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The Relationship of Affective Domains and Cognitive Performance in Paramedic Students

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The Relationship of Affective Domains and Cognitive Performance in Paramedic Students

by

Katie J. Lyman

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
Department of Leadership, Counseling, Adult, Career, and Higher Education
College of Education
University of South Florida

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Dedication

On this day, August 9, 2014, I have successfully completed one of the most strenuous and yet fulfilling feats of my lifetime. No matter where life has taken me, I have learned from every person and every experience. The following Ralph Waldo Emerson passage is one which keeps me grounded when I forget how important it is to be a productive member of society. Therefore, this dissertation is dedicated to all former students and those I have yet to meet...

“Success”

To laugh often and much; To win the respect of intelligent people and the affection of children;

To earn the appreciation of honest critics and endure the betrayal of false friends;

To appreciate beauty, to find the best in others;

To leave the world a bit better, whether by a healthy child, a garden patch, or a redeemed social condition; To know even one life has breathed easier because you have lived.

This is to have succeeded.

~Ralph Waldo Emerson

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Abstract

No universal approach for application procedures has been established for paramedic curriculum programs. The field of pre-hospital, Emergency Medical Services (EMS) has evolved quickly from its inception to present date. The educational components of EMS are still in their infancy and lack evidence-based protocols (Drees, 2006). Predicting success in an allied health program typically concentrates on some type of academic instrument. The use of personality inventories has been underexplored; however, literature reveals they may be more reliable in determining academic and employment success compared with other non-cognitive tools (Groves, Gordon, & Ryan, 2007; Marrin et al., 2004; McManus & Richards, 1986; Sadler, 2003).

The purpose of this study was to explore the relationship of affective domains to cognitive scores in entrance and exit examinations of paramedic students (Fisdap, 2013). Comparing the results of affective domains to areas of cognition should enable administrators in pre-hospital health care systems to make admission recommendations based on evidence-based research rather than intuition. Identifying the candidates who have a higher potential of success for completing an academic program and the possibility of contributing to the profession is necessary for the advancement of emergency medical service programs.

A quantitative, retrospective study using data collected by Fisdap® was used to test four separate research questions. The general premise of the four research questions can be combined

by asking: Is there a relationship between selected affective domains and the sub-categories and totals of an entrance and comprehensive exam?

Pearson product-moment correlation coefficients were used for data analysis in all four research questions. As was analyzed through Pearson correlations, the selected affective domains did not show any relationship to any of the cognitive portions of the EE or the PRE3. However, an additional multiple regression concluded that the EE positively predict the PRE3.

This research project was the first to explore the relationship of affective domains and cognitive ability in paramedic students. Although no statistically significant data for the four proposed research questions was reportable, future publications from this project will assist Fisdap® and the field of emergency medical services.

Chapter One:

Introduction

Introduction to the Problem

Allied health care education programs seek prospective students who are most likely to succeed in a specific field of study. As students progress from basic knowledge to application of a particular concept, admission committees are expected to select the best candidates that will not only flourish with the academic component but also contribute as the next generation of experts and researchers (Furnham & Monsen, 2009). The importance of choosing the most appropriate candidates is, arguably, most critical in health care careers. A total of 90% of those people seeking admission into medical school will receive a letter of denial (Norman, 2004). However, a comprehensive review of literature will reveal that the cumbersome requirements (interviews and essays) of the medical school admissions process are fallible due to human judgment (Eva & Reiter, 2004). Thus, the question of whether or not admissions committees are making the correct decision of the 10% they are admitting should make health care consumers wonder about the care they are receiving from their physician (Marrin, McIntosh, Keane, & Schmuck, 2004; Peskun, Detsky, & Shandling, 2007). Similar concerns are shared for professionals in other health care settings including the pre-hospital field.

No universal approach for application procedures has been established for pre-hospital academic programs. The field of pre-hospital, emergency care has evolved quickly from its inception to present date. Early paramedics provided basic care and drove patients as quickly as

possible to the nearest hospital. Medical advances have been introduced for practicing paramedics including diagnostic tools and treatment procedures, but these have largely been researched in controlled settings rather than the pre-hospital situations. The educational components of EMS are still in their infancy and lack evidence-based protocols (Drees, 2006). The U.S. Department of Transportation (2001) issued a statement to all involved in the pre-hospital profession indicating that a lack of EMS research was the impediment to progress of emergency medical services. It is the responsibility of educators and researchers to contribute evidence-based suggestions through research and publications. In order to prepare the next generation of paramedics, educators must make decisions based on published research rather than theoretical experiences.

The changes being imposed by the latest health care standards as well as the Federal funding institutions receive from the Department of Education demand that resources are spent on the appropriate admissions requirements (Sadler, 2003). First-time pass rates on examinations, attrition rates, and employment statistics are used as evaluation tools for specific programs within an institution because of the objective nature of these numbers (Davenport, 2007; Simon, McGinniss, & Krauss, 2013). In order to comply with the objective data that legislatures seek, institutions have necessitated cumbersome prerequisites at the expense of consumers and institutions of higher education (Marrin et al., 2004; Norman, 2004).

Predicting success in an allied health program typically concentrates on some type of academic instrument. Overall Grade Point Average (GPA), specified academic curriculum GPA, standardized tests, and assessments that measure specific aptitudes for respective programs (such as the MCAT) have been a part of admission criteria since health care programs first commenced (Marrin et al., 2004; Sadler, 2003; Taylor, 1974). Researchers have spent time calculating the

predictive value of cognitive abilities and found mixed results. Eva and Reiter (2004) report that GPA has been the most reliable tool to forecast performance. Other authors have published articles that confirm the reliability of considering GPA when evaluating applicants (Colliver, Verhulst, & Williams, 1989; Crowe et al., 2004; Davenport, 2007; Groves, Gordon, & Ryan, 2007; Hall & Bailey, 1992; McManus & Richards, 1986; Sadler, 2003; Tipton et al., n.d.; Yoho et al., 2007). Although the aforementioned articles discuss aspects of cognitive admission tools, there is no universal conclusion that can be made for all allied health programs. Due to the inconsistencies in findings of relying solely on cognitive reports, considering affective domains should be explored for those students interested in pre-hospital academic programs.

Many programs utilize nonacademic tools such as interviews and essays, but dependability of human judgment and conclusions based on these non-cognitive instruments has been shown to be unreliable (Eva & Reiter, 2004; Ferguson, James, & Madeley, 2002; Martin, Montgomery, & Saphian, 2006; Sadler, 2003). The use of personality inventories has been underexplored; however, literature reveals they may be more reliable in determining academic and employment success compared with other non-cognitive tools (Groves, Gordon, & Ryan, 2007; Marrin et al., 2004; McManus & Richards, 1986; Sadler, 2003). “If personal qualities are domains deemed vital to the selection of medical students, then a sufficiently reliable measure of those domains must be applied if an appropriate counterbalance is to be struck with reliably measured cognitive qualities” (Eva & Reiter, 2004, p. 168). The topic of affective domains is just as important for those individuals that choose paramedicine as a career.

In reference to admitting applicants with the ability to provide ethical health care practices, Taylor (1974) stated, “If the right kind of people are properly selected and produced for each of the health care fields, then the existing problems will continually be resolved by such

people. But if the wrong people are selected...then the problems will have just begun and too many of the public will continue to be plagued...in the health area” (p. 88). Such high stakes highlight the dilemma for admission committees to implement an admission process that will admit only quality prospective students. Although controversy still exists regarding the details of personality testing, the growing mountain of research concludes that the future of admission decisions may lie in individual responses to questions of character rather than strict academic tools (Albanese, Snow, Skochelak, Huggett, & Farrell, 2003; Ferguson, James, & Madeley, 2002; Lievens, Ones, & Dilchert, 2009; Morris, 2000; Lowe, Kerridge, Bore, Munro, & Powis, 2001; Peskun, Detsky, & Shandling, 2007; Rothstein, Paunonen, Rush, & King, 1994; Porter, 2008; Stewart, 1999; Tyssen, Dolatowski, Rovik, Thorkildsen, Ekeberg, Hem, Gude, Gronvold, & Vaglum, 2007). Those applicants with characteristics that indicate they are likely to persevere in times of stress and treat health care consumers with passionate attention are arguably the applicants who should be admitted into allied health education programs (Crow, Handley, Morrison, & Shelton, 2004; Furnham & Monsen, 2007; Lowe, Kerridge, Bore, Munro, & Powis, 2001; Morris, 2000; Taylor, 1974).

Statement of the Problem

Undergraduate and graduate level allied health care admission committees are spending time and resources in order to find the best candidates to complete an educational program and represent the profession with moral and ethical standards (Lowe, et al., 2001). The area of pre-hospital, academic programs has attracted little research in regards to the selection process of promising paramedics. A lack of research and publications requires administrators to make decisions based on research in other fields and past, personal experiences. To date, no research

has been published comparing affective domains of prospective paramedic students to the results of entrance and exit cognitive examinations offered through Fisdap®. If we recognize that specific interpersonal characteristics are important in caring for health care consumers, a quantitative measure of these affective domains should be studied to provide guidance in the admission process of paramedic students (Barrick, Mount, & Judge, 2001; Eva & Reiter, 2004).

Purpose of the Study

The purpose of this study was to explore the relationship of affective domains to cognitive scores in entrance and exit examinations of paramedic students (Fisdap, 2013). Comparing the results of affective domains to areas of cognition should enable administrators in pre-hospital health care systems to make admission recommendations based on evidence-based research rather than intuition. Identifying the candidates who have a higher potential of success for completing an academic program and the possibility of contributing to the profession is necessary for the advancement of emergency medical service programs.

Research Questions

Based on a comprehensive review of literature in emergency medical services and other allied health care professions, a plan was developed to compare the pre- and post-scores of paramedic students in affective and cognitive domains. Refer to Table 1 for an overview of the original plan.

Table 1

Overview of the Research Design

	Affective	Cognitive
Research Question 1	Selected EE	Sub-categories of EE
Research Question 2	Selected EE	Total score of EE
Research Question 3	Selected EE	Sub-categories of PRE3
Research Question 4	Selected EE	Total score of PRE3

The paramedic Entrance Exam (EE) was used for the baseline affective domain data using selected domains of the M5-50 Questionnaire. In the same test, the cognitive data of the EE was used in both sub-category and total format. In the post-test, the cognitive data of the Paramedic Readiness Exam 3 (PRE3) was used in both sub-category and total format. The following formal research questions were developed to guide this study:

Research Question One (RQ₁): What is the relationship between paramedic students' selected affective domains and the cognitive sub-categories (anatomy, Emergency Medical Technician-Basic [EMT-B], information/expository reading at 11th grade level, narrative reading at 9th grade level, math, and physiology) of the paramedic Entrance Exam (EE)?

Research Question Two (RQ₂): What is the relationship between paramedic students' selected affective domains and the cognitive total score of the paramedic Entrance Exam (EE)?

Research Question Three (RQ₃): What is the relationship between paramedic students' selected affective domains and the cognitive sub-categories (airway management, cardiology, medical emergencies, OB/Gyn and peds, operations, trauma) of the comprehensive Paramedic Readiness Exam 3 (PRE3)?

Research Question Four (RQ₄): What is the relationship between paramedic students' selected affective domains and the cognitive total of the comprehensive Paramedic Readiness Exam 3 (PRE3)?

Definition of Terms

Defining the terms used in this research study bounds the terms as they were used specifically in the research and discussion. The following definitions are based on their meaning and use in the literature and practice in the field.

Fisdap®- A grant-funded project that started as Field Internship Student Data Acquisition Project (FISDAP) in 1997 and has since evolved into Fisdap® as a brand name company. This company tracks clinical components as well as provides reliable and validated test questions (Fisdap, 2013).

National Registry of Emergency Medical Technicians (NREMT)- An organization founded in 1970 to establish standards for emergency medical service professionals. Individuals must pass cognitive (NREMTCE) and psychomotor examinations in order to be recognized as a nationally registered emergency technician (NREMT, 2014).

M5-50- A personality inventory that uses a Likert-type scale in order to assess affective domains known as the Big Five Personality traits (Costa & McCrae, 1985).

Paramedic- An American Medical Association (AMA) recognized professional that provides emergency care to patients in the pre-hospital setting. The scope of practice for paramedics is based on state and local protocols developed by medical directors (CoAEMSP, 2010).

Paramedic Entrance Exam (EE)- A multiple-choice examination developed by emergency medical service educators in order to provide an idea of cognitive dimensions (anatomy, Emergency Medical Technician-Basic [EMT-B], information/expository reading at 11th grade level, narrative reading at 9th grade level, math, physiology, and total score) and affective domains (Agreeableness, Conscientiousness, and Neuroticism) of prospective paramedic students (Page et al., 2013).

Paramedic Readiness Exam 3 (PRE3)- A comprehensive exam that presents multiple-choice valid and reliable questions regarding cognitive domain content. This exam is predictive as 97% of students who pass the exam also pass the National Registry® cognitive exam on the first attempt. The PRE3 exam is divided into the following sections: airway management, cardiology, medical emergencies, OB/Gyn and peds, operations, trauma, and total score (Fisdap, 2013).

Limitations, Delimitations, and Assumptions

Limitations of this study which could not be controlled were: (1) the personality questionnaire that Fisdap® chose to include in the paramedic Entrance Exam, and (2) testing procedures at a given institution. A review of the literature reveals researchers utilize multiple versions of personality evaluation tools with no universally accepted standard (Bartone, Eid, Helge, Laberg, & Snook, 2009; Daniels & King, 2002; Doerner & Nowell, 1999; Furnham &

Monesn, 2009; Morris, 2000; Rothstein et. al., 1994). Fisdap® utilizes questions relating to agreeableness, conscientiousness, and neuroticism from the M5-50 (McCord, 2002). As originally published by Costa and McCrae (1995), research has demonstrated Fisdap's® internal reliability for assessing the five domains of personality (also referred to as the "Big 5") (Bolender, 2001; Bridges, 2011; Socha, Cooper, & McCord, 2010).

Regarding testing procedures at a given institution, since this research project looked at historical data from responses of prospective students across the country, the author could not control the testing environment that occurred at various institutions. As with any test, there was a chance that students were able to cheat if the appropriate examination conditions were not implemented.

Delimitations, or factors controlled by the researcher, include the selection of those programs and paramedic students that utilize Fisdap® for their clinical tracking and testing purposes. This constraint was placed on the study because it is the only system that utilizes both cognitive and affective domains in the entrance exam for prospective paramedic students. It is also the only company which focuses on emergency medical clinical tracking and assessments. Fisdap® offers a comprehensive examination which has been proven to be predictive with reliable and valid test questions (Fisdap®, 2013). The study did not evaluate prior academic success of the participants as this information is not necessary for the current research questions.

Based on the literature, it was assumed that prospective paramedic students answered questions relating to their personality without fear of being influenced by how an individual thinks they should answer (Daniels & King, 2002; Morris, 2000). While candidates may wonder how to answer the personality questions to their favor, the reliability of the M5-50 reveals good internal validity (Bolender, 2001; Bridges, 2011). It is also assumed that students participating

attempted the examinations pursuing the highest score possible. Because of the predictive quality of the Paramedic Readiness Exam 3 (PRE3) to the National Registry Cognitive Exam (NREMTCE), it is assumed the exam will continue to be used by paramedic programs around the country.

Summary

The ability to implement an objective admission process is vital to selecting the best candidates that will succeed academically as well as a future professional (Lowe et al., 2001). “The best health personnel of today do not completely represent the ideal personnel of tomorrow, the real target in selecting and educating health personnel of any kind” (Taylor, 1974, p. 5). Previous research in multiple domains has produced varying conclusions regarding the most appropriate prerequisite materials. The lack of educational research in emergency medical services proves to be a limiting factor in the progression of the field. This study proposed to compare affective domains to the results of cognitive scores on entrance and exit examinations.

Chapter Two:

Literature Review

Introduction

The ability of admissions' committees to make decisions on prospective students based on preadmission criteria continues to be an area of research in pre-hospital academic programs. The right collection of cognitive and non-cognitive documentation has been analyzed for decades in order to admit the "perfect" student. While administrators and instructors of programs have understood the importance of selecting quality candidates for generations, consumers should demand a more scientific-based approach for protection of their health care needs (Norman, 2004; Taylor, 1974). In addition, those applicants who wish to pursue education in a health profession deserve to be evaluated objectively (Hall & Bailey, 1992). There is a lack of empirical research in pre-hospital academic programs. To date, little research exists as to the required materials prospective paramedic students need to submit so that a committee can make an objective decision regarding admittance. Although some researchers have prepared abstracts regarding this topic, full papers have not been accepted for publication.

In order to have a better understanding of the research that has been conducted on admission criteria, the following chapter serves to outline the importance of cognitive factors and affective domains in allied health science programs. By examining research that has been published in similar fields, the current study can be based on a sound methodology. Information regarding cognitive prerequisites (overall Grade Point Average [GPA] and prerequisite courses)

and nonacademic requirements (interviews and essays) from several different domains will be presented. In addition, research regarding personality inventories and how they were related to the current project will be introduced. While there is no conclusion that is absolute, attempting to find balance between cognitive and affective documents for admission criteria in a pre-hospital education program is essential for selecting quality paramedic students (Fernandez, Studnek, & Margolis, 2008).

Academic Variables in Admission Decisions

A meta-analysis published in 1996 reported that quantitative data predominated the medical research from 1981 to 1990 (Campbell & Dickson, 1996). Early researchers spent time comparing the knowledge base of novices to experts through comprehension assessments (Rolfhus & Ackerman, 1999). While interpersonal qualities were later introduced as an important component, academic variables continue to be a factor for admission decisions.

Cumulative grade point average. One can hypothesize that individuals with a high general intelligence score typically perform better on cognitive tasks throughout their academic career (Crow et al., 2004; Peskun, Detsky, & Shandling, 2007; Rothstein et al., 1994). Hall and Bailey (1992) cited four articles that found Grade Point Averages (GPAs) to be predictive of academic success in medical school. Peskun, Detsky, and Shandling (2007) studied 700 applicants to the Internal Medicine and Family Medicine programs at the University of Toronto. They reported a correlation between GPA (slope= 1.1174, $p < 0.00001$) and MCAT (slope= 0.5352, $p < 0.00001$) with final grade in medical school. Their conclusion confirms that those individuals who commence with successful academic records will be academically successful at the time of graduation. Similarly, Lievens, Ones, and Dilchert (2009) conducted longitudinal

research of medical students throughout a seven-year program. They found that attrition in year one was attributed to a low GPA ($d= 0.96$, $CI= 1.10$). A longitudinal study of Dartmouth medical students found that those students who performed well in one course generally did well in all courses ($p\leq .001$) (Hall & Bailey, 1992). Byrd, Garza, and Nieswiadomy (1999) reported a 77% predictive correlation between pre-nursing GPA and student graduation. Similarly, an article from the profession of nursing published a positive correlation between standardized entrance exam scores and the National Council Licensure Examination-Registered Nurse (NCLEX-RN) ($r= -0.4$, $p= .03$) (Crow, Handley, Morrison, & Shelton, 2004). One published article in the field of emergency medicine reported a higher probability of first-time pass rate on the National Registry cognitive exam for those students that reported a high school class rank in the top 10% ($p< 0.001$) (Fernandez, Studnek, & Margolis, 2008). Albeit research not in health care, a publication from the business world has shown a correlation between verbal ($p< .001$) and quantitative ($p< .01$) GMAT scores and overall GPA (Rothstein et al., 1994). Based on research concluding that high GPA's have correlated with success in academic programs, some have argued to raise the minimum GPA as an admission requirement (Eva & Reiter, 2004).

Although the theory that intelligent individuals will continue to succeed and less intelligent students will fail may make sense superficially, controversy between other published articles indicates that overall intelligence is not always a predictor of future academic achievement. Students are dismissed from allied health care programs every semester despite having met the required minimum grade point average (Sadler, 2003). Lievens, Ones, and Dilchert (2009) concluded that first year attrition rates can be linked to overall GPA in medical students. However, poor grades do not appear to make a difference after year one. Since multiple students were dismissed from the program after year one, the authors concluded that

other variables are associated with poor performance. The authors also examined personality factors which will be discussed in a later subsection of this chapter.

Specific course grade point average. The question of whether or not prerequisite courses best predict academic success in a specific allied health field remains controversial. A publication from the Dartmouth Medical School found a statistically significant correlation ($r = .221-.357, p \leq .001$) between high science GPAs with higher grades in the first year of medical school (Hall & Bailey, 1992). A literature review of nursing students revealed those who obtained one or more Cs during the didactic portion of their schooling were more likely to fail their board certification (Crow et al., 2004). A published article by Tipton et al. (n.d.) confirmed the hypothesis through paired- t tests that there was an association between grades in nursing courses and success on the NCLEX-RN (79.8 compared to 77.05). Simon, McGinnis, and Krauss (2013) reported mixed conclusions from preclinical and clinical course grades from other researchers. Their study concluded biology ($p = .003$), chemistry ($p = .020$), and GPA ($p = .001$) were the three factors that predicted overall success in a nursing program. However, a study from Australian Medical School suggested that students with little background in biology ($p = .003$) were not disadvantaged when compared to their peers who concentrated in science (Groves, Gordon, & Ryan, 2007). No other pre-program course work was found to be statistically significant, which is similar to findings by other researchers (Davenport, 2007; Yoho, Young, Adamson, & Britt, 2007). Since strict academic variables cannot accurately predict student retention, “information that provides attitudinal and motivational information may be predictive of attrition” (Sadler, 2003, p. 620).

Nonacademic Variables in Admission Decisions

The ability to make a decision about an applicant based on cognitive variables alone has been subjected to scrutiny. During a keynote address to the Association of American Medical Colleges, Dr. Jordan Cohen warned committees about using academic variables as initial benchmarks (Albanese et al., 2003). Prominent allied health leaders, such as Dr. Cohen, are recognizing the importance of affective qualities and making changes to historical admission processes. Candidates wishing to pursue a career in a specific allied health program may have non-cognitive qualities that are stronger than their academic portfolio indicates (Marrin et al., 2004). By rejecting those individuals who have strong affective domains but weak cognitive scores, admission committees are dismissing the notion that interpersonal characteristics may be just as important as cognitive success (Chamberlain, Catano, & Cunningham, 2005). Individuals who have been deemed worthy of entering a program may not be the best candidates; they might be the ones that have not been rejected for another reason (Doerner & Nowell, 1999).

Interview. One way to gather non-academic information about a medical school candidate is through a formal interview (Albanese et al., 2003). Almost all (99%) of North American medical schools rely on an interview for weeding out candidates (Nayer, 1992). The interview process has been used for decades in order to select those students who are likely to succeed as a future physician (Taylor, 1974). Peskun, Detsky, and Shandling (2007) reported statistically significant results when comparing the interview to class rank in Family Medicine ($p = .0209$) as well as interview score to success in simulated patient exercises ($p = .0234$). The authors suggest the interview is an appropriate method to predict both cognitive and affective domain success early in a candidate's career.

Despite Peskun, Detsky, and Shandling's (2007) publication, the reliability and validity of scoring a medical school interviewee has been scrutinized since the 1970's (Eva & Reiter, 2004). Very often a candidate who receives an invitation for an interview has already passed the initial cut score based on academic merits (Lowe et al., 2013). While no two institutions use the same format for interviewing candidates, the lack of statistically significant results can lead administrators to conclude that interviews are not predictive of academic success (Edwards, Johnson, & Molidor, 1990). Further, Ehrenfeld and Tabak (2000) found that individual or group interview scores were not predictive of attrition in nursing students (5%). Even when an institution uses multiple raters to evaluate, the results prove a lack of inter-rater reliability (Edwards, Johnson, & Molidor, 1990; Meridith, Dunlap, & Baker, 1982; Powis, Neame, Bristow, & Murphy, 1988). Historical evidence published by Litton-Hawes, MacLean, and Hines (1976) suggested that a lack of training on the part of the interviewer led to inefficiencies during the process (Albanese et al., 2003). Smith, Vivier, and Blain (1986) compared academic results of students who participated in an interview to those that did not. The authors reported no statistically significant difference in academic performance ($p = .12$).

Eva and Reiter (2004) acknowledge the problems associated with a one-time interview even when multiple reviewers are evaluating the interviewee. Eva and Reiter (2004) cited a publication by Turnbull, Danoff, and Norman (1996) who reported poor reliability between raters when candidates had multiple interviews. However, Eva and Reiter (2004) argue a predictive quality when more interview stations are incorporated with fewer interviewers in those stations. The authors hypothesize that multiple opportunities to express personal qualities will clearly delineate bad candidates with good interview skills from good candidates with poor interview skills. Placing emphasis on a one-time interview with a candidate may prove

detrimental to a future physician as well as his or her future patients. Individuals who ranked positively for following directions and expectations may also be the physicians who practice inappropriate medicine because they lack the ability to empathize and be creative in their patient care (Lowe et al., 2013). An interview costs a great deal of time and money because of the number of facilitators and the travel costs of the candidates. Less time-intensive and more reliable results can be obtained through individual personality inventories.

Essay. Rather than using a time-intensive process such as an interview, some allied health programs have resorted to requesting an essay for each individual applicant. Wilson and a group of colleagues from the University of Missouri Kansas City (UMKC) prepared their own study about pre-admission criteria after no general conclusions could be made based off existing literature in the field of nursing. Wilson (1999) concluded that essays are more efficient than interviews and did not affect attrition rates. As with the interview process, there are no universal essay topics that admission committees require. Sadler (2003) reported those individuals who described the profession of nursing as an external thought rather than an internal philosophy were more likely to be dismissed. “While there was a significant difference in mean scores on the essays, there was not a point where one could identify which student would complete and which student would not based on the score on his/her admission essay (Sadler, 2003, p. 626). Therefore, basing admission decisions on an essay will not improve retention since a cut score cannot be determined.

Affective Domains in Admission Decisions

Personality is defined as, “the set of emotional qualities, ways of behaving, etc., that makes a person different from other people” (Merriam-Webster Dictionary, 2014). The ability

of a person to adapt to their environmental conditions is determinant by a person's particular personality traits (Morris, 2000). Several personality inventories (Myers-Briggs, Kiersey Temperament Sorter [Morris, 2000], Minnesota Multiphasic Personality Inventory, and M5-50) have been published in order to provide an individual with a description of their natural tendencies. Although a researcher has multiple choices for personality inventories, the five-factor model can be identified in a range of instruments (Costa, Busch, Zonderman, & McCrae, 1986; McCrae, Costa, & Busch, 1986). The five-factor model was originally described in peer reviews from as far back as 1946 by Cattell (Briggs, 1992). Since that time the five-factor model has been cited in multiple research projects and found to be adequate and valid for describing personality dimensions (Bartone, Eid, Johnsen, Laberg, & Snook, 2009; Bolender, 2001; Socha, Cooper, & McCord, 2010). "The five-factor model is the model of choice for the researcher wanting to represent the domain of personality variables broadly and systematically" (Briggs, 1992, p. 254).

Psychologists have argued about the facets of personality for hundreds of years (Morris, 2000). From as far back as the 1800's, Carl Jung explained that people have natural tendencies that remain stable throughout a person's life (Benjamin, 2006). Bullimore (1992) suggests that personality is determined by the age of 18 indicating that a person has developed their moral and ethical aptitude well before they reach higher education. Age, however, should not be the only criterion for moral development (Lowe et al., 2013). Lievens, Ones, and Dilchert (2009) suggest that as a medical student progresses from procedural knowledge to clinical application, personal qualities alter because the demands have changed. Having opportunities to practice moral decision making skills may be just as important as biological progression (Crisham, 1981;

Morris, 2000; Self, Baldwin, & Wolinsky, 1992). In fact, Lowe et al. (2013) argues that participating in a formal education can broaden a person's moral reasoning beyond the age of 18.

No personality type is necessarily better than another. However, researchers have attempted to link personality types with success in academic and employment settings. It would stand to reason that those individuals who strive for excellence should achieve academic success (Rothstein et al., 1994). Ferguson, James, & Madeley (2002) concluded a contradiction to Rothstein et al.'s research indicating that those individuals who had more stress due to striving for excellence performed worse in the academic setting. Because of contradictory published studies, it is clear that more research is needed in regards to personality to make conclusions about admission to academic programs or employment recommendations.

Since faculty members and employers are trying to find the best candidates for academic programs or employment settings, it is necessary to define and discuss the role of personality for decision making purposes. Early publications examining the relationship between personality and job performance were using similar names of personalities but defining them differently (Barrick, Mount, & Judge, 2001). General definitions and aspects of each personality trait from the five-factor model for the current research project are presented in the following paragraphs.

Neuroticism. Neuroticism is defined as a person's tendency to become upset during a life event (Lievens, Ones, & Dilchert, 2009). Individuals who are neurotic are typically described as emotionally unstable; thus, having low scores on student professionalism scales ($r = -.27, p < .05$) (Chamberlain, Catano, & Cunningham, 2005). Neuroticism has been shown to predict job performance in public safety domains such as police ($p = .001$) (Barrick, Mount, & Judge, 2001). Through Barrick, Mount and Judge's (2001) second-order meta-analysis, they also showed statistically significant results for training performance ($p = .001$) and teamwork ($p =$

.001). Individuals who are labeled as neurotic tend to be the people unable to work with others. Students reluctant to work with others during their academic career frequently struggled academically in the first two years of medical school as they tended to express concern about the ability to study in a group setting (Dolan, Mallot, & Emery, n.d.). However, neurotic individuals are often leaders who accomplish tasks even though they disregard others. Should a program dismiss an applicant because of their tendency to be neurotic, they could potentially lose a candidate that could be the leader in a particular field (Lowe et al., 2013). The current research analyzed the neurotic personality trait due to the published research about poorer academic scores with the potential of being a leader in a respective field.

Extraversion. Extraversion is defined as a person's tendency for happiness and seek external stimulation. Extraverts tend to be the people who enjoy crowds and group dynamics (Barrick, Mount, & Judge, 2001; Lievens, Ones, & Dilchert, 2009). Publications about extraverts have concluded that they tend to do poorly on assessments and academic settings most likely because they spend time socializing (Chamorro-Premuzic & Furnham, 2003; Rolfhus & Ackerman, 1999). Rolfhus and Ackerman (1999) recruited 143 college students from the University of Minnesota to participate in knowledge and personality inventories. When comparing personality to knowledge-based questions, extraversion was a negative predictor of success in all but one category- Art ($p \geq .05$). Introverts are better able to concentrate and remain on task. Extraverts are more likely to succeed academically when they are interested in the topic (Furnham & Monsen, 2008). Extraversion is a negative predictor of performance in medical school. However, along with conscientiousness and openness, it is a positive predictor of graduate success (Lievens, Ones, & Dilchert, 2009). Research has produced mixed results when comparing extraversion to leadership performance (Chamberlain, Catano, & Cunningham, 2005;

Martin, Montgomery, & Saphian, 2005). McCormack and Mellor (2002) reported a high score in extraversion often leads to a low score in leadership abilities whereas Bartone et al. (2009) reported the opposite in United States military cadets ($p \leq .05$). Barrick, Mount, and Judge (2001) published similar results to Bartone et al. (2009) indicating police occupations showed a positive relationship between extraversion and job performance ($p = .001$).

Openness. Openness describes a person's tendency to imagine and produce original work rather than restricting themselves to rules or rubrics (Lievens, Ones, & Dilchert, 2009). A general characterization of this type of individual is the artist who can create and provide insight (Barrick, Mount, & Judge, 2001). Research has produced mixed conclusions on the validity of predicting academic performance based on the personality trait of openness. Some have argued that because of their ability to think beyond the scope of an assignment, these personalities tend to score better on intellect assessments (Bickle, 1996; Goff & Ackerman, 1992). Farsides and Woodfield (2002) compared 432 students who had completed their third year of undergraduate education at Sussex University. By using Spearman rho statistics to compare the five-factor model to verbal IQ, spatial IQ and other factors not relevant to the current research, they concluded openness was positively correlated with verbal IQ ($p = .001$). Other research has suggested that openness does not predict how an individual will perform academically in medical school ($p = .02$). However, the validity of openness increases as a student progresses throughout a seven-year medical school program (Lievens, Ones, & Dilchert, 2009). The breadth of the openness trait makes it difficult to draw conclusions and produce consistent results (Barrick, Mount, & Judge, 2001; Hough, 1992). Chamberlain, Catano, and Cunningham (2005) report that openness did not predict criterion defined for the workplace except for the narrow facet of actions ($r = .22$). This publication confirmed the secondary meta-analysis performed by Barrick,

Mount, and Judge (2001) which indicated openness was not relevant to specific work demands ($p = .33$). Openness was not one of the affective domains included in the current research.

Agreeableness. Agreeableness describes a person's tendency to behave in socially acceptable norms and assist others during a time of need. People who are agreeable tend to care about their peers and display affection (Barrick, Mount, & Judge, 2001; Lievens, Ones, & Dilchert, 2009). Individuals who are agreeable have the ability to empathize with others, which is a quality important in the clinical experiences of an allied health care program (Gough et al., 1991). Farsides and Woodfield (2003) were able to show a comparison between agreeableness and final academic grades in 423 British university students ($t = 2.82, p \leq .005$). Chamberlain, Catano, and Cunningham (2005) found a correlation between agreeableness with didactic ($r = .30$) performance in dental students. These authors concluded that the best dentists are those who show compassion, which is one of the subtraits of agreeableness. Barrick, Mount, and Judge (2001) did not find a correlation between agreeableness and job performance in their meta-analysis report ($p = .34$).

Conscientiousness. Conscientiousness relates to dependability and control over a given situation (Barrick, Mount, & Judge, 2001). These people tend to be goal-oriented and persevere during stressful events. Of all of the five-factor personality traits, conscientiousness has produced the most consistent research when comparing this dimension to academic performance (Chamberlain, Catano, & Cunningham, 2005; Lievens, Ones, & Dilchert, 2009; Martin, Montgomery, & Saphian, 2005). This trait is a moderate predictor of medical school performance and eventually becomes a strong predictor of performance in the final year of medical school (Lievens, Ones, & Dilchert, 2009). It has also shown validity for predicting leadership abilities both in academic and employment settings (Barrick & Mount, 1991; Barrick,

Mount, & Judge, 2001; Bartone et al., 2009). Conscientious people tend to perform well in their preferred occupation and find success that requires interpersonal associations (Barrick & Mount, 1991; Lievens, Ones, & Dilchert, 2009; Tett, Jackson, & Rothstein, 1991).

Multi-dimensional. Lievens, Ones, and Dilchert (2009) studied participants throughout their seven year academic career in medical school. The authors made conclusions about each personality trait and compared the five-factors to academic success. They found the largest change in predictive value for extraversion suggesting that people displaying warmth, assertive, and excitement-seeking characteristics score poorly in early years but score positively when completing clinicals with patients. These results are similar to what was found for openness and agreeableness. People that tend to be extraverted, open, and agreeable are more likely to understand their patients and empathize thus having greater success in clinical venues. Conscientiousness was the one personality trait that was predictive of both early and late medical school success. “The more proactive conscientiousness traits appeared to better predict medical school performance than inhibitory traits” (Livens, Ones, & Dilchert, 2009, p. 1524). Neuroticism was the only personality trait that the authors found little predictive value for any of the seven years in medical school.

Development of inclusion criteria in Paramedic Entrance Exam (EE). Research has been conducted that omits aspects of the Big Five in order to focus on specific traits. For example, Tyssen et al. (2007) omitted agreeableness and openness in their study examining stress levels of medical students. They cited four articles which concluded neuroticism, conscientiousness, and extroversion form the basis of genetics and the other two were not relevant. A recent article described higher levels of stress in those individuals that had neurotic and conscientious traits (Tyssen et al., 2007). Page (2013) and other content experts in the field

of emergency medicine have chosen to focus on the personality traits of agreeableness, conscientiousness, and neuroticism in paramedic students. Early results indicate that the more agreeable and conscientious a student, the less neurotic an individual is likely to be ($r = .49$). This study also concluded a correlation between neurotic students and poor cognitive scores ($p < .01$). However, there were outliers indicating some neurotic individuals can produce high academic scores. More research similar to Page et al.'s (2013) initial abstract is needed for further analysis.

Fisdap® Examinations

Fisdap® commenced as a grant-funded project in 1997 first known as Field Internship Student Data Acquisition Project (FISDAP). Originally the project focused on the clinical component of paramedic students' clinical performance. It has since turned into a brand company name which also provides reliable and validated test questions written by Subject Matter Experts (SMEs) from around the country. Fisdap® provides the following assessments for paramedic students: entrance, formative, and summative.

Paramedic Entrance Exam (EE). The Paramedic Entrance Exam (EE) was established and released as an EMS-specific assessment for program administrators to test prospective paramedic students. The assessment was pilot tested for one year by 1,038 students in 29 states to obtain content validity (Page et al., 2013). The EE continues to be modified based on feedback from administrators and faculty members regarding the minimum competencies that should be established for prospective paramedic students (Page et al., 2013). As such, the exam is still in its infancy and waiting on projects such as the current research in order to establish additional content, recalibration of items, and a positive predictive value (Romero & Bowen, 2012).

M5-50 Questionnaire. Although a researcher has multiple options for personality inventories, the five-factor model (M5-50) can be identified in a range of instruments (Costa, Busch, Zonderman, & McCrae, 1986; McCrae, Costa, & Busch, 1986). The five-factor model was originally described in peer reviews from as far back as 1946 by Cattell (Briggs, 1992). Since that time the five-factor model has been cited in multiple research projects and found to be adequate and valid for describing personality dimensions (Bartone, Eid, Johnsen, Laberg, & Snook, 2009; Bolender, 2001; Socha, Cooper, & McCord, 2010). Positively and negatively worded statements for each of the identified personality traits (agreeableness, conscientiousness, and neuroticism) are presented to participants. They are asked to respond on a “5-point Likert-type scale ranging from 1 inaccurate to 5 accurate with a neutral midpoint” (McCord, 2002, p. 1). “The five-factor model is the model of choice for the researcher wanting to represent the domain of personality variables broadly and systematically” (Briggs, 1992, p. 254).

Paramedic Readiness Exam 3 (PRE3). The Paramedic Readiness Exam 3 (PRE3) is a comprehensive, cognitive examination offered through Fisdap® for paramedic programs around the nation. Most educators use these assessments as a summative exam prior to allowing students to attempt the National Registry of Emergency Medical Technicians® Cognitive Exam (NREMTCE). The National Registry® consists of both cognitive and psychomotor exams, which students must pass in order to become a recognized Nationally Registered® provider. The PRE3 was pilot-tested with a group of geographically and gender diverse paramedic students (n=1040). The test was able to accurately “distinguish proficient learners from weak learners” (Fisdap®, 2013).

The term validity refers to the capacity to which results indicate the stated purposes (Gall, Gall, & Borg, 2007). For example, in this case, validity would indicate whether these exams

effectively evaluate the proficiency of paramedic students in the domains of cardiology, airway management, OB/Gyn and peds, operations, trauma, medical emergencies, ECG interpretation, and total score. Both exams were written and reviewed by Subject Matter Experts (SMEs) in the field of pre-hospital medicine. The exams were developed “according to the Standards for Educational and Psychological Testing of the American Psychological Association and adheres to the National EMS Practice Analysis developed by the NREMT” (Fisdap®, 2013). The PRE3 was pilot tested over a period of two years and proved to be valid as described below.

One initiative of Fisdap® is to develop formative and summative assessment tools that are predictive of paramedic student success. In order to provide pre-hospital program administrators and faculty with tools that are predictive of success, the experts at Fisdap® have compared the results of their comprehensive, cognitive assessments to first-time pass rates of the NREMTCE. From a total of 53 programs in 25 different states, 379 students reported their results. From this information, Fisdap® experts calculated a Positive Predictive Value (PPV). “A cut score is the score that separate passing examinees from failing examinees; examinees that meet or exceed the cut score pass the exam” (Fisdap®, 2013, p. 3). The Angoff cut score was published by Fisdap® suggesting a minimum percentage for subcategories and overall total that examinees should obtain. “97.3% of student passing the Paramedic Readiness Exam 3 (PRE3) with a 73% or higher also passed the National Registry cognitive exam on the first attempt” (Fisdap®, 2013, p. 2).

Summary

Basing admission decisions solely on either cognitive or affective domains would be a dis-service to future applicants in any profession (Morris, 2000). Those individuals responsible

for compiling admission information may be wasting time, energy, and resources when a few components of an algorithm are enough to produce valid results (Norman, 2004). The research mentioned in the aforementioned sections reveals that more analysis is needed in cognitive and affective domains for pre-hospital settings before recommendations can be given for professionals in emergency medical services.

Chapter Three:

Methods

Introduction

The purpose of this study was to explore the relationship of affective domains to cognitive scores in entrance and exit examinations of paramedic students (Fisdap, 2013). Comparing the results of affective domains to areas of cognition should enable administrators in pre-hospital health care systems to make admission decisions based on evidence-based research rather than intuition. Identifying the candidates who have a higher probability of success for completing an academic program with the potential to eventually contribute to the profession is necessary for development of emergency medical service programs. Figure 1 provides a graphic illustration of the sequence of examinations used for paramedic students' application and exit from their program of study.

Figure 1 portrays that prospective applicants take the EE prior to beginning a paramedic curriculum. Once an administrator in EMS determines that a student has completed all academic course work, students are allowed to complete PRE3. Fisdap® has published a cut score for the PRE3 which separates passing examinees from failing examinees. The Angoff cut score was established suggesting a minimum percentage for sub-categories and overall total. Paramedic program administrators are expected to enforce the published cut scores to maximize first-time pass rates on the National Registry® of Emergency Medical Technicians cognitive exam (Fisdap®, 2013).

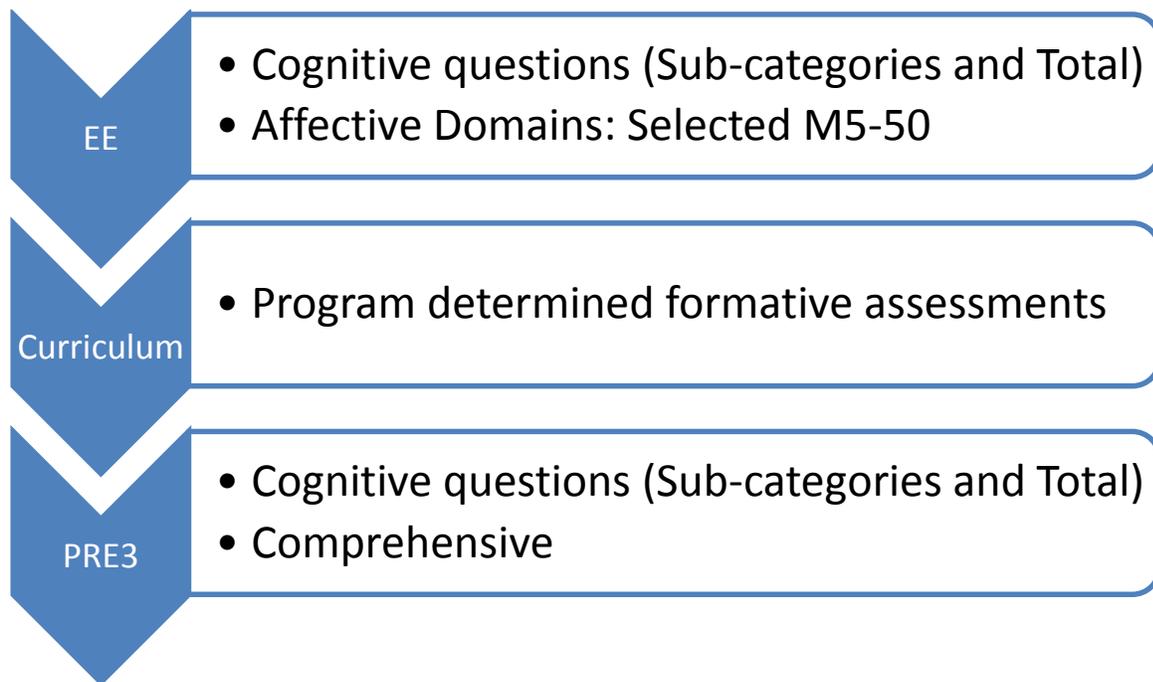


Figure 1

Sequence of Examinations

Research Questions

Based on a comprehensive review of literature in emergency medical services and other allied health care professions, the following research questions were developed:

Research Question One (RQ₁): What is the relationship between paramedic students' selected affective domains and the cognitive sub-categories (anatomy, Emergency Medical Technician-Basic [EMT-B], information/expository reading at 11th grade level, narrative reading at 9th grade level, math, and physiology) of the paramedic Entrance Exam (EE)?

Research Question Two (RQ₂): What is the relationship between paramedic students' selected affective domains and the cognitive total score of the paramedic Entrance Exam (EE)?

Research Question Three (RQ₃): What is the relationship between paramedic students' selected affective domains and the cognitive sub-categories (airway management, cardiology, medical emergencies, OB/Gyn and peds, operations, trauma) of the comprehensive Paramedic Readiness Exam 3 (PRE3)?

Research Question Four (RQ₄): What is the relationship between paramedic students' selected affective domains and the cognitive total of the comprehensive Paramedic Readiness Exam 3 (PRE3)?

Participants

This study was designed to analyze quantitative, retrospective data from de-identified, consenting paramedic students that are enrolled in a paramedicine curriculum that utilizes Fisdap® for assessment purposes. A convenience sample was selected of paramedic programs from around the nation (Gall, Gall, & Borg, 2003). Fisdap® started in 1997 as a national tracking system for paramedic student internship experience. In addition, the company now provides validated examinations for formative and summative assessments (Salzman, Dillingham, Kobersteen, Kaye, & Page, 2006). Participation in a pre-hospital academic program is voluntary as well as student involvement in data collection. Students were able to choose whether his/her clinical and assessment data may be utilized for research and publishing purposes when the individual initially establishes their account through Fisdap®.

Data regarding all participants who completed the paramedic EE with affective domains and the comprehensive, Paramedic Readiness Exam 3 (PRE3) were included for the current research project. The testing environment and procedures were standardized, although they will not have been externally monitored for two reasons. First, this was an ex post facto study; the

data had been gathered through standard testing instructions at multiple sites. Therefore, the testing conditions were beyond the researcher's control. Second, the tests and guidelines for confidentiality, implementation conditions, and any time limits are familiar to the institutions and were distributed with the instruments. Therefore, it was expected that educators and administrators at respective institutions aptly monitor the students for behaviors consistent with the test guidelines for confidentiality, implementation, and time limits.

Instrumentation: Fisdap® Testing

Three existing instruments and assessments which are part of Fisdap® testing were used in this study. This section describes these three instruments: the paramedic Entrance Exam (EE), M5-50 Questionnaire, and the Paramedic Readiness Exam 3 (PRE3). The section following this one discusses the instrumentations' validity and reliability.

Fisdap® Paramedic Entrance Exam (EE). Fisdap® serves as a reputable organization for providing data to answer the research questions and includes validated questions written and reviewed by content experts in emergency medical services (Salzman et al., 2008). Assessments that are utilized in other allied health programs have shown to have little predictive value in paramedic students' success (Page et al., 2013). Individuals that partake in the paramedic EE offered through Fisdap® are asked to respond to items pertaining to cognitive variables and affective domains. The academic variables include: math (16), narrative 9th grade reading level (8), information/expository 11th grade reading (8), anatomy (13), physiology (17), and Emergency Medical Technician-Basic (EMT-B) level thinking (30). Since the exam incorporates anatomy, physiology, and EMT-B-specific questions, it is proposed that the exam provided profession-specific information about a candidate. Students were asked multiple-

choice questions with five options for each of the aforementioned categories. The answer was recorded and was posted as a percentage in that particular domain as well as incorporated into the total score (Romero & Bowen, 2012).

M5-50 Questionnaire. Personality traits were evaluated based on the results from the M5-50 Questionnaire developed to ask respondents specifically about: agreeableness, conscientiousness, neuroticism, openness, and extraversion (McCord, 2002; Socha, Cooper, & McCord, 2010). (These traits are referred to in the field of psychology as “the Big Five.”) McCrae and John (1992) reported three characteristics of using a tool based on the Big Five: 1) it integrates various personality dimensions, 2) it is comprehensive allowing for exploration of relationships between personalities, and 3) it is efficient because it explores so many personality factors with only five scores.

Page et al. (2013) determined that three of the five personality traits were important specifically for prospective paramedic students. Agreeableness, conscientiousness, and neuroticism “may have utility in predicting elements of caring or empathetic behaviors” (Page et al., 2013, p. 1). The paramedic Entrance Exam provided 10 statements for each of the three traits relating to agreeableness, conscientiousness, and neuroticism. Each trait had five positively and five negatively worded statements. Students were asked to respond to each of the 30 statements with a Likert-type scale ranging from very inaccurate to very accurate (see Appendix A for sample items).

Fisdap® Paramedic Readiness Exam 3 (PRE3). The PRE3 was developed after subject matter experts updated questions from the first exam (Blue) in order to ensure appropriate questions were being asked based on medical advances. The PRE3 exam has been used since March 1, 2013 as the preferred comprehensive assessment for paramedic students.

The PRE3 asks 200 multiple-choice questions related to the following categories: airway management (32), cardiology (35), medical emergencies (33), Ob/Gyn and peds (35), operations (30), and trauma (34). Students were asked multiple-choice questions with five options for each of the aforementioned areas. The total score of the number of correct answers is reported, and then also calculated as a percentage out of 200 possible points.

Alignment of Research Questions and Instruments

It is essential in research to assure the research plan is comprehensive and yet not overreaching. That is, the American Psychological Association (2010) ethical guidelines demand that all data being gathered will be used to answer research questions. In addition, in order to avoid delays in data analysis, this evaluation ensures that the data sought was sufficient for the task.

In order to clarify which of the study's instruments and questions provided data for each of the study's research questions, Table 2 presents this information in a concise format. This table aligns each of the study's research questions with the specific information (or instruments), sub-categories, and the relevant question numbers.

Reliability, Validity, and Cut Scores

Paramedic Entrance Exam (EE). The Paramedic Entrance Exam (EE) was established and released as an EMS-specific assessment for program administrators to test prospective paramedic students. The assessment was pilot tested for one year among 1,038 students in 29 states to obtain content validity (Page et al., 2013). The EE continues to be modified based on

Table 2*Alignment of Research Questions with Examination, Sub-categories, and Item Number*

Research Question	Examination	Sub-Categories	Item Number
Research Question One (RQ ₁): What is the relationship between paramedic students' selected <u>affective</u> domains and the <u>cognitive</u> sub-categories (anatomy, Emergency Medical Technician-Basic [EMT-B], information/expository reading at 11 th grade level, narrative reading at 9 th grade level, math, and physiology) of the paramedic Entrance Exam (EE)?	M5-50 (included as a part of the EE)	Agreeableness, conscientiousness, neuroticism	17040-17069
	Entrance Exam	Anatomy, EMT-B, Information reading, Narrative reading, Math, Physiology	16911-17028
Research Question Two (RQ ₂): What is the relationship between paramedic students' selected <u>affective</u> domains and the <u>cognitive</u> total score of the paramedic Entrance Exam (EE)?	M5-50 (included as a part of the EE)	Agreeableness, conscientiousness, neuroticism	17040-17069
	Entrance Exam	Total score of all sub-categories	Total score= # correct/92
Research Question Three (RQ ₃): What is the relationship between paramedic students' selected <u>affective</u> domains and the <u>cognitive</u> sub-categories (airway management, cardiology, medical emergencies, OB/Gyn and peds, operations, trauma) of the comprehensive Paramedic Readiness Exam 3 (PRE3)?	M5-50 (included as a part of the EE)	Agreeableness, conscientiousness, neuroticism	17040-17069
	PRE3	Airway management, Cardiology, Medical emergencies, OB/Gyn and peds, Operations, Trauma	839-16459
Research Question Four (RQ ₄): What is the relationship between paramedic students' selected <u>affective</u> domains and the <u>cognitive</u> total of the comprehensive Paramedic Readiness Exam 3 (PRE3)?	M5-50 (included as a part of the EE)	Agreeableness, conscientiousness, neuroticism	17040-17069
	PRE3	Total score of all sub-categories	Total Score= # correct /200

feedback from administrators and faculty members regarding the minimum competencies that should be established for prospective paramedic students (Page et al., 2013). As such, the exam is still in its infancy and waiting on projects such as the current research in order to establish additional content, recalibration of items, and a positive predictive value (Romero & Bowen, 2012).

M5-50 Questionnaire. Although a researcher has multiple options for personality inventories, the M5-50 can be identified in a range of instruments (Costa, Busch, Zonderman, & McCrae, 1986; McCrae, Costa, & Busch, 1986). The five-factor model was originally described in peer reviews from as far back as 1943 by Cattell (Briggs, 1992). The M5-50 is based on numerous publications describing personality as five major factors: agreeableness, conscientiousness, extraversion, openness, and neuroticism. The emergence of classifications has been validated and replicated by several authors over a lengthy period of time (1943 to present date) (Barrick & Mount, 1991). Since that time the five-factor model has been cited in multiple research projects and found to be adequate and valid for describing personality dimensions (Bartone, Eid, Johnsen, Laberg, & Snook, 2009; Bolender, 2001; Socha, Cooper, & McCord, 2010).

In the M5-50 positively and negatively worded statements for each of the selected personality traits (agreeableness, conscientiousness, and neuroticism) were presented to participants. They were asked to respond on a “5-point Likert-type scale ranging from 1 inaccurate to 5 accurate with a neutral midpoint” (McCord, 2002, p. 1). “The five-factor model is the model of choice for the researcher wanting to represent the domain of personality variables broadly and systematically” (Briggs, 1992, p. 254).

Paramedic Readiness Exam 3. The Paramedic Readiness Exam 3 (PRE3) is a comprehensive, cognitive examination offered through Fisdap® for paramedic programs around the nation. Most educators use this assessment as a summative exam prior to allowing students to attempt the National Registry of Emergency Medical Technicians® Cognitive Exam (NREMTCE). The National Registry® consists of both cognitive and psychomotor exams, which students must pass in order to become a recognized Nationally Registered® provider. The PRE3 was pilot-tested with a group of geographically and gender diverse paramedic students (n=1040). The test was able to accurately “distinguish proficient learners from weak learners” (Fisdap®, 2013, p. 1).

The term validity refers to the capacity to which results indicate the stated purposes (Gall, Gall, & Borg, 2007). For example, in this case, validity referred to whether the exams effectively evaluated the proficiency of paramedic students in the domains of cardiology, airway management, OB/Gyn and peds, operations, trauma, medical emergencies, ECG interpretation, and total score. Both exams were written and reviewed by Subject Matter Experts (SMEs) in the field of pre-hospital medicine. The exams were developed “according to the Standards for Educational and Psychological Testing of the American Psychological Association and adheres to the National EMS Practice Analysis developed by the NREMT” (Fisdap®, 2013, p. 3). The PRE3 was pilot tested over a period of two years and proved to be valid as described below.

One initiative of Fisdap® is to develop formative and summative assessment tools that are predictive of paramedic student success. In order to provide pre-hospital program administrators and faculty with tools that are predictive of success, the experts at Fisdap® have compared the results of their comprehensive, cognitive assessments to first-time pass rates of the NREMTCE. From a total of 53 programs in 25 different states, 379 students reported their

results. From this information, Fisdap® experts calculated a Positive Predictive Value (PPV). “A cut score is the score that separate passing examinees from failing examinees; examinees that meet or exceed the cut score pass the exam” (Fisdap®, 2013, p. 3). The Angoff cut score was published by Fisdap® suggesting a minimum percentage for subcategories and overall total that examinees should obtain. “97.3% of student passing the Blue Paramedic Exam with a 73% or higher also passed the National Registry cognitive exam on the first attempt” (Fisdap®, 2013, p.2).

Procedures

Prior to compiling data, this research study was approved by the University of South Florida Human Research Protection Program (HRPP). Student consent for the use of data in research has been obtained by Fisdap®. Upon initiating their log-in information to complete the exams, each student provided permission for his/her data to be used in research and publications.

Extended discussions transpired between the researcher and the developers at Fisdap® who are located in St. Paul, Minnesota. Arrangements were made to receive deidentified, raw data from respondents’ paramedic EE and PRE3 scores once all approvals had been received. The following inclusion criteria were abstracted from the database from students who participated in both the EE and PRE3 from March 2013 to May 2014: 1) total and subcategory cognitive scores on the paramedic EE, 2) personality trait results for agreeableness, conscientiousness, and neuroticism from the M5-50, 3) total and subcategory cognitive scores on the PRE3. Only first-time exam scores will be extrapolated from the EE and PRE3.

Research Design

The design of this study was retrospective using quantitative, descriptive, and correlational data from prospective paramedic students. Quantitative research is appropriate for the current project as it will provide continuous scores for the three instruments (Gall, Gall, & Borg, 2007). Descriptive statistics were reported for predicting cognitive success based on cognitive and affective domains. All four research questions used correlational research statistics because they were attempting to find relationships between the affective domains and cognitive performance. The advantage of using a correlational design is that it considers relationships for a large number of variables (Gall, Gall, & Borg, 2007). Table 3 provides a matrix to compare the cognitive components of each of the examinations in this study. This table illustrates where correlations were determined among the many variables.

Table 3

Matrix of Affective and Cognitive Relationships

	Agreeableness	Conscientiousness	Neuroticism
Entrance Exam (EE)			
Anatomy			
EMT-B			
Information Reading			
Narrative Reading			
Math			
Physiology			
Total			
Paramedic Readiness Exam 3 (PRE3)			
Airway Mangement			
Cardiology			
Medical Emergencies			
OB/Gyn & Peds			

Table 3 (continued)

Matrix of Affective and Cognitive Relationships

	Agreeableness	Conscientiousness	Neuroticism
Operations			
Trauma			
Total			

Developers at Fisdap® provided de-identified data for students that consented to having their data used for research purposes when they initially created their account. The data was provided in an Excel spreadsheet sent directly from Fisdap® to the author. Once received, the data was reviewed to ensure all categories have been incorporated. It was intended that cognitive information from the paramedic EE and PRE3 as well as affective domain data was included. If any data is missing from a participant, all information pertaining to that participant was eliminated in its entirety. Only data sets which included all essential elements were used for the analysis.

Analysis

Data were entered into SPSS (v. 22, 2013) for statistical calculation. Statistical tests were executed to include descriptive and correlations in order to provide answers to the research questions. Table 4 displays the alignment of this study’s research questions, examination, sub-categories, item number, and analysis method for the reader’s ready reference.

Table 4

Alignment of Research Questions with Examination, Sub-categories, Item Number, and Statistical Analysis

Research Question	Examination	Sub-categories	Item Number	Statistical Analysis
Research Question One (RQ ₁): What is the relationship between paramedic students' selected <u>affective</u> domains and the <u>cognitive</u> sub-categories (anatomy, Emergency Medical Technician-Basic [EMT-B], information/expository reading at 11 th grade level, narrative reading at 9 th grade level, math, and physiology) of the paramedic Entrance Exam (EE)?	M5-50 (included as a part of the EE)	Agreeableness, conscientiousness, neuroticism	17040-17069	Correlation
	Entrance Exam	Anatomy, EMT-B, Information reading, Narrative reading, Math, Physiology	16911-17028	
Research Question Two (RQ ₂): What is the relationship between paramedic students' selected <u>affective</u> domains and the <u>cognitive</u> total score of the paramedic Entrance Exam (EE)?	M5-50 (included as a part of the EE)	Agreeableness, conscientiousness, neuroticism	17040-17069	Correlation
	Entrance Exam	Total score of all sub-categories	Total score=# correct/92	
Research Question Three (RQ ₃): What is the relationship between paramedic students' selected affective domains and the cognitive sub-categories (airway management, cardiology, medical emergencies, OB/Gyn & peds, operations, & trauma) of the Paramedic Readiness Exam 3 (PRE3)?	M5-59 (included as a part of the EE)	Agreeableness, conscientiousness, neuroticism	17040-17069	Correlation
	Entrance Exam	Airway management, Cardiology, Medical emergencies, OB/Gyn & peds, Operations & Trauma	839-16459	

Table 4 (Continued)

Research Question	Instrument	Sub-categories	Item Number	Statistical Analysis
Research Question Four (RQ ₄): What is the relationship between paramedic students' selected <u>affective</u> domains and the <u>cognitive</u> total of the comprehensive Paramedic Readiness Exam 3 (PRE3)?	M5-50 (included as a part of the EE)	Agreeableness, conscientiousness, neuroticism	17040-17069	Correlation
	PRE3	Total score of all sub-categories	Total Score= # correct /200	

Timeline for Completion

Following approval of the proposal from the proposal committee members, an application for research exemption will be sent to the Human Research Protection Program (HRPP) at the University of South Florida. No data will be collected prior to authorization from HRPP. Once the data has been received from Fisdap®, it will be analyzed using the aforementioned statistical procedures following Electronic Thesis and Dissertation (ETD) guidelines. It is anticipated this work will be completed by the 3rd week of Summer A session. A defense proposal will be scheduled with the proposal committee members. The final steps of the dissertation process will be finalized by the 9th week of Summer A session and final clearance from the ETD no later than four days prior to commencement. Table 5 displays the components of the dissertation and the proposed timeline for completion.

Summary

The purpose of this study was to explore the relationship of affective domains to cognitive scores in entrance and exit examinations of paramedic students (Fisdap, 2013). In

order to examine possible relationships between personality and cognitive performance, a correlational analysis was performed on data obtained from Fisdap®. All data are reported in Chapter 4 and the analysis and conclusions are reported in Chapter 5.

Table 5

Estimated Dissertation Timeline

Dissertation Component	Timeline
Proposal Defense	April 2014
IRB Approval	May 2014
Receive Data from Fisdap®	May 2014
Analysis of Data	May 2014
Write Chapters 4 & 5	May 2014
Review of Dissertation by Editor & Statistician	May 2014
Review & Approval of Dissertation by Major Professor	June 2014
Defend Dissertation to Full Committee	June 2014
Final Edits & Formatting of Dissertation	June 2014
Final Copy of Dissertation	June 2014
ProQuest Submission	July 2014
Graduation	August 2014

Chapter Four:

Results

Introduction

The purpose of this study was to explore the relationship of affective domains to cognitive scores in entrance and exit examinations of paramedic students (Fisdap, 2013). Comparing the results of affective domains to areas of cognition should enable administrators in pre-hospital health care systems to make admission decisions based on evidence-based research rather than intuition. Identifying the candidates who have a higher probability of success for completing an academic program with the potential to eventually contribute to the profession is necessary for development of emergency medical service programs. This ex post facto study aimed to answer the following research questions:

Research Question One (RQ₁): What is the relationship between paramedic students' selected affective domains and the cognitive sub-categories (anatomy, Emergency Medical Technician-Basic [EMT-B], information/expository reading at 11th grade level, narrative reading at 9th grade level, math, and physiology) of the paramedic Entrance Exam (EE)?

Research Question Two (RQ₂): What is the relationship between paramedic students' selected affective domains and the cognitive total score of the paramedic Entrance Exam (EE)?

Research Question Three (RQ₃): What is the relationship between paramedic students' selected affective domains and the cognitive sub-categories (airway management, cardiology,

medical emergencies, OB/Gyn and peds, operations, trauma) of the comprehensive Paramedic Readiness Exam 3 (PRE3)?

Research Question Four (RQ₄): What is the relationship between paramedic students' selected affective domains and the cognitive total of the comprehensive Paramedic Readiness Exam 3 (PRE3)?

Descriptive Statistics

The participants in this study consisted of 131 paramedic students who participated in both the paramedic Entrance Exam (EE) as well as the Paramedic Readiness Exam 3 (PRE3) offered by Fisdap® from August 2012 to August 2013. Data from participants were included if they agreed to have their data used for research purposes and fully participated in all components of the three examinations. Eight records were eliminated from the data that Fisdap® provided because they had identical answers for all 92 cognitive questions. Therefore, raw data from a total of 123 paramedic students from around the nation were included for this quantitative, retrospective study.

The researchers and developers at Fisdap® explained that some educators or administrators purchase a student code in order to preview the types of questions asked on these exams. This practice is not promoted by Fisdap® as the test was developed to provide questions similar to those presented on the National Registry® cognitive exam. Fisdap's® philosophy is that paramedic educators should be teaching content rather than teaching to a particular instrument. The Director of Testing at Fisdap® suggested that the best option was to eliminate those de-identified users who had not attempted the examination for the purposes of which it was developed.

Table 6 provides descriptive statistics regarding the paramedic Entrance Exam (EE) and Paramedic Readiness Exam 3 (PRE3). The three affective domains which are included as a part of the EE are also listed. The range, minimum, maximum, mean, and standard deviations for the three examinations are presented in table format.

Table 6

Descriptive statistics: EE, PRE3, and Affective Domain Scores

	N	Range	Minimum	Maximum	Mean	SD
EE_ANAT*	123	7	5	12	9.84	1.62
EE_EMT*	123	14	15	29	22.72	2.65
EE_INFOREAD*	123	6	2	8	6.64	1.33
EE_MATH	123	8	8	16	13.33	2.16
EE_NARRREAD*	123	6	2	8	6.55	0.89
EE_PHYS	123	8	9	17	14.67	1.68
EE_TOTAL	123	33	53	86	73.76	6.21
PRE_AIR*	123	17	13	30	23.86	3.01
PRE_CARD*	123	19	15	34	25.15	3.62
PRE_MEDEMER*	123	19	12	31	23.54	3.43
PRE_OB*	123	19	15	34	27.80	3.27
PRE_PER*	123	15	10	25	19.76	2.63
PRE_TRAUMA	123	16	14	30	23.33	3.27
PRE_TOTAL	123	73	100	173	143.45	14.29
AGREE*	123	22	18	40	30.50	4.71
CONSC*	123	18	18	36	28.34	4.42
NEUROTIC	123	25	0	25	9.48	5.67

*Due to space constraints, the titles of the sub-categories have been shortened. The full name of the categories are as follows: ANAT=anatomy, EMT= Emergency Medical Technician-Basic, INFORREAD= information/expository reading at the 11th grade level, NARRREAD= narrative reading at the 9th grade level, PHYS= physiology, AIR= airway; CARD= cardiology, MEDEMER= medical emergencies, OB= obstetrics/gynecology and pediatrics, PER= operations, AGREE= agreeableness, CONSC= conscientiousness.

Results of Data Analysis

Correlation analyses were conducted in SPSS (v. 22, 2013) to examine the relationship between affective domains and cognitive scores on the entrance and comprehensive examinations. Bivariate correlational statistics were used to analyze the data because two variables were involved (Gall, Gall, & Borg, 2007). Each of the selected affective domains was compared with a sub-category and total score of both cognitive exams. For example, the score for Agreeableness was compared with the score for Anatomy from the EE. Pearson product-moment correlation coefficients were the appropriate choice of correlational statistics because both variables are expressed as continuous scores. Correlation analyses have been used in other research studies with similar research designs; these studies seek to understand the relationship between two variables including an affective domain and cognitive skill (Barrick & Mount, 1991; Dollinger & Orf, 1991; Hall & Bailey, 1992; Rolfhus & Ackerman, 1999). Another strength of the Pearson product-moment correlation coefficient is that it has the smallest standard error (Gall, Gall, & Borg, 2007). The goal of the four research questions was to measure the magnitude of the relationship between students' scores on affective domains and cognitive tools.

Affective Domains. Personality traits can be evaluated based on the results from the M5-50 Questionnaire developed to ask respondents specifically about: agreeableness, conscientiousness, extroversion, neuroticism, and openness (McCord, 2002; Socha, Cooper, & McCord, 2010). (These traits are referred to in the field of psychology as “the Big Five.”) McCrae and John (1992) reported three characteristics of using a tool based on the Big Five: 1) it integrates various personality dimensions, 2) it is comprehensive allowing for exploration of relationships between personalities, and 3) it is efficient because it explores so many personality factors with only five scores. The emergence of classifications has been validated and replicated

by several authors over a lengthy period of time (1943 to present date) (Barrick & Mount, 1991). Since that time the five-factor model has been cited in multiple research projects and found to be adequate and valid for describing personality dimensions (Bartone, Eid, Johnsen, Laberg, & Snook, 2009; Bolender, 2001; Socha, Cooper, & McCord, 2010).

A Pearson product-moment correlation coefficient was computed to assess the relationship between the three affective domains from the M5-50, which are included in the EE. Table 7 presents the correlation of the affective domains. Agreeableness and Conscientiousness are positively correlated with each other ($r=.400$, $n=123$, $p\leq .001$). In addition, Agreeableness and Conscientiousness are negatively correlated with Neuroticism, respectively ($r= -.391$, $n=123$, $p\leq .001$; $r= -.591$, $n=123$, $p\leq .001$). It can be summarized from these results that an individual who is Agreeable and Conscientious may likely not be Neurotic. Similarly, a student who scores high in the Neurotic domain may likely not be categorized as Agreeable or Conscientious. These results are comparable to the results reported in Dollinger and Orf's (1991) study ($r= -0.31$, $n= 58$, $p\leq .01$) and Farsides and Woodfield's (2003) research ($r= -0.19$, $n= 432$, $p\leq .01$), which concluded that Neuroticism was inversely related to Conscientiousness.

The analysis of the three affective domains through the use of Pearson product-moment correlation coefficients revealed a strong, statistical relationship amongst all three affective domains. The results support previous studies such as Bartone, Eid, Johnsen, Laberg, and Snook (2009); Bolender (2001); and Socha, Cooper, and McCord (2010), which all used the M5-50 for research purposes. By conducting and reporting statistics which show a strong relationship amongst the three affective domains, conclusions are made in Chapter 5 comparing the affective domains to cognitive scores necessary for this research project.

Table 7*Correlations of affective domains (n=123)*

	CONSC	NEUROTIC
AGREE	.400**	-.391**
CONSC		-.519**
* Correlation is significant at the 0.05 level (2-tailed).		
** Correlation is significant at the 0.01 level (2-tailed).		

Cognitive Results Comparison. While not an initial research question specific to this study, an additional Pearson product-moment correlation coefficient was conducted in SPSS (v. 22, 2013) to assess the relationship between the paramedic Entrance Exam (EE) and the Paramedic Readiness Exam 3 (PRE3). The decision to add the emergent question was made because there is a limited amount of research in emergency medical services education; thus, it was important to justify the use of the two cognitive exams (Page, Stanke, & Bowen, 2013). Results indicate the entrance and exit exams are significantly related ($r=.502$, $n=123$, $p\leq .001$). Due to the strong relationship, the results support the comparison of the two cognitive examinations for the current research project.

Research Questions 1 and 2. The relationship between selected affective domains and cognitive scores in the EE for paramedic students was conducted using Pearson product-moment correlations. In regards to Research Question 1, there was no statistically significant relationship between affective domains and cognitive scores of the sub-categories of the EE. One example of the results is the lack of statistical significance between Agreeableness and Anatomy ($r= -0.002$, $n=123$, $p= .982$). All other relationships can be referenced in Table 8. Similarly, there was no statistically significant relationship between Agreeableness ($r= 0.007$, $n=123$; $p=.395$), Conscientiousness ($r= 0.026$, $n=123$, $p=.776$), Neuroticism ($r= -0.127$, $n=123$, $p=.158$) and the

total score of the EE, which answers Research Question 2. Table 8 graphically displays the relationship between the affective domains and the cognitive sub-categories and total of the EE.

There is a statistically positive relationship between all cognitive sub-categories (anatomy, EMT-B, informational reading, math, narrative reading, and physiology) and the total score of the paramedic Entrance Exam (EE). Table 8 graphically displays the relationship between the sub-categories and total. Most of the sub-categories reveal a statistically positive relationship with each other. There does not appear to be a pattern between those sub-categories which are statistically significant and those that are not. For example, there is a statistically positive relationship between informational reading and math ($r = .330$, $n = 123$, $p \leq .01$) but not between narrative reading and math ($r = .014$, $n = 123$, $p \geq .05$).

One relationship which is not statistically significant is informational reading and narrative reading ($r = 0.162$, $n = 123$, $p \geq .05$). This lack of statistical significance should be highlighted since it would be assumed that an individual who scores well in one reading category would do similarly well in the other reading category. Additional research needs to be completed on the two categories before further conclusions can be drawn.

Research Questions 3 and 4. The relationship between selected affective domains and cognitive scores in the exit examination (PRE3) for paramedic students was conducted using Pearson product-moment correlations. In regards to Research Question 3, there was no statistically significant relationship between affective domains and cognitive scores of the sub-categories of the PRE3. One example of the results is the lack of statistical significance between Agreeableness and Airway ($r = 0.036$, $n = 123$, $p = .695$). All other relationships can be referenced in Table 9. Research Question 4 also showed no relationship between Agreeableness ($r = 0.051$,

Table 8*Correlations of EE scores (n=123)*

	AGREE	CONSC	NEUR	EE_EMT	EE_IREAD	EE_MATH	EE_NREAD	EE_PHYS	EE_TTL
EE_ANAT	-0.002	0.111	-0.069	.213*	.159	.277**	.177*	.505**	.644**
EE_EMT	0.153	-0.049	-0.043		.102	.175	.281**	.147	.645**
EE_IREAD	-0.029	-0.042	-0.013			.339**	0.162	.259**	.510**
EE_MATH	0.012	-0.048	-0.135				0.014	.231*	.632**
EE_NREAD	-0.028	0.058	-0.087					.198*	.403**
EE_PHYS	0.069	0.130	-0.110						.629**
EE_TTL	0.077	0.026	-0.128						

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

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

Due to space constraints, the titles of the sub-categories have been shortened. The full name of the categories are as follows: ANAT= anatomy; EMT= Emergency Medical Technician- Basic, IREAD= information/expository reading at the 11th grade level, NREAD= narrative reading at the 9th grade level, PHYS= physiology, TTL= total, AGREE= agreeableness, CONSC= conscientiousness, NEUR= neuroticism.

n=123, $p= .572$), Conscientiousness ($r= -0.047$, n=123, $p= .608$), Neuroticism ($r= -0.105$, n=123, $p= .249$), and the total score on the PRE3.

Similar to the results from the paramedic Entrance Exam (EE), there is a statistically positive relationship between all cognitive sub-categories (airway management, cardiology, medical emergencies, OB/gyn and peds, operations, and trauma) and the total score of the paramedic Entrance Exam (EE). Table 9 graphically displays the relationship between the sub-categories and total. All of the sub-categories reveal a statistically positive relationship with each other. These results indicate that if a student scores well one category, he/she is likely to do well in all categories.

Cognitive Results Prediction. Recognizing that the field of emergency medical education has a limited amount of evidence-based literature, the data provided the opportunity to examine a possible prediction model for the Paramedic Readiness Exam 3 (PRE3), which involves multiple variables (CoAEMSP, 2010; U.S. Department of Transportation, 2001). Thus, after all Pearson correlations were run to identify a possible relationship between two variables. A multiple regression is an appropriate statistical test to “measure and study a prediction relationship among various combinations of variables” (Gall, Gall, & Borg, 2007, p. 353). In the recorded literature, there is no evidence or documentation of testing this valuable statistical relationship.

The affective domains and the cognitive scores of the paramedic Entrance Exam (EE) were used as predictor variables of success on the PRE3. Table 10 presents the multiple linear regression model. The cognitive portions of the EE positively predicted success on the PRE3;

Table 9*Correlations of PRE3 scores (n=123)*

	AGREE	CONSC	NEUR	PRE_CARD	PRE_MED	PRE_OB	PRE_PER	PRE_TRAUMA	PRE_TTL
PRE_AIR	0.036	-0.048	0.024	.453**	.443**	.464**	.326**	.404**	.690**
PRE_CARD	-0.067	-0.046	-0.100		.515**	.668**	.339**	.473**	.796**
PRE_MED	0.016	-0.024	-0.084			.608**	.315**	.497**	.775**
PRE_OB	0.006	-0.090	-0.085				.397**	.537**	.838**
PRE_PER	0.126	0.051	-0.112					.332**	.581**
PRE_TRAUMA	0.142	-0.035	-0.106						.737**
PRE_TTL	0.051	-0.047	-0.105						

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

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

Due to space constraints, the titles of the sub-categories have been shortened. The full name of the categories are as follows: AIR= airway management; CARD= cardiology, MED= medical emergencies, OB= obstetrics/gynecology and pediatrics, PER= operations, TTL= total, AGREE= agreeableness, CONSC= conscientiousness, NEUR= neuroticism.

however, the affective domains had no predictive value (R-squared= .254, $F[4,118]= 11.395$, $p \leq .001$). According to this research, the affective domains cannot predict nor is there a statistically significant relationship between them and cognitive fields. The results of the predictability of the EE to the PRE3 is promising for the field of paramedicine. Future research considerations based on this research are presented in Chapter 5.

Table 10

Regression results predicting PRE3

	<i>B</i>	<i>SE</i>	<i>t</i>
Constant	68.023	18.12	3.754**
EE	1.167	0.182	6.419**
Agree	0.071	0.267	0.265
Consc	-0.376	0.306	-1.229
Neurotic	-0.229	0.239	-0.96

** Coefficient is significant at 0.01 level (2-tailed)

Notes: R-squared = .254

Summary

Descriptive statistics revealed that more paramedic students identified as being Agreeable and Conscientious rather than Neurotic. The averages for Agreeableness, Conscientiousness, and Neuroticism are 30.5, 28.34, and 9.48 respectively. It should also be noted that there was a large standard deviation in all of the affective domains, but the Neuroticism category had an especially large range (25). Other descriptive statistics which were presented are the standard deviations of the totals of both the EE (SD= 6.21) and the PRE3 (SD=14.29). The standard deviations of both exams are relatively low considering the EE contains 92 questions and the PRE3 asks 200 multiple-choice questions. Since the totals of both exams were two of the four research questions, it is important to note the basic information about them.

As was analyzed through Pearson correlations, there is no statistically significant relationship between the selected affective domains (Agreeableness, Conscientiousness, and Neuroticism) and the cognitive portions of the EE or the PRE3. Specific to the research questions, particular scores on the selected affective domains may not determine a paramedic student's success on the cognitive aspects of assessments. Even though no statistically significant relationship was found, it was important to analyze the total scores as well as the sub-categories of the two exams to make recommendations regarding the relationship of affective to cognitive domains.

Chapter 5 presents a discussion of the current research project making reference to previous research in other allied health fields and makes recommendations for future practice. It is also necessary to draw conclusions about the study's limitations such that future researchers are able to capture the important concepts as well as improve and enhance the future of EMS research.

Chapter Five:

Discussion

Introduction

The purpose of this study was to explore the relationship of affective domains to cognitive scores in entrance and exit examinations of paramedic students (Fisdap, 2013). Comparing the results of affective domains to areas of cognition should enable administrators in pre-hospital health care systems to make admission decisions based on evidence-based research rather than intuition. Identifying the candidates who have a higher probability of success for completing an academic program with the potential to eventually contribute to the profession is necessary for the continuing advancement and development of emergency medical service programs.

As evidenced in this document, there is a lack of evidence-based research in the field of emergency medical education. To date, no research has been published exploring the relationship between affective domains and cognitive success. Although other allied health care fields have spent time analyzing the most effective means of admitting only those students who are likely to succeed, emergency medical education is behind in publishing data to assist educators and future employers with decision-making processes based on accurate, objective data (Page, Stanke, & Bowen, 2013).

Fisdap® is the first company to track clinical skills for paramedic students in addition to providing valid and reliable tests which are predictive of success on the National Registry® cognitive exam (Fisdap®, 2013). Although many of the tests are still in their infancy, it is research projects such as this that can assist the administrators and developers at Fisdap® in continuing a tradition of producing quality EMS-based products. The opportunity to analyze data in order to make recommendations for program administrators and educators existed due to the data already collected by experts in the field.

Current Research

Four research questions were developed to investigate the relationships between selected affective domains and cognitive performance on an entrance and comprehensive exam in the field of paramedicine. The four research questions were as follows:

Research Question One (RQ₁): What is the relationship between paramedic students' selected affective domains and the cognitive sub-categories (anatomy, Emergency Medical Technician-Basic [EMT-B], information/expository reading at 11th grade level, narrative reading at 9th grade level, math, and physiology) of the paramedic Entrance Exam (EE)?

Research Question Two (RQ₂): What is the relationship between paramedic students' selected affective domains and the cognitive total score of the paramedic Entrance Exam (EE)?

Research Question Three (RQ₃): What is the relationship between paramedic students' selected affective domains and the cognitive sub-categories (airway management, cardiology, medical emergencies, OB/Gyn and peds, operations, trauma) of the comprehensive Paramedic Readiness Exam 3 (PRE3)?

Research Question Four (RQ₄): What is the relationship between paramedic students' selected affective domains and the cognitive total of the comprehensive Paramedic Readiness Exam 3 (PRE3)?

Results from studying Pearson product-moment correlation coefficients indicate there are no statistically significant relationships between any of the selected affective domains and the cognitive areas of the paramedic Entrance Exam (EE) and Paramedic Readiness Exam 3 (PRE3). These results provide beneficial conclusions not only to the field of emergency medical education but all allied health fields. Although there was no statistically significant relationship between the selected affective domains and the cognitive scores, administrators, educators, and future employers can make more informed admission and employment decisions. The following section will compare and contrast previous literature with the results from the current research such that conclusions can be made founded on evidence-based research.

Comparing Current Research to Past Research

A comprehensive literature review was presented in Chapter Two, which indicated a wide variety of requirements for admission into particular allied health programs. To date, no research has specifically targeted affective domains and cognitive performance in emergency medical education. Based on the literature review, the current problem was identified and research questions were developed. After conducting research analyses, conclusions can be discussed which compare and contrast the current study's results with past research.

Academic variables in admission decisions. Using academic variables to predict cognitive success are important factors for admission committee's consideration in order to maintain quality within a specific field (Hall & Bailey, 1992). Predictors of success have been

an “inexact science” potentially leading to student attrition to the detriment of higher education institutions and society (Campbell & Dickson, 1996, p. 47). Quantitative, academic information regarding applicants predominated the medical research from 1981 to 1990 (Campbell & Dickson, 1996). Campbell and Dickson (1996) conducted a meta-analysis with results indicating that several research projects in the profession of nursing concluded that college GPA ($n=22$), pre-nursing GPA ($n=20$), and nursing GPA ($n=20$) were predictive of retention or graduation. Therefore, the inclusion of comparing cognitive results in the current research is important for future research in paramedicine.

Some research has concluded that those individuals who have high general intelligence will perform better on cognitive tasks throughout their academic career no matter what the requirement (Crow et al., 2004; Peksun, Detsky, & Shandling, 2007; Rothstein et al., 1994). Dollinger and Orf (1991) reported a correlation between high school rank and course grades in an undergraduate, collegiate personality course ($r=.381$, $n=118$, $p\leq .01$). Researchers Hall and Bailey (1992) published longitudinal data which found Grade Point Averages (GPAs) to be predictive of academic success in medical school. Data from students enrolled in the Dartmouth Medical School concluded that students’ MCAT sub-scores were positively correlated with first-year grade averages ($p\leq .001$). Other research has found a predictive correlation between GPA and graduation (Byrd, Garza, & Nieswiadomy, 1999).

Studying the prediction between the paramedic Entrance Exam (EE) and Paramedic Readiness Exam 3 (PRE3) was not one of the original four research questions. However, a multiple linear regression was completed after Pearson product-moment correlations were conducted in order to predict success on PRE3 based on performance of the EE (Gall, Gall, & Borg, 2007). Rolfhus and Ackerman (1999) studied individual differences in knowledge in 143

introductory psychology students from the University of Minnesota. They concluded that after knowledge has been acquired it remains stable throughout a lifetime. The current research supports those studies which conclude that those individuals who produced a high total score on the EE produced a similarly high total score on the PRE3 (R-squared= .254, $F[4,118]= 11.395$, $p \leq .001$) (Byrd, Garza, & Nieswiadomy, 1999; Crow et al., 2004; Hall & Bailey, 1992; Peksun, Detsky, & Shandling, 2007; Rothstein et al., 1994). The results of the current research project support Rolfhus and Ackerman's (1999) conclusions since the results of the entrance exam could predict results of an exit exam several months later.

Based on the results that there is a strong relationship between the paramedic Entrance Exam (EE) and the Paramedic Readiness Exam 3 (PRE3), administrators and educators in the field of paramedicine can use the results to establish a minimum score which students should achieve on the EE in order to proceed in a paramedic curriculum. To date, the EE is the only published exam for prospective paramedic students which asks questions based on the Emergency Medical Technician-Basic curriculum and standardized tests (Romero & Bowen, 2012). Some educators and administrators are waiting to implement the EE until there is more evidence that it can predict success on the PRE3 and National Registry® cognitive exam (Fisdap®, 2013). Therefore, publishing statistics which establishes a moderate relationship between the two examinations is critical for institutional decision making (R-squared= .254, $F[4,118]= 11.395$, $p \leq .001$). At the same time, it is outside the scope of this study to make a concrete recommendation as to a minimum cut score because of the nature of the statistical analyses used. This conclusion can be a topic of conversation held by those individuals at Fisdap® to provide data-driven support for the use of the EE and PRE3.

Nonacademic variables in admission decisions. The ability to make a decision about an applicant for admission into an academic program based on cognitive variables alone has been subject to scrutiny in recent years (Dollinger & Orf, 1991). An increased amount of emphasis has been placed on specific affective domains in order to ensure all students are successful in their field of choice. Researchers, educators, administrators, and future employers are starting to recognize the value of interpersonal characteristics as well as cognitive performance (Chamberlain, Catano, & Cunningham, 2005). Norman (2004) wrote in an editorial for *Advances of Health Sciences Education*, "...once we go beyond [academic] marks, many of our schools are engaged in the process of conducting a very elaborate, labour-intensive, and expensive lottery" (p. 79). Using personality inventories rather than interviews or essays may be just as predictive of success without the work and cost of an interview (Nayer, 1992; Sadler, 2003; Stewart, 1999).

The current study used the five-factor model of personality originally described in peer reviews from as far back as 1946 by Cattell (Briggs, 1992). The five-factor model has been used in several research projects and has been proven both reliable and valid for describing the many personality dimensions (Bartone, Eid, Johnsen, Laberg, & Snook, 2009; Bolender, 2001; Costa, Busch, Zonderman, & McCrae, 1986; McCrae, Costa, & Busch, 1986; Socha, Cooper, & McCord, 2010). "The five-factor model is the model of choice for the researcher wanting to represent the domain of personality variables broadly and systematically" (Briggs, 1992, p. 254). Three of the five factors were included in this study through the use of the widely used M5-50: Agreeableness, Conscientiousness, and Neuroticism.

Agreeableness. Agreeableness describes a person's tendency to behave in socially acceptable norms and assist others during a time of need. People who are agreeable tend to care

about their peers and display affection (Barrick, Mount, & Judge, 2001; Lievens, Ones, & Dilchert, 2009). The literature review for the current project listed two articles which concluded agreeable individuals tended to perform better on cognitive tasks (Chamberlain, Catano, Cunningham, 2005; Farsides & Woodfield, 2003). The current study did not find a statistically significant relationship between high agreeableness scores and high, total cognitive performance on either the EE ($r = 0.077$, $n = 123$, $p = .395$) or PRE3 ($r = 0.051$, $n = 123$, $p = .572$).

The results of the current study are similar Rolfhus and Ackerman's (1999) research which studied the relationship between Agreeableness and general knowledge in humanities, science, civics, and mechanical categories. There was no statistically significant relationship between Agreeableness and any of the knowledge domains. Rothstein, Paunonen, Rush, and King (1994) also did not find a relationship between agreeableness and cognitive ability in graduate students ($r = .04$).

Farsides and Woodfield (2003) reported that agreeableness was positively correlated with verbal intelligence ($r = 0.17$, $n = 432$, $p \leq .01$) and predictive of final grade ($\beta = 0.14$, $t = 2.82$, $p \geq 0.1$) in third-year undergraduate students at the University of Sussex. Not only did the researchers find agreeableness to be predictive of final grade, but it was also negatively correlated with seminar attendance ($r = -0.14$, $n = 432$, $p \leq .01$). Farsides and Woodfield (2003) report a strong "interaction between a personality disposition and a social context variable in determining academic success" (p. 1239). The researchers suggest that future research should consider the agreeableness trait and academic success when social interaction is required for successful completion of an academic course. Rothstein et al. (1994) reported similar findings as Farsides and Woodfield (2003) noting those individuals who scored high in Agreeableness were more likely to participate in class activities ($r = .20$).

Conscientiousness. Barrick and Mount (1991) concluded that those individuals who report personalities to be conscientious are “those individuals who exhibit traits associated with a strong sense of purpose, obligation, and persistence” compared to those individuals who self-report other personalities (p. 18). Conscientious people tend to be goal-oriented and persevere during times of stress (Chamberlain, Catano, & Cunningham, 2005). They also tend to be organized and plan life events (Stewart, 1999). Conscientiousness has also been shown to have key indicators for leadership skills (Bartone et al., 2009; Ferguson, James, & Madeley, 2002). One published article reported a strong ability to predict a high amount of stress in those individuals who were categorized as conscientious (Tyssen et al., 2007). Due to the variety of conclusions in current literature, this was a critical component to the current research and as the results of the domain seem to vary when different dimensions are researched.

Conscientiousness has shown a positive relationship to intellectual ability in multiple fields. Dollinger and Orf (1991) reported that conscientiousness and final course grades in an undergraduate personality course were positively related ($p \leq .001$). Lievens, Ones, and Dilchert (2009) reported operational validity between conscientiousness and predicting GPA in first-year medical students (.18). The validity increased to .45 when comparing conscientiousness to GPA in seventh-year medical students. Individuals who display higher levels of conscientious traits perform well during the initial medical school years compared to those individuals who are lower on these traits. The prediction value of conscientiousness strengthens in the later years of medical school.

Conscientiousness has been one of the few dimensions to consistently predict employment performance. Barrick, Mount, and Judge (2001) published a meta-analysis examining the five-factor model dimensions. Based on their inclusion criteria, 11 published

articles and four paper presentations were examined for their research. They concluded that conscientiousness consistently predicted success in virtually all careers.

Although many studies have shown a correlation between conscientiousness and academic performance, the current study did not find a statistically significant relationship between conscientiousness and total cognitive performance on either the EE ($r= 0.026$, $n=123$, $p= .776$) or PRE3 ($r= -0.047$, $n= 123$, $p= .608$). The results of the current study do not support other research which links conscientiousness with high intellectual and employment abilities. Because research in other fields has supported the link between conscientiousness and success in academic programs, more research in the field of emergency medicine is needed before implementing admission standards based on the statistics reported in the current study.

Neuroticism. For the purposes of this research, neuroticism is defined as a person's tendency to become upset during a life event (Lievens, Ones, & Dilchert, 2009). People who display neurotic behaviors typically have a difficult time working with others. Students reluctant to work with peers during their school career frequently struggled academically (Dolan, Mallot, & Emery, n.d.). Lievens, Ones, and Dilchert (2009) reported no predictive value between Neuroticism and GPA in medical students throughout their seven years ($r= .03$). This research is in contrast to Lowe, Kerridge, Bore, Munro, and Powis (2001) who indicated that moral and ethical thought processes will develop as a person experiences more medical education.

Even though neuroticism is thought to be a negative personality trait for professionals who need to work with colleagues and customers (or patients), Lowe et al. (2001) caution admission committees about denying entrance to potential physicians. The researchers stated, "...although it is widely agreed that they are unpleasant to work with, we are struck by the prevalence of narcissistic traits among leaders of the profession. If we reject the narcissists, do

we lose valuable future leaders?" (p. 407). The field of emergency medicine is seeking professionals who are willing to be leaders by producing evidence-based research (U.S. Department of Transportation, 2001). Thus, more research needs to be conducted on the Neurotic dimension to ensure allied health care fields do not lose valuable leaders.

The current study did not find a statistically significant relationship between high neurotic scores and low, total cognitive performance on either the EE ($r = 0.128$, $n = 123$, $p = .158$) or PRE3 ($r = -0.105$, $n = 123$, $p = .249$). Understanding the research and suggestions about neurotic individuals made by Lowe et al. (2001) is important for the future of the profession.

Conclusion. Research comparing affective domains to cognitive variables has produced mixed results (Farsides, & Woodfield, 2003). The current study did not find a statistically significant relationship between Agreeableness, Conscientiousness, or Neuroticism and cognitive examinations offered through Fisdap®. The results of this research can be a part of further conversations regarding predictive models for entrance into allied health care education programs. As changes in health care and education standards change, there will be a greater need to explore the relationships between personality and cognitive abilities (Bolman & Gallos, 2011).

Further statistical analyses based off the four original research questions revealed statistical significance between the three selected affective domains (Agreeableness, Conscientiousness, and Neuroticism). Knowing that Agreeable and Conscientious individuals are not likely to identify with Neurotic tendencies and vice versa can be the foundation for future research in this area. A multiple regression was conducted in order to examine whether or not a prediction on the Paramedic Readiness Exam 3 (PRE 3) could be made based off the results from the paramedic Entrance Exam (EE) ($R\text{-squared} = .254$, $F[4,118] = 11.395$, $p \leq .001$). The

moderate predictive value suggests educators and administrators associated with paramedic programs can use the total score of the EE to predict an individual's results on the PRE3.

Additional Observations Regarding the M5-50

M5-50: Openness. The choice of Fisdap® administrators to exclude two of the five dimensions of the five-factor model does not appear to be justified. In fact, excluding Openness and Extraversion from the research may diminish the ability to apply the findings to other situations. A positive correlation was found between Openness and first-year undergraduate students' academic success (Farsides & Woodfield, 2003) and among business school graduate students and GPA (Rothstein, Pauonen, Rush, & King, 1994). Openness was found to be positively correlated with Agreeableness in a study conducted by Farsides and Woodfield (2003). These findings are significant to the current study because Agreeableness was positively correlated with Conscientiousness and negatively correlated to Neuroticism. Thus, Openness may be an important affective domain in prospective paramedic students.

Additionally, Farsides and Woodfield (2003) suggested that specific learning environments should be considered for those individuals who have high Openness personalities. They suggest that students who describe themselves as Open would “thrive in educational settings promoting and rewarding critical and original thought” (p. 1240). They continued to report that Open individuals may struggle in an academic setting that does not support excitement-seeking opportunities. Lievens, Ones, and Dilchert (2009) reported similar findings to Farsides and Woodfield (2003) when they followed medical students during seven years of medical school. Openness became predictive of success in the fifth year of medical school when students were expected to practice medicine in an open environment (.30).

Based on past research, administrators and educators in paramedicine could use the M5-50 to make strategic decisions regarding learning environments and make appropriate decisions for significant learning experiences. By eliminating the Openness dimension from the M5-50 in the EE, key decision-makers at Fisdap® may have diminished the conclusions available for administrators and educators in paramedic programs.

M5-50: Extraversion. Rolfhus and Ackerman (1999) found that Extraversion was negatively related to knowledge in sub-categories of humanities, science, and civics. Thus, if a person self-reported a high Extraversion score, these individuals are likely to score poorly on cognitive skills. Lievens, Ones, and Dilchert (2009) also reported a negative association between Extraversion and academic achievement in medical students (-.11). However, the researchers found a positive association between Extraversion and academic achievement in later years of medical school (.31). In contrast, De Barbenza and Montoya (1974, cited in Farsides & Woodfield, 2003) reported that Extraverted college students slightly outperformed introverted ones. When interpersonal skills and emotional intelligence are required in an academic curriculum, those individuals with a high level of Extraversion are likely to score better than when traditional educational models are used.

Extraversion has been reported to predict success in careers that involve social interaction (Barrick & Mount, 1991). Lievens, Ones, and Dilchert (2009) supported the research conducted by Barrick and Mount (2003) stating, “Being socially ascendant, affectionate, and warm appears to be important for latter grades that are based on practicums and internships” (p. 1523). Barrick, Mount, and Judge (2001) reported a positive predictability between the trait of Extraversion and police occupations. The profession of paramedicine demands a large amount of social interaction between colleagues, patients, and other allied health care professionals.

Since there has been some reports of statistically significant findings, the administrators at Fisdap® should consider this research and how it might be relevant for future studies which examine relationships between affective domains and cognitive abilities.

Future Research

The results and conclusions of the study can be catalysts for more discussions and research. As stated in the aforementioned section, further research is needed regarding the inclusion of the two domains which Fisdap® personnel chose to discard from the paramedic Entrance Exam (EE). Evidence from previous research supports the use of all five domains in the M5-50 rather than the three Fisdap® personnel chose to include in the EE. Additional research should be considered based on the results of the current research. The following section will discuss the size of the population which met the inclusion criteria. Next, future research considerations are suggested for studying the relationship between affective domains and employment success as well as clinical performance for students in allied health care fields. The last point proposes further research for paramedic students and the stresses of outside employment and academic success.

Population. A potential limitation for this research project is the size of the population studied. 123 participants may not be a good enough sample to make solid recommendations to administrators, educators, and future employers in emergency medical services. However, similar research in the field has used populations similar to what was included in this project. Dollinger and Orf (1991) were able to make conclusions about Conscientiousness and Openness based on 118 students. Costa and McCrae (1992) studied 117 “normal” adult men and women to study the effectiveness of the five-factor model and its use in clinical practice. The current

research did not show a statistically significant relationship between affective domains and cognitive performance; however, a larger sample size should be used in future research projects in order to make additional conclusions.

Affective domains and employment. The current study developed research questions specifically designed to test for relationships between affective domains and cognitive performance while participants were still involved in the academic portion of their careers. In recent years, researchers have analyzed the relationship between personality and job performance success. Barrick, Mount, and Judge (2001) reported their meta-analysis results indicating Agreeableness, Conscientiousness, and Neuroticism to be a valid predictor of job performance. However, Extraversion and Openness were not relevant for dimensions associated with professionalism. The research performed by Barrick, Mount, and Judge may give credibility to excluding Extraversion and Openness from the M5-50 for paramedic professionals. Further research is needed that separates the participants into paramedic students and professionals for all of the five-factor categories in order to draw conclusions related specifically to the field of emergency medicine.

Affective domains and clinical performance. To succeed as a paramedic, a person must display competence in both cognitive and psychomotor skills (Fernandez, Studnek, & Cone, 2009; NREMT, 2013). Most allied health care fields demand that professionals have the knowledge-base as well as the ability to interact with patients (Chamberlain, Catano, & Cunningham, 2005). Smith, Catano, and Cunningham (2004) concluded there were differences in academic versus clinical performance in dental students. Lievens, Ones, and Dilchert (2009) conducted a longitudinal study on medical students, which concluded that “personality determinants of attrition are different early compared with late in medical school” (p. 1515).

They indicated that initial knowledge is procedural and much different than latter expectations of a medical student. The expectations of students in the field of paramedicine are similar to those of medical students; basic knowledge in the initial curriculum followed by application knowledge to patients. Thus, further research in paramedicine should consider the relationship between personality factors and clinical performance. If the regulatory board of paramedics has determined that both aspects are crucial for the profession, then the relationship between affective domains and clinical success needs to be explored in order to give recommendations constructed on evidence-based research.

Cognitive variables and outside employment. Most of the paramedic curricula in the United States are based out of community colleges (CoAEMSP, 2010). Those students who enroll in a community college have different priorities and demographics from those students attending a four-year institution (Mellow & Heelan, 2008). Mellow and Heelan (2008) stated, “On average, community college students are older, poorer, more likely to be part time and working, and more likely to be the first member of their family in college” (p. xv). Research from the field of nursing has explored the relationship between outside factors and success in school and the National Council Licensure Examination (NCLEX-RN®). Davenport (2007) reported a relationship between employment and unsuccessful students in a small Midwestern community college. Johnson (2003, cited in Yoho, et al., (2007)) reported a 70% attrition rate in nursing programs due to the need to seek outside employment while attempting to also be a full-time student. Based on these research projects, experts in the field of paramedicine should conduct a study analyzing the relationship between cognitive success and number of hours spent in outside employment.

Summary

Allied health care education programs seek prospective students who are most likely to succeed in a specific field of study. As students progress from basic knowledge to application of a particular concept, admission committees are expected to select the best candidates that will not only flourish with the academic component but also contribute as the next generation of experts and researchers (Furnham & Mosen, 2009). The importance of choosing the most appropriate candidates is, arguably, most critical in health care careers. Future health care consumers demand that researchers and educators prepare people to be competent health care providers, which demands skill in cognitive areas as well as an ability to relate to patients (Albanese et al., 2003).

Cumbersome and a vast amount of admission requirements have not ensured that all admitted students have the ability to succeed. Allied health care programs continue to struggle with attrition as well as spend a great deal of time with students who are not prepared to succeed in course work or clinical rotations (Crow et al., 2004; Simon, McGinniss, & Krauss, 2013). Using the results of cognitive scores has not guaranteed that students will succeed in a particular academic program. Therefore, finding a method to assess affective domains in potential applicants has been recognized as an important consideration. “Great care should be taken to select candidates who will be academically sound and have the behavioral characteristics required for the practice of medicine” (Marrin et al., 2004, p. 129). Numerous studies have been published attempting to develop a matrix which would predict student success, but none of these published articles has specifically addressed the field of paramedicine.

Based on a comprehensive literature review, the current study was developed to analyze the relationship between affective domains and entrance and exit exams in the field of

paramedicine. A retrospective, quantitative study was conducted for the purposes of investigating a potential connection between personality factors and cognitive abilities. All data was provided by Fisdap® which specializes in tracking clinical education as well as providing reliable and valid examinations for paramedic students. No statistically significant relationship was found between affective domains and the sub-categories or total scores of the paramedic Entrance Exam (EE) or Paramedic Readiness Exam 3 (PRE 3).

Because quantitative data was analyzed in order to examine the relationship between affective domains and cognitive abilities, future research recommendations were constructed based on previous literature. The possibilities associated with studying the relationships and predictive qualities with other areas are not limited to admission requirements. Fink (2003) and others indicate there are many benefits for educators and administrators to consider in utilizing the results of affective domain summaries for other purposes. Specifically, these results may be used to guide the development of syllabi and significant learning experiences based on the learning styles and personalities of enrolled students. Therefore, educators and administrators can create a learning environment based on the needs of students rather than general ideas. The researcher associated with this study hopes that this is the first of many more projects and conversations regarding affective domains and cognitive performance and prediction models for all allied health care fields.

References

- Albanese, M. A., Snow, M. H., Skochelak, S. E., Huggett, K. N., & Farrell, P. M. (2003). Assessing personal qualities in medical school admissions. *Academic Medicine, 78*(3), 313-321.
- Barrick, M. R. & Mount, M. K. (1991). The Big Five personality dimensions and job performance: A meta-analysis. *Personnel Psychology, 44*, 1-26.
- Barrick, M. R., Mount, M. K., & Judge, T. A. (2001). Personality and performance at the beginning of the new millennium: What do we know and where do we go next? *Personality and Performance, 9*(1/2), 9-30.
- Bartone, P. T., Eid, J., Johnsen, B. H., Laberg, J. C., & Snook, S. A. (2009). Big five personality factors, hardiness, and social judgment as predictors of leader performance. *Leadership & Organization Development Journal, 30*(6), 498-521. doi: 10.1108/01437730910981908.
- Benjamin, L. T., Jr. (2006). *A brief history of modern psychology*. Hoboken, NJ: Wiley, John & Sons Incorporated.
- Boldender, J. S. (2001). Predictors of certification scores in family nurse practitioners: personality, academic, and demographic factors. (Unpublished doctoral dissertation). Cardinal Stritch University, Milwaukee, WI.
- Bolman, L. G. & Gallos, J. V. (2011). *Reframing academic leadership*. San Francisco, CA: Jossey-Bass.
- Bridges, A. N. (2011). Personality in treatment seeking and non-treatment seeking individuals with self-reported anorexia. (Unpublished master's thesis). Western Carolina University, Cullowhee, NC.
- Briggs, S. R. (1992). Assessing the Five-Factor Model of personality description. *Journal of Personality, 60*(2), 253-293.
- Bullimore, D. W. (1992). Selection interviewing for medical school admission. *Medical Education, 26*, 347-349.
- Byrd, G., Garza, C., & Nieswiadomy, R. (1999). Predictors of successful completion of a baccalaureate nursing program. *Nurse Educator, 24*(6), 321-324.

- Campbell, A. & Dickson, C. (1996). Predicting student success: A 10-year review using integrative review and meta-analysis. *Journal of Professional Nursing, 12*(1), 47-59.
- Chamberlain, T. C., Catano, V. M., & Cunningham, D. P. (2005). Personality as a predictor of professional behavior in dental school: Comparisons with dental practitioners. *Journal of Dental Education, 69*(11), 1222-1237.
- CoAEMSP. (2010). EMS accreditation fact sheet [Fact sheet]. Retrieved from www.coaemsp.org/Documents/Fact_Sheet_Accreditation_CoAEMSP.pdf.
- Colliver, J. A., Verhulst, S. H., & Williams, R. G. (1989). Using a standardized-patient examination to establish the predictive validity of the MCAT and undergraduate GPA as admissions criteria. *Academic Medicine, 64*, 482-484.
- Costa, P. T., Busch, C. M., Zonderman, A. B., & McCrae, R. R. (1986). Correlation of MMPI factor scales with measures of the five factor model of personality. *Journal of Personality Assessment, 50*(4), 640-650.
- Costa, P. T., Jr. & McCrae, R. R. (1985). *The NEO Personality Inventory manual*. Odessa, FL: Psychological Assessment Resources.
- Crisham, P. (1981). Measuring moral judgment in nursing dilemmas. *Nursing Research, 30*, 104-110.
- Crow, C. S., Handley, M., Morrison, R. S., Shelton, M. M. (2004). Requirements and Interventions used by BSN programs to promote and predict NCLEX-RN success: A national study. *Journal of Professional Nursing, 20*(3), 174-186. doi: 10.1016/j.profnurs.2004.04.004.
- Daniels, S. & King, E. (2002). The predictive validity of the MMPI-2 content scales for small town police officer performance. *Journal of Police and Criminal Psychology, 17*(2), 54-61.
- Doerner, W. G. & Nowell, T. M. (1999). The reliability of the behavioral-personnel assessment device (B-PAD) in selecting police recruits. *Policing: An International Journal of Police Strategies & Management, 22*(3), 342-352.
- Davenport, N. C. (2007). A comprehensive approach to NCLEX-RN® success. *Nursing Education Perspectives, 28*(1), 30-33.
- Dolan, S., Mallott, D. B., & Emery, J. A. (n.d.). Passive learning: a marker for the academically at risk. *Short Communication, 648-649*.
- Dollinger, S. J. & Orf, L. A. (1991). Personality and performance in "personality": Conscientiousness and openness. *Journal of Research in Personality, 25*, 276-284.

- Drees, W. F. (2006). The prediction of academic and credentialing success in an allied health program. (Unpublished doctoral dissertation). Sam Houston State University, Texas.
- Edwards, J. C., Johnson, E. K., & Molidor, J. B. (1990). The interview in the admission process. *Academic Medicine, 65*, 167-177.
- Eva, K. W. & Reiter, H. J. (2004). Where judgment fails: pitfalls in the selection process for medical personnel. *Advances in Health Sciences Education, 9*, 161-174.
- Eysenck, H. J. (1967). Personality patterns in various groups of businessmen. *Occupational Psychology, 41*, 249-250.
- Farsides, T. & Woodfield, R. (2003). Individual differences and undergraduate academic success: The roles of personality, intelligence, and application. *Personality and Individual Differences, 34*, 1225-1243.
- Fernandez, A. R., Studnek, J. R., & Margolis, G. S. (2008). Estimating the probability of passing the National Paramedic certification examination. *Academic Emergency Medicine, 15*(3), 11-15.
- Ferguson, E., James, D., Madeley, L. (2002). Factors associated with success in medical school: Systematic review of the literature. *British Medical Journal, 324*, 952-957.
- Fink, L. D. (2003). *Creating significant learning experiences*. San Francisco, CA: Jossey-Bass.
- Fisdap®. (2013). Testing. Retrieved from <http://www.fisdap.net>.
- Furnham, A. & Monsen, J. (2008). Personality traits and intelligence predict academic school grades. *Learning and Individual Differences, 19*, 28-33. doi: 10.1016/j.lindif.2008.02.001.
- Gall, M. D., Gall, J. P., & Borg, W. R. (2007). *Educational research: An introduction*. Boston, MA: Allyn and Bacon.
- Groves, M. A., Gordon, J., & Ryan, G. (2007). Entry tests for graduate medical programs: Is it time to re-think? *Medical Journal of Australia, 186*(3), 120-123.
- Hall, F. R. & Bailey, B. A. (1992). Correlating students' undergraduate science GPAs, their MCAT scores and the academic caliber of the undergraduate college with first-year academic performances across five classes at Dartmouth Medical School. *Academic Medicine, 67*, 121-123.
- Inver Hills Community College. (1997). IRB human subjects research review protocol.
- Lievens, F., Ones, D. S., & Dilchert, S. (2009). Personality scale validities increase throughout medical school. *Journal of Applied Psychology, 94*(6), 1514-1535.

- Litton-Hawes, E., MacLean, I. C., & Hines, M. H. (1976). An analysis of the communication process in the medical admissions interview. *Journal of Medical Education, 51*, 332-334.
- Lowe, M., Kerridge, I., Bore, M., Munro, D., & Powis, D. (2001). Is it possible to assess the “ethics” of medical school applicants? *Journal of Medical Ethics, 27*, 404-408.
- Marrin, M. L., McIntosh, K. A., Keane, D., & Schmuck, M. L. (2004). Use of the paired comparison technique to determine the most valued qualities of the McMaster Medical Programme admissions process. *Advances in Health Sciences Education, 9*, 129-135.
- Martin, J. H., Montgomery, R. L., & Saphian, D. (2006). Personality, achievement test scores, and high school performance percentile as predictors of academic performance across four years of coursework. *Journal of Research in Personality, 40*, 424-431. doi: 10.1016/j.jrp.2005.02.001.
- McCord, D. M. (2002). M5-50 Questionnaire [Database record]. Retrieved from PsycTESTS. doi: 10.1037/t00909-000.
- McCormack, L. & Mallor, D. (2002). The role of personality in leadership: An application of the Five-Factor model in the Australian military. *Military Psychology, 14*, 179-197.
- McCrae, R. R., Costa, P. T., & Busch, C. M. (1986). Evaluating comprehensiveness in Personality systems: The California Q-Set and the Five-Factor model. *Journal of Personality, 54*(20), 430-446.
- McCrae, R. R. & John, P. (1992). Introduction to the five-factor model and its applications. *Journal of Personality, 60*, 175-215.
- McManus, I. C. & Richards, P. (1986). Prospective survey of performance of medical students during preclinical years. *British Medical Journal, 293*, 124-127.
- Meridith, K. E., Dunlap, M. R., & Baker H. H. (1982). Subjective and objective admissions factors as predictors of clinical clerkship performance. *Journal of Medical Education, 57*, 743-751.
- Mellow, G. O. & Heelan, C. (2008). *Minding the dream: The process and practice of the American community college*. New York: Rowman & Littlefield Publishers, Inc.
- Merriam-Webster Dictionary. (2014). Retrieved from <http://www.merriam-webster.com>.
- Morris, D. O. (2000). Personality types of dental school applicants. *European Journal of Dental Education, 4*, 100-107.

- Nayer, M. (1992). Admission criteria entrance to physiotherapy schools: How to choose among many applicants. *Physiotherapy Canada*, 44, 41-46.
- Norman, G. (2004). Editorial—The morality of medical school admissions. *Advances in Health Sciences Education*, 9, 79-82.
- NREMT. (2014). About the NREMT. Retrieved from <http://www.nremt.org/nremt/about>.
- Page, D., James, B., Stanke, L., & Bowen, M. L. (2013). Affective domain matters: Personality traits of paramedics students and their effect on cognitive performance. Poster presented the National Association of EMS Educators, Washington, D.C.
- Peskun, C., Detsky, A., & Shandling, M. (2007). Effectiveness of medical school admissions criteria in predicting residency ranking four years later. *Medical Education*, 41, 57-64.
- Porter, K.B. (2008). Current trends in student retention: a literature review. *Teaching and Learning in Nursing*, 3, 3-5. doi: 10.1016/j.teln.2007.09.001.
- Powis, D. A., Neame, R. L. B., Bristow, T., & Murphy, L. B. (1988). The objective structured interview for medical student selection. *British Medical Journal*, 296, 765-768.
- Romero, G. & Bowen, M. L. (2012). Entrance exam for prospective paramedic students. Retrieved from <http://www.fisdap.net/Testing>.
- Rothstein, M. G., Paunonen, S. V., Rush, J. C., & King, G. A. (1994). Personality and cognitive ability predictors of performance in graduate business school. *Journal of Educational Psychology*, 86(4), 516-530.
- Sadler, J. (2003). Effectiveness of student admission essays in identifying attrition. *Nurse Education Today*, 23, 620-627. doi: 10.1016/S0260-6917(03)00112-6.
- Salzman, J., Dillingham, J., Kobersteen, J., Kaye, K., & Page, D. (2006). Effect of paramedic student internship on performance on the National Registry written exam [Abstract]. *Prehospital Emergency Care*.
- Self, D. J., Baldwin, D. C., & Wolinsky, F.D. (1992). Evaluation of teaching medical ethics by an assessment of moral reasoning. *Medical Education*, 26, 178-184.
- Simon, E. B., McGinniss, S. P., & Krauss, B. J. (2013). Predictor variables for NCLES-RN readiness exam performance. *Nursing Education Perspectives*, 34(1), 18-24.
- Smith, S. R., Vivier, P. M., Blain, A. L. B. (1986). A comparison of first-year medical school performances of students admitted with and without interviews. *Journal of Medical Education*, 61, 404-406.

- Socha, A., Cooper, C. A., & McCord, D. M. (2010). Confirmatory factor analysis of the M5-50: An implementation of the international personality item pool item set. *Psychological Assessment, 22*(1), 43-49. doi: 10.1037/a0017371
- SPSS. (2013). *Statistics for Windows, Version 22.0*. Armonk, NY: IBM Corp.
- Stewart, G. L. (1999). Trait bandwidth and stages of job performance: assessing differential effects for conscientiousness and its subtraits. *Journal of Applied Psychology, 84*(6), 959-968.
- Taylor, C. W. (1974). New manpower selection and educational programs for more effective health care performances. *Professional Psychology, 85-88*.
- Tipton, P., Pulliam, M., Beckworth, C., Ilich, P., Griffin, R., & Tibbitt, A. (n.d.). Predictors of associate degree during students' success. *Southern Nursing Research Society, 8*(1).
- Trett, R., Jackson, D., & Rothstein, M. (1991). Personality measures as predictors of job performance: A meta-analytic review. *Personal Psychology, 44*, 703-742.
- Turnbull, J., Danoff, D., & Norman, G. R. (1996). Content specificity and oral certification exams. *Medical Education, 30*, 56-59.
- Tyssen, R., Dolatowski, F. C., Rovik, J. O., Thorkildsen, R. F., Ekeberg, O., Hem, E., Gude, T., Gronvold, N. T., Vaglum, P. (2007). Personality traits and types predict medical school stress: a six-year longitudinal study. *Medical Education, 41*, 781-787.
- U.S. Department of Transportation. (2001). National EMS research agenda (DTN 22-99-H 05100). Retrieved from <http://www.nhtsa.gov>.
- Yoho, M. J., Young, A., Adamson, C., & Britt, R. (2007). The predictive accuracy of Health Education Systems, Inc. examinations for associate degree nursing students. *Teaching and Learning in Nursing, 2*, 80-84. doi: 10.1016/j.teln.2007.04.004.

Appendix A: M5-50

Personality Traits relating to: Agreeableness, Conscientiousness, and Neuroticism

This is a personality questionnaire, which should take about 10 minutes. There are no right or wrong answers to these questions; you simply respond with the choice that describes you best.

If you feel extremely nervous about the testing process and feel that your nervousness will affect your performance, please notify the testing administrator so that they can answer any questions about this process and alleviate any fears. Please recognize that a degree of nervousness is normal for most testing.

17040 - Have a good word for everyone.

- A. Very Inaccurate
- B. Moderately Inaccurate
- C. Neither Accurate Nor Inaccurate
- D. Moderately Accurate
- E. Very Accurate

17043 - Have a sharp tongue.

- A. Very Inaccurate
- B. Moderately Inaccurate
- C. Neither Accurate Nor Inaccurate
- D. Moderately Accurate
- E. Very Accurate

17046 - Believe that others have good intentions.

- A. Very Inaccurate
- B. Moderately Inaccurate
- C. Neither Accurate Nor Inaccurate
- D. Moderately Accurate
- E. Very Accurate

17049 - Cut others to pieces.

- A. Very Inaccurate
- B. Moderately Inaccurate
- C. Neither Accurate Nor Inaccurate
- D. Moderately Accurate
- E. Very Accurate

17052 - Respect others.

- A. Very Inaccurate
- B. Moderately Inaccurate
- C. Neither Accurate Nor Inaccurate
- D. Moderately Accurate
- E. Very Accurate

17055 - Suspect hidden motives in others.

- A. Very Inaccurate
- B. Moderately Inaccurate
- C. Neither Accurate Nor Inaccurate
- D. Moderately Accurate
- E. Very Accurate

17058 - Accept people as they are.

- A. Very Inaccurate
- B. Moderately Inaccurate
- C. Neither Accurate Nor Inaccurate
- D. Moderately Accurate
- E. Very Accurate

17061 - Get back at others.

- A. Very Inaccurate
- B. Moderately Inaccurate
- C. Neither Accurate Nor Inaccurate
- D. Moderately Accurate
- E. Very Accurate

17064 - Make people feel at ease.

- A. Very Inaccurate
- B. Moderately Inaccurate
- C. Neither Accurate Nor Inaccurate
- D. Moderately Accurate
- E. Very Accurate

17067 - Insult people.

- A. Very Inaccurate
- B. Moderately Inaccurate
- C. Neither Accurate Nor Inaccurate
- D. Moderately Accurate
- E. Very Accurate

17041 - Waste my time.

- A. Very Inaccurate
- B. Moderately Inaccurate
- C. Neither Accurate Nor Inaccurate
- D. Moderately Accurate
- E. Very Accurate

17044 - Am always prepared.

- A. Very Inaccurate
- B. Moderately Inaccurate
- C. Neither Accurate Nor Inaccurate
- D. Moderately Accurate
- E. Very Accurate

17047 - Find it difficult to get down to work.

- A. Very Inaccurate
- B. Moderately Inaccurate
- C. Neither Accurate Nor Inaccurate
- D. Moderately Accurate
- E. Very Accurate

17050 - Pay attention to details.

- A. Very Inaccurate
- B. Moderately Inaccurate
- C. Neither Accurate Nor Inaccurate
- D. Moderately Accurate
- E. Very Accurate

17053 - Do just enough work to get by.

- A. Very Inaccurate
- B. Moderately Inaccurate
- C. Neither Accurate Nor Inaccurate
- D. Moderately Accurate
- E. Very Accurate

17056 - Get chores done right away.

- A. Very Inaccurate
- B. Moderately Inaccurate
- C. Neither Accurate Nor Inaccurate
- D. Moderately Accurate
- E. Very Accurate

17059 - Don't see things through.

- A. Very Inaccurate
- B. Moderately Inaccurate
- C. Neither Accurate Nor Inaccurate
- D. Moderately Accurate
- E. Very Accurate

17062 - Carry out my plans.

- A. Very Inaccurate
- B. Moderately Inaccurate
- C. Neither Accurate Nor Inaccurate
- D. Moderately Accurate
- E. Very Accurate

17065 - Shirk my duties.

- A. Very Inaccurate
- B. Moderately Inaccurate
- C. Neither Accurate Nor Inaccurate
- D. Moderately Accurate
- E. Very Accurate

17068 - Make plans and stick to them.

- A. Very Inaccurate
- B. Moderately Inaccurate
- C. Neither Accurate Nor Inaccurate
- D. Moderately Accurate
- E. Very Accurate

17042 - Often feel blue.

- A. Very Inaccurate
- B. Moderately Inaccurate
- C. Neither Accurate Nor Inaccurate
- D. Moderately Accurate
- E. Very Accurate

17045 - Rarely get irritated.

- A. Very Inaccurate
- B. Moderately Inaccurate
- C. Neither Accurate Nor Inaccurate
- D. Moderately Accurate
- E. Very Accurate

17048 - Dislike myself.

- A. Very Inaccurate
- B. Moderately Inaccurate
- C. Neither Accurate Nor Inaccurate
- D. Moderately Accurate
- E. Very Accurate

17051 - Seldom feel blue.

- A. Very Inaccurate
- B. Moderately Inaccurate
- C. Neither Accurate Nor Inaccurate
- D. Moderately Accurate
- E. Very Accurate

17054 - Am often down in the dumps.

- A. Very Inaccurate
- B. Moderately Inaccurate
- C. Neither Accurate Nor Inaccurate
- D. Moderately Accurate
- E. Very Accurate

17057 - Feel comfortable with myself.

- A. Very Inaccurate
- B. Moderately Inaccurate
- C. Neither Accurate Nor Inaccurate
- D. Moderately Accurate
- E. Very Accurate

17060 - Have frequent mood swings.

- A. Very Inaccurate
- B. Moderately Inaccurate
- C. Neither Accurate Nor Inaccurate
- D. Moderately Accurate
- E. Very Accurate

17063 - Am not easily bothered by things.

- A. Very Inaccurate
- B. Moderately Inaccurate
- C. Neither Accurate Nor Inaccurate
- D. Moderately Accurate
- E. Very Accurate

17066 - Panic easily.

- A. Very Inaccurate
- B. Moderately Inaccurate
- C. Neither Accurate Nor Inaccurate
- D. Moderately Accurate
- E. Very Accurate

17069 - Am very pleased with myself.

- A. Very Inaccurate
- B. Moderately Inaccurate
- C. Neither Accurate Nor Inaccurate
- D. Moderately Accurate
- E. Very Accurate

Appendix B: IRB Letter of Approval



RESEARCH INTEGRITY AND COMPLIANCE
Institutional Review Boards, FWA No. 00001669
12901 Bruce B. Downs Blvd., MDC035 • Tampa, FL 33612-4799
(813) 974-5638 • FAX (813) 974-7091

May 9, 2014

Katie Lyman
Adult, Career and Higher
Education Tampa, FL
33612

RE: NOT Human Research Activities Determination

IRB#: Pro00017352

Title: The Relationship of Affective Domains and Cognitive Performance in Paramedic Students

Dear Ms. Lyman:

The Institutional Review Board (IRB) has reviewed the information on May 9, 2014, that you provided regarding the above referenced project and has determined the activities do not meet the definition of human subjects research. Therefore, IRB approval is not required. If, in the future, you change this activity such that it becomes human subjects research, IRB approval will be required. If you wish to obtain a determination about whether the activity, with the proposed changes, will be human subjects research, please contact the IRB for further guidance.

All research activities, regardless of the level of IRB oversight, must be conducted in a manner that is consistent with the ethical principles of your profession and the ethical guidelines for the protection of human subjects. As principal investigator, it is your responsibility to ensure subjects' rights and welfare are protected during the execution of this project

Also, please note that there may be requirements under the HIPAA Privacy Rule that

apply to the information/data you will use in your activities. For further information about any existing HIPAA requirements for this project, please contact a HIPAA Program administrator at 813-974- 5638.

We appreciate your dedication to the ethical conduct of human subject research at the University of South Florida and your continued commitment to human research protections. If you have any questions regarding this matter, please call 813-974-5638.

Sincerely,

A handwritten signature in black ink that reads "John A. Schinka, Ph.D." The signature is written in a cursive style with a large, prominent initial 'J'.

John Schinka, Ph.D.,
Chairperson USF Institutional
Review Board