296 | 0.131 |
| EI Understanding Branch | -1.143 | -1.120 | -0.023 |
| EI Reasoning Area | -0.840 | -0.298 | -0.541 |
| Changes Task | -1.219 | -0.458 | -0.762 |
| Pictures Task | -0.263 | 0.839 | -1.102 |
| Sensations Task | -0.244 | 0.963 | -1.208 |
| Social Manage Task | -0.795 | 0.756 | -1.551 |
| Emotion Manage Task | -0.260 | 1.585 | -1.845 |
| EI Managing Branch | -0.596 | 1.351 | -1.947 |

Table 55

*Descending Array of Differences Between Types 2 and 3 – Year 1 Group 2*

| Statement | Type 2 | Type 3 | Difference |
|---|---|---|---|
| Faces Task | 0.923 | -1.862 | 2.785 |
| EI Perceiving Branch | 0.816 | -0.597 | 1.412 |
| Changes Task | 0.211 | -0.458 | 0.669 |
| EI Reasoning Area | 0.358 | -0.298 | 0.656 |
| EI Overall | 0.270 | -0.339 | 0.610 |
| EI Understanding Branch | -0.928 | -1.120 | 0.192 |
| Social Manage Task | 0.858 | 0.756 | 0.102 |
| EI Experiencing Area | -0.116 | -0.150 | 0.034 |
| EI Managing Branch | 1.196 | 1.351 | -0.155 |
| Pictures Task | 0.435 | 0.839 | -0.404 |
| Blends Task | -1.720 | -1.296 | -0.424 |
| Emotion Manage Task | 0.944 | 1.585 | -0.640 |
| Sensations Task | -0.167 | 0.963 | -1.131 |
| EI Facilitating Branch | -1.102 | 0.502 | -1.603 |
| Facilitation Task | -1.978 | 0.124 | -2.103 |

Table 56

*Distinguishing Statements for Type 1 - Year 1 Group 2*

| Statement | Type 1 Z-Scores | Type 2 Z-Scores | Type 3 Z-Scores |
|---|---|---|---|
| Faces Task | 1.573* | 0.923 | -1.862 |
| EIExpArea | 1.496* | -0.116 | -0.150 |
| Emotion Manage Task | -0.260* | 0.944 | 1.585 |
| Pictures Task | -0.263* | 0.435 | 0.839 |
| EI Managing Branch | -0.596* | 1.196 | 1.351 |
| Social Manage Task | -0.795* | 0.858 | 0.756 |
| EI Reasoning Area | -0.840 | 0.358 | -0.298 |
| Changes Task | -1.219* | 0.211 | -0.458 |

$p<.05$.
*Indicates significance at $p<.01$.

Table 57

*Distinguishing Statements for Factor 2 - Year 1 Group 2*

| Statement | Type 1 Z-Scores (Rank) | Type 2 Z-Scores (Rank) | Type 3 Z-Scores (Rank) |
|---|---|---|---|
| Emotion Manage Task | -0.260 | 0.944 | 1.585 |
| Faces Task | 1.573 | 0.923* | -1.862 |
| EI Reasoning Area | -0.840 | 0.358 | -0.298 |
| Changes Task | -1.219 | 0.211 | -0.458 |
| EI Facilitating Branch | 0.947 | -1.102* | 0.502 |
| Facilitation Task | 0.568 | -1.978* | 0.124 |

$p<.05$.
*Indicates significance at $p<.01$.

Table 58

*Distinguishing Statements for Factor 3 - Year 1 Group 2*

| Statement | Type 1 Z-Scores (Rank) | Type 2 Z-Scores (Rank) | Type 3 Z-Scores (Rank) |
|---|---|---|---|
| Emotion Manage Task | -0.260 | 0.944 | 1.585 |
| Sensations Task | -0.244 | -0.167 | 0.963* |
| EI Reasoning Area | -0.840 | 0.358 | -0.298 |
| EI Overall | 0.699 | 0.270 | -0.339 |
| Changes Task | -1.219 | 0.211 | -0.458 |
| EI Perceiving Branch | 1.242 | 0.816 | -0.597* |
| Faces Task | 1.573 | 0.923 | -1.862* |

$p<.05$.
*Indicates significance at $p<.01$.

Table 59

*Descending Array of Differences Between Factors 1 and 2 – Year 2 Group 1*

| Statement | Type 1 | Type 2 | Difference |
|---|---|---|---|
| Faces Task | 0.541 | -0.277 | 2.818 |
| Facilitation Task | 0.016 | -1.730 | 1.746 |
| EI Experiencing Area | 0.717 | -0.992 | 1.709 |
| EI Facilitating Branch | -0.243 | -1.827 | 1.584 |
| EI Perceiving Branch | 1.518 | 0.380 | 1.138 |
| Sensations Task | -0.462 | -1.115 | 0.653 |
| EI Overall | 0.127 | 0.084 | 0.043 |
| Emotion Manage Task | 0.360 | 1.232 | -0.872 |
| EI Reasoning Area | -0.625 | 0.379 | -1.004 |
| Pictures Task | 0.203 | 1.244 | -1.041 |
| Social Manage Task | -0.729 | 0.356 | -1.086 |
| EI Managing Branch | -0.352 | 0.791 | -1.142 |
| EI Understanding Branch | -1.107 | 0.206 | -1.313 |
| Changes Task | -1.166 | 0.183 | -1.349 |
| Blends Task | -0.798 | 1.086 | -1.884 |

Table 60

*Descending Array of Differences Between Factors 1 and 3 – Year 2 Group 1*

| Statement | Type 1 | Type 2 | Difference |
|---|---|---|---|
| Faces Task | 2.541 | -1.903 | 4.443 |
| EI Perceiving Branch | 1.518 | -0.957 | 2.474 |
| EI Experiencing Area | 0.717 | -0.377 | 1.094 |
| EI Understanding Branch | -1.107 | -1.215 | 0.108 |
| EI Overall | 0.127 | 0.020 | 0.107 |
| Changes Task | -1.166 | -1.124 | -0.042 |
| Pictures Task | 0.203 | 0.461 | -0.259 |
| Blends Task | -0.798 | -0.352 | -0.446 |
| Sensations Task | -0.462 | 0.030 | -0.492 |
| EI Reasoning Area | -0.625 | 0.020 | -0.645 |
| EI Facilitating Branch | -0.243 | 0.518 | -0.761 |
| Emotion Manage Task | 0.360 | 1.149 | -0.789 |
| Facilitation Task | 0.016 | 1.180 | -1.165 |
| EI Managing Branch | -0.352 | 1.373 | -1.725 |
| Social Manage Task | -0.729 | 1.174 | -1.903 |

Table 61

*Descending Array of Differences Between Factor 2 and 3 – Year 2 Group 1*

| Statement | Type 1 | Type 2 | Difference |
|---|---|---|---|
| Faces Task | -0.277 | -1.903 | 1.625 |
| Blends Task | 1.086 | -0.352 | 1.438 |
| EI Understanding Branch | 0.206 | -1.215 | 1.421 |
| EI Perceiving Branch | 0.380 | -0.957 | 1.336 |
| Changes Task | 0.183 | -1.124 | 1.307 |
| Pictures Task | 1.244 | 0.461 | 0.783 |
| EI Reasoning Area | 0.379 | 0.020 | 0.359 |
| Emotion Manage Task | 1.232 | 1.149 | 0.082 |
| EI Overall | 0.084 | 0.020 | 0.064 |
| EI Managing Branch | 0.791 | 1.373 | -0.582 |
| EI Experiencing Area | -0.992 | -0.377 | -0.615 |
| Social Manage Task | 0.356 | 1.174 | -0.817 |
| Sensations Task | -1.115 | 0.030 | -1.144 |
| EI Facilitating Branch | -1.827 | 0.518 | -2.346 |
| Facilitation Task | -1.730 | 1.180 | -2.910 |

Table 62

*Distinguishing Statements for Factor 1 - Year 2 Group 1*

| Statement | Type 1 Z-Scores | Type 2 Z-Scores | Type 3 Z-Scores |
|---|---|---|---|
| Faces Task | 2.54* | -0.28 | -1.90 |
| EI Perceiving Branch | 1.52* | 0.38 | -0.96 |
| EI Experiencing Area | 0.72* | -0.99 | -0.38 |
| Emotion Manage Task | 0.36* | 1.23 | 1.15 |
| Facilitation Task | 0.02* | -1.73 | 1.18 |
| EI Facilitating Branch | -0.24* | -1.83 | 0.52 |
| EI Managing Branch | -0.35* | 0.79 | 1.37 |
| EI Reasoning Area | -0.63 | 0.38 | 0.02 |
| Social Manage Task | -0.73* | 0.36 | 1.17 |

$p<.05$.
*Indicates significance at $p<.01$.

Table 63

*Distinguishing Statements for Factor 2 - Year 2 Group 1*

| Statement | Type 1 Z-Scores | Type 2 Z-Scores | Type 3 Z-Scores |
|---|---|---|---|
| Pictures Task | 0.20 | 1.24* | 0.46 |
| Blends Task | -0.80 | 1.09* | -0.35 |
| EI Managing Branch | -0.35 | 0.79 | 1.37 |
| EI Perceiving Branch | 1.52 | 0.38* | -0.96 |
| Social Manage Task | -0.73 | 0.36* | 1.17 |
| EI Understanding Branch | -1.11 | 0.21* | -1.21 |
| Changes Task | -1.17 | 0.18* | -1.12 |
| Faces Task | 2.54 | -0.28* | -1.90 |
| EI Experiencing Area | 0.72 | -0.99 | -0.38 |
| Sensations Task | -0.46 | -1.11* | 0.03 |
| Facilitation Task | 0.02 | -1.73* | 1.18 |
| EI Facilitating Branch | -0.24 | -1.83* | 0.52 |

$p<.05$.
*Indicates significance at $p<.01$.

Table 64

*Distinguishing Statements for Factor 3 - Year 2 Group 1*

| Statement | Type 1 Z-Scores | Type 2 Z-Scores | Type 3 Z-Scores |
|---|---|---|---|
| EI Managing Branch | -0.35 | 0.79 | 1.37 |
| Facilitation Task | 0.02 | -1.73 | 1.18* |
| Social Manage Task | -0.73 | 0.36 | 1.17* |
| EI Facilitating Branch | -0.24 | -1.83 | 0.52* |
| EI Experiencing Area | 0.72 | -0.99 | -0.38 |
| EI Perceiving Branch | 1.52 | 0.38 | -0.96* |
| Faces Task | 2.54 | -0.28 | -1.90* |

$p<.05$.
*Indicates significance at $p<.01$.

Table 65

*Descending Array of Differences Between Factors 1 and 2 – Year 2 Group 2*

| Statement | Type 1 | Type 2 | Difference |
|---|---|---|---|
| EI Managing Branch | 1.555 | -0.813 | 2.368 |
| Social Manage Task | 1.371 | -0.813 | 2.184 |
| Emotion Manage Task | 1.499 | -0.374 | 1.873 |
| Sensations Task | 0.613 | -0.586 | 1.199 |
| EI Reasoning Area | 0.171 | -0.538 | 0.709 |
| EI Facilitating Branch | 0.364 | -0.071 | 0.434 |
| Changes Task | -1.113 | -1.156 | 0.044 |
| EI Overall | 0.171 | 0.437 | -0.266 |
| EI Understanding Branch | -1.452 | -0.842 | -0.610 |
| Blends Task | -1.332 | -0.519 | -0.813 |
| EI Experiencing Area | 0.088 | 0.990 | -0.902 |
| Facilitation Task | -0.920 | 0.132 | -1.051 |
| Pictures Task | -0.954 | 0.176 | -1.129 |
| EI Perceiving Branch | -0.067 | 1.507 | -1.574 |
| Faces Task | 0.005 | 2.469 | -2.464 |

Table 66

*Descending Array of Differences Between Factors 1 and 3 – Year 2 Group 2*

| Statement | Type 1 | Type 2 | Difference |
|---|---|---|---|
| Social Manage Task | 1.371 | -0.871 | 2.242 |
| EI Managing Branch | 1.555 | -0.521 | 2.076 |
| Emotion Manage Task | 1.499 | 0.585 | 0.914 |
| EI Reasoning Area | 0.171 | -0.665 | 0.836 |
| Faces Task | 0.005 | -0.718 | 0.723 |
| EI Overall | 0.171 | -0.412 | 0.582 |
| EI Perceiving Branch | -0.067 | -0.367 | 0.300 |
| Changes Task | -1.113 | -1.128 | 0.015 |
| Sensations Task | 0.613 | 0.639 | -0.026 |
| EI Understanding Branch | -1.452 | -0.947 | -0.505 |
| Blends Task | -1.332 | -0.818 | -0.514 |
| EI Experiencing Area | 0.088 | 0.724 | -0.636 |
| EI Facilitating Branch | 0.364 | 1.727 | -1.363 |
| Pictures Task | -0.954 | 0.762 | -1.715 |
| Facilitation Task | -0.920 | 2.008 | -2.928 |

Table 67

*Descending Array of Differences Between Factors 2 and 3 – Year 2 Group 2*

| Statement | Type 1 | Type 2 | Difference |
|---|---|---|---|
| Faces Task | 2.469 | -0.718 | 3.187 |
| EI Perceiving Branch | 1.507 | -0.367 | 1.874 |
| EI Overall | 0.437 | -0.412 | 0.848 |
| Blends Task | -0.519 | -0.818 | 0.299 |
| EI Experiencing Area | 0.990 | 0.724 | 0.266 |
| EI Reasoning Area | -0.538 | -0.665 | 0.127 |
| EI Understanding Branch | -0.842 | -0.947 | 0.105 |
| Social Manage Task | -0.813 | -0.871 | 0.058 |
| Changes Task | -1.156 | -1.128 | -0.029 |
| EI Managing Branch | -0.813 | -0.521 | -0.292 |
| Pictures Task | 0.176 | 0.762 | -0.586 |
| Emotion Manage Task | -0.374 | 0.585 | -0.959 |
| Sensations Task | -0.586 | 0.639 | -1.225 |
| EI Facilitating Branch | -0.071 | 1.727 | -1.797 |
| Facilitation Task | 0.132 | 2.008 | -1.877 |

Table 68

*Distinguishing Statements for Factor 1 - Year 2 Group 2*

| Statement | Type 1 Z-Scores | Type 2 Z-Scores | Type 3 Z-Scores |
|---|---|---|---|
| EI Managing Branch | 1.56* | -0.81 | -0.52 |
| Emotion Manage Task | 1.50* | -0.37 | 0.59 |
| Social Manage Task | 1.37* | -0.81 | -0.87 |
| EI Reasoning Area | 0.17* | -0.54 | -0.66 |
| EI Experiencing Area | 0.09 | 0.99 | 0.72 |
| Faces Task | 0.00* | 2.47 | -0.72 |
| Facilitation Task | -0.92* | 0.13 | 2.01 |
| Pictures Task | -0.95* | 0.18 | 0.76 |

$p<.05$.
*Indicates significance at $p<.01$

Table 69

*Distinguishing Statements for Factor 2 - Year 2 Group 2*

| Statement | Type 1 Z-Scores | Type 2 Z-Scores | Type 3 Z-Scores |
|---|---|---|---|
| Faces Task | 0.00 | 2.47* | -0.72 |
| EI Perceiving Branch | -0.07 | 1.51* | -0.37 |
| Pictures Task | -0.95 | 0.18 | 0.76 |
| Facilitation Task | -0.92 | 0.13* | 2.01 |
| Emotion Manage Task | 1.50 | -0.37* | 0.59 |
| Sensations Task | 0.61 | -0.59* | 0.64 |

$p<.05$.
*Indicates significance at $p<.01$.

Table 70

*Distinguishing statements for Factor 3 - Year 2 Group 2*

| Statement | Type 1 Z-Scores | Type 2 Z-Scores | Type 3 Z-Scores |
|---|---|---|---|
| Facilitation Task | -0.92 | 0.13 | 2.01* |
| EI Facilitating Branch | 0.36 | -0.07 | 1.73* |
| Pictures Task | -0.95 | 0.18 | 0.76 |
| Emotion Manage Task | 1.50 | -0.37 | 0.59* |
| EI Overall | 0.17 | 0.44 | -0.41 |
| Faces Task | 0.00 | 2.47 | -0.72* |

$p<.05$.
*Indicates significance at $p<.01$.

Table 71

*Descending Array of Differences Between Factors 1 and 2 – Year 3 Group 1*

| Statement | Type 1 | Type 2 | Difference |
|---|---|---|---|
| Emotion Manage Task | 0.513 | -1.139 | 1.653 |
| EI Managing Branch | 0.884 | -0.729 | 1.612 |
| Changes Task | 1.325 | -0.162 | 1.487 |
| EI Reasoning Area | 1.119 | -0.250 | 1.369 |
| Social Manage Task | 0.957 | -0.300 | 1.257 |
| Sensations Task | -0.206 | -1.209 | 1.003 |
| Blends Task | 0.784 | -0.148 | 0.932 |
| EI Understanding Branch | 0.898 | -0.002 | 0.900 |
| Pictures Task | -0.478 | -0.324 | -0.154 |
| EI Overall | -0.028 | 0.529 | -0.557 |
| EI Facilitating Branch | -1.256 | -0.652 | -0.604 |
| Facilitation Task | -1.760 | -0.090 | -1.670 |
| EI Experiencing Area | -1.224 | 0.482 | -1.706 |
| EI Perceiving Branch | -0.785 | 1.138 | -1.923 |
| Faces Task | -0.742 | 2.857 | -3.599 |

Table 72

*Descending Array of Differences Between Factors 1 and 3 – Year 3 Group 1*

| Statement | Type 1 | Type 2 | Difference |
|---|---|---|---|
| Social Manage Task | 0.957 | -0.497 | 1.454 |
| Sensations Task | -0.206 | -1.600 | 1.394 |
| EI Managing Branch | 0.884 | -0.209 | 1.093 |
| EI Overall | -0.028 | -0.443 | 0.415 |
| Pictures Task | -0.478 | -0.792 | 0.315 |
| Emotion Manage Task | 0.513 | 0.260 | 0.253 |
| EI Reasoning Area | 1.119 | 0.886 | 0.233 |
| Changes Task | 1.325 | 1.118 | 0.207 |
| Faces Task | -0.742 | -0.791 | 0.049 |
| EI Perceiving Branch | -0.785 | -0.791 | 0.006 |
| EI Experiencing Area | -1.224 | -0.851 | -0.372 |
| EI Understanding Branch | 0.898 | 1.631 | -0.733 |
| Blends Task | 0.784 | 1.579 | -0.795 |
| EI Facilitating Branch | -1.256 | -0.445 | -0.812 |
| Facilitation Task | -1.760 | 0.946 | -2.706 |

Table 73

*Descending Array of Differences Between Factors 2 and 3 – Year 3 Group 1*

| Statement | Type 1 | Type 2 | Difference |
|---|---|---|---|
| Faces Task | 2.857 | -0.791 | 3.648 |
| EI Perceiving Branch | 1.138 | -0.791 | 1.929 |
| EI Experiencing Area | 0.482 | -0.851 | 1.334 |
| EI Overall | 0.529 | -0.443 | 0.972 |
| Pictures Task | -0.324 | -0.792 | 0.469 |
| Sensations Task | -1.209 | -1.600 | 0.391 |
| Social Manage Task | -0.300 | -0.497 | 0.197 |
| EI Facilitating Branch | -0.652 | -0.445 | -0.208 |
| EI Managing Branch | -0.729 | -0.209 | -0.519 |
| Facilitation Task | -0.090 | 0.946 | -1.037 |
| EI Reasoning Area | -0.250 | 0.886 | -1.136 |
| Changes Task | -0.162 | 1.118 | -1.280 |
| Emotion Manage Task | -1.139 | 0.260 | -1.399 |
| EI Understanding Branch | -0.002 | 1.631 | -1.633 |
| Blends Task | -0.148 | 1.579 | -1.727 |

Table 74

*Distinguishing Statements for Factor 1 - Year 3 Group 1*

| Statement | Type 1 Z-Scores | Type 2 Z-Scores | Type 3 Z-Scores |
|---|---|---|---|
| Social Manage Task | 0.96* | -0.30 | -0.50 |
| EI Understanding Branch | 0.90* | 0.00 | 1.63 |
| EI Managing Branch | 0.88* | -0.73 | -0.21 |
| Blends Task | 0.78* | -0.15 | 1.58 |
| Sensations Task | -0.21* | -1.21 | -1.60 |
| EI Facilitating Branch | -1.26 | -0.65 | -0.44 |
| Facilitation Task | -1.76* | -0.09 | 0.95 |

$p<.05$.
*Indicates significance at $p<.01$.

Table 75

*Distinguishing Statements for Factor 2 - Year 3 Group 1*

| Statement | Type 1 Z-Scores | Type 2 Z-Scores | Type 3 Z-Scores |
|---|---|---|---|
| Faces Task | -0.74 | 2.86* | -0.79 |
| EI Perceiving Branch | -0.78 | 1.14* | -0.79 |
| EI Overall | -0.03 | 0.53 | -0.44 |
| EI Experiencing Area | -1.22 | 0.48* | -0.85 |
| EI Understanding Branch | 0.90 | 0.00* | 1.63 |
| Facilitation Task | -1.76 | -0.09* | 0.95 |
| Blends Task | 0.78 | -0.15* | 1.58 |
| Changes Task | 1.32 | -0.16* | 1.12 |
| EI Reasoning Area | 1.12 | -0.25* | 0.89 |
| Emotion Manage Task | 0.51 | -1.14* | 0.26 |

$p<.05$.
*Indicates significance at $p<.01$.

Table 76

*Distinguishing Statements for Factor 3 - Year 3 Group 1*

| Statement | Type 1 Z-Scores | Type 2 Z-Scores | Type 3 Z-Scores |
|---|---|---|---|
| EI Understanding Branch | 0.90 | 0.00 | 1.63* |
| Blends Task | 0.78 | -0.15 | 1.58* |
| Facilitation Task | -1.76 | -0.09 | 0.95* |

$p<.05$.
*Indicates significance at $p<.01$.

Table 77

*Descending Array of Differences Between Factors 1 and 2 – Year 3 Group 2*

| Statement | Type 1 | Type 2 | Difference |
|---|---|---|---|
| Emotion Manage Task | 0.655 | -1.383 | 2.038 |
| Social Manage Task | 0.175 | -1.183 | 1.358 |
| EI Managing Branch | 0.062 | -1.212 | 1.274 |
| EI Reasoning Area | 0.866 | -0.393 | 1.259 |
| Changes Task | 1.396 | 0.378 | 1.018 |
| Faces Task | -0.340 | -1.249 | 0.909 |
| EI Understanding Branch | 1.723 | 1.101 | 0.622 |
| Blends Task | 1.413 | 1.329 | 0.084 |
| Sensations Task | -0.948 | -0.887 | -0.061 |
| EI Overall | -0.297 | 0.036 | -0.333 |
| EI Perceiving Branch | -0.641 | 0.302 | -0.944 |
| Pictures Task | -0.793 | 0.569 | -1.362 |
| EI Experiencing Area | -1.296 | 0.302 | -1.599 |
| EI Facilitating Branch | -1.210 | 0.665 | -1.875 |
| Facilitation Task | -0.766 | 1.626 | -2.392 |

Table 78

*Descending Array of Differences Between Factors 1 and 3 – Year 3 Group 2*

| Statement | Type 1 | Type 2 | Difference |
|---|---|---|---|
| Blends Task | 1.413 | -0.588 | 2.002 |
| EI Understanding Branch | 1.723 | -0.270 | 1.994 |
| Changes Task | 1.396 | -0.383 | 1.779 |
| Social Manage Task | 0.175 | -0.872 | 1.047 |
| Sensations Task | -0.948 | -1.657 | 0.709 |
| EI Reasoning Area | 0.866 | 0.224 | 0.642 |
| Emotion Manage Task | 0.655 | 0.265 | 0.390 |
| EI Managing Branch | 0.062 | -0.109 | 0.171 |
| Pictures Task | -0.793 | -0.944 | 0.152 |
| EI Facilitating Branch | -1.210 | -0.489 | -0.722 |
| EI Overall | -0.297 | 0.619 | -0.916 |
| Facilitation Task | -0.766 | 0.462 | -1.227 |
| EI Perceiving Branch | -0.641 | 0.678 | -1.319 |
| EI Experiencing Area | -1.296 | 0.326 | -1.622 |
| Faces Task | -0.340 | 2.740 | -3.080 |

Table 79

*Descending Array of Differences Between Factors 2 and 3 – Year 3 Group 2*

| Statement | Type 1 | Type 2 | Difference |
|---|---|---|---|
| Blends Task | 1.329 | -0.588 | 1.917 |
| Pictures Task | 0.569 | -0.944 | 1.513 |
| EI Understanding Branch | 1.101 | -0.270 | 1.371 |
| Facilitation Task | 1.626 | 0.462 | 1.165 |
| EI Facilitating Branch | 0.665 | -0.489 | 1.154 |
| Sensations Task | -0.887 | -1.657 | 0.770 |
| Changes Task | 0.378 | -0.383 | 0.761 |
| EI Experiencing Area | 0.302 | 0.326 | -0.023 |
| Social Manage Task | -1.183 | -0.872 | -0.312 |
| EI Perceiving Branch | 0.302 | 0.678 | -0.375 |
| EI Overall | 0.036 | 0.619 | -0.583 |
| EI Reasoning Area | -0.393 | 0.224 | -0.617 |
| EI Managing Branch | -1.212 | -0.109 | -1.103 |
| Emotion Manage Task | -1.383 | 0.265 | -1.648 |
| Faces Task | -1.249 | 2.740 | -3.989 |

Table 80

*Distinguishing Statements for Factor 1 - Year 3 Group 2*

| Statement | Type 1 Z-Scores | Type 2 Z-Scores | Type 3 Z-Scores |
|---|---|---|---|
| EI Understanding Branch | 1.72 | 1.10 | -0.27 |
| Changes Task | 1.40* | 0.38 | -0.38 |
| EI Reasoning Area | 0.87* | -0.39 | 0.22 |
| Social Manage Task | 0.17* | -1.18 | -0.87 |
| Faces Task | -0.34* | -1.25 | 2.74 |
| EI Perceiving Branch | -0.64* | 0.30 | 0.68 |
| Facilitation Task | -0.77* | 1.63 | 0.46 |
| EI Facilitating Branch | -1.21* | 0.67 | -0.49 |
| EI Experiencing Area | -1.30* | 0.30 | 0.33 |

$p<.05$.
*Indicates significance at $p<.01$.

Table 81

*Distinguishing Statements for Factor 2 - Year 3 Group 2*

| Statement | Type 1 Z-Scores | Type 2 Z-Scores | Type 3 Z-Scores |
|---|---|---|---|
| Facilitation Task | -0.77 | 1.63* | 0.46 |
| EI Understanding Branch | 1.72 | 1.10 | -0.27 |
| EI Facilitating Branch | -1.21 | 0.67* | -0.49 |
| Pictures Task | -0.79 | 0.57* | -0.94 |
| Changes Task | 1.40 | 0.38* | -0.38 |
| EI Reasoning Area | 0.87 | -0.39 | 0.22 |
| EI Managing Branch | 0.06 | -1.21* | -0.11 |
| Faces Task | -0.34 | -1.25* | 2.74 |
| Emotion Manage Task | 0.66 | -1.38* | 0.27 |

$p<.05$.
*Indicates significance at $p<.01$.

Table 82

*Distinguishing Statements for Factor 3 - Year 3 Group 2*

| Statement | Type 1 Z-Scores | Type 2 Z-Scores | Type 3 Z-Scores |
|---|---|---|---|
| Faces Task | -0.34 | -1.25 | 2.74* |
| EI Overall | -0.30 | 0.04 | 0.62 |
| Facilitation Task | -0.77 | 1.63 | 0.46* |
| EI Reasoning Area | 0.87 | -0.39 | 0.22 |
| EI Understanding Branch | 1.72 | 1.10 | -0.27* |
| Changes Task | 1.40 | 0.38 | -0.38* |
| EI Facilitating Branch | -1.21 | 0.67 | -0.49* |
| Blends Task | 1.41 | 1.33 | -0.59* |
| Sensations Task | -0.95 | -0.89 | -1.66* |

$p<.05$.
*Indicates significance at $p<.01$

# APPENDIX H

## APPENDIX OF STABILITY OF Q-TYPOLOGIES

Correlations between groups and types for each year estimates the stability for each type and within and between groups.

**Correlations**

| | | Y1 G1 T1 Z Score | Y1 G1 T2 Z Score | Y1 G1 T3 Z Score | Y1 G2 T1 Z Score | Y1 G2 T2 Z Score | Y1 G2 T3 Z Score | Y2 G1 T1 Z Score | Y2 G1 T2 Z Score | Y2 G1 T3 Z Score | Y2 G2 T1 Z Score | Y2 G2 T2 Z Score | Y2 G2 T3 Z Score | Y3 G1 T1 Z Score | Y3 G1 T2 Z Score | Y3 G1 T3 Z Score | Y3 G2 T1 Z Score | Y3 G2 T2 Z Score | Y3 G2 T3 Z Score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Y1G1 T1 ZScore | Pearson Correlation | 1 | .172 | .060 | .261 | .045 | -.310 | .535* | -.126 | -.331 | -.139 | .470 | .044 | -.268 | .528* | -.089 | -.072 | -.170 | .512 |
| | Sig. (2-tailed) | | .541 | .832 | .348 | .874 | .260 | .040 | .653 | .228 | .621 | .077 | .875 | .335 | .043 | .753 | .800 | .545 | .051 |
| | N | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Y1G1 T2 ZScore | Pearson Correlation | .172 | 1 | -.077 | .791** | .381 | .222 | .713** | -.322 | .266 | .564* | .652** | .420 | -.612* | .367 | -.633* | -.738** | -.398 | .541* |
| | Sig. (2-tailed) | .541 | | .785 | .000 | .161 | .425 | .003 | .242 | .338 | .029 | .008 | .120 | .015 | .179 | .011 | .002 | .142 | .037 |
| | N | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Y1G1 T3 ZScore | Pearson Correlation | .060 | -.077 | 1 | -.281 | .753** | .236 | .150 | .855** | -.022 | .209 | -.018 | -.432 | .473 | -.009 | -.126 | .278 | -.487 | .008 |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sig. (2-tailed) | .832 | .785 | | .310 | .001 | .398 | .592 | .000 | .937 | .454 | .950 | .107 | .075 | .975 | .653 | .316 | .066 | .978 |
| | N | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Y1G2 T1 ZScore | Pearson Correlation | .261 | .791** | -.281 | 1 | .077 | -.161 | .837** | -.522* | -.186 | .149 | .878** | .461 | -.852** | .589* | -.603* | -.787** | -.028 | .605* |
| | Sig. (2-tailed) | .348 | .000 | .310 | | .785 | .566 | .000 | .046 | .507 | .596 | .000 | .084 | .000 | .021 | .017 | .000 | .920 | .017 |
| | N | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Y1G2 T2 ZScore | Pearson Correlation | .045 | .381 | .753** | .077 | 1 | .283 | .367 | .491 | .002 | .630* | .195 | -.416 | .313 | .181 | -.498 | -.047 | -.830** | .239 |
| | Sig. (2-tailed) | .874 | .161 | .001 | .785 | | .306 | .178 | .063 | .994 | .012 | .487 | .123 | .256 | .518 | .059 | .867 | .000 | .391 |
| | N | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Y1G2 T3 ZScore | Pearson Correlation | -.310 | .222 | .236 | -.161 | .283 | 1 | -.259 | .050 | .848** | .655** | -.444 | .455 | .025 | -.763** | -.357 | -.312 | -.392 | -.539* |
| | Sig. (2-tailed) | .260 | .425 | .398 | .566 | .306 | | .351 | .859 | .000 | .008 | .098 | .089 | .929 | .001 | .191 | .257 | .148 | .038 |
| | N | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Y2G1 T1 ZScore | Pearson Correlation | .535* | .713** | .150 | .837** | .367 | -.259 | 1 | -.095 | -.327 | .162 | .959** | .145 | -.598* | .755** | -.541* | -.527* | -.271 | .775** |

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sig. (2-tailed) | .040 | .003 | .592 | .000 | .178 | .351 | | .738 | .234 | .565 | .000 | .606 | .018 | .001 | .037 | .044 | .329 | .001 |
| | N | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Y2G1 T2 ZScore | Pearson Correlation | -.126 | -.322 | .855** | -.522* | .491 | .050 | -.095 | 1 | .013 | .047 | -.202 | -.617* | .677** | -.063 | .233 | .581* | -.261 | -.054 |
| | Sig. (2-tailed) | .653 | .242 | .000 | .046 | .063 | .859 | .738 | | .964 | .868 | .471 | .014 | .006 | .823 | .403 | .023 | .347 | .848 |
| | N | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Y2G1 T3 ZScore | Pearson Correlation | -.331 | .266 | -.022 | -.186 | .002 | .848** | -.327 | .013 | 1 | .548* | -.452 | .480 | -.017 | -.698** | -.092 | -.233 | -.170 | -.433 |
| | Sig. (2-tailed) | .228 | .338 | .937 | .507 | .994 | .000 | .234 | .964 | | .035 | .091 | .070 | .951 | .004 | .745 | .402 | .545 | .107 |
| | N | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Y2G2 T1 ZScore | Pearson Correlation | -.139 | .564* | .209 | .149 | .630* | .655** | .162 | .047 | .548* | 1 | -.031 | .068 | .091 | -.247 | -.538* | -.296 | -.840** | .003 |
| | Sig. (2-tailed) | .621 | .029 | .454 | .596 | .012 | .008 | .565 | .868 | .035 | | .911 | .809 | .748 | .375 | .038 | .285 | .000 | .991 |
| | N | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Y2G2 T2 ZScore | Pearson Correlation | .470 | .652** | -.018 | .878** | .195 | -.444 | .959** | -.202 | -.452 | -.031 | 1 | .135 | -.665** | .844** | -.479 | -.537* | -.066 | .774** |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sig. (2-tailed) | .077 | .008 | .950 | .000 | .487 | .098 | .000 | .471 | .091 | .911 | | .631 | .007 | .000 | .071 | .039 | .815 | .001 |
| | N | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Y2G2 T3 ZScore | Pearson Correlation | .044 | .420 | -.432 | .461 | -.416 | .455 | .145 | -.617* | .480 | .068 | .135 | 1 | -.784** | -.302 | -.289 | -.707** | .273 | -.139 |
| | Sig. (2-tailed) | .875 | .120 | .107 | .084 | .123 | .089 | .606 | .014 | .070 | .809 | .631 | | .001 | .273 | .297 | .003 | .325 | .622 |
| | N | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Y3G1 T1 ZScore | Pearson Correlation | -.268 | -.612* | .473 | -.852** | .313 | .025 | -.598* | .677** | -.017 | .091 | -.665** | -.784** | 1 | -.310 | .464 | .845** | -.306 | -.295 |
| | Sig. (2-tailed) | .335 | .015 | .075 | .000 | .256 | .929 | .018 | .006 | .951 | .748 | .007 | .001 | | .261 | .082 | .000 | .267 | .286 |
| | N | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Y3G1 T2 ZScore | Pearson Correlation | .528* | .367 | -.009 | .589* | .181 | -.763** | .755** | -.063 | -.698** | -.247 | .844** | -.302 | -.310 | 1 | -.146 | -.123 | -.008 | .843** |
| | Sig. (2-tailed) | .043 | .179 | .975 | .021 | .518 | .001 | .001 | .823 | .004 | .375 | .000 | .273 | .261 | | .604 | .662 | .978 | .000 |
| | N | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Y3G1 T3 ZScore | Pearson Correlation | -.089 | -.633* | -.126 | -.603* | -.498 | -.357 | -.541* | .233 | -.092 | -.538* | -.479 | -.289 | .464 | -.146 | 1 | .814** | .512 | -.020 |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sig. (2-tailed) | .753 | .011 | .653 | .017 | .059 | .191 | .037 | .403 | .745 | .038 | .071 | .297 | .082 | .604 | | .000 | .051 | .944 |
| | N | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Y3G2 T1 ZScore | Pearson Correlation | -.072 | -.738** | .278 | -.787** | -.047 | -.312 | -.527* | .581* | -.233 | -.296 | -.537* | -.707** | .845** | -.123 | .814** | 1 | .067 | -.074 |
| | Sig. (2-tailed) | .800 | .002 | .316 | .000 | .867 | .257 | .044 | .023 | .402 | .285 | .039 | .003 | .000 | .662 | .000 | | .813 | .793 |
| | N | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Y3G2 T2 ZScore | Pearson Correlation | -.170 | -.398 | -.487 | -.028 | -.830** | -.392 | -.271 | -.261 | -.170 | -.840** | -.066 | .273 | -.306 | -.008 | .512 | .067 | 1 | -.161 |
| | Sig. (2-tailed) | .545 | .142 | .066 | .920 | .000 | .148 | .329 | .347 | .545 | .000 | .815 | .325 | .267 | .978 | .051 | .813 | | .566 |
| | N | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Y3G2 T3 ZScore | Pearson Correlation | .512 | .541* | .008 | .605* | .239 | -.539* | .775** | -.054 | -.433 | .003 | .774** | -.139 | -.295 | .843** | -.020 | -.074 | -.161 | 1 |
| | Sig. (2-tailed) | .051 | .037 | .978 | .017 | .391 | .038 | .001 | .848 | .107 | .991 | .001 | .622 | .286 | .000 | .944 | .793 | .566 | |
| | N | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |

*Correlation is significant at the 0.05 level (2-tailed). **Correlation is significant at the 0.01 level (2-tailed).

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| 2008 | **Doctor of Nursing Practice**<br>Leadership and Healthcare Management – 4.0 GPA<br>Rush University, Chicago, IL |
| 1995 | **Master of Science in Nursing**<br>**Nurse Anesthesia** – 3.9 GPA<br>University of Tennessee at Chattanooga, Chattanooga, TN |
| 1991 | **Bachelor of Science in Nursing**<br>Southern College of SDA, Collegedale, TN |
| 1989 | **Associate of Science in Nursing**<br>Southern College of SDA, Collegedale, TN |

## PROFESSIONAL EXPERIENCE

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| 2008 to Present | **Western Carolina University -** Cullowhee, NC<br>Director of the School of Nurse Anesthesia. Responsible for 14-16 students per class, with 28-42 total students at any given time. |
| 2006 to 2008 | **Western Carolina University -** Cullowhee, NC<br>Assistant Professor/Assistant Director of the School of Nurse Anesthesia. |
| 2006 to Present | **Nurse Anesthesia Legal Consulting**<br>Provide nurse anesthesia malpractice consulting services for several legal firms across the country. |
| 1996 to Present | **St. Luke's Hospital -** Columbus, NC<br>President/owner of CRNA-only group, Sandman Anesthesia Services, PA, performing all types of anesthesia for general, orthopedic, ophthalmologic, and urologic surgery. |
| 1995 to 2006 | **Asheville Anesthesia Associates -** Asheville, NC<br>Education inservice coordinator for a group of ninety CRNA's and clinical instructor CRNA for anesthesia students in Obstetrics. |

## PROFESSIONAL HONORS AND AWARDS

1. 2011 AANA Foundation Doctoral Fellow
   - Competitive Application Process with Dissertation. $10,000 Scholarship.
2. Nurse Educators of Tomorrow Scholarship
   - Doctoral studies scholarship from the state of North Carolina ($30,000)

## PROFESSIONAL PUBLICATIONS

**2012** Haslam, B**, Collins, S.** Unilateral hypoglossal neuropraxia following endotracheal intubation for total shoulder arthroplasty. *AANA Journal* (Accepted for publication with tentative publication date of June, 2013).

**2011** Loftis, G, **Collins, S**, McDowell, M. Anesthesia-induced neuronal apoptosis in the Neonate: A review of the current literature. *AANA Journal* (Accepted for publication with tentative publication date of August, 2012).

**2011** **Collins, S**. Description of a model for a reproducible curriculum infrastructure to provide international nurse anesthesia continuing education. *AANA Journal, 79(6)*, 491-496.

**2010** Key L, Rich C, DeCristofaro C, & **Collins, S**. (2010). Literature review on the use of propofol and emergence agitation in children. *AANA Journal, 78*(6), 468-473.

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**SCHOLARLY PODIUM PRESENTATIONS**

**2011** Collins, S. (September 2011) *Beware the procrustean solution: Evidence-based practice versus the standard of care.* 2011 NCANA Meeting. Asheville, NC.

**2011** Collins, S. (2011 May) *Life upstairs: A neuro review.* 2011 WCU Nurse Anesthesia Update. Asheville, NC.

**2011** Collins, S. (2011 May) *Anesthesia implications of endocrine disease.* 2011 WCU Nurse Anesthesia Update. Asheville, NC.

**2010** Collins, S. (2010 November) *Model for a reproducible curriculum infrastructure for nurse anesthesia CE in developing countries.* International Conference on Education, Research, and Innovation (ICERI). Madrid, Spain.

**2010** Collins, S. (2010 October) *Reproducible curriculum infrastructure for nurse anesthesia CE in developing countries.* 3rd Annual National Doctors of Nursing Practice Conference. San Diego, CA

**2010** Collins, S. (2010 May) *Reproducible curriculum infrastructure for nurse anesthesia CE in developing countries.* Eta Psi/NCANA Mountain Region Meeting. Candler, NC

**2009** Collins, S. (2009 October) *Evidence-based practice and standards of care: Which way should I go?* 2nd Annual National Doctors of Nursing Practice Conference: Exemplars of the DNP in Practice and Nursing Education. Miami, FL.

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**PEER REVIEWED POSTER PRESENTATIONS**

**2010** Roth, D., Hatch, A., DeCristofaro, C., & **Collins, S**. (2010 September) *What is the Incidence of Non-therapeutic Drug Effects from Fospropofol When it is Used to Achieve Moderate Sedation in the Outpatient Daignostic Setting?* North Carolina Association of Nurse Anesthetists Annual Meeting. Wilmington, NC.

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**GRANT ACTIVITY**

**2011** HRSA Nurse Anesthesia Traineeship Grant – ($2,306 FUNDED)

**2011** HRSA Advanced Education Nursing Grant – ($1,236,000 FUNDED)

**2010** HRSA Nurse Anesthesia Traineeship Grant – ($1,807 FUNDED)

**2010** HRSA AEN Grant – Approved but not funded ($1,297,000)

**2010** HRSA ARRA Equipment to Enhance Training for Health Professionals – Advanced Education Nursing – Approved but not funded ($299,400)

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**OTHER PROFESSIONAL ACTIVITIES**

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| **2010 to Present** | Peer Reviewer, *Journal of Research on Christian Education* |
| **2010 to Present** | National Certification Examination Committee |
| **September 2010** | NCANA Poster Judge |