STRUCTURAL EQUATION MODELS EXAMINING THE RELATIONSHIPS BETWEEN THE BIG FIVE PERSONALITY FACTORS AND THE MUSIC MODEL OF ACADEMIC MOTIVATION COMPONENTS

Jonathan Rupert Fink

Dissertation submitted to the faculty of the Virginia Polytechnic Institute and State University in partial fulfillment of the requirements for the degree of

Doctor of Philosophy
In
Curriculum and Instruction

Brett D. Jones, Chair
Peter E. Doolittle
Kathryne D. McConnell
Thomas O. Williams

September 11, 2015
Blacksburg, VA

Keywords: personality, openness, conscientiousness, extraversion, agreeableness, neuroticism, academic motivation, empowerment, usefulness, success, interest, caring, structural equation modeling

STRUCTURAL EQUATION MODELS EXAMINING THE RELATIONSHIPS BETWEEN THE BIG FIVE PERSONALITY FACTORS AND THE MUSIC MODEL OF ACADEMIC MOTIVATION COMPONENTS

Jonathan Rupert Fink

ABSTRACT

Scholars have long been interested in the complex relationships between personality and motivation. However, much of their understanding has been limited to The Big Five personality factors (namely, Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism), and a proliferation of motivation constructs emanating from a large number of different theories and sub-theories. This study adds to the body of personality psychology and motivation science literature by examining the relationships between The Big Five personality factors and The MUSIC[SM] Model of Academic Motivation (MMAM) components (i.e., eMpowerment, Usefulness, Success, Interest, and Caring). The MMAM is comprised of five components that summarize the many instructional implications derived from motivation theories and research to provide instructors with a holistic, conceptual understanding of them. The results of this study may provide evidence as to whether or not the personality traits of college students influence their academic motivation beliefs. To obtain data, I surveyed college students using two self-report instruments. The first instrument, the Big Five Inventory (BFI), measured college students on The Big Five personality factors. The second instrument, the MUSIC Model of Academic Motivation Inventory (MMAMI), measured the academic motivation beliefs of college students as related to the MMAM. Data were obtained from 305 college students at a single university in southwest Virginia enrolled in an online course. Exploratory Factory Analysis (EFA) and Confirmatory Factor Analysis (CFA) using Structural Equation Modeling (SEM) were used to

answer the following research question: *To what extent do the Five Factor Model factors relate to the MMAM components?* Due to the lack of substantiated knowledge regarding the relationships between The Big Five personality factors and the MMAM components, specific hypotheses were not generated. The measurement models for the Big Five personality factors and the MMAM fit well. However, the structural model, in which the Big Five factors were modeled to predict the MMAM components, did not adequately fit the data for these college students. Yet, there were a number of significant pathways between The Big Five personality factors and the MMAM components. Openness and Conscientiousness had a significant, negative impact on eMpowerment, while Extraversion had a significant, positive impact on eMpowerment, Usefulness, and Interest. Additionally, Agreeableness had a significant, positive impact on Usefulness, Success, Interest, and Caring, while Neuroticism had a significant, negative impact on Success.

Findings indicated that personality factors can relate to or predict academic motivation. In other words, students' academic motivation beliefs are, to a certain degree, influenced by some of their personality traits, and these differences in traits may manifest themselves in the classroom. In the future, researchers could examine the extent to which students with different personality traits display varying preferences as to the types of pedagogical methods or strategies that motivate them academically.

ACKNOWLEDGMENTS

In no small measure, the road of graduate school is challenging to navigate. Not many folks can or want to travel this path, and rightfully so. If it were not for the direction, guidance, and support of others I would have turned off of this road long ago to pursue other endeavors. However, I managed to stay on-track long enough to arrive at the top of the mountain and the view is not so bad.

I would like to thank Dr. Brett D. Jones. For five years, he has been my program leader, advisor, professor, assistantship supervisor, dissertation chairperson, and mentor. Not many graduate students have the opportunity to work so closely with one individual but I have and it has been an honor. Dr. Jones' knowledge, wisdom, and guidance were crucial to both the development and success of this dissertation, as well as my development as a scholar and researcher. I can candidly attest that he is the all-around *best professor* that I have ever had the privilege to know, learn from, and work with. I will miss no longer being your student.

I would also like to thank my committee members for their willingness to work with me on this dissertation and to see it through to completion. Dr. Thomas W. Williams' assistance and counsel on the methodology and statistical analyses used in this dissertation was invaluable. My knowledge and understanding of Structural Equation Modeling (SEM) has increased substantially because of him. I would also like to thank Drs. Peter E. Doolittle and Kathryn D. McConnell for their thoughtful insights, accessibility, and guidance throughout this process. They both have a unique, uncanny ability to make their students think deeply and meaningfully about a variety of theoretical topics. I personally have amassed a great wealth of knowledge by heeding their suggestions for this dissertation and by taking their courses.

Others made significant contributions to assist me throughout my doctoral training as well. To my parents, James R. and Barbara W. Fink: Thank you for your encouragement and support while I have been at Virginia Tech (VT). Without you allowing my childhood home (the cabin) to be an oasis for me throughout this process I would not have maintained such a high degree of sanity. To my childhood friend, Jason P. Cowden: Thank you for allowing me to literally crash at your house during the weeknights for two of these five years to work on my degree, while my wife completed her clinical internship at the University of North Carolina— Chapel Hill (UNC) and post doc at James Madison University (JMU). I would have quit this program if it were not for you. To my sister, Laura Fink Roberts, and her husband, Drew J. Roberts: Thank you for forcing me to laugh, have fun, and not lose my Chevy Chase and Jim Carrey-like sense of humor. My trips to Baltimore, your trips to Blacksburg, and our mutual trips to the cabin will be engrained in my memory forever. Here is a figurative toast to sharing more good times together. Last but certainly not least to my human angel, my wife: Thank you for being my rock and savior for the last 10 years. I could not have earned this degree without you. I truly feel badly for the other men out there, as I have already snagged the absolute *best woman* that any man could marry. I love you!

DEDICATION

I would like to dedicate this dissertation to my late grandmother, Marie B. Wall. While my grandmother was not a university-educated woman, she possessed a level of wisdom that was truly remarkable. She was also one of the kindest, genuine, unconditionally caring individuals that I ever known. I remember when I first began my bachelors training: It was an opportunity for me to spend more time with her. Our mutual conversations, our sharing of jokes, her storytelling, and her preparation of fantastic southern meals provided me with a sense of great comfort as I embarked upon the adventure of being a newly minted undergraduate student. The one piece of advice that she gave me was this: Seek out every bit of knowledge that you can, as it will enrich your life. Just do not forget who you are and where you come from.

Throughout the years, I took time to visit with my grandmother during my masters and doctoral training, and things never changed between us. Our relationship was as constant as the northern star. Last year she jokingly told me: "Well, it looks like you are almost fully 'edumacated' since that Ph.D. is on the horizon. I look forward to seeing you earn it." I had hoped that my grandmother would live long enough to see me defend my dissertation and to get hooded. Ironically though, she passed away last year on September 11, 2014. I had also hoped she would see that despite all of my hard work to become a scholar, there is still quite a bit of good ole' country boy left in me.

Interestingly, I had not planned to defend my dissertation on the same date that my grandmother passed away. But sometimes it is best to let the universe unfold as it should. Perhaps this is her way of letting me know that she had no intentions of missing "defense" day. With that said, Grandma, this dissertation is for you.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1.

INTRODUCTION

Overview and Problem Statement

For decades, scholars have been interested in the relationship between personality and motivation (Komarraju & Karau, 2005). The preponderance of available research suggests that personality characteristics and traits *relate* to motivation constructs (Barrick & Mount, 1996; Biderano & Yun Dai, 2007; Clark & Schroth, 2010; Diseth, 2003; Swanberg & Martinsen, 2010; Zhang, 2003). Interestingly, some of this research has been fragmentary and unsystematic (Furnham, Eracleous, & Chamorro-Premuzic 2009; Judge & Ilies, 2002). This inconsistency is largely because personality psychology and motivation science has (a) a long history of being in theoretical chaos, possessing a large number of theories and sub-theories, some of which are not based on scientific methodology and rigor; (b) an abundance of different terms to describe its constructs; and (c) hundreds of different questionnaires to measure its constructs (Hogan & Roberts, 2001; Finn & Zimmer, 2012; Jones, 2009; Jones & Skaggs, in press). Yet, despite these challenges, personality psychology and motivation science have made noteworthy theoretical progress (Judge & Illies, 2002). In personality psychology, five broad traits or factors—namely, Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism—describe personality (McCrae & Costa, 1989a; McCrae & John, 1992). These factors are now widely known as "The Big Five" (Srivastava, 2013). For motivation science, several theories (e.g., attribution, expectancy-value, interest, self-determination, self-efficacy, goal orientation, etc.) have all emerged as central perspectives in motivation (Graham & Weiner, 1996).

Much is known about the relationship between The Big Five factors and *some* motivation constructs. For example, Ross, Rausch, and Canada (2003) found that The Big Five personality

factors can explain significant variance in academic motivation orientations (e.g., hyper-competition, personal development competition, and cooperation). Additionally, Payne, Youngcourt, and Beaubien (2007) found that individuals who were conscientious, extraverted, and open to experiences demonstrated high levels of performance and mastery goals, as opposed to individuals who were atypically introverted and/or neurotic. The neurotic individuals were likely to experience a fear of being unable to learn, and possessed low levels of goal orientations. Furthermore, Komarraju and Karau (2005) found that individuals who were extraverted and open to experiences demonstrated high levels of academic engagement (e.g., effective reasoning proclivities and self-improving behaviors). Finally, individuals who were conscientious, open to experiences, and not neurotic demonstrated high levels of achievement motivations (i.e., persisting in the face of challenges and overcoming setbacks). In contrast, individuals who were neurotic, lacked conscientiousness, and not to open to experiences demonstrated avoidance motivations (i.e., social apprehension, withdrawal behaviors, and an aversion to school). Similar findings have been reported in other studies (Busato, Prins, Elshout, & Hamaker, 1999; De Guzman, Calderon, 2003; Kanfer, Ackerman, & Heggestand, 1996).

Although the research between The Big Five factors and some motivation constructs has been important to personality psychology and motivation science, it has not been without its problems. For example, as motivation research has proliferated, researchers' reliance on multiple assessment approaches to measure its constructs has contributed to its lack of theoretical precision, especially regarding the origin, development, implementation, and stability of such constructs (Kaplan & Maehr, 2007). Consequently, as scholars have explored the relationships between The Big Five and various motivation constructs, the results have oftentimes led to a

piecemealed understanding of these associations (Furnham, Eracleous, & Chamorro-Premuzic 2009; Judge & Ilies, 2002).

There is one contemporary motivation model that organizes motivation strategies into a framework that is understandable to instructors: The MUSIC[SM] Model of Academic Motivation (MMAM; Jones 2009). Its five components (eMpowerment, Usefulness, Success, Interest, and Caring) can be used to categorize the majority of instructional strategies associated with academic motivation. Presently, nothing is known about the relationship between The Big Five factors and the MMAM components.

Purpose

Ongoing investigations that address the relationships between personality and motivation are critical to personality psychology and motivation science. However, our understanding of these relationships must extend beyond the scope of The Big Five factors and the previously studied motivation constructs. Thus, this novel quantitative study was designed to examine the relationship between personality and motivation—and in particular academic motivation—in a more complete, systematic manner by determining the linkages between The Big Five factors and MMAM components. To achieve this goal, I utilized questionnaires to assess individuals' perceptions of their personality traits and their academic motivation beliefs. Additionally, I employed a family of statistical techniques known as Structural Equation Modeling (SEM) to conduct this investigation.

SEM played a critical role in this study for four reasons. First, researchers have realized that to fully explore and better understand the relationships among variables pertaining to a particular theory, all of them need to be included in a study (Schumacker & Lomax, 2010). Many statistical methods utilize only a small number of variables, which may not fully represent the

theories upon which they are based. Thereby, the use of a limited number or non-representative portion of variables potentially constrains the results of studies. For example, the use of bivariate correlations is ineffectual for examining many variables comprising a theory. SEM allows multiple variables to be statistically tested; therefore, it has become a preferred method for understanding the relationship among theoretical models quantitatively. SEM was appropriate for my study because the intent was to examine the relationships between *all* of the variables that comprise The Big Five, coupled with *all* of the variables that comprise the MMAM.

Second, researchers have come to realize that they must more fully incorporate the observed scores from measurement instruments (Schumacker & Lomax, 2010). For example, measurement error has impacted the results of many studies pertaining to different disciplines. However, researchers have tended to address measurement error and statistical analysis as two separate entities. SEM specifically addresses measurement error when data is statistically analyzed. SEM was appropriate for this investigation because it allowed me to address measurement error by deriving measurement models for the latent personality and academic motivation variables.

Third, SEM methodology has significantly improved over the last three decades, especially regarding the analysis of complex theoretical models (Dimitrov, 2006; Schumacker & Lomax, 2010). These advanced SEMs have given researchers the ability to examine sophisticated theoretical models comprised of complex constructs/variables, requiring less dependence on simplistic statistical methods. SEM served this study well because The Big Five factors and MMAM components comprise inherently complex factor analytic models, representing a wide variety of personality and motivation theories, respectively. By using this approach, I was able to derive fit indices to assess the significance of the hypothesized factor

model(s) and data (see Nachtigall, Kroehne, Funke, & Steyer, 2003, for a discussion of fit statistics).

Fourth, over the years, SEM programs have become easier to use, operate, and understand (Schumacker & Lomax, 2010). For example, until the early 1990s, researchers using a SEM program referred to as LISREL had to compose and input syntax comprised of Greek symbols and matrix notations. Oftentimes, this was challenging for researchers so they sought out help for their efforts. Presently, a large number of SEM programs are Windows or MAC-based, which enable researchers to use various tabs, menus, or drawing features that are more user friendly. Specifically, my study focused on AMOS, a user-friendly SEM program.

Dissertation Outline

This dissertation includes five chapters. The current chapter provides an overview of the rationale for this investigation, as well as the methodology I used to carry out this study. Chapter Two includes an in-depth review of the literature in order to establish the necessary theoretical foundations for this study. This chapter begins with a literature review of personality, focusing on The Big Five, and then addresses its origin, development, and germane factors. Chapter Two then continues with a literature review on academic motivation. Specifically, I cover the MMAM: (a) what it is, (b) how it was developed, and (c) what its components are. Third, I have summarized a series of studies that previously investigated the relationship between The Big Five factors and various academic motivation constructs. Additionally, I have drawn some comparisons between those constructs and the MMAM components. Fourth, I present my rationale for this study, discussing current issues and gaps in the literature. Furthermore, I briefly review my findings for a data analysis project for which I analyzed the relationship between two of The Big Five factors, the MMAM components, and an effort variable. This chapter ends with

the purpose of my study, and the presentation of the single research question that this investigation was designed to answer.

After laying the groundwork for my study through a discussion of relevant theory, Chapter Three provides the overall design and methodological approach for my study; it also includes a description of participants. Additionally, I provide detailed descriptions of the measures used in this study, as well as the procedure used for data collection, and the types of analyses. Chapter Four details the results of the data analyses, with preliminary and brief interpretations. An in-depth discussion of the findings of this investigation is included in Chapter Five; I also contextualize these meanings within the initial research question. Furthermore, this chapter includes discussion, implications, limitations, recommendations, and the conclusion sections.

Finally, according to Boote and Beile (2005), it is important for doctoral students to discuss and justify the reasoning for the selection of literature in a formal research document such as this one. The articles that I selected for this line of research emanated primarily from peer-reviewed journals. Additionally, other researchers heavily cited the articles that I used. I located these articles searching databases such ERIC, Google Scholar, and PsycINFO. The literature on personality and academic motivation was robust. I included sources in the literature that pertained primarily to The Big Five, MMAM, and studies that examined personality and academic motivation via SEM.

CHAPTER 2.

LITERATURE REVIEW

Personality

McDougal (1932) famously wrote that *character* was the aggregate of characteristics and traits that comprise the unique, individual nature of all humans. He also wrote that *personality* embodied behavioral, emotional, mental, and psychological traits that define a person. Toward the latter half of his work, he made a compelling statement: "Personality may to advantage be broadly analyzed into five distinguishable but separate factors, namely, intellect, character, temperament, disposition, and temper…each of these is highly complex [and] comprises many variables" (p. 15). After I initially read this quote I was intrigued that McDougal—years before Allport (1936), Allport and Odbert (937), Cattell (1943, 1945a, 1945b), Tupes and Christal (1961), and Costa and McCrae (1976)—mentioned the term "factor." Besides, based on today's contemporary standards, it is a term most often associated with statistical reduction methods. Nevertheless, McDougal's usage of this term foreshadowed a lifetime of work that organized the body of linguistic terminology propelling the conceptualization of personality into a factor analytic structure.

Traits versus Characteristics

Before discussing personality in terms of The Big Five, I want to clarify the terms "traits" and "characteristics." Outside the field of personality psychology these terms are oftentimes used interchangeably; however, each one is different. A *trait* is an element of a person's personality that does not typically change or vary over time (Engler, 2008; McCrae & Costa, 1989a). An example of a trait would be extraversion or introversion. In contrast, a *characteristic* is a description of any number of different behaviors that a person may engage in or exemplify when

they possess a particular trait. Characteristic examples of extroversion would include the following social behaviors (a) talkative, (b) energetic, and (c) assertive (McCrae & John, 1992; Srivastava, 2013).

The Big Five

In the mid-twentieth century, psychologists (typically research psychologists as opposed to practitioners) possessing a variety of sub-disciplinary expertise attempted to conceptualize and understand personality from different theoretical positions (John, Hampson, & Goldberg, 1991; John, Naumann, & Soto, 2008; McAdams, 1995). Additionally, they tried to study and understand these theoretical positions on numerous levels of abstraction, breadth, and depth. Thus, psychologists investigating personality produced significant contributions to the traits, characteristics, and behaviors that comprise this construct. However, these contributions were not without questions or problems. For example, personality-related traits, characteristics, and behaviors were measured with scales—some of which were of adequate value and quality, and others that were not (Goldberg, 1971). The most pressing problem was that the development and number of scales available up to that point were vast (John et al., 2008). Because of this dilemma, psychologists typically found it challenging to choose a particular scale that was scientifically rigorous. To complicate matters further, some of the scales possessing commensurate title names were used to measure different personality components, while other scales with varying title names measured commensurate components. Indeed, this was a complex matter that needed to be made more comprehensible and uniform.

While the accumulation of numerous, different scales had the potential to be both meaningful and valuable, it also had the potential to complicate the communicative language among psychologists (John et al., 2008; McCrae & John, 1992). In other words, with the

availability of too many varying scales, psychologists were not communicating in a similar

manner regarding personality. Consequently, psychologists knew that a common communicative

language was necessary. Personality psychology needed to operationalize its subject matter into

a scientifically-oriented classification system, which would allow for more consistent,

generalized communication and scholarly study regarding personality. Furthermore, the

development of a uniform language would better allow for the targeted study of traits,

characteristics, and behaviors associated with agreed-upon personality domains—rather than the

arbitrary study of singular behaviors.

After years of debate and scholarly study, personality psychology began to reach a

unified agreement regarding a personality trait and characteristic classification system ultimately

to be known as The Big Five (John et al., 2008; McCrae & John, 1992). Interestingly, the lexicon

utilized to represent each factor comprising The Big Five did not emanate from a lone theoretical

perspective. Instead, it was developed based on scientific analyses of common language(s)

people utilized to describe their own personality and others' personalities. This was inherently

useful because it was typical of the population norm.

The Big Five: The Lexical Quest

A few years after McDougal (1932) demonstrated scholarly interest in personality,

Allport and Odbert (1936) began to study actual traits and characteristics comprising personality.

Their own search started with an unusual, yet innovative, study of personality terms in a long-

form English dictionary. They studied terminology that could be utilized to discriminate the

overt behaviors from one human to the next. They recognized close to 18,000 words referring to

the entire quest as a "semantic nightmare" (Allport, 1937, pp. 353-354), noting that these terms

would keep psychologists busy for several years.

A few years after the research of Allport and Odbert (1936), Cattell (1943) attempted to utilize their terminological organization system by deriving a taxonomy that would allow for the pragmatic configuration of human behaviors indicative of characteristics, followed by the organization of characteristics indicative of traits (John et al., 2008; McCrae & John, 1992). Cattell (1943, 1945a, 1945b) realized very quickly that a taxonomic structure of nearly 18,000 terms was too large, so he derived a subset of 4,500 terms. To reduce the size even further, he utilized terminological and scientific patterning procedures (as well as his own study and understanding of the available literature). The final number of terms ended up being 35; thereafter, Cattell conducted a number of factor analyses using oblique rotation methods, which allowed for the identification of 12 terms (in this case, factors). These 12 factors, along with 5 others, resulted in the development of a 16 Personality Factors Questionnaire (16PF; Catell, Eber, & Tatsuoka, 1970). Cattell et al.'s (1970) exemplary work led Tupas and Christal (1961) to study various matrices that supplied the correlations among all data sets. Their study revealed five significant, repeated factors. These findings were then replicated and refined by others (Norman, 1963; Borgatta, 1964; Digman and Takemoto-Chock, 1981). (For further information regarding the early history and quest of The Big Five, please refer to John and Srivastava [1999] and John et al. [2008].)

The research of Allport and Odbert in the 1930s, Cattell in the 1940s, and Tupes and Christal in the 1960s eventually led up to what Costa and McCrae investigated in the latter half of the 1970s and 1980s (John et al., 2008; McCrae & John, 1992; Digman, 1990). At first, they focused on constructing elaborate taxonomies of personality traits and characteristics; however, they were not using these factors to derive and analyze hypotheses. Preferentially, they were using component and common factor analyses to investigate the soundness and organization of

personality. At this time, they focused on two predominant dimensions: *Extraversion* and

Neuroticism. Not long after, Costa and McCrae derived a third factor, which they referred to as

Openness to Experience (John & Srivastava, 1999; John et al., 2008). Not surprisingly, the

majority of their initial research focused on these dimensions (Costa & McCrae, 1976; Costa,

Fozard, McCrae, & Bosse, 1976)—even after Goldberg (1981) had used the term "Big Five" as a

way of depicting the statistically-consistent findings of five personality traits. However, Costa

and McCrae (1976) continued their work on perfecting Extraversion, Neuroticism, and Openness

to Experience.

The Big Five Factors: Developed and Solidified

Despite Goldberg's (1981) preference for The Big Five, McCrae and Costa (1983)

continued to advocate for only a three-factor model of personality (John & Srivastava, 1999;

John et al., 2008). Nonetheless, they investigated five actual factors until the latter half of the

1980s. This particular research resulted in the development of a five-factor personality survey:

The NEO-PI (Costa & McCrae, 1985). Originally, the unpublished NEO-PI measured only

McCrae and Costa's first three dimensions, but it was redesigned to measure all five factors,

including the *Agreeableness* and *Conscientiousness* dimensions. There were some problems with

these last two dimensions, however, in that there were no well-developed subscales related to

them. However, this was corrected in 1992 when the revised NEO-PI was developed.

After 1985, McCrae and Costa (1985, 1989a) continued their factor analytic research

(John & Srivastava, 1999; John et al., 2008). They spent quite a bit of time studying other

personality inventories, such as the Myers-Briggs (Myers, 1962) and the Eysenck Personality

Inventory (Eysenck & Eysenck, 1975). McCrae and Costa's (1985, 1989a) research revealed that

Eysenck's first two dimensions, Extraversion and Neuroticism, were unequivocally related to their same two dimensions.

Given the high degree of available personality literature, inventories, and scales (all of which account for hundreds of personality terms and/or factors), it was a revelation for personality psychology when The Big Five was established (McCrae & John, 1992). Without it, there were too many questions about how common personality terms could emerge, and what the overall structure of personality actually was. Speaking to this effect, Eysenck (1991) famously wrote:

> Where we have literally hundreds of inventories incorporating thousands of traits, largely overlapping but also containing specific variance, each empirical finding is strictly speaking only relevant to a specific trait. This is not the way to build a unified scientific discipline. (p. 786)

In short, too many psychologists had their own preferential set of personality terms, factors and/or variables, making the juxtapositions among studies challenging and tedious. In contrast, The Big Five provided definitive, consistent answers (McCrae & John, 1992).

With McCrae and Costa (1992) leading the way, the majority of psychologists unilaterally favored The Big Five (Digman, 1990; John & Srivastava, 1999; John et al., 2008). This trend continues to the present day. The traits, characteristics, and behaviors that emanate from The Big Five factors are globally based, vary from culture to culture, and are described in numerous languages and by varying terms (McCrae & Allik, 2002).

The Big Five: Taxonomy to Theory

How do researchers distinguish between taxonomy and theory? The term "taxonomy" pertains to how researchers classify their information (Feist & Feist, 2009). Taxonomies are

essential when it comes to the advancement of science, but there is a clear distinction among them when juxtaposed to theories. Taxonomies allow for the generation of information classification systems, while theories engender research. This was the path The Big Five followed. For example, Eysenck's (1967) predilection for the biological and psychometric approach to personality allowed him to create a three-factor approach. Interestingly, his approach is an excellent example of how theories utilize taxonomies to derive hypotheses, which can be tested scientifically. It is important to note that McCrae and Costa's research in the late 1970s and early 1980s began as an endeavor to determine key personality traits and characteristics via scientific analysis, particularly factor analysis (John et al., 2008; McCrae & John, 1992). This gradually developed into a classification system of The Big Five. Ultimately, this taxonomy evolved into a theory, allowing for the prediction and explanation of overt behaviors based on five personality factors.

The Big Five and the Five-Factor Model (FFM)

Emanating from terminological studies, The Big Five merely provides a summative description of the five traits or factors (Engler, 2008; Saucier & Goldberg, 1996). As a result, no assumption is made as to whether the factors exist or what their potential causes are. In other words, The Big Five is commensurate with description *not* explanation. Put simply, the Five-Factor Model (FFM) is an *explanatory* interpretation of The Big Five (Engler, 2008; McCrae & Costa, 1989), which was designed to further some claims that did not necessarily originate from terminological studies. First, the FFM suggests that personality can be described in five different factors, with each including specific characteristics. Additionally, it suggests that the way individuals endorse items on the NEO-PI-R (or similar instruments) allows for a broad and/or narrow description of their personalities. Second, the FFM suggests that the factors are

genetically oriented, based on undiscovered internal elements. Furthermore, it suggests that the factors are relatively stable over a developmental continuum. Juxtaposed to The Big Five, FFM asserts farther-reaching theoretical claims.

Psychologists differ as to the extent to which The Big Five refers to factors, as well as the extent to which the FFM is driven by internal elements (Engler, 2008). Historically, Cattell (1945a) in his initial work expressed interest in the internal elements that impact behaviors, but he did not capitalize on this interest with respect to his work with the factors. Eyesnck (1967) in his preliminary work expressed interest in discovering *what* internal elements make-up the factors, but the nemesis for his work was factor analysis. Overall, although some psychologists use the FFM, they do not universally submit to its theoretical claims (John & Srivastava, 1999; John et al., 2008). If anything, they are cautious when it comes to fully believing and/or suggesting that the factors are driven by internal elements.

The Big Five Factors: Definitions and Interpretations

It was not a matter of conventionality for psychologists to decide how to delineate the five factors (John & Srivastava, 1999; John et al., 2008; McCrae & John, 1992). Indeed, the labels or names of the factors reflected various ideas and notions. At that time, psychologists (and other personality pundits) possessed differing perceptions and views regarding the finality of the actual factor names. (Presently, some psychologists continue to debate the finality of the factor-naming scheme [John et al., 2008].) The current naming scheme was descriptive in nature (McCrae & John, 1992). In other words, the types of characteristics that meaningfully define each factor were of the utmost relevance. However, determining which characteristics were most germane was theoretically challenging. Presently, some psychologists continue to debate the relevancy of the characteristics that comprise the factors (John et al., 2008). Despite any

theoretical challenge, one notion is certain: The theory must be acclimated to the characteristics attempting to explain the factors (McCrae & John, 1992).

Although the factors comprising The Big Five possess a unique (yet seemingly arbitrary) numerical arrangement in their theoretical structure, they are oftentimes distilled into the acronym OCEAN, with each capitalized letter symbolizing the five central factors of the model: (1) O for Openness, (2) C for Conscientiousness, (3) E for Extraversion, (4) A for Agreeableness, and (5) N for Neuroticism. The sole premise of OCEAN is that each factor is important to understanding the nature of people's personalities.

Openness (O)

Openness is the first and most controversial of the theoretical structures (McCrae & John, 1992). Part of the controversy is the difference between native vernacular and survey studies. Some of the studies on personality characteristics and trait wording in English (Goldberg, 1990; John, 1990a) and German (Ostendorf, 1990) suggest that Openness is commensurate with various forms of intellect (Borgatta, 1964; Digman, 1990; Digman & Takemoto-Chock, 1981; Fiske, 1949; Hogan, 1983, 1986; John, 1989b; McCrae & John, 1992; Peabody & Goldberg, 1989). These various forms tend to revolve around imagination, perception, and openness to broad, worldly experiences (McCrae & Costa, 1985b), and/or culture (Hakel, 1974; Norman, 1963). Suffice it to say, all of these aforementioned forms likely represent Openness in some manner (Digman, 1990). However, according to McCrae and John (1992), many characteristics indicative of Openness are not necessarily represented in the English vernacular. For example, not all descriptive phrases can be exemplified by a singular term. Because of this, Openness has been expressed vis-à-vis: (a) unique emotions, (b) aesthetic appreciation, (c) desire for diversification, and (d) unique (perhaps unconventional) values. This broader definition of

Openness can also be seen in the work of McCrae and Costa (1997), Rogers (1961), and

Rokeach (1960)—all of who suggest that it is related to and part of consciousness. Furthermore,

Openness is related to a motivational desire for contextual variety and experience (MaCrae &

John, 1992). Like the remaining factors, the descriptions of Openness are broad (Srivastava,

2013). However, simply put, if individuals are intellectual, insightful or imaginative, possess a

wide array of interests, and value experiential novelty, they epitomize the generally-accepted

definition of Openness.

Conscientiousness (C)

Conscientiousness, which has also been referred to as *conscience*, is the second factor of

the theoretical structure and has been highly evaluated (Botwin & Buss, 1989; John, 1989;

McCrae & Costa, 1985; Noller et al., 1987; Norman, 1963). Some authors (e.g., Fiske, 1949;

Hogan, 1983) have referred to Conscientiousness as conformity or dependability. Other authors

(e.g., Digman, 1989; Smith, 1967; Wiggins, Blackburn, & Hackman, 1969) suggest that this

factor is synonymous with several constructs: (a) achievement preoccupation, (b) cognitive

deliberation, (d) purposeful determination, (e) willfulness, (f) organizational proclivity, and (g)

planning. Clearly, many different definitions of Conscientiousness have been suggested;

nevertheless, the common theme among many of these aforementioned interpretations revolves

around a person's ability to make conscious choices and decisions, as well as proceed with

directed intentionality (Bernstein, Garbin, & McClellan, 1983; Borgatta, 1964; Conley, 1985;

Costa & McCrae, 1988; Digman & Inouye, 1986; Digman & Takemoto-Chock, 1981; Howarth,

1976; John et al., 2008; Krug & Johns, 1986; Lei & Skinner, 1982; Lorr & Manning, 1978;

McCrae & Costa, 1985b, 1987, 1989c; McCrae & John, 1967; Norman, 1963; Peabody &

Goldberg, 1989; Smith, 1967). Simply put, if individuals are organized, meticulous, thorough,

and operate with planned intentionality, they are the epitome of Conscientiousness (Srivastava, 2013).

Extraversion (E)

Extraversion is the third factor of the theoretical structure, and has been equated with surgency (Botwin & Buss, 1989; Digman & Takemoto-Chock, 1981, Hakel, 1974; Hogan, 1983; Howarth, 1976; Krug & Johns, 1986; John, 1986; John et al., 2008; Noller, et al., 1987; Norman, 1963, Smith, 1967). Even though this factor is commonly understood to imply a certain way of interacting with the world, surprisingly there is less agreement about its precise definition (McCrae & John, 1992). For example, Wiggins (1979; 2003) suggested that Extraversion—in tandem with the next OCEAN factor, Agreeableness—form a social circle often referred to as an "interpersonal circumplex." That is, the adjectives or terms that comprise Extraversion within this circumplex have antonyms. The historical terms associated with Extraversion include dominance and affiliation (Wiggins, 1979). However, McCrae and John (1992) pointed out that these terms' association with Extraversion remains controversial and should not be considered in isolation when conceptualizing it. The more appropriate conceptualization suggests that Extraversion is halfway point between these two terms, especially in social contexts. Other less debatable terms frequently associated with Extraversion include (a) active, (b) assertive, (c) energetic, (d) enthusiastic, (e) outgoing, (f) gregarious, and (g) talkative (McCrae & John, 1992; Srivastava, 2013). Simply put, if individuals are interpersonally active, outgoing, and loquacious, they exemplify Extraversion (Srivastava, 2013).

Agreeableness (A)

Agreeableness is the fourth factor of the theoretical structure. Some researchers (e.g., Borgoatta, 1964; Conley, 1985; Hakel, 1974; John, 1989; Golberg, 1981; McCrae & Costa,

1985; Norman, 1963; Smith, 1967; Tupes & Christal, 1961) indicate that Agreeableness is synonymous with likeability. Digman (1990) noted, however, that defining Agreeableness as mere likeability only describes a fraction of its essence. The reason for this caution is because many other "human" aspects of the good human-nature phenomenon comprise this factor (e.g., altruism, nurturance, caring, and emotional support). Other researchers have characterized this factor as friendliness (Guildford & Zimmerman, 1949), interpersonal/gregarious conformity (Fiske, 1949), and compliance (Digman & Takemoto-Chock, 1981). Several other terms are also associated with Agreeableness: (a) appreciative, (b) forgiving, (c) generous, (d) kind, (e) sympathetic, and (f) trusting (McCrae & John, 1992). It is important to note that Agreeableness is adjacent or linked to Extraversion; therefore, the definition of Agreeableness is somewhat contingent upon agreed-upon characterizations of Extraversion. Simply put, if individuals are amenable, demonstrate fondness or tenderness, are kind, and are empathetic and/or sympathetic, they are the epitome of Agreeableness (Srivastava, 2013).

Neuroticism (N)

Neuroticism is probably the least disputed of the OCEAN factors (McCrae & John, 1992). According to John et al. (2008), this factor is a representation of neurosis where individuals tend to experience distress in a way that is cognitively, emotionally, and behaviorally debilitating. Individuals who score highly on a Neuroticism scale tend to experience chronic affective symptoms that dominate their personality (Watson & Clark, 1984). For example, feelings of apprehension/nervousness, obsessive thought and compulsive behavioral patterns, and physiological complaints (without medical evidence warranting such a problem) are all indicative of neurosis (Zonderman, Stone, & Costa, 1989). Other neurotic issues include (a) depressive symptomatology, (b) poor self-esteem, (c) cognitive indecisiveness, (d) frustration,

18

(e) irrational thinking, (f) excessive self-consciousness, and (g) social maladjustment (McCrae & Costa, 1987)—all of which lead to poor adjustment and coping. Contrastingly, individuals who possess low Neuroticism scores, while not necessarily the quintessence of psychological health, do tend to possess more imperturbable cognitive, emotional, and behavioral characteristics. Simply put, if individuals are pathologically apprehensive, nervous, or moody, they are the epitome of Neuroticism (Srivastava, 2013).

Table 1 provides the five specific factors associated with that are considered within each of The Big Five factors when the NEO-PI-R is scored and analyzed.

Table 1. *The OCEAN Factors Comprising the Big Five and their Associated Personality Traits*

OPENNESS	CONSCIENTIOUSNESS	EXTRAVERSION	AGREEABLENESS	NEUROTICISM
fantasy	competence	warmth	trust	anxiety
aesthetics	order	gregariousness	straightforwardness	angry hostility
feelings	dutifulness	assertiveness	altruism	depression
actions	achievement striving	activity	compliance	self-consciousness
ideas	self-discipline	excitement seeking	modesty	impulsiveness
values	deliberation	positive emotions	tender-mindedness	vulnerability

Note. These facets do not take into account all of the terms associated with each factor.

Academic Motivation

Research psychologists have conducted research and developed theories to determine the reasons why individuals are motivated to act or behave in certain ways (Jones, 2009). There are many different interpretations for the term "academic motivation." However, for the purposes of this study, I specifically focus on the five components included in the MMAM because they are among the most commonly-accepted concepts studied in motivation science today (Schunk et al., 2008). Consistent with the definitions of Jones (2009), Reeve (2005; 2009), and Schunk et al.

(2008), academic motivation is a cognitive intention whereby processes (e.g., beliefs) initiate and maintain mental or physical goal-directed behaviors that facilitate academic success. As Jones (2009) pointed out, academic motivation by itself is not important; it is important because students who possess motivation are more likely to "engage" in academic-related tasks. For example, academically motivated students are more likely to initiate and maintain their attentional faculties during class time, employ useful learning tactics, and seek others' assistance when they have difficulty completing a task or understanding a concept (Jones, 2009; Schunk et al., 2008).

The MUSIC Model of Academic Motivation (MMAM)

Many K–16 teachers have an interest in learning about the types of instructional methods/strategies that will academically motivate their students (Jones, 2009). But given the large number of motivation theories and sub-theories, it can be challenging for them to know which ones are most beneficial or useful. Due to this dilemma, Jones (2009) designed the MMAM, which is a model that disentangles numerous motivation theories and sub-theories, thereby helping teachers more easily determine the best strategies that foster students' academic motivation. Both motivation research and various motivation theories and sub-theories were examined across the fields of education and psychology to develop this model. Furthermore, its focus is on *how* contexts in academic settings, and *what* instructional elements, impact students' motivation beliefs.

The acronym, MUSIC, refers to the five central components of the MMAM: (1) *M* for *eMpowerment*, (2) *U* for *Usefulness*, (3) *S* for *Success*, (4) *I* for *Interest*, and (5) *C* for *Caring* (Jones, 2009). Correspondingly, students are motivated in academic settings when they: (1) believe they are *empowered*, (2) think the scholastic material is *useful*, (3) believe they have the

potential to be *successful* with learning academic content, (4) think the scholastic material or instruction is *interesting*, and (5) believe others (particularly the instructor) *care* about not only their learning of the academic content but also their overall scholastic well-being.

The components comprising the MMAM are not novel to the field of motivation and correlate with numerous motivation constructs (Schunk, 2000). It should be noted, however, that confirmatory factor analytic results conducted by Jones and colleagues (Jones & Skaggs, in press; Jones & Wilkins, 2013) suggest that the components are different and unique, and strongly represent the model. While it may be necessary for scholars to understand the details and intricacies of the components directly associated with the study of the MMAM, it is less important for teachers to understand these nuances. However, what is relevant for teachers is to understand that each of the five MUSIC components refers to a group of strategies that can be used to motivate students (Jones, 2009; 2010), as I will discuss the following sections.

eMpowerment

Empowerment is derived from research conducted on self-determination theory (Deci & Ryan, 1985, 1981; Ryan & Deci, 2000), specifically the need to feel autonomous. When students believe that they have some control over their learning, they are empowered (Jones, 2009). Empowerment facilitates a student's need for autonomy. To facilitate a sense of empowerment, it is important for teachers to develop a curriculum and set-up a classroom environment whereby their students are given choices and options regarding their learning process (Jones 2009, 2010).

Usefulness

Usefulness, which is in part based on *future time theory* research (Devolder & Lens, 1982; Eren, 2009; Phan, 2008; Tabachnick, Miller & Relyea, 2008), pertains to student perceptions of the usefulness of academic content to meet their future goals. This component is

also partially derived from research conducted on utility value (Eccles & Wigfield, 1995; Wigfield & Eccles 1992, 2000), which examines students' perceptions of the usefulness of the academic content being taught. It is essential for students to believe that the academic content they are learning is both relevant and necessary to help them achieve short and long-term goals (Jones, 2009). If students do not believe this to be true, their overall level of motivation and engagement with the content is negatively impacted; furthermore, their outlook on meeting their future goals will likely be diminished (Simons, Vansteenkiste, Lens, & Lacante, 2004; Van Calster, Lens, & Nutttin, 1987). To facilitate a sense of usefulness, it is important for teachers to develop a curriculum and set-up a classroom environment where students perceive that the academic content or instruction will help them achieve a means to their goals (Jones 2009, 2010).

Success

Success is based on various motivation theories such as: (1) self-concept theory (Marsh, 1990); (2) social-cognitive theory, with a focus on self-efficacy (Bandura, 1986); (3) self-worth theory, with a focus on achievement motivation (Convington, 1984, 1992); (4) goal orientation theory (Ames, 1992); and (5) expectancy-value theory, with a focus on expectancy for success (Wigfield & Eccles, 2000). According to Jones (2009), students need to believe that they can succeed on a given academic task if they put forth adequate effort (i.e., if they *try*). To facilitate a sense of success, it is important for teachers to implement instructional activities whereby students perceive a sense of accomplishment during and after engaging in those activities.

Interest

Interest is derived from research conducted on (1) affect and (2) cognition, particularly concentration (Hidi & Renninger, 2006). According to Jones (2009) and Hidi and Renninger (2006), students are typically interested in an academic activity/task when they "like" it. If students like an academic activity/task, they put forth adequate (or noticeable) mental effort to work with it in a way that demonstrates interest. Although interest in and of itself may be considered the primary component of the MUSIC model, this factor can be divided into *individual* and *situational* sub-components (Hidi & Renninger, 2006). According to Schraw, Flowerday, and Lehman (2001), individual interest is intrapersonally based. Because individual interest is unique to a single person, it is subjectively and thematically selective, practically useful, and personally valuable. On the other hand, situational interest is more socially and situationally driven. It is not based on mere individualistic factors. Situational interest is not necessarily permanently valuable. Additionally, it is circumstantially driven and environmentally oriented. To facilitate a sense of interest, it is important for teachers to develop and implement curricular tasks that capitalize on students' individual and situational interests (Jones 2009). Furthermore, Hinton and Kern (1999) suggested that antecedent interventions (e.g., including student interest in, and input toward, the generation of academic assignments) increase engagement and responsivity.

Caring

Caring in the MMAM is partly based on interpersonal/social involvement research, which includes, but is not limited to belongingness, connectedness, relatedness, affiliation, involvement, attachment, commitment, and bonding (Jones, 2009). According to research posited by Baumeister and Leary (1995), and Ryan and Deci (2000), humans are social species,

which means that there is an internalizing force within all humans compelling them to be interpersonally interactive and engaging. This drive is central to the caring component. Caring can be split up into two subcomponents: (1) academic and (2) personal (Johnson, Johnson, & Anderson, 1983; Jones & Wilkins, 2013). Academic caring relates to both teachers and peers. That is, teachers and peers should interpersonally exemplify to others in the classroom setting that they care about the level of success they have in undertaking and fulfilling academic goals and objectives. For personal caring, teachers and students need to model that they care about each other's physical and mental prosperity, and overall personal well-being.

Studies Examining The Big Five and Academic Motivation Constructs

As indicated in Chapter 1, scholars have been interested in the relationship between personality and motivation for many years. While there are a few studies that focus on the relationship of The Big Five factors and various academic motivation constructs (Komarraju & Karau 2005; Komarraju, Karau, Schmeck, 2009), there are no studies that focus on The Big Five factors and the MMAM components. I have selected 10 relevant studies that focus on what has been previously examined. These studies and their methodological foci are discussed. Additionally, these studies are presented in chronological order from earliest to most recent.

Study 1

Using an expectancy-valence framework (Baldwin & Karl, 1984; Mathieu, Tannenbaum, & Salas, 1992; Vroom 1964), Colquitt and Simmering (1998) conducted a study that examined Conscientiousness and goal orientation as (a) predictors of *motivation to learn*, and (b) moderators of behaviors (e.g., reactions) to performance levels. The authors defined goal orientation as a type of (a) learning orientation that is fostered by the development and honing of abilities/skills, and (b) performance orientation whereby sufficient abilities/skills, knowledge,

and experience is exemplified by meeting normative-based standards (Dweck 1986; 1989).

Additionally, they defined motivation to learn as the "desire to learn content" (see Noe, 1986, for an additional discussion). In this case, Colquitt and Simmering cast Conscientiousness, learning orientation, and performance orientation as distal personality variables. Additionally, the authors indicated that moderators of reactions to performance levels were based on feedback regarding performance.

Colquitt and Simmering's (1998) sample consisted of 103 undergraduate students with varying majors enrolled in two sections of a management course. The researchers used a variety of scales to measure expectancy, valence, and pre/post feedback. They utilized (a) three adapted items from Noe and Schmitt (1986) to measure motivation to learn, (b) the 12-item scale from the NEO-Five Factor Inventory (NEO-FFI; Costa & McCrae, 1992) to measure Conscientiousness, and (c) the eight-item dispositional goal orientation scale (Button, Mathieu, & Zajac, 1996) to measure goal orientation. Methodologically, Colquitt and Simmering used descriptive statistics to test for zero-order correlations among their chosen variables. Additionally, they used factor analysis (with a varimax rotation) to test the one dimensionality of the expectancy variable, and regression analysis to test the relationship of the personality variables and predictor variables. The positive associations of Conscientiousness and learning orientation stood out as the most important predictors of motivation to learn. Additionally, performance orientation was negatively associated with motivation to learn. Furthermore, Conscientiousness, learning and performance orientations served as moderators to performance levels while learning took place.

Study 2

  Vermetten, Lodewijks, and Vermunt (2001) conducted a study that examined the role of

The Big Five factors, regulatory strategies (i.e., self-regulation, external regulation, and lack of

regulation), and goal orientations (i.e., individual differences pertaining to ego orientation, task

orientation, and effort orientation) in learning strategies (i.e., deep learning and surface learning).

Their sample included 310 undergraduate students majoring in psychology, sociology, or art.

The authors used the B5BBS-25 (Mervielde, 1992) to measure trait adjectives of The Big Five

factors. Additionally, Vermetten et al. used a scale derived by Nicholls (Duda & Nicholls, 1992;

Nicholls, 1989; Nicholls, Patashnick, & Nolen, 1985) to measure goal orientations.

Methodologically, the authors conducted Structural Equation Modeling (SEM) analyses to study

the relationship among their chosen variables. The authors first constructed and evaluated a

measurement model of the endogenous learning strategy variables via Confirmatory Factor

Analysis (CFA); they then connected it to a full structural model, after which they evaluated the

model/data fit holistically.

  Vermetten et al. (2001) found that Agreeableness and Conscientiousness both directly

and indirectly influenced surface learning (i.e., a reproductive, regurgitant type of learning), with

indirect paths going through effort orientation. Their findings support prior research by Busato et

al. (1999) and Slaats, Van der Sanden, and Lodewijks (1997). Additionally, the authors found

that Extraversion and Neuroticism (i.e., low features/symptoms of this factor) were not related to

learning strategies, with no direct or indirect paths extending to goal orientation. However,

Vermetten et al. did point out that prior studies did demonstrate such a relationship (De Raad &

Schowwenburg, 1996; Slaats, Van der Sanden, & Lodewijks, 1997).

Study 3

Ackerman, Bowen, Beier, and Kanfer (2001) conducted a study that examined the relationship of the intellectual abilities (e.g., fluid and crystallized intelligences), self-concept, personality (i.e., The Big Five factors), interest, motivation traits (i.e., approach-oriented motivation—the desire to learn or master concepts/ideas, competitive excellence, and aversion-related motivation—the preoccupation of worrying about learning or mastering ideas) and other agents of knowledge across numerous academic domains. Their sample included 320 undergraduates with varying majors. They utilized different measures to assess each different domain in their study. For example, the researchers used the Multidimensional Personality Questionnaire (MPQ; Tellegen, 1982) to assess The Big Five factors, the 90-item Unisex American College Testing Interest Inventory (UACTII; Lamb & Prediger, 1981) to measure interests, and a short form of the Motivational Trait Questionnaire (MTQ; Kanfer & Ackerman, 2000) to assess motivation trait factors.

Methodologically, Ackerman et al. (2001) conducted SEM analyses to study the relationship among their chosen variables. They created a structural equation model to examine the relationships between the latent knowledge and ability factors. Additionally, Ackerman et al. created a second model to examine the relationships between "trait complexes" and knowledge factors. In specific reference to the second model, Exploratory Factor Analysis (EFA) was used to derive a number of "trait complexes." For example, trait complexes one and two referred to of "Science/Math/Technology," and "Verbal/Intellectual," respectively. The first corresponds to mathematics, science, and spatial self-concepts (among others), while the latter refers to verbal self-concept, Openness, and interests. They noted (based on a previous study; Ackerman & Heggestad, 1997) that by considering the commonality of self-concept, personality, interests and

27

motivation, they were able to measure various relations among their participants' intellectual abilities and knowledge acquirement. Ackerman et al. found that Openness and verbal self-concept positively related to trait complex two. Additionally, Neuroticism negatively related to trait complex one, while mathematics, science, and spatial self-concepts positively related to it. In this study, self-concept was not considered to be a motivation trait. However, it is important to note that others researchers (e.g., Newton, 2009; Hassan, 2008) make note of its relationship to academic motivation. Due to the design of Ackerman et al.'s EFA analysis, no relationships between The Big Five factors and motivation traits were reported. Instead, the EFA analysis explored the relationship between motivation traits, and intellectual abilities.

Study 4

Judge and Ilies (2002) conducted a meta-analysis of The Big Five factors and three constructs of performance motivation: goal-setting, expectancy, and self-efficacy. Utilizing correlational methodological procedures, they reviewed 65 studies and found that Conscientiousness, and Neuroticism consistently influenced and/or related to all three constructs of performance motivation. Additionally, they found that these two factors were the *best* predictors of these constructs. Furthermore, they found that Extraversion was a non-zero correlate of goal-setting and expectancy, but its relatedness to self-efficacy was strong. Openness and Agreeableness showed inconsistent patterns in their relatedness to all three constructs. Judge and Ilies noted, however, that these inconsistent patterns might have been due to the fact that this was a small-scale meta-analysis.

Study 5

Day, Radosvich, and Chasteen (2003) conducted a study that examined the relationship of The Big Five factors on three goal orientation dimensions: learning goal orientation, performance-approach goal orientation, and performance-avoidance goal orientation. The authors defined learning goal orientation as the scholarship or study of knowledge, and facilitation of competence. Additionally, they defined performance-goal orientation as one's focus on execution or accomplishment of work. Performance-avoidance goal orientation was considered to be the opposite of performance-goal orientation (see Dweck, 1986; 1989 for a discussion on goal orientation dimensions).

Day et al.'s (2003) sample included 384 undergraduate students with varying majors. The authors used four different instruments to measure goal orientation (a) "Button," Button et al. (1996); (b) TEOS, Duda (1989); (c) three-factor "VandeWalle," VandeWalle (1997); and (d) PALS, Midgley, C., Kaplan, A., Middleton, M., Maehr, M. L., Urdan, T., Anderman, L. H., … Roeser, R. (1998). Additionally, to measure The Big Five factors, Day et al. used Goldberg's (1992) 100 Unipolar Markers. Methodologically, the authors conducted SEM analyses to study the relationship among their chosen variables. They used Confirmatory Factor Analysis (CFA) to assess and compare many measurements models of different goal orientation instruments. Additionally, Day et al. examined the extent to which the goal orientations dimensions were interrelated. After they established a measurement model of their goal orientation instrument, they used SEM to establish a representation of goal orientation constructs. Finally, Day et al. constructed and examined separate SEMs for the relations between goal orientation and (a) The Big Five factors, (b) achievement learning strategies and educational outcomes, and (c) participant response biasness.

Day et al. (2003) found that Conscientiousness and Openness positively related to learning-goal orientation, while Neuroticism negatively related to it. Additionally, they found that Neuroticism positively related to both performance-approach goal orientation and performance-avoidance goal orientation, while Extraversion was negatively related to performance-avoidance goal orientation.

Study 6

Komarraju and Karau (2005) conducted a study that examined The Big Five Personality factors and individual differences regarding several aspects of academic motivation. The authors did not clearly define academic motivation. Instead, their conceptualization of academic motivation derived from Moen and Doyle (1977), which was based on a subset of 16 different descriptions (e.g., thinking, persisting, achieving, etc.). These 16 different descriptions comprise a scale known as the 90-item Academic Motivations Inventory (AMI).

To more clearly describe and understand academic motivation, Komarraju and Karau (2005) performed factor analysis of the 16 descriptions (i.e., subscales) of the AMI to derive a small set of factors. The resulting factors that emerged were (a) avoidance, (b) engagement, and (c) achievement. In their study, avoidance was characterized by the following subscales: "debilitating anxiety," "economic orientation," "demanding," "withdrawing," "disliking school," and "discouraged about school." Additionally, engagement was characterized by the following subscales: "thinking," "facilitating anxiety," "desires self-improvement," "influencing," "approval," and "affiliating." Furthermore, achievement was characterized by the following subscales: "persisting," "achieving," "grades orientation," and "competing."

Komarraju and Karau's (2005) sample included 172 undergraduate students majoring in business or psychology. Using the 60-item NEO-FFI (Costa & McCrae, 1992), The Big Five

factors were found to be associated with a variety academic motivation subscales. For example, Neuroticism and Extraversion were positively associated with avoidance, while Conscientiousness and Openness were negatively associated with it. In this case, Neuroticism explained the most variance. Additionally, engagement was positively related to Extraversion and Openness, with the latter explaining the most variance. (The authors noted that Extraversion was related to both avoidance and engagement. To them, it suggested that the participants in the study were likely to be preoccupied about the social and economic consequences of the learning process, and be heavily involved in the learning process.) Furthermore, Conscientiousness, Openness, and Neuroticism were positively related to achievement, with Conscientiousness explaining the most variance. (The authors noted that Neuroticism was positively related achievement. To them, it suggested that the participants in this study were likely to be compulsively preoccupied with not wanting to fail.)

Study 7

As part of a broad, ongoing German study of secondary schools, Marsh, Trautwein, Lüdtke, Köller, and Baumert (2006) conducted a study that examined self-concept dimensions, The Big Five factors, well-being, and academic outcomes (e.g., course grades and test scores). In this case, while the authors considered The Big Five as "core" personality factors, they also considered self-concept dimensions from a multidimensional perspective, which served as "surface" or secondary personality characteristics. Marsh et al.'s sample ($N = 4,475$, aged 17 to 19 years) was chosen from 149 randomly selected secondary (upper level) German schools. The authors used the German version (Borkenau & Ostendorf, 1993) of the 60-item NEO-FFI (Costa & McCrae, 1985) to measure The Big Five factors, and the SDQ-III (Marsh & O'Neill, 1984) to

31

measure 16 different self-concept dimensions (e.g., mathematics self-concept and problem-solving).

Methodologically, Marsh et al. (2006) conducted SEM analyses to study the relationship among their chosen variables. They relied primarily on CFA, in which all of their latent factors (self-concept factors, Big Five factors, well-being and gender factors, and academic outcome factors) were included into one model. Marsh et al. found that Conscientiousness positively related to mathematics self-concept and problem-solving, while Openness was negatively correlated to mathematics self-concept, but positively correlated to problem-solving. Furthermore, Marsh et al. found that The Big Five factors explained small, varying amounts of course grades and test scores.

Study 8

Payne et al., (2007) conducted a meta-analysis that examined three goal orientation dimensions—namely, learning goal orientation (LGO), prove performance goal orientation (PPGO), and avoid performance goal orientation (APGO)—along with various antecedent domains, including The Big Five factors. The authors defined LGO as "learning for its own sake." Additionally, Online et al. defined PPGO as the aspiration to increase competency, and to gain favorable opinions about it. Furthermore, they defined APGO as the desire to prevent the disapproving of competency, and to prevent unfavorable judgments about it (Walle, 1996).

Payne et al. (2007) found that Conscientiousness was the most examined factor in reference to all three aforementioned goal-orientation dimensions; in fact, it consistently and positively related to LGO. In contrast, Conscientiousness was unrelated to PPGO and APGO. Similar results were found with the remaining Big Five factors. Specifically, Openness, Extraversion, Agreeableness, and Neuroticism (i.e., the emotional stability spectrum) positively

related to LGO, and negatively related to APGO. Additionally, Openness, Extraversion, and Agreeableness were unrelated to PPGO, while Neuroticism was negatively related to it.

Study 9

In the context of an expectancy-value model (see Dauphinee, Schau, & Stevens 1997; Hilton, Schau, & Olsen, 2004; Schau, 2003; Schau, Stevens, Dauphinee, & Del Vecchio, 1994; Sorge & Schau, 2002), Tempelaar, Gijselaers, van der Loeff, and Nijhuis (2007) conducted a complex study that examined the relationship between The Big Five factors, context-dependent achievement motivations, and both course-specific and generic achievement motivations. Tempelaar et al.'s sample included 264 undergraduate students enrolled in a business program, taking eight core business courses. The authors used the Survey of Attitudes Toward Statistics (SATS; Dauphine et al., 1997; Hilton, et al. 2004; Schau, 2003; Schau, et al. 1995; Sorge & Schau, 2002) to measure students' achievement motivations. In particular, the SATS measured their *attitudes*, which included (a) affect—positive and negative feelings about statistics, (b) cognitive competence—attitudes about intellect and competency regarding statistics, (c) value—attitudes about the personal relevance and usefulness of statistics, and (d) difficulty—attitudes about the perceived level of difficulty regarding statistics. Tempelaar et al. noted that they captured attitudes for four subjects (Business Strategy, Finance and Accounting, Marketing Management, and Organization and Human Resource Management) by utilizing an adapted version of the SATS—they simply replaced the term *Statistics* with each of the four subject names aforementioned. Additionally, the authors used the 50-item version of the International Personality Item Pool (IPIP) Big Five unipolar markers (Goldberg, 2005; Gow, Whiteman, Pattie, & Deary, 2005) to measure the personality factors.

Methodologically, Tempelaar et al. (2007) conducted SEM analyses to study the relationships among their chosen variables. They provided a descriptive analysis of achievement motivations. Thereafter, Tempelaar et al. examined the extent to which a four-factor achievement motivations model describes achievement motivations for many different academic subjects. They did this via Correlated Trait (CT) first and second-order CFAs. Tempelaar et al. also constructed subject-specific models whereby the full structural model was estimated with The Big Five factors explaining achievement motivations. In conclusion, Tempelaar et al. found that Openness and Neuroticism (i.e., the emotional stability spectrum) was positively correlated to both affect and cognitive competence. Additionally, they found that Openness was positively correlated to value. Finally, they found that Openness, Conscientiousness, Extraversion, and Neuroticism were positively correlated to difficulty.

Study 10

Komarraju et al., (2009) conducted one of the most recent examinations of The Big Five factors and academic motivation components. Specifically, the authors focused on whether The Big Five factors could explain the following academic motivation components: (a) "intrinsic motivation to know," (b) "intrinsic motivation to accomplish," (c) "intrinsic motivation to experience stimulation," (d) "extrinsic motivation to identify," (e) "extrinsic motivation to introject," (f) "extrinsic motivation to externally regulate," and (g) amotivation. Additionally, they also focused on whether The Big Five factors could explain academic achievement as evidenced by grade point average.

Komarraju et al.'s (2009) sample included 308 undergraduate students with varying majors. The authors used the 60-item NEO-FFI (Costa & McCrae, 1992) to measure The Big Five factors, and the 28-item Academic Motivation Scale (AMS; Fairchild, Horst, Finney, &

Barron, 2005; Vallerand, Pelletier, Blasi, Briere, Senecal, & Vallieres, 1992) to measure the aforementioned academic motivation components.

Methodologically, Komarraju et al. (2009) conducted correlational, regression, and mediation analyses to study the relationships among their chosen variables. They began by using a correlational analysis to examine the relatedness among The Big Five factors, academic motivation, and academic achievement. They then conducted a simultaneous regression analysis by which they explored if The Big Five factors could explain the academic motivation variance. Finally, Komarraju et al. examined whether The Big Five factors could be shown to mediate the relationship between academic motivation and grade point average.

Komarraju et al.'s (2009) results provide strong support for The Big Five factors explaining academic motivation and academic achievement. For example, Conscientiousness was positively related to academic motivation and academic achievement. In fact, Conscientiousness was the most significant factor in explicating academic motivation and academic achievement. Furthermore, Kommarraju et al. revealed significant support for three of the other four factors in explaining the various academic motivation components. For example, Openness was positively correlated to intrinsic motivation, Extraversion was positively correlated to extrinsic motivation, and Agreeableness was negatively related to both academic motivation and academic achievement. Table 2 provides an overview of the ten summarized studies, the population/sample, majors of participants, and the academic motivation foci.

Table 2. *Studies Examining The Big Five and Academic Motivation*

Citation	Population	Major	Academic Motivation Foci	Method Foci
Colquitt and Simmering (1998)	Undergraduates	Varied	Learning and Performance Goal Orientations	Factor Analysis
Vermetten et al. (2001)	Undergraduates	Varied	Ego, Effort, and Task Goal Orientations	SEM Analyses
Ackerman et al. (2001)	Undergraduates	Varied	Approach Orientated and Aversion-Related Motivations	SEM Analyses
Judge and Ilies. (2002)	N/A	Varied	Performance Motivations: Goal-Setting, Expectancy, and Self-Efficacy	Meta Analysis
Day et al. (2003)	Undergraduates	Varied	Learning, Performance-Approach/Avoidance Goal Orientations	SEM Analyses
Komarraju and Karau (2005)	Undergraduates	Varied	AMI Descriptions: Avoidance, Engagement, and Achievement	Factor Analysis
Marsh et al. (2006)	High School Students	N/A	Self-Concept Dimension: Problem-Solving	SEM Analyses
Online et al. (2007)	N/A	Varied	Learning, Performance, and Avoid Performance Goal Orientations	Meta Analysis
Tempelaar et al. (2007)	Undergraduates	Varied	Affect, Cognitive Competence, Value, and Difficulty	SEM Analyses
Komarraju et al. (2009)	Undergraduates	Varied	Intrinsic and Extrinsic Motivation; Amotivation	Regression

Relationships Among Academic Motivation Constructs and MMAM Components

Many of the 10 summarized studies (as well as other studies not detailed herein) focused on different constructs as they related to goal or performance orientations. Contrastingly, the MMAM includes a broader variety of academic motivation constructs. These different foci make for interesting comparisons among the academic motivation constructs comprising the 10 studies and the MMAM components. However, some of the studies (i.e., Studies 4, 6, 7, 9, and 10) did use constructs that have been shown to *relate* to the MMAM components. First, in Study 4, Judge and Ilies (2002) examined two constructs that have been shown to relate to Success: (a) expectancy (Atkinson, 1957; 1964; Ciani, Summers, Easter, & Sheldon, 2008; Wigfield, Tonks, & Klauda, 2009) and (b) self-efficacy (Furia, Lee, Strother, & Hung, 2009; Glynn, Taasoobshirazi, & Brickman, 2009; Gungor, Eryilmaz, & Fakioglu, 2007). Second, in Study 6, Komarraju and Karau (2005) examined one construct that has been shown to relate to all of the MMAM components: engagement (Jang, 2008). Third, in Study 9, Tempelaar et al. (2007) examined one construct that has been shown to relate to Usefulness: value (Cox, 2009). Additionally, they examined another construct that has been shown to relate to Success: cognitive competence (Boekaerts & Minnaert, 2006; Harper, 2009; Inoue, 2007; Shroff & Vogel, 2009). Studies 1, 2, 3, 5, and 8 did not appear to use constructs that clearly related to the MMAM components.

Rationale for the Present Study

The findings within the sample of summarized studies suggest that there is a link between The Big Five factors and various academic motivation constructs. However, according to Ariani (2013), we still lack a full understanding of this relationship, predicating a need for continued scientific exploration. First, four of the 10 summarized studies (and others not included)

appeared to focus on the relationship of The Big Five factors and goal orientation theory constructs. Why has this relationship continued to intrigue researchers? This question is difficult question to answer with certainty, but it is clear that goal orientation has been one of the central theories of academic motivation over the past two decades (Kaplan & Maehr, 2007). Although there may be scientific merit in examining the link among The Big Five factors and these constructs, the results of these studies are inconsistent. For example, there are a large number of goal orientation sub-theories, and a total of six theoretical models of goal orientation, as suggested by the literature (Arias, 2004). The lack of theoretical cohesion regarding goal orientation, coupled with the proliferation of goal orientation theory studies utilizing different measurements to assess that construct, has resulted in its conceptual and definitional variability (Elliot, 2005). Due to these issues, the first aim of my study is to examine motivation in a slightly different way. Because the MMAM is an organizational framework of motivation strategies for teachers, linking The Big Five factors to the MMAM components could have important practical implications for them specifically. If significant relationships exist among some of the variables, teachers may be able to identify strategies that are most useful to certain students.

It must be noted that not one of the 10 studies I reviewed utilized variables from a factor analytic model of academic motivation. Why? Gellatly (1996) suggested that there is a predilection for researchers to examine the effects of a narrow range of individual differences (since those differences pertain to academic motivation) in the absence of using variables that comprise a model that has uncovered the latent structure (or specific dimensions) of such variables. Factor analytic models work well at reducing a large number of variables to a manageable set of factors or components (Feist & Feist, 2009; Huges, 1997). Additionally, Jones

(2009; 2010) also suggested that part of the reason the MMAM was developed was because a factor analytic model of academic motivation was virtually nonexistent. Thus, the second aim of my study is to examine the relationship among *all* of The Big Five factors represented within the FFM, as well as *all* of the academic motivation components represented within the MMAM. Indeed, both the FFM (McCrae & Costa, 1985; 1989a) and the MMAM (Jones & Wilkins, 2013) are based on well-developed theory and factor analytic research. Given the scientific rigor of the variables that make-up these two models, there is both scientific merit, and potentially theoretical merit, in investigating the relationship between personality and academic motivation via this approach.

Finally, there is scientific merit in examining *beliefs* that pertain to other academic motivation theories, separate from what has been previously examined, particularly goal orientation theory. There are a few studies (e.g., Tempelaar et al., 2007) that have focused on expectancy-value theory beliefs (Eccles & Wigfield, 2002). Although Tempelaar et al. did examine the relationship of The Big Five factors and expectancy-value beliefs (i.e., attitudes), a large number of other studies did not examine this relationship. In fact, The Big Five factors and expectancy-value beliefs have typically been addressed as separate entities. That is, scholars assessed The Big Five factors' relationship with other variables separately; similarly, the relationships of expectancy-value beliefs with other variables were also assessed separately. For example, Caprara, Vecchione, Alessandri, Gerbino, and Barbaranelli (2011) conducted a study that examined the pathways through which The Big Five factors and expectancy (i.e., self-efficacy) beliefs relate to goal orientation behavior (i.e., academic achievement). This particular study did not look at the relationship among The Big Five factors and expectancy beliefs. Given that personality psychology had established that The Big Five factors strongly influence various

39

human-related facets, including attitudes, beliefs, values, etc. (Engler, 2008), I find it interesting that more studies examining such a relationship have *not* been conducted. Thus, the third aim of my study will focus on the relationship of The Big Five factors and academic motivation beliefs as they pertain to the MMAM. If a link exists between The Big Five factors and academic motivation, I find it reasonable to assume that a potential link exists among The Big Five factors and *MMAM* components.

Pilot Study

The rationale for the present study stems partially from my completion of a SEM data analysis project undertaken during a statistics graduate course. Using previously-collected data, which was analyzed by Jones (2012), I examined the relationship among two of The Big Five personality factors, six MMAM components, and an effort variable. Due to time constraints pertaining to the applied this graduate course, I was unable to include all five personality factors in the data analysis. Also, although five components comprise the MMAM, I separated the Interest component into two different variables: Individual and Situational interest, similar to what had been done by Jones (2010). I also included an effort variable because it is related to motivation (see Lawler, Porter, & Vroom, 2009 for a discussion of the relationship between motivation and effort).

A brief review of the literature suggests that Conscientiousness and Extraversion are positively related to various academic motivation components and can explain a significant portion of the variance compared to the other factors (Bustao et al., 1999; De Guzman et al., 2003; Heaven, 1989; Kanfer et al., 1996; Komarraju & Karau, 2005; Komarraju et al., 2009; Payne et al., 2007; Ross et al., 2003). This evidence provided a rationale for me to use these two factors in my theoretical model.

Participants and Measures

The data used in this data analysis project was obtained from 475 undergraduate students enrolled in a large, online course entitled "Personal Health" at a university in Southwest Virginia. The Big Five was assessed using the Mini-Markers (Saucier, 1994), a brief version of the Goldberg (1992) Unipolar Big Five Markers; motivation was assessed using the Music Model of Academic Motivation Inventory (MMAMI; Jones, 2015). Effort was assessed using a five-item Effort and Importance subscale derived from the Intrinsic Motivation Inventory (Plant & Ryan, 1985). Participant responses to the Mini-Markers were based on their perceptions of their personality traits, while their responses to the MMAMI and effort items were based on their beliefs and experiences related to the online course.

Analysis and Missing Data

I analyzed the data via Exploratory Factor Analysis (EFA) using the Statistical Package for the Social Sciences (SPSS; Version 20.0), and via Confirmatory Factor Analysis (CFA) and path analysis using SEM procedures in LISREL (Version 9.1). CFA provided information regarding the structure of the factor loadings and inter-correlations tested, while path analysis provided information regarding the non-experimental causal relationships among the variables tested. An SPSS analysis of the 475 cases revealed the presence of missing data responses. Little's Missing Completely at Random (MCAR) test was performed to determine if the data was missing randomly or non-randomly. The results of this test indicated that the data were missing randomly. The Expectation Maximization (EM) algorithm is arguably the second best way to deal with missing responses because it is a "natural generalization of maximum likelihood estimation to the incomplete data case" (Do & Batzoglou, 2008, p. 897). Consequently, the

missing data were addressed via this algorithm. This method was employed during the analysis of missing responses in the full data as well.

Exploratory Factor Analysis (EFA)

Using SPSS, EFA was conducted on 100 randomly selected cases from the Jones (2012) dataset. The purpose of this step was to find a model that was representative of the data by specifying different, alternative models that best fit the data based on Maximum Likelihood (ML) estimation of the indicators/items (Schumacker & Lomax, 2010; Costello & Osborne, 2005). To begin, the hypothesized model included two exogenous variables (i.e., Conscientiousness and Extraversion), six endogenous mediator variables (i.e., eMpowerment, Usefulness, Success, Individual Interest, Situational Interest, Caring), and an endogenous or outcomes variable (i.e., Effort). The exogenous personality variables possessed 8 indicators each (16 total), the endogenous motivation variables possessed four to six items each (31 total), and the endogenous effort variable possessed four indicators. Error was associated with the indicators. Structurally, a total of 12 paths extended from the personality variables (six from Conscientiousness and six from Extraversion) to the six motivation variables. Additionally, the two personality variables were correlated. A total of six paths extended from the motivation variables to the Effort variable. Furthermore, the six motivation variables were correlated. Figure 1 of the initial theoretical model is presented below.
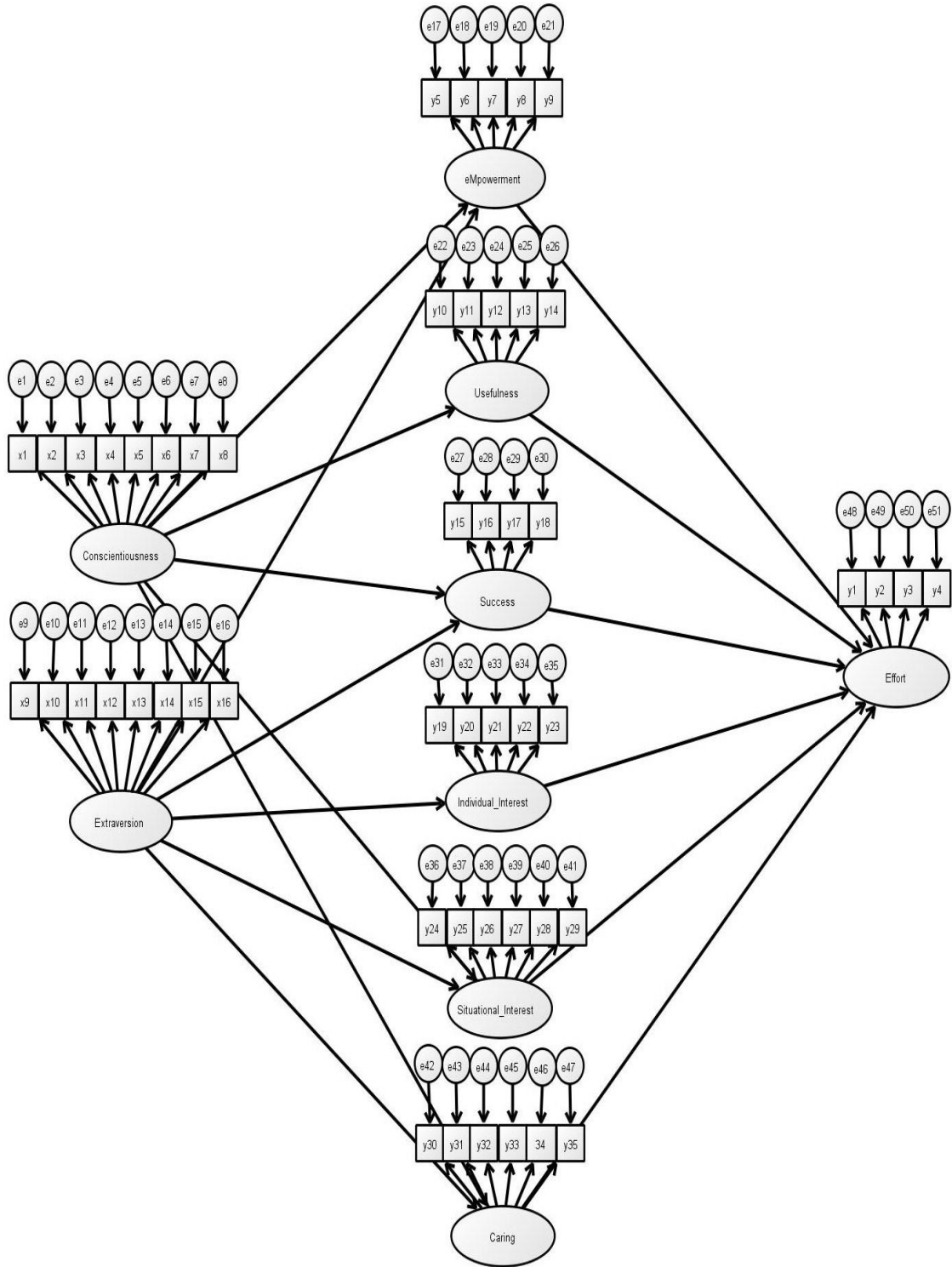
Figure 1. Initial Theoretical Structural Model. *Note*. This model does not depict the correlational relationships between the FFM and MMAM latent variables.

To determine the significance level of the loading for each item on its respective factor, a

0.7 significance loading level was set as the cutoff score (Kelloway, 1998). If any item's score

was below this level, it was not considered. The EFA results revealed that six of the 16-items for

the personality variables, 15 of the 31-items for the motivation variables, and three of four items

for effort met the cut-off criteria. Furthermore, the results revealed that the items for the

Individual Interest variable loaded on the same factor as the Usefulness items, so this variable

was discarded. Figure 2 of the revised model below represents the model that was tested in CFA.
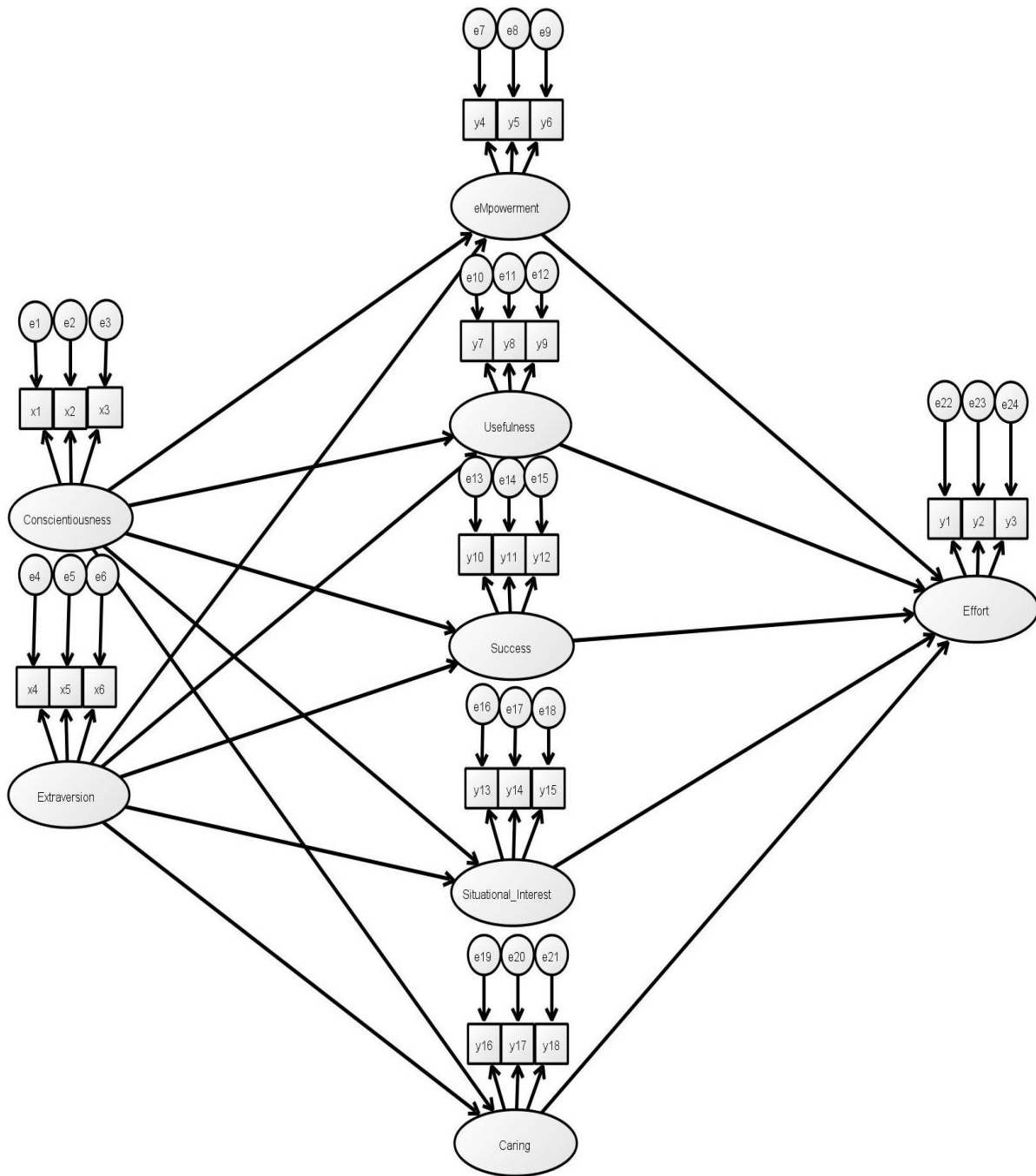
Figure 2. Revised Structural Model. *Note.* This model does not depict the correlational relationships between the FFM and MMAM latent variables.

Measurement Models

The purpose of Measurement Modeling (MM) was to link the exogenous and endogenous variables to its respective indicators via CFA. Thus, syntax was composed for the three measurement models, input into LISREL, producing results for analysis. The results affirmed the EFA findings in SPSS: Each of the indicators loaded onto their respective variables. Furthermore, examination of the Goodness-of-Fit-Statistics for each of the congeneric measurement models revealed that there was *acceptable* model/data fit for each of the personality and motivation measurement models, while there was *perfect* or saturated model/data fit for the effort measurement model. Table 3 lists the fit indices for each model.

Table 3. *Fit-Statistics of the Measurement Models*

	X^2	*df*	RMSEA	CFI	NFI	GFI
Personality	11.162	8	0.0292	0.996	0.986	0.992
Motivation	258.328	80	0.0685	0.97	0.957	0.932
Effort	0	Saturated	Saturated	Saturated	Saturated	Saturated

Full Structural Model

To determine the model/data fit—as well as to identify relationships between the exogenous and endogenous latent variables—syntax was composed for the full-structural model and input into LISREL to produce results for analysis. First, examination of the initial two parameter matrices (lambda-y and lambda-x) indicated that the values of the estimates, standard errors, and t-values for the y and x-variables (i.e., the indicators of the endogenous and exogenous variables) revealed statistical significance. This information suggested that all of the indicators loaded on their respective variables, which confirmed the MM results. Second, examination of the Goodness-of-Fit-Statistics revealed that there was *acceptable* model/data fit for the structural model. (See Table 4 for fit indices is below.) Third, examination of the third

matrix (beta) revealed that the paths from four of the five motivation variables to Effort were significant, but the path from eMpowerment to Effort was not significant. Finally, examination of the fourth matrix (gamma) revealed that the paths from Conscientiousness to *all* motivation variables were significant, but the paths from Extraversion to the motivation variables were not significant.

Table 4. *Fit-Statistics of the Structural Models*

	X^2	*df*	RMSEA	CFI	NFI	GFI
Personality, Motivation, and Effort	236	694.97	0.066	0.95	0.93	0.89

Brief Discussion and Conclusion

My data analysis project confirmed what many other studies (e.g., Studies 1 through 10 in my literature review) have also documented: Conscientiousness relates positively to academic motivation. Additionally, all five of the MMAM components were shown to relate positively to effort. In this case, although Extraversion was not related to the MMAM components, clearly it partially explains various academic motivation constructs in other studies. (For an additional discussion on how The Big Five factors explain the variance in academic motivation constructs see Komarraju et al. [2009].) It is important that these findings be affirmed or disaffirmed in future studies. Additionally, the other three personality variables should also be considered in a future study to determine the effect each of these variables have on one another.

Purpose of the Present Study

This study was designed to achieve two goals: (1) To further explore the relationships between personality and academic motivation (beyond the scope of other popular motivation theories, particularly goal orientation theory), and (2) To examine the relationships between *all* of the FFM factors and *all* of the MMAM components. At the time this study was conceived, no

studies had examined these particular relationships. However, it did share some similarities with

the SEM data analysis project and the Jones (2012) study that I described in the "Pilot Study"

section. Dissimilar to the data analysis project, the MMAM components were not used as

mediators and the Effort variable was not included. Also, dissimilar to the data analysis project,

this study did *not* utilize previously collected data; new data was collected. It was expected that

this study would serve as a starting point for future studies intended to examine the relationships

between the FFM factors and the MMAM components.

CHAPTER 3.

METHODOLOGY

Research Question

The following research question guided this study: *To what extent do the FFM factors relate to the MMAM components?* I did not generate specific hypotheses for two primary reasons. First, there was no substantiated knowledge or empirical research on the relationships between the FFM factors and the MMAM components. Because of this absence, I did not want to make predictions regarding these relationships without this information. Second, the overarching goal of this study was to specify and test the significance of hypothesized factor model(s) using the complete set of FFM factors and MMAM components to reveal *all* of the possible relationships between the variables. If I had generated hypotheses, this study would have been limited to those predictions.

Participants

A total of 325 undergraduates enrolled in a large, online course entitled "Drug Education" at a university in Southwest Virginia, participated in this study. However, 305 surveys (93.84%) were analyzed in this study; 20 of the 325 available surveys were duplicated or incomplete. Although their participation was not mandatory, the instructor indicated on the syllabus that the undergraduates would receive "5 extra credit points" added to their total number of points at the end of the semester if they completed the survey. Frequency statistics revealed that 52.1% of the participants were male and 47.9% were female. Other demographic information for the participants' class standing and ethnicity/race is shown in Table 5.

Table 5. *Participant Demographics*

	Frequency	Percent
Gender		
Male	159	52.1
Female	146	47.9
Race/Ethnicity		
American Indian	1	0.3
Asian or Pacific Islander	42	13.8
Black or African-American	12	3.9
Hispanic	11	3.6
White	223	73.1
Other or multiple	16	5.2
Class Standing		
First-year	2	0.7
Sophomore	34	11.1
Junior	90	29.5
Senior	179	58.7
Graduate student	0	0

Personality Measure: BFI-54

For this study, I used the Big Five Inventory-54—often referred to as the *BFI*—which is a multidimensional questionnaire that measures the "individual" on The Big Five factors of personality (Goldberg, 1993). It consists of 54 items, arranged into 5 subscales: Openness, Conscientiousness, Extroversion, Agreeableness, and Neuroticism. (Ten of the 54 items on the BFI are not scored on any of the scales; Benet-Martinez & and John [1998]; John, Donahue, & Kentle [1991]; John, Naumann, & Soto [2008].) The five BFI subscales have 8 to 10 items each. All of the items for each subscale are rated on a 5-point Likert scale ranging from *disagree strongly* to *agree strongly*. An example item from each subscale is provided here: "Is curious about many different things" (Openness), "Does a thorough job" (Conscientiousness), "Is outgoing, social" (Extraversion), "Is considerate and kind to almost everyone" (Agreeableness), and "Gets nervous easily" (Neuroticism).

Coverage and assessment of The Big Five factors is thorough, and the psychometric properties are satisfactory (John & Srivastava, 1999; John, Naumann, & Soto, 2008). The BFI offers an assessment of The Big Five factors that is comparable to the NEO-FFI versions and the 100-item TDA. Additionally, the Cronbach's alphas for the BFI subscales range from .75 to .90, with an average above .80. Furthermore, the BFI possesses ample construct (e.g., convergent and divergent) validity with other measures of The Big Five (John & Srivastava, 1999).

BFI scoring is a two-step process (Benet-Martinez & John, 1998; John, Donahue, & Kentle, 1991; John, Nauman, & Soto, 2008). For Part One, 20 of the 44 items are reverse coded. This occurs by changing a value of 1 to a value of 5, a value of 2 to a value of 4, a value of 3 does not change, a value of 4 to a 2, and a value of 5 to a 1. For Part Two, the values of each of the factors are added up to produce a score for each subscale. The scores determine whether an

individual has more or less of that particular trait. For example, Openness has a possible score range between 18 and 90; the higher the score the more open to experience the individual is likely to be.

There are a few benefits of the BFI. One, it is brief; it takes approximately five minutes for participants to complete. Other instruments (e.g., versions of the NEO-FFI and the 100-item TDA) take participants approximately 15 minutes to complete (John et al., 2008). Two, the BFI items are unambiguous, easily readable, and well understood by participants in comparison to items on other instruments (e.g., items on versions of the NEO-FFI; Benet-Martinez & John, 1998; Soto, John, Gosling, & Potter, 2008). Three, the BFI is free to use for educational purposes, as well as easy to obtain.

Academic Motivation Measure: MMAMI

The MUSIC[SM] Model of Academic Motivation Inventory (MMAMI; Jones, 2015) measures college students' academic motivation beliefs related to the MMAM. Table 6 provides the MUSIC components and their respective definitions according to Jones (2015). The MMAMI consists of 26 items that are arranged into five subscales. The five subscales have 4 to 6 items each (i.e., five eMpowerment items, five Usefulness items, four Success items, six Situational Interest items, and six Caring items). All of the items for each subscale are rated on a 6-point Likert scale ranging from *strongly disagree* to *strongly agree*. An example item from each subscale is provided here: "I had the opportunity to decide for myself how to meet the course goals" (Empowerment), "In general, the coursework was useful to me" (Usefulness), "I was confident that I could succeed in the coursework" (Success), "The instructional methods used in the course held my attention" (Interest), and "The instructor was willing to assist me if I needed help in the course."

Table 6. *Definitions of the Components of the MUSIC Model*

MUSIC Components	Definitions in terms of the degree to which a student perceives that:
eMpowerment	He or she has control of his or her learning environment in the course
Usefulness	The coursework is useful to his or her future
Success	He or she can succeed at the coursework
Interest	The instructional methods and coursework are interesting
Caring	The instructor cares about whether the student succeeds in the coursework and cares about the student's well-being

To empirically test the MMAMI, Jones and Skaggs (in press) conducted a study on 397 undergraduate students in which they conducted Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA), classical item analysis, and Rasch scaling. The Cronbach's alphas for the five subscales ranged from .91 to .96 in the Jones and Skaggs study. MMAMI scoring is a one-step process (Jones, 2015). For each subscale, means are computed by averaging the item scores for that subscale. It is important to note that summing the subscale scores are meaningless; the MMAMI was not developed to produce a holistic or total academic motivation score.

There are a few benefits of the MMAMI. One, similar to the BFI it is brief; it takes an average of two minutes for participants to complete. Two, all of the subscales possess consistent labels at response options (Jones & Skaggs, in press). To that end, the subscales are not complex, they are consistent, and can be administered at random. Three, the inventory is easy to administer and assesses multiple facets of academic motivation.

Procedures

Qualtrics

I collected data utilizing an electronic survey tool titled "Qualtrics," which is web-based software that allows researchers to create surveys online and distribute these surveys via a secure web-link to their participants. There were several advantages to using Qualtrics for this study. One, it was user-friendly and allowed for me to quickly input and edit information that pertained to the BFI and MMAMI. Two, I was able to easily distribute the survey via a web-browser to all of the participants. Three, I was able to quickly send reminders and track participants' survey progress and status. Four, I was able to avoid any bias associated with in-person survey administration; the tool impartially controlled how my questions were asked. Thus, I was able to obtain results that reflected the right information. Five, there were advanced confidentiality and security features for my results via password encryptions, secure connections, and firewalls. Overall, Qualtrics allowed me to build one comprehensive survey that included (a) information about the study, (b) directions for completing survey, (c) demographics, and (d) all necessary items from the BFI and MMAMI.

Primary Data Collection

I e-mailed all of the participants a secure web-link on Wednesday, October 15, 2014, at 5:00 p.m. so that they could begin completing the survey. Once they accessed and opened the link (no time limit was imposed on a singular session) they began by reading the survey directions then agreeing or disagreeing to proceed with it. If participants agreed, they had to provide their first and last names and their e-mail addresses. (This information was necessary in order to provide them with the allotted extra credit points.) After they provided this data, they

were then able to begin answering the BFI and MMAMI items. If participants did not agree to complete the survey, they had the option to complete a different extra credit assignment.

The participants had one-week to complete the survey. However, eight days after the survey was released the timeline was extended by an additional five days in an attempt to obtain at least 300 completed surveys. After 5:00 p.m. on Monday, October 27, 2014, participants were no longer able to begin or complete it. During the 13-day duration, participants were sent e-mail reminders to complete the survey twice: once on Wednesday, October 22, 2015, and again on Sunday, October 26, 2015.

Analysis Overview

First, I downloaded the raw data from Qualtrics into a "Comma Separated Values" (.CSVs) text file that could be opened and viewed in Microsoft Excel. I then removed extraneous information that was not necessary for analysis. Additionally, I labeled individual items with a name for identification purposes and I reverse coded the appropriate BFI items. (None of the MMAMI items required reverse coding.) Second, within Excel I converted the ".CSV" file, and viewed and partially analyzed it in the Statistical Package for the Social Sciences (SPSS) Version 20.0. Specifically, I computed demographic frequencies and percentages. Furthermore, I computed the reliability estimates for the FFM factors and MMAM components. Third, I specified a model using a representative set of graphical Structural Equation Modeling (SEM) symbols that allowed me to define parameters to indicate the relationship between the observed manifest (i.e., indicator) variables, and the latent variables (Kelloway, 1998; Schumacker & Lomax, 2010). This step served as a framework for testing the model/data fit. I used a representative set of graphical Structural Equation Modeling (SEM) symbols that allowed me to define parameters to indicate the relationship between the observed manifest (i.e., indicator)

variables and the latent variables (Kelloway, 1998; Schumacker & Lomax, 2010). This step

served as a framework for testing the model/data fit. Indicators were represented by small

squares; large circles represented the exogenous and endogenous latent FFM and MMAM

variables, respectively, and small circles represented measurement error. Depictions of the

graphical symbols are shown in Figure 3. Finally, my primary data analysis occurred within the

following program: SPSS Analysis of Moment Structures (AMOS). It enabled me to specify,

estimate, assess, and present models to show relationships between the FFM factors and MMAM
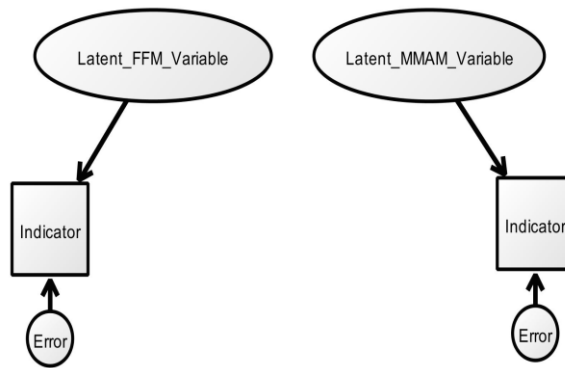
components.

Figure 3. Graphical Symbols

Model Specification

Prior research conducted on the FFM factors and goal orientation theory constructs

provided the rationale to examine the relationships between the FFM factors and the MMAM

components. Given that the relationship between the FFM factors and MMAM components had

never been studied, the challenge was to specify a model that was theoretically sound and could

be estimated in AMOS using a Strictly Confirmatory (SC) framework (Jöreskog & Sörbom,

1993).

To capitalize on the proposed theory, both a measurement model and structural model

were generated. The measurement portion specified how the exogenous and endogenous

variables came together to represent the essence of the theory that conceptualized this study. For

the measurement model, the exogenous personality variables included all five FFM factors and

the endogenous motivation variables included all five MUSIC components. Furthermore, all the

five personality variables were correlated and all the five motivation variables were correlated.

The personality variables included eight to 10 indicators each (44 total), while the motivation

variables included four to six indicators each (26 total). Measurement error was associated with

each of the indicators. The measurement model is depicted in Figure 4.

Figure 4. Measurement Model. *Note*. This model does not depict the correlational relationships between the FFM and MMAM latent variables.

The structural model represented the portion of this study's theory that showed how the exogenous and endogenous variables related to one another. For the structural portion, 25 paths extended from the FFM variables (i.e., five paths from each of the five FFM variables) to the five MMAM variables (i.e., one-headed, single-direction arrows). The initial hypothesized theoretical structural model is shown in Figure 5.
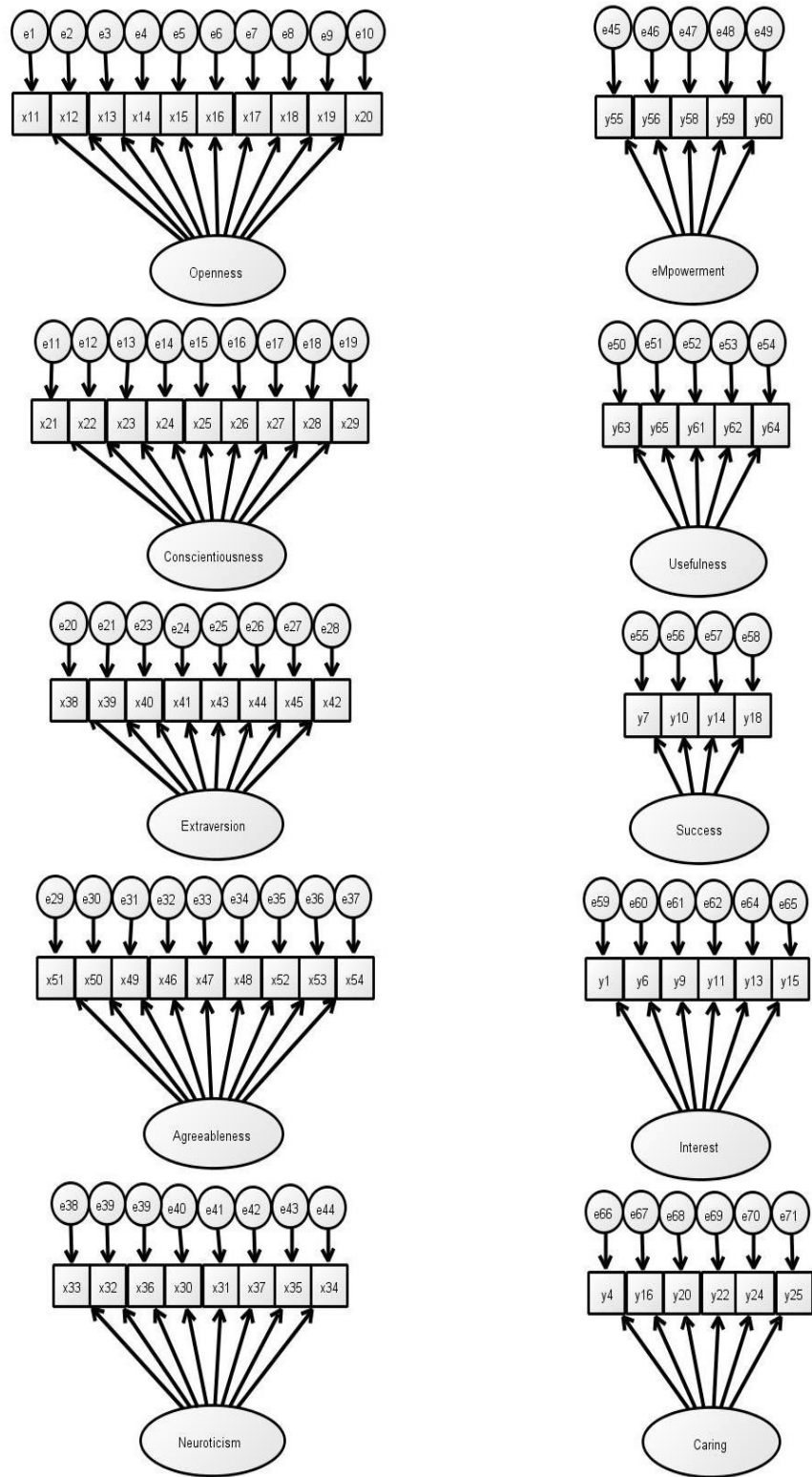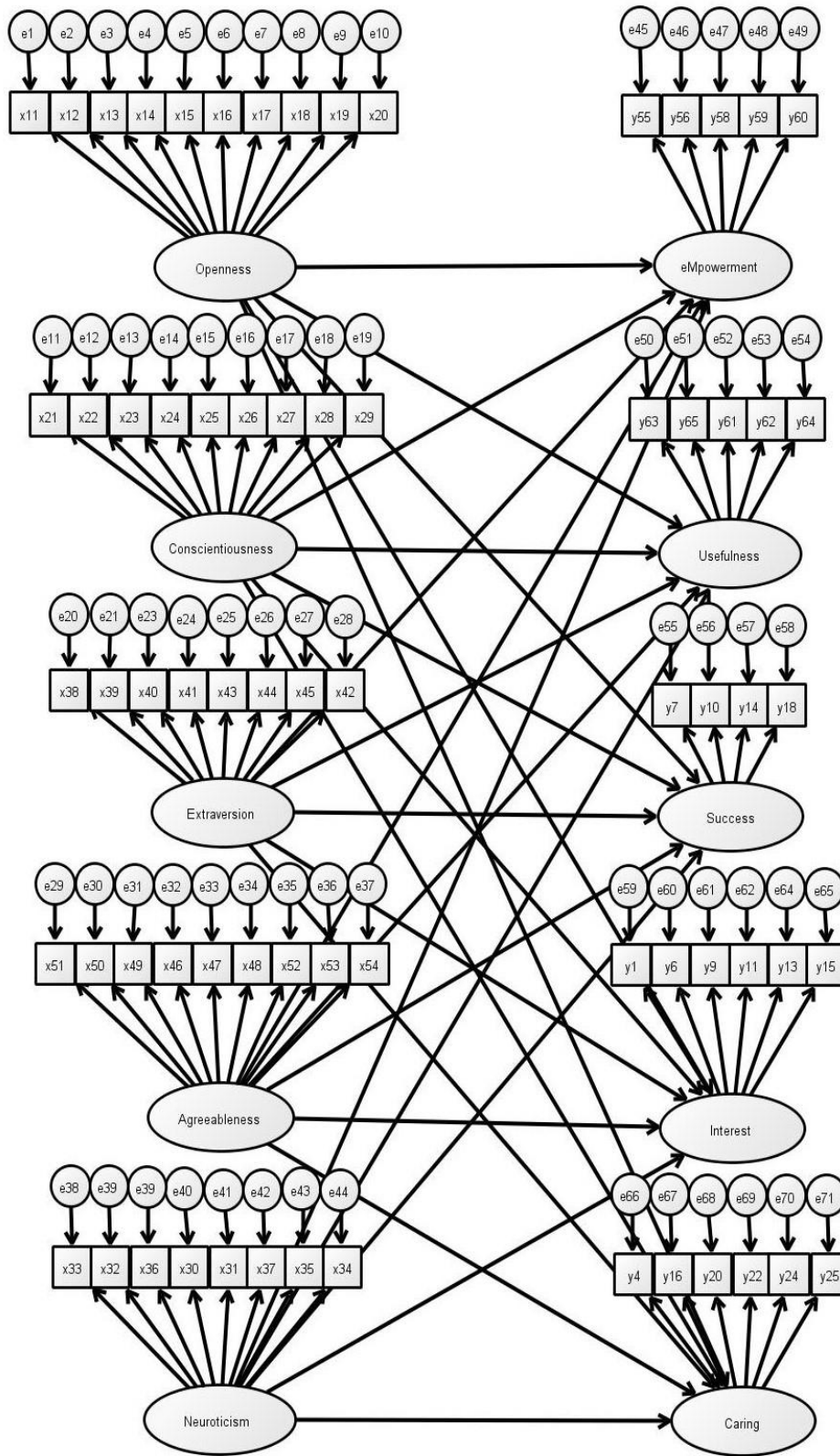
Figure 5. Structural Model. *Note.* This model does not depict the correlational relationships between the FFM and MMAM latent variables.

The purpose of the all-inclusive structural model was to determine the extent of the relationships between the FFM factors and MMAM components. However, AMOS was not able to estimate this model as shown in Figure 5. According to Brown (2006), *underidentification* occurs when some models contain a mixture of indicators that load on multiple factors. To confirm whether or not this was the case, it was necessary to abandon the SC framework and conduct an EFA. This analysis was conducted on the entire sample (as opposed to half of the sample). Hair, Black, Babin, Anderson, and Tatham (2006) suggested that conducting EFA and CFA on the entire sample allows for a rigorous assessment of the statistical make-up of the instruments used in a study; if half of the sample was split or if different samples were used to conduct both EFA and CFA, the results would yield varying results regarding the instruments. For EFA, the principal axis factor method was employed in SPSS to determine if all of the FFM indicators loaded cleanly onto their respective factors; this was not the case for some of the indicators. To address this issue, the FFM indicators were parceled (Kelloway, 1998; Schumacker & Lomax, 2010). Specifically, three parcels were created for each of the latent personality variables, reducing the total number of indicators for the five variables to three each. The mean for each indicator associated with its respective personality variable was arithmetically calculated. The means were arranged from high-to-low and added to each parcel until exhausted.

Theoretical complexity was also considered to be an issue for this particular structural model. Therefore, to reduce its complexity, the hypothesized model was separated into five different ones, whereby the relationships of all of the FFM factors were analyzed with one MMAM component at a time. These models were estimated in AMOS, which allowed for the relationships between all of the FFM factors and MMAM components to still be explored. The revised structural models are shown in Figures 6 – 10.

Figure 6. eMpowerment Structural Model. *Note*. This model does not depict the correlational relationships between the FFM latent variables.

Figure 7. Usefulness Structural Model. *Note*. This model does not depict the correlational relationships between the FFM latent variables.

Figure 8. Success Structural Model. *Note.* This model does not depict the correlational relationships between the FFM latent variables.

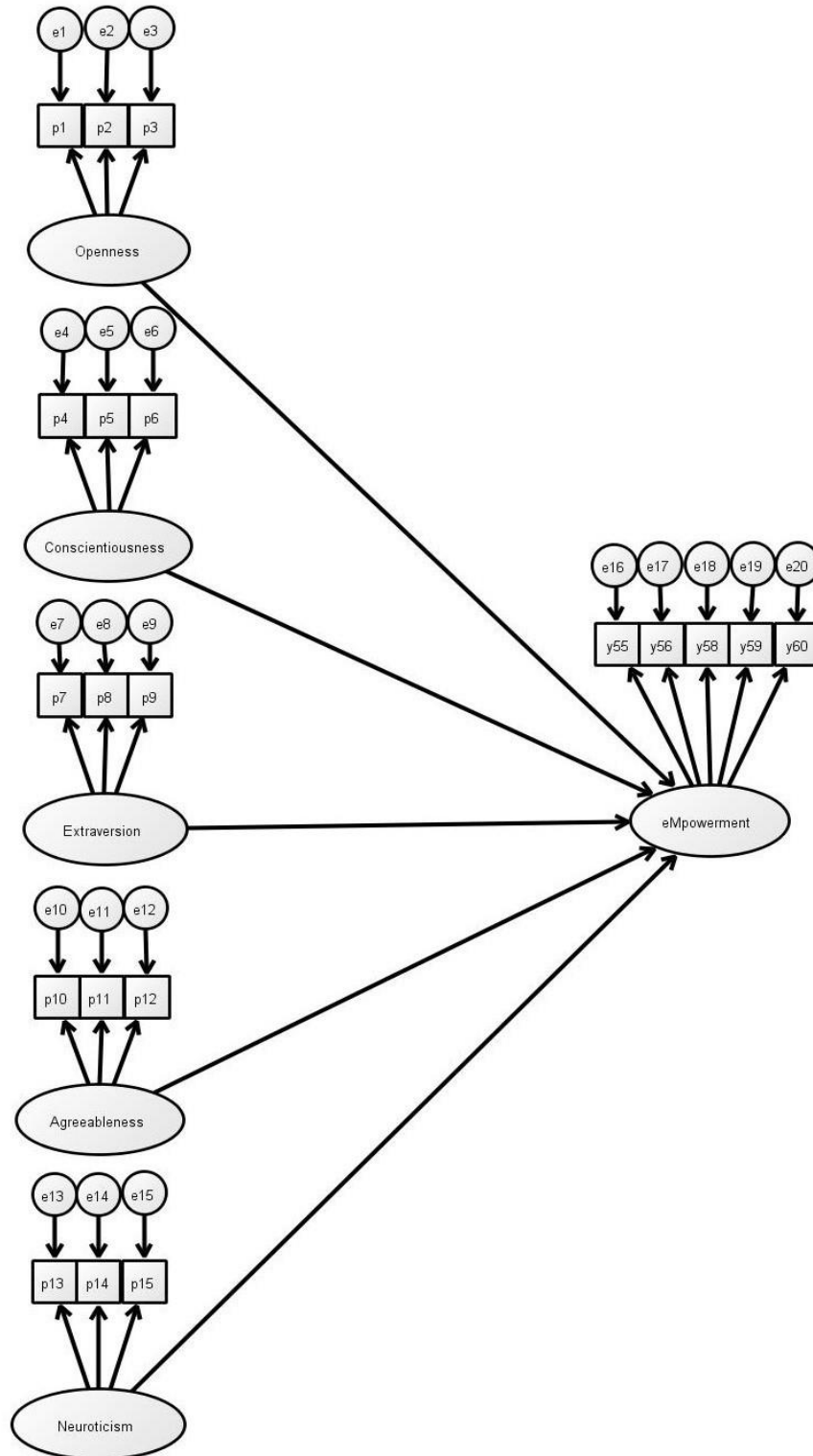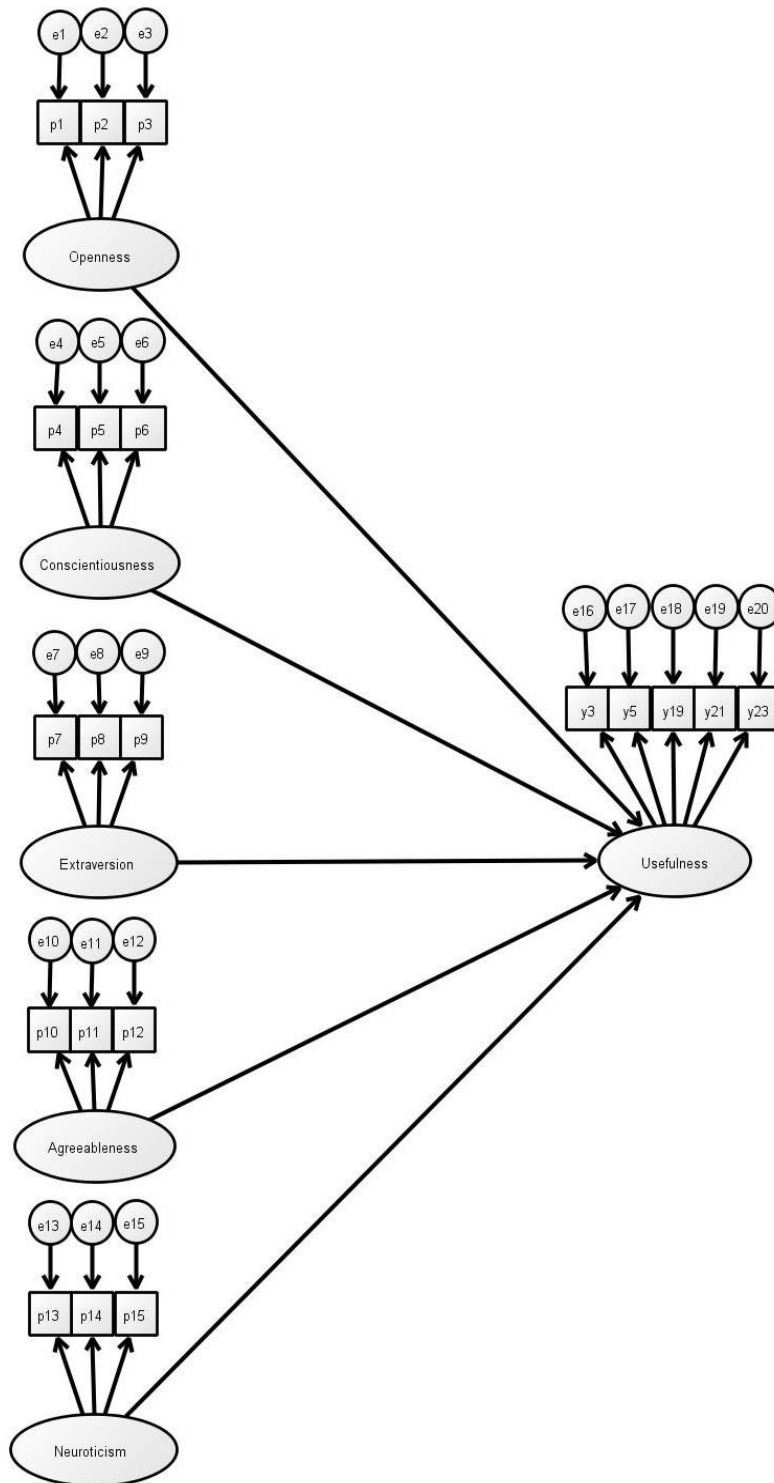*Figure 9.* Interest Structural Model. *Note*. This model does not depict the correlational relationships between the FFM latent variables.
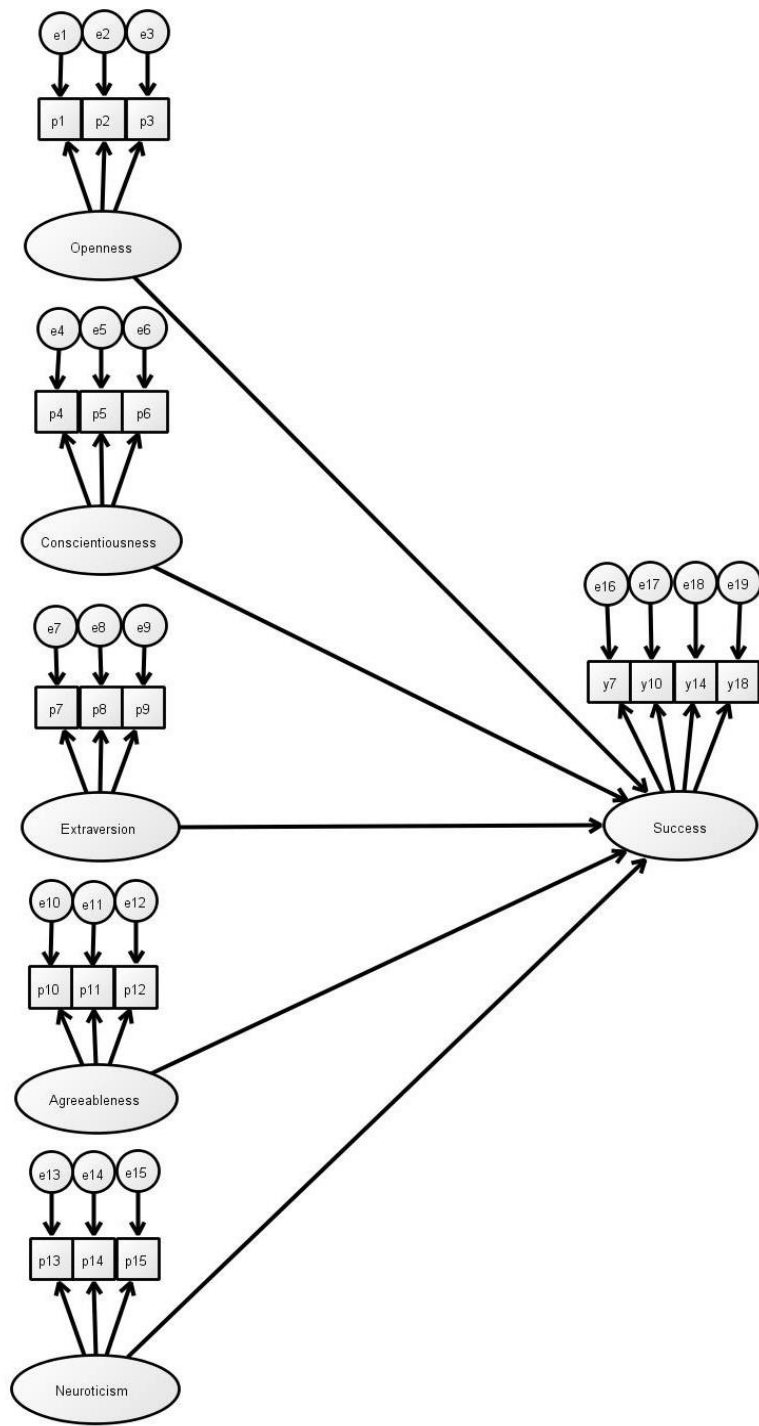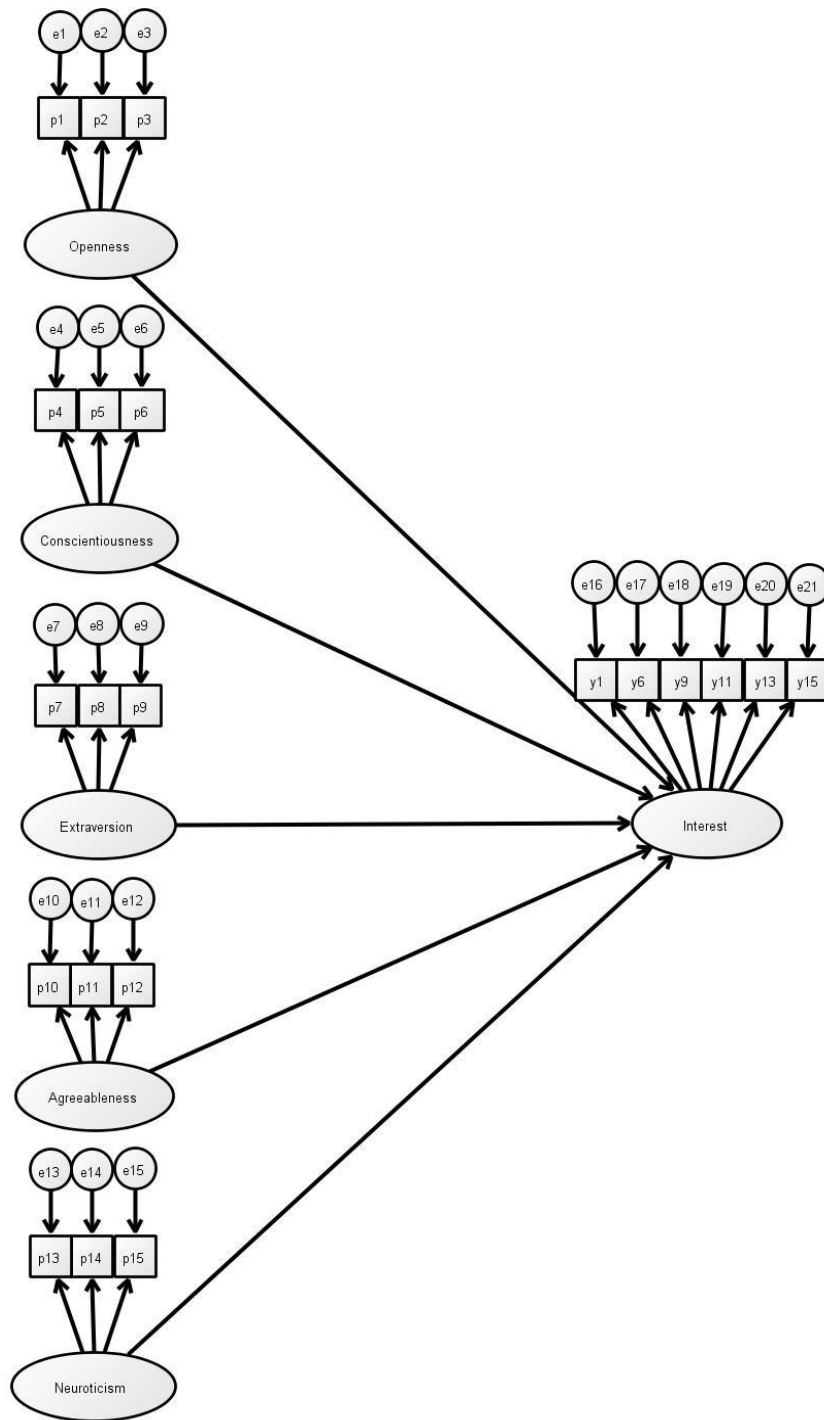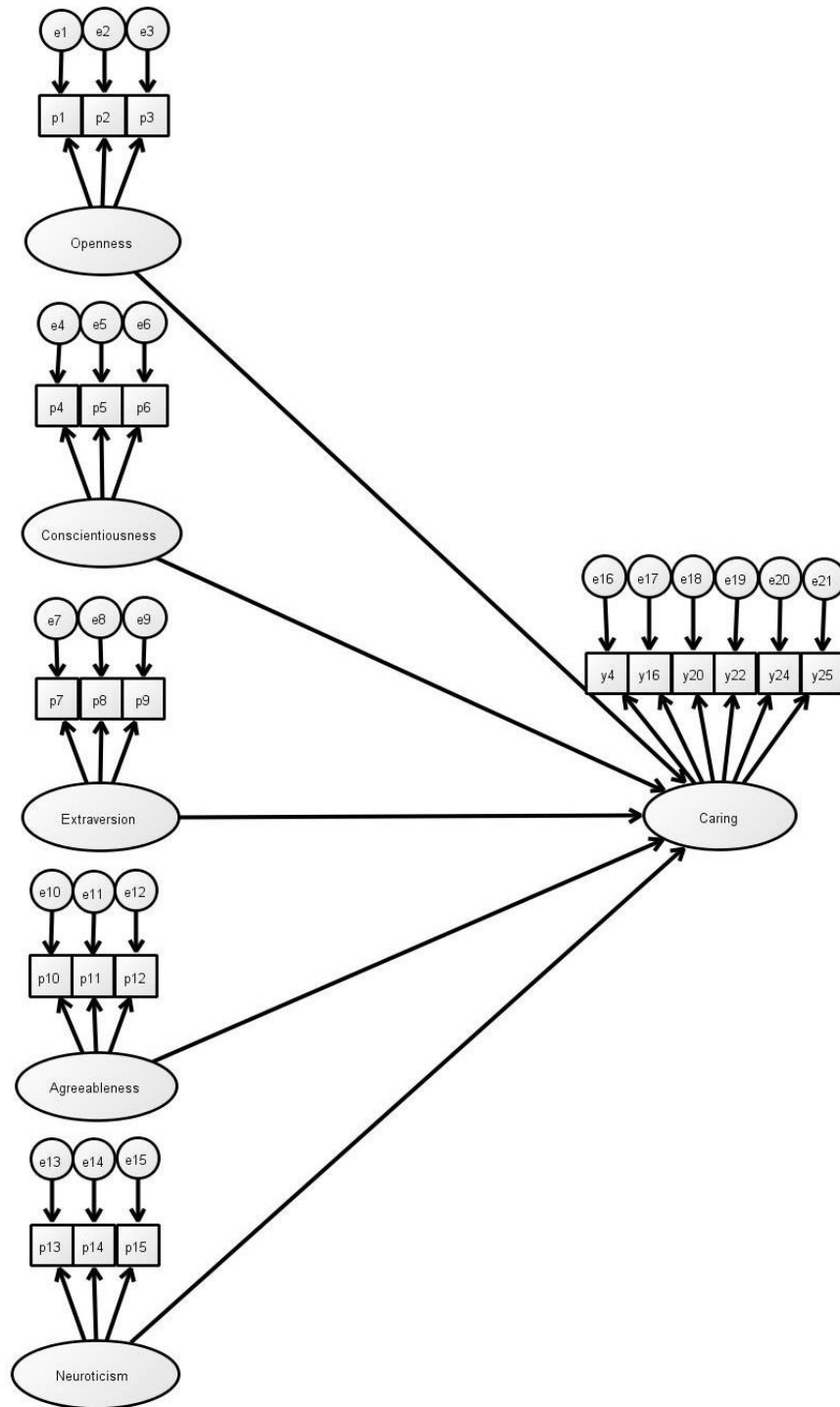
Figure 10. Caring Structural Model. *Note*. This model does not depict the correlational relationships between the FFM latent variables.

Measurement and Structural Modeling

During the measurement model phase, CFA was conducted in AMOS. The measurement model for both CFA and SEM is a multivariate regression model that describes the relationships between a set of indictor variables and a set of latent variables (Kelloway, 1998; Schumacker & Lomax, 2010). These relationships were described by a set of linear regression equations. The primary aim was to answer the following questions as suggested by Schumacker and Lomax (2010): (1) To what extent do the indicator variables measure the latent variables? (2) Which indicator variables are the best (and worst) measures of the latent variables? (3) To what extent are the indicator variables actually measuring something other than the latent variables? These questions enabled me to determine whether or not the indicators loaded on their respective latent variables.

Finally, during the structural model phase, path analysis was conducted to test the theoretical relationships between the FFM factors and MMAM components. To determine the fit of each of the five models, absolute fit indices were analyzed. The chi-square (χ^2) values (or Ts) defined the absolute fit indices (Fs; Yuan, 2005). These were derived from the fit of the obtained and implied covariance matrix. The χ^2 values were the original fit indices for the five structural models because they were directly derived from the fit functions [$f_{ML}(N-1)$]. In other words, χ^2 values were used as the preliminary indicators of each model's fit to the data, with significant values suggesting poor fit. Additionally, the χ^2 values were interpretted in terms of their degrees of freedom (*df*; Dion, 2008), with ratios above 1.0 suggesting poor fit.

Several other model fit indicators were used to acquire further information about the model/data fit. The Compartive Fit Index (CFI; Bentler, 1990) and Root Mean Square Error of Approximation (RMSEA; Browne & Cudeck, 1993; Steiger & Lind, 1980) were used as the

primary fit indices. The CFI assessed relative fit of the models that used an approach based on the noncentral χ^2 distribution with the noncentrality parameter, τ_i. If the estimated models were perfect, $\tau_i = 0$. Therefore, the larger the value of τ_i, the greater the model misspecification.

$$CFI = 1 - \frac{\tau \text{est.model}}{\tau \text{indep.model}}$$

For the models in this study, the smaller the noncentrality parameter, τ_i for the estimated models relative to the τ_i, for the independence models, the larger the CFI and the better the model/data fit. The CFI possesses a norm between the 0 to 1 range. Values greater than 0.95 indicate good model/data fit (Hu & Bentler, 1999). The RMSEA (Steiger, 2000; Steiger & Lind, 1980) estimated the lack of model/data fit for each model compared to a saturated model by

$$\text{Estimated RMSEA} = \sqrt{\frac{\hat{\tau}}{N df_{\text{model}}}}$$

As previously noted, when the model is perfect, $\tau_i = 0$, and the greater the model misspecification, the larger the estimated model ($\hat{\tau}$). Hence, the RMSEA was a measure of noncentrality relative to the sample size and df. For a given noncentrality, a large sample size (N) and df imply good model/data fit, that is, a smaller RMSEA. Values of .06 or less indicate good model/data fit (Hu & Bentler, 1999), while values greater than .10 indicate poor model/data fit (Browne & Cudeck, 1993).

Three other fit indices were used: The Goodness-of-fit Index (GFI), Normed Fit Index (NFI), and Tucker Lewis Index (TLI). For the GFI, NFI, and TFI, a value above 0.90 was established as the cut-off score for good fit (Schumacker & Lomax, 2010). For additional discussions on other fit indices see Ullman (2006), Bentler and Rayklov (2000), and Hu and Bentler (1999).

Finally, the standardized path coefficients between the variables were used to examine the relationships between the variables and the significance of these relationships within the model. A p-value of $< .001$ was established as the criterion for a significant standardized path coefficient.

CHAPTER 4.

RESULTS

Data Screening

The validation feature (i.e., "force response option") in Qualtrics facilitated the collection of a *complete* data set with no missing cases. In particular, a force response option was set for each of the BFI and MMAMI items, which required participants to answer all of the items comprising the survey. If participants attempted to progress from one electronic page to the next without answering all of the items on that particular page, they received a warning message letting them know that they must answer all of items before they could proceed. For each item that was not answered, it was highlighted in red allowing them to quickly scroll through the page and provide an answer the item(s) not answered. Skewness for the variables ranged from -0.88 to -0.09, and the kurtosis ranged from -1.40 to -1.134. All values for skewness and kurtosis were within an acceptable range (+/-1.0 to +/-2.0; George & Mallery, 2003).

Internal Consistency

Reliability of the BFI subscales (prior to item parceling) and the MMAM subscales was explored using Cronbach's alpha (α) values to measure internal consistency. The resulting values, which are listed in Table 7, range between 0 and 1, with *acceptable* levels of reliability between .70 and .79 and *good* levels between .80 and .89 (George & Mallery, 2003). The Openness, Conscientiousness, and Agreeableness subscales demonstrated acceptable levels of reliability, while the Extraversion and Neuroticism subscales demonstrated good levels of reliability. All of the MMAM subscales demonstrated good levels of reliability.

Table 4. *Reliability Estimates for Variables*

Variable	α
Openness	0.76
Conscientiousness	0.76
Extraversion	0.89
Agreeableness	0.80
Neuroticism	0.80
eMpowerment	0.82
Usefulness	0.86
Success	0.87
Interest	0.84
Caring	0.85

The inter-item correlation matrix of the items comprising each subscale was also examined in order to determine if all of the items correlated positively with the same construct. Inter-item correlations between .20 and .29 were identified as *acceptable*, while values between .30 and .70 were noted to be *good* (Ferketich, 1991). Both acceptable and good inter-item correlations are typically indicative of a reliable scale. In contrast, values between 0 and .19 are generally considered to be *questionable*, while inter-item correlations that are negative suggest that those items do not theoretically measure the construct that they intend to measure. All of the FFM items inter-correlated positively, with the exception of the Openness item 35, whose inter-item correlations are shown in Table 8. As listed therein, Openness item 35 correlated negatively with items 15, 30, and 44 with values of -0.041, -0.007, and -0.007, respectively. In examining the item-total statistics for the Openness subscale, its α value would increase from .783 to .810 (from acceptable to good), if Openness item 35 was removed. However, in examining the item-total statistics for the BFI scale, its α value would only increase from .755 to .763 (both of which are acceptable) if Openness item 35 was removed. In light of this result—as well as the decision to use item parcels as the measured variables for the BFI—the item was not removed.

Table 8. *Openness Subscale Inter-Item Correlation Matrix*

Item	O5	O10	O15	O20	O25	O30	O35	O40	O41	O44
O5	1									
O10	0.365	1								
O15	0.333	0.351	1							
O20	0.487	0.414	0.389	1						
O25	0.554	0.345	0.447	0.522	1					
O30	0.324	0.297	0.286	0.397	0.266	1				
O35	0.123	0.069	-0.041	0.037	0.166	-0.007	1			
O40	0.392	0.479	0.367	0.439	0.437	0.301	0.035	1		
O41	0.149	0.105	0.195	0.266	0.191	0.398	0.11	0.116	1	
O44	0.321	0.248	0.26	0.366	0.221	0.632	-0.007	0.214	0.385	1

Exploratory Factor Analysis (EFA)

The five FFM latent variables were forced onto their respective factors to fit the variance-covariance matrix of the item parcel variables. The five MMAM latent variables were extracted based on eigenvalues greater than 1.0 to fit the variance-covariance matrix of the indicator variables. In both cases, the principal axis factor method with promax oblique rotation was used.

Descriptive statistics for the FFM item parcel variables and for the MMAM indicator variables are listed in Tables 9 and 10, respectively. An examination of the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy suggests that the sample size was acceptable for the FFM and the MMAM (KMO = .742 (FFM) and .908 (MMAM)). Additionally, the intercorrelation (*R*-matrices) were examined using Barlett's Test of Sphericity, which "[tested] the null hypothesis that the original correlation matrix [was] an identity matrix" (Field, 2000, p. 457). This test was significant (p < .001) for the FFM and MMAM measurement models. Furthermore, 62.27% explained the total variance of five FFM extracted factors and 56.45% explained the total variance of five MMAM extracted factors (see Table 11). Finally, to determine significant factor loadings of the FFM item parcels and MMAM indicator variables, a

criterion level of 0.2 was used. To examine the pattern matrix, an effect size of 0.3 was used to determine if the variables contributed to the factor(s) in a meaningful way (Sullivan & Feinn, 2012). All 15 of the FFM items parcels loaded cleanly onto five different factors. That is, the five sets of FFM item parcels, when grouped together, best explained their respective factors. All 26 of the MMAM indicator variables loaded onto five factors; however, two Usefulness variables loaded onto multiple factors. While this was concerning, previous studies (e.g., Jones & Skaggs, in press) revealed that the factor structure of all the MMAM items was confirmed. Based on this information, these items were not removed (see Table 12 for item parcel and indicator variable loadings). Finally, the eMpowerment, Success, Interest, and Caring indicator variables could best explain their respective factors when grouped together.

Table 9. *Descriptive Statistics for BFI Parcels*

Variable	*M*	*SD*
O P1	14.05	2.36
O P2	10.74	2.48
O P3	10.70	2.19
C P1	11.16	1.86
C P2	11.30	1.92
C P3	10.64	2.43
E P1	10.40	2.49
E P2	10.06	2.42
E P3	6.77	2.12
A P1	11.42	1.97
A P2	11.65	2.19
A P3	11.54	2.13
N P1	8.77	2.70
N P2	8.27	2.44
N P3	5.55	1.90

Table 10. *Descriptive Statistics for MMAM Items*

Variable	M	SD
M1	5.13	0.88
M2	5.40	0.79
M3	4.91	0.97
M4	4.97	0.90
M5	4.82	1.08
U1	4.49	0.94
U2	4.61	0.92
U3	4.24	1.20
U4	4.64	0.96
U5	4.30	1.09
S1	5.38	0.81
S2	5.25	0.76
S3	5.42	0.79
S4	5.25	0.77
I1	4.39	0.94
I2	4.18	1.12
I3	4.66	1.06
I4	4.31	1.09
I5	4.24	1.13
I6	4.78	0.91
C1	4.85	0.83
C2	4.90	0.82
C3	4.55	1.00
C4	5.16	0.72
C5	5.08	0.73
C6	4.55	1.02

Table 11. *Extraction Sums of Squared Loadings*

Factors	Total	% of Variance	Cumulative %
FFM 1	3.43	22.84	22.84
FFM 2	1.90	12.69	35.54
FFM 3	1.69	11.26	46.80
FFM 4	1.41	9.42	56.22
FFM 5	0.91	6.05	62.27
MMAM 1	8.49	32.66	32.66
MMAM 2	3.04	11.71	44.37
MMAM 3	1.57	6.03	50.40
MMAM 4	0.88	3.39	53.78
MMAM 5	0.69	2.67	56.45

Table 12. *Individual Factor Loadings for the BFI Item Parcels and MMAMI Indicators*

ITEMS	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
O	0.58				
O	0.74				
O	0.87				
C		0.74			
C		0.72			
C		0.73			
E			0.89		
E			0.81		
E			0.89		
A				0.69	
A				0.72	
A				0.86	
N					0.75
N					0.81
N					0.77
M1	0.32				
M2	0.56				
M3	0.79				
M4	0.82				
M5	0.60				
*U1	0.77				
*U2	0.57				
U3		0.73			
U4		0.69			
U5		0.75			
S1			0.83		
S2			0.76		
S3			0.84		
S4			0.62		

Table 12, *continued*

ITEMS	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
I1				0.70	
I2				0.68	
I3				0.44	
I4				0.66	
I5				0.62	
I6				0.47	
C1					0.81
C2					0.83
C3					0.46
C4					0.71
C5					0.78
C6					0.71

Note. * Indicates that the variables loaded on multiple factors.

Confirmatory Factor Analysis (CFA)

Sample Size

Structural Equation Modeling (SEM) was utilized to determine the goodness-of-fit of the five proposed models to the data, as well as to determine the amount of variance explained by the models. Although there is scholarly debate regarding SEM sample size, Schumacker and Lomax (2010) suggest that at least 100 to 150 participants are required to conduct SEM analysis. Moreover, 15 participants per indicator variable are not considered unreasonable. However, Bentler and Chou (1987) suggested that researchers might go as low as five participants per parameter estimate if the data are normally distributed, the sample is not missing data, or does not contain any outlying cases. Based on these criteria, with no more than 21 indicator variables in each of the five models, the participant pool of 305 was considered to be adequate.

Models

Five MMAM models were used to test the relationship between all five FFM factors and one MMAM component at a time. The number of parameters, degrees of freedom (*df*), and chi-square (χ^2) values were estimated in AMOS. The null hypothesis was that the models' restricted covariance was equal to the sample covariance. This hypothesis was tested with the models' χ^2 values. Good model/data fit was based on following equation: $\chi^2 = df$ (Dion, 2008). The Maximum Likelihood (ML) method yielded F_{ML} with $(1/2)\,(p + q)\,(p + q + 1) - t$ (# estimated parameters in the models) degrees of freedom that were distributed $T\,(N - 1)\,F_{ML}$ as χ^2. The χ^2 values measured the difference between what the actual relationships in the models were and what was expected if the models were assumed to be correct. For each MMAM model, the χ^2 value was interpreted in terms of its *df* to determine the type of model/data fit. Thus, a ratio of χ^2/df was arithmetically calculated in each instance. The parameters, *df*, χ^2 values, χ^2/df ratios are listed in Table 13. The calculated ratios for the models yielded results well above 1.0, suggesting *poor* model/data fit.

Table 13. *Notes for Models*

Variable	Parameters	*df*	χ^2	χ^2/df ratios
eMpowerment	55	155	360.16	2.32
Usefulness	55	155	381.50	2.46
Success	53	137	312.81	2.28
Interest	57	174	452.13	2.59
Caring	57	174	447.10	2.57

Note. The minimum was achieved for the default models.

The model fit summary provided additional fit indices to assess the type of model/data fit. It was important to consider and analyze these additional fit statistics because the five models did not meet the χ^2 criterion. AMOS provided several different fit indices; the values are listed in Table 14. The CFI values for all of the models were below 0.95, suggesting inadequate

model/data fit. Additionally, the RMSEA values for all of the models were above .06, suggesting

the model/data fit was *not* good.

Table 14. *Fit Indices for the Models with the BFI Constructs Predicting one of the MUSIC*

Model Components

Variable	CFI	RMSEA	GFI	NFI	TLI
eMpowerment	0.916	0.066	0.895	0.863	0.897
Usefulness	0.914	0.069	0.886	0.865	0.894
Success	0.930	0.065	0.899	0.884	0.913
Interest	0.897	0.072	0.870	0.844	0.876
Caring	0.899	0.073	0.872	0.847	0.878

Despite an overall lack of model/data fit, there were a total of ten significant paths.

However, even when paths within structural models are found to be significant, there is no

guarantee that they will fit the data (Kenny, 2011). Furthermore, according Bentler and Chou

(1987): "Even when there are no problems with estimation, or unusual features to the results, a

specified model may simply not fit the sample data" (p. 107). Thus, it is possible to have

parameter values within expected ranges and still find that the proposed model does not fit the

data. The unstandardized loadings for the MMAM models were comprised of parameter

estimates, standard errors, critical ratios, and *p*-values. The standardized regression weights and

the correlations remained independent of the units in which all of the variables were measured.

Therefore, they were not affected by the choice of identification constraints.

The regression weights are listed in Table 15. Based on the regression weights for the

eMpowerment model, three unconstrained estimates were significant: Openness and

Conscientiousness had a significant, negative impact on eMpowerment while Extraversion had a

significant, positive impact on it. For the Usefulness model, two unconstrained estimates were

significant: Extraversion and Agreeableness had a significant, positive impact on Usefulness. For

the Success Model, two unconstrained estimates were significant: Agreeableness had a significant, positive impact on Success while Neuroticism had a significant, negative impact on it. For the Interest model, two unconstrained estimates were significant: Extraversion and Agreeableness had a significant, positive impact on Interest. Finally, for the Caring Model, Agreeableness had a significant, positive impact on Caring. The significant pathways are depicted in Figure 11.

Table 15. *Regression Weights*

| Variable	Estimate	SE	CR	p
O -> M	-0.019	0.022	-0.898	***
C -> M	-0.031	0.024	-1.284	***
E -> M	0.045	0.023	2.013	***
A -> M	0.097	0.024	4.03	0.199
N -> M	-0.063	0.028	-2.293	0.369
O -> U	0.016	0.023	0.730	0.466
C -> U	-0.017	0.025	-0.687	0.492
E -> U	0.092	0.024	3.746	***
A -> U	0.096	0.025	3.784	***
N -> U	0.048	0.028	1.687	0.920
O -> S	-0.003	0.025	-0.12	0.904
C -> S	0.012	0.028	0.45	0.653
E -> S	0.036	0.025	1.435	0.151
A -> S	0.081	0.025	3.181	***
N -> S	-0.061	0.031	-1.957	***
O -> I	0.011	0.024	0.443	0.657
C -> I	-0.046	0.027	-1.700	0.089
E -> I	0.066	0.025	2.618	***
A -> I	0.113	0.028	3.956	***
N -> I	-0.047	0.03	-1.538	0.124
O -> C	0.018	0.023	0.804	0.422
C -> C	0.001	0.025	0.026	0.979
E -> C	0.031	0.023	1.329	0.184
A -> C	0.109	0.025	4.289	***
N -> C	-0.054	0.029	-1.889	0.059

Note. *** $p < .05$.
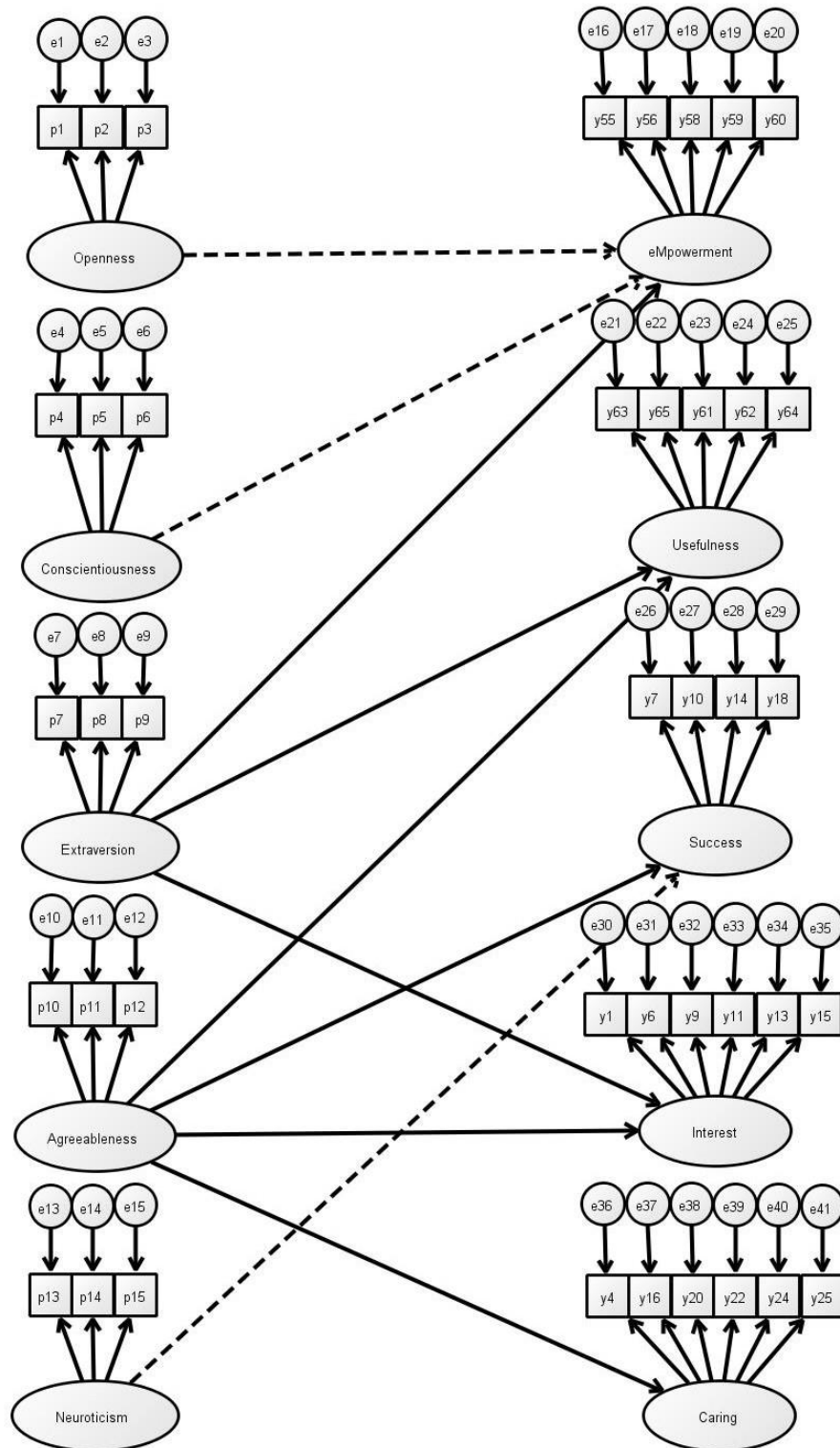
Figure 11. Depiction of Significant Pathways. *Notes.* This was not the actual model entered into AMOS for analysis. Additionally, the relationships between Openness and eMpowerment, Conscientiousness and eMpowerment, and Neuroticism and Success are *negative,* as depicted by the dashed lines. All other relationships are *positive*.

CHAPTER 5.

DISCUSSION AND CONCLUSION

The overarching goal of this research was to contribute to the theoretical and methodological understanding of the relationship between personality and academic motivation. I used Structural Equation Modeling (SEM) to examine the relationships between the Five Factor Model (FFM) factors and the Music Model of Academic Motivation (MMAM) components. In this chapter, I discuss the model/data fit, as well as the results of prior statistical analyses in the context of the guiding research question for this study. Additionally, the implications, limitations and recommendations, and conclusions are discussed.

This study was guided by the following question: *To what extent do the FFM factors relate to the MMAM components?* Part of the challenge of this study was whether the translation of substantive theory (that personality is related to academic motivation) would produce a runnable model in AMOS using the FFM factors and MMAM components. The AMOS estimation procedure did not converge to produce a reasonable solution for the initial hypothesized model. However, it did converge to provide a reasonable solution for each of the five theoretically-respecified models. To determine the statistical significance and substantive meaning of these full structural models, Schumacker and Lomax (2010) suggest that the following three criteria should be considered: (1) insignificant chi-square (χ^2) values and an acceptable RMSEA value, (2) significant parameter estimates of the model(s), and (3) acceptable strength, directionality, and value range of the parameter estimates. None of the five models met the first criterion, suggesting poor model/data fit. However, Nachtigall et al. (2003) suggested that well-fitting models are not always promising and may reveal a lack of predictive validity. Additionally, poor fit does not imply weak effects or mooted links between the exogenous and

83

endogenous variables. To that end, a total of ten pathways were found to be significant. Three significant pathways emanated from the eMpowerment Model, two from the Usefulness Model, two from the Success Model, two from the Interest Model, and one from the Caring Model.

I offer two likely explanations for the lack of model/data fit. First, it is possible that the instrumentation used in this study negatively impacted the model/data fit. In the general analysis of the BFI subscales, the reliability estimates showed that Openness, Conscientiousness, and Agreeableness had reliability estimates below 0.8, which can be considered to be acceptable, but not good. In contrast, Extraversion and Neuroticism had reliability estimates above 0.8. These findings suggest that there is room for improvement regarding the psychometric properties of the individual items comprising the Openness, Conscientiousness, and Agreeableness subscales for use with this population of students. An improvement might include the rewording of, or reduction of items, which could increase the level of convergent and discriminant validity. This would potentially raise the reliability estimates of Openness, Conscientiousness, and Agreeableness, thereby improving the overall factorial validity of the BFI. Nonetheless, as noted in Chapter 3, John and Srivastava (1999) and John, Naumann, and Soto (2008) suggest that the psychometric properties and validity findings of this scale are satisfactory. For the MMAMI subscales, the reliability estimates were all above 0.8, which indicates that it is not necessary to revise those subscales.

The second likely reason for the lack of model/data fit has to do with this study's focus on a single online college course. Although an individual's personality tends not to change very much once it has reached developmental fruition, his or her academic motivation beliefs regarding a particular online course may differ with respect to other courses or even to the course in question. These differences could create potential model/data representation problems from a

theoretical perspective. Overall, the model/data fit results in poor absolute and relative fit; the observed and implied variance-covariance matrices differ.

Despite the lack of model/data fit, the standardized pathways do provide useful information regarding the relationships of all five models tested. First, Openness and Conscientiousness (eMpowerment Model) were found to be significant. However, the pathways from both of these factors to eMpowerment were negative. Prior studies have found that Openness and Conscientiousness related positively to other academic motivation constructs (e.g., Busato et al., 1999; De Guzman et al., 2003; Heaven, 1989; Kanfer et al., 1996; Komarraju et al., 2009). Relevant to this study, these college students' Openness and Conscientious traits did not relate to beliefs/perceptions of eMpowerment, at least as they pertained to the online Drug Education course.

Even though I did not generate any specific hypotheses regarding the relationships between the FFM factors and MMAM components, it was compelling that Openness and Conscientiousness did not positively relate to eMpowerment and to some of the other components. Indeed, Openness has been found to explain a large portion of the variance in intrinsic motivation as well as academic motivation to learn scholarly content (Ariani, 2013; Kommarraju et al., 2009). Additionally, De Feyter, Caers, Vigna, and Berings (2012) suggested that Conscientiousness seems to explain a large portion of the variance in academic motivation. Previously, these relationships have implied that college students who were intellectually gifted, valued experiential novelty, and/or organized, meticulous, thorough, and operated with planned intentionality were academically motivated. Overall, the findings between Openness, Conscientiousness, and the components appear to be counterintuitive. It is possible that there are sub-dimensions of these two factors which need to be examined separately. This would allow for

a better understanding as to why and when Openness and Conscientiousness impacts or relates to these components.

Second, Extraversion was found to be positively related to eMpowerment, Usefulness, and Interest (eMpowerment, Usefulness, and Interest Models). While other studies have found that Extraversion relates positively to academic motivation and scholastic learning, particularly in courses that are face-to-face or traditionally based (Köseoğlu, 2014), this finding was interesting given that this on-line course did not include an interpersonal and/or social component. Indeed, the communication and interaction amongst students and between the students and the instructor was limited to e-mail correspondence. No Internet-based or on-line social discussion platforms were utilized. All of the assignments, quizzes, and tests were completed individually, without the assistance or help of others. Because of how this course was constructed and implemented, lacking course aspects of what would be idealistically appealing to those students who are extraverted, it was compelling that this factor related positively to three of the five components.

Third, Agreeableness was found to be positively related to Usefulness, Success, Interest, and Caring. The results for Agreeableness were interesting: Prior studies are mixed on the relatedness of Agreeableness to academic motivation. Some research (e.g., De Feyter et al., 2012) suggests that it has predictive validity for academic achievement/performance, but not for academic motivation. Additionally, some studies (e.g., Ariani, 2013) have suggested that it relates positively to intrinsic motivation, while other studies (e.g., Kommarraju et al, 2009) have indicated that it relates negatively to amotivation. Furthermore, De Raad & Schouwenburg (1996) suggested that Agreeableness exhibits a weaker, inconsistent relationship with academic motivation when juxtaposed to the other factors. Relevant to this study, students in this course

86

who were amenable, cooperative, and compliant found some level of use in the academic content being taught, were successful with the coursework, were interested in what they were learning, and believed that the instructor cared about the extent of their learning.

Finally, Neuroticism was found to be negatively related to Success (Success Model). Most studies (e.g., Kommarraju et al., 2009) have found that this factor relates negatively to academic motivation and positively to amotivation. Indeed, anxious or nervous students tend to exemplify low intrinsic and/or extrinsic motivation under evaluative settings (Rajiah, Coumaravelou, & Ying, 2014). However, it is also important to note that students who exemplify a healthy or normal level of anxiety, prior to instructors teaching beyond their threshold for tolerance, are motivated and perform well under such settings. In this study, students who possessed neurotic traits believed that they could not be successful with their coursework.

Implications

This investigation has some possible implications for educational practice. For example, college students will exhibit motivation on a continuum ranging from low to high, irrespective of the theory being used to conceptualize academic motivation (Tempelaar et al., 2007). However, their motivation, or lack thereof, occurs for different reasons. Regardless, for some students, they will likely benefit from their instructor's understanding of the relationships between personality and academic motivation, particularly as it relates to different teaching modalities. Furthermore, for instructors to understand the individual differences among personality traits, they may want to administer a suitable tool or questionnaire to their students. Thereafter, they can run a simple statistical analysis to determine where the significance of those differences therein lie. Additionally, administration of the MMAMI (Jones, 2015) could prove useful in helping instructors understand their students' academic motivation beliefs, too. If instructors understand

87

how students perceive their overall learning experience in the classroom, their pedagogical delivery can be modified if necessary.

Taking the findings of this study a bit further, I hypothesize that instructors who want to increase the level of their college students' engagement with academic content may do so by targeting the trait make-up or qualities of certain FFM factors. For instance, findings from this investigation suggest that the characteristics of Extraversion and Agreeableness affect students' course-related perceptions. Kommarraju et al. (2009) suggested that students who are extraverted need outlets to interact and relate to others. Whether this is accurate for students taking on-line courses may require additional research. Nevertheless, it may be appropriate for instructors teaching on-line courses to provide a means to increase student interaction virtually. These could include Internet-based interaction/video tools or synchronous text discussion platforms. Additionally, students who are agreeable tend not to be critical of pedagogical variations or unique course-based activities designed to facilitate learning. Therefore, instructors may find that it is easier to implement a variety of teaching methods. Furthermore, these students may also be likely to want to assist their peers with their learning given that they exemplify compassionate and/or helpful behaviors. In essence, the importance of recognizing the trait make-up of all five factors may complement an instructor's curricular approach or round out the composition of a course activity.

Pedagogically, the delivery modality and course-based activities could be designed to build on the strengths of each student, although additional research is needed to support this hypothesis. If instructors wish to take into consideration their students' personality traits and academic motivation beliefs when it comes to addressing learning outcomes, they may benefit in varying their pedagogical approach, perhaps utilizing forms of transmissionist and reciprocal

teaching techniques, modifying them as appropriate for in-person and on-line courses. Further research could examine whether or not instructors who possess suitable pedagogical approaches that appeal to all five of the FFM factors and some of the MMAM components may be more likely to motivate their students academically.

Limitations and Recommendations

There are two primary limitations associated with this investigation. First, this study relied on self-reported data. I assumed that all participants were able to accurately assess and report their personality perceptions and academic motivation beliefs. But, there is a significant body of research suggesting that self-report data can be problematic and that participants not adept at assessing themselves may provide inaccurate, non-representative responses (Kazemian & Farrington, 2005). For example, items in the BFI that describe personality traits that participants strive to develop—but do not currently possess—may lead them to provide answers that are non-representative of the trait(s) they truly exhibit. If time constraints are of little concern, future researchers could address this challenge by administering the instrument one-on-one with each participant, asking them to verbally justify their endorsement of the items with examples. Additionally, I also assumed that the participants were able to accurately access their academic motivation beliefs. Such beliefs are oftentimes implicit—meaning that the participants may not have thought about them previously. Other researchers could address this issue by having students provide in-depth verbal or written descriptions of their beliefs. However, if such a method is employed, participants may inadvertently change their own beliefs as a result (Quihuis et al., 2002). Because of this possibility, researchers may want to have participants elaborate on their beliefs over the course of a series of different timeframes.

The second limitation of this study is that it investigated sophisticated statistical relationships, not behavioral ones. Although this approach provided worthwhile information, future research endeavors may want to investigate these relationships in terms of the actual personality traits exhibited by participants—coupled with a qualitative assessment of academic motivation beliefs. Such a mixed-methods approach would be an essential step in establishing content validity of the current theoretical model(s) and the instrumentation utilized. Moreover, to determine personality traits, pretesting would be crucial, capitalizing on face-to-face interviewing and behavioral coding (Wrzus & Mehl, 2015). For academic motivation, having students keep an anecdotal or journalistic record of their motivation beliefs on a regular basis would likely provide an accurate account of actual behaviors—as would comparing this information to their performance in courses and soliciting input from their instructors. Additionally, researchers' structured observation(s) of students as they engage in the classroom setting would be a critical aspect of such an investigation; students thereafter could describe their chosen engagement approach, verbalizing their beliefs as they went through the process.

It is recommended that future studies explore different methodological frameworks when examining the relationships between the FFM factors and the MMAM components. The lack of model/data fit is problematic. However, it is not unusual if a model does not fit the data well initially (Schumacker & Lomax, 2010). Because of this inevitability, Jöreskog and Sörbom (1993) suggested that it is appropriate to employ one of these two strategic frameworks: Alternative Models (AM) or Model Generating (MG). For the AM framework, several alternative or competing models are proposed, all of which must be grounded on substantive theory. Thereafter, the models are tested and one is selected based on its representativeness of the empirical data. For the MG framework, the goal is to postulate and test a model; if that model

is then rejected based on poor model/data fit, an Exploratory Factor Analysis (EFA) is conducted

to modify and reestimate the model. Hence, the primary aim of the MG framework is to locate

the source(s) of misfit and generate a model that *does* represent the data. It must be noted,

therefore, that this study did not adhere to either the AM or MG frameworks. From the onset, the

goal was to (a) postulate a single model based on the extrapolation of substantive theory, (b)

collect the data, (c) test the model/data fit, and (d) reject or accept the model with no additional

model modifications. While theoretical complexity and underidentification impacted the initial

hypothesized theoretical model—thereby necessitating the need to conduct EFA so that a model

(in this case five models) could be estimated in AMOS—the goal of this study remained

unchanged. It was beyond the scope of this study to address more than the initial findings

between the FFM factors and the MMAM components. Thus, it is recommended that future

studies employ the MG framework . . . but with caution. Anytime a model is re-specified or

modified, its meaning is implicitly changed in some fundamental way (Schumacker & Lomax,

2010). In some instances, model modification results in a trivial or unimportant corresponding

alteration of its substantive meaning. However, in other instances it can indicate a strong shift in

the model's theoretical underpinnings. In such cases it will be essential to think critically through

various proposed models in order to ensure that they are theoretically sound. Another

consideration that must be taken into account is when a model is modified, there is typically

strong reliance on the results of the empirical data, rather than substantive theory. This caveat is

important to bear in mind since when more empirically-based tweaks are incorporated into a

model—the less likely it can be replicated using other datasets. The takeaway message: Base all

future model respecifications on theory (Jöreskog & Sörbom, 1993).

Finally, it is recommended that future studies explore the relationships between the FFM factors and the MMAM components using a sample of college students that are *not* enrolled in an on-line course. Such studies may reveal statistical and meaningful differences in how the factors relate to the components in traditional classroom settings. However, given that on-line education is not likely to subside (and perhaps likely to increase) over the next several years, it will be important for other researchers to replicate this study using different samples of college students.

Conclusions

This study extends our understanding of the relationship between personality and academic motivation by taking a crucial first step in exploring the preliminary relationships between the FFM factors and the MMAM components. Broadly speaking, it can be concluded from this study that personality relates to or predicts factors important to students' academic motivation. However, until further research on the relationships between the FFM factors and the MMAM components is conducted, the findings and interpretations described herein should be considered tentative. Nevertheless, instructors should be aware that their students' motivation beliefs are, to a certain degree, influenced by their personality traits, and that these differences are likely to affect how students perceive the academic learning environment. To that end, students with different personality traits will likely display varying preferences as to the types of pedagogical methods or strategies that motivate them academically. More research is needed to understand how instructors can appropriately capitalize on these methods or strategies to improve students' motivation, engagement, and learning. I hope that this study stimulates further exploration of the complex relationships between personality and academic motivation.

REFERENCES

Ackerman, P. L. (1997). Personality, self-concept, interests, and intelligence: Which construct doesn't fit? *Journal of Personality, 65,* 171-204.

Ackerman, P. L. & Heggestad, E. D. (1997). Intelligence, personality, and interests: Evidence for overlapping traits. *Psychological Bulletin, 121,* 219-245.

Ackerman, P. L., Bowen, K. R., Margaret, E. B., Kanfer, R. (2001). Determinants of individual differences and gender differences in knowledge. *Journal of Educational Psychology, 93*(4), 797-825.

Allport, G. W. (1937). *Personality: A psychological interpretation.* New York: Holt.

Allport, G. W., & Odbert, H. S. (1936). Trait names: A psycho-lexical study. *Psychological Monographs, 47,* No. 211.

Amabile, T. M. (1985). Motivation and creativity: Effect of motivational orientation on creative writers. *Journal of Personality and Social Psychology, 48,* 393-399.

Ames, C. (1992). Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology, 84,* 261-271.

Anastasi, A. (1958). *Differential psychology: Individual and group differences in behavior.* New York: Macmillan.

Anastasi, A. (1982). *Psychological testing* (5th ed.). New York: Mac-Millan.

Appleton, J. J., Christenson, S. L., Kim, D., & Reschly, A. L. (2006). Measuring cognitive and psychological engagement: Validation of the student engagement instrument. *Journal of School Psychology, 44,* 427-445.

Ariani, D. W. (2013). Personality and learning motivation. *European Journal of Business and Management, 5*(10), 26-38.

Austin, E. J., Gibson, G. J., Deary, I. J., McGregor, M. J., & Dent, J. B. (1998). Individual response spread in self-report scales: *Personality correlations and consequences. Personality and Individual Differences, 24,* 421-438.

Balakrishnan, J. D. (1999). Decision processes in discrimination: Fundamental misrepresentations of signal detection theory. *Journal of Experimental Psychology: Human Perception & Performance, 25,* 1189-1206.

Baldwin, T.T., & Karl, K. (1987, August). *The development and empirical test of a measure for assessing motivation to learn in management education.* Paper presented at the 47th Annual Meeting of the Academy of Management, New Orleans, LA.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191-215.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory.* Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1997). *Self-efficacy. The exercise of control.* New York: Freeman.

Bandura, A. (2001). Social cognitive theory: An agentive perspective. *Annual Review of Psychology, 52,* 1-26.

Barrick, M. R., & Mount, M. K. (1996). Effects of impression management and self-deception on the predictive validity of personality constructs. *Journal of Applied Psychology, 81,* 261-272.

Baumeister, R., & Leary, M. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin, 117*, 497-529.

Benet-Martinez, V., & John, O. P. (1998). Los Cinco Grandes across cultures and ethnic groups: Multi-trait multi-method analyses of The Big Five in Spanish and English. *Journal of Personality and Social Psychology, 75,* 729-750.

Bentler, P., & Chou, C. (1987). Practical issues in structural modeling. *Sociological Methods & Research, 16*(1), 78-117.

Bernard, L. C. (2010). Motivation and personality: Relationships between putative motive dimensions and the five-factor model of personality. *Psychological Reports, 106,* 613-631.

Bernstein, I. H., Garbin, C. P., & McClellan, P. G. (1983). A confirmatory factoring of the California Psychological Inventory. *Educational and Psychological Measurement*, *32*, 687-691.

Bidjerano, T., & Dai, D. Y. (2007). The relationship between The Big-Five model of personality and self-regulated learning strategies. *Learning and Individual differences, 17,* 69-81.

Bloom, B. S., & Broder, L. (1958). *Problem-solving processes of college students.* Chicago: The University of Chicago Press.

Boggiano, A. K., Main, D. S., & Katz, P. A. (1988). Children's preference for challenge: The role of perceived competence and control. *Journal of Personality and Social Psychology, 54,* 134-151.

Boote, D., & Beile, P. (2005). Scholars before researchers: On the centrality of the dissertation literature review in research preparation. *Educational Researcher, 34*(6), 3-15.

Borgatta, E. E., (1964). The structure of personality characteristics. *Behavioral Science, 9,* 8-17.

Borkenau, P., & Ostendorf, F. (1993). *NEO-Fünf-Faktoren-Inventar (NEO-FFI) nach Costa und McCrae.* Göttingen: Hogrefe.

Botwin, M. D., & Buss, D. M. (1989). Structure of act-report data: Is the five-factor model of personality recaputured? *Journal of Personality and Social Psychology, 56,* 988-1001.

94

Brown, T. A. (2006). *Confirmatory factor analysis for applied research*. New York: Guilford Press.

Brown, R. L. (2009). Assessing specific meditational effects in complex theoretical models. *Structural Equation Modeling: A Multidisciplinary Journal, 4*(2), 142-156.

Busato, V. V., Prins, F. J., Elshout, J. J., & Hamaker, C. (1999). The relation between learning styles, the big five personality traits, and achievement motivation in higher education. *Personality and Individual Differences, 26,* 129-140.

Busato, V. V., Prins, F. J., Elshout, J. J., & Hamaker, C. (2000). Intellectual ability, learning style, personality, achievement motivation and academic success of psychology students in higher education. *Personality and Individual Differences, 29,* 1057-1068.

Button, S. B., Mathieu, J. E., & Zajac, D. M. (1996). Goal orientation in organizational research: A conceptual and empirical foundation. *Organizational Behavior and Human Decision Processes, 67,* 26-48.

Caprara, G. V., Vecchione, M., Alessandri, G., Gerbino, M., & Barbaranelli, C. (2011). The contribution of personality traits and self-efficacy beliefs to academic achievement: A longitudinal study. *British Journal of Educational Psychology, 81,* 78-96.

Cattell, R. B. (1943). The description of personality: Basic traits resolved into clusters. *Journal of Abnormal and Social Psychology, 38,* 476-506.

Cattell, R. B. (1945a). The description of personality: Principles and findings in factor analysis. *American Journal of Psychology, 58,* 69-90.

Cattell, R. B. (1945b). The principle trait clusters for describing personality. *Psychological Bulletin, 42,* 129-161.

Cattell, R. B., Eber, H., W., & Tatsuoka, M. M. (1970). *Handbook for Sixteen Personality Factor questionnaire (16PF)*. Champaign, IL: IPAT.

Chamorro-Premuzic, T., & Furnham, A. (2003). Personality predicts academic performance: Evidence from two longitudinal studies on British University students. *Journal of Research in Personality, 37,* 319-338.

Chamorro-Premuzic, T., & Furnham, A. (2003). Personality traits and academic exam performance. *European Journal of Personality, 17,* 237-250.

Chamorro-Premuzic, T., & Furnham, A. (2005). *Personality and intellectual competence.* Mahwah: Lawrence Erlbaum Associates.

Clark, M. H., & Schroth, C. A. (2010). Examining the relationships between academic motivation and personality among college students. *Learning and Individual Differences, 20,* 19-24.

Cofer, C. N., & Appley, M. H. (1964). Motivation: Theory and research. Oxford, England: John Wiley.

Colquitt, J. A., & Simmering, M. J. (1998). Conscientiousness, goal orientation, and motivation to learn during the learning process: A longitudinal study. *Journal of Applied Psychology, 83*(4), 654-665.

Connell, J. P. (1990). Context, self and action: A motivational analysis of self-system processes across the life span. In D. Cicchetti & M. Beeghly (Eds.), *The self in transition: Infancy to childhood* (pp. 61 – 97). Chicago: University of Chicago Press.

Connell, J. P., Spencer, M. B., & Aber, J. L. (1994). Educational risk and resilience in African-American youth: Context, self, action, and outcomes in school. *Child Development, 65,* 493-506.

Connell, J. P., & Wellborn, J. G. (1991). Competence, autonomy, and relatedness: A motivational analysis of self-system processes. In M. R. Gunnar & L. A. Sroufe (Eds.), *Self-process and development: The Minnesota symposia on child development* (Vol. 23, pp. 43 – 77). Hillsdale, NJ: Erlbaum.

Conley, J. J. (1985). Longitudinal stability of personality traits: A multi-trait-multimethod-multioccasion analysis. *Journal of Personality and Social Psychology*, *49,* 1266-1282.

Costa P. T., Fozard J. L., McCrae R.R., and Bosse R. (1976). Relations of age and personality dimensions to cognitive ability factors. *Journal of Gerontology, 31,* 663-669.

Costa, P. T., Jr., & McCrae, R. R. (1976). Age differences in personality structure: A cluster analytic approach. *Journal of Gerontology, 31,* 564-570.

Costa, P. T., Jr., & McCrae, R. R. (1985). *The NEO Personality Manual inventory.* Odessa, FL: Psychological Assessment Resources.

Costa, P. T., Jr., & McCrae, R. R. (1992). Four ways five factors are basic. *Personality and Individual Differences*, *13*, 653-665.

Costello, A. B., & Osborne, J. W. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment, Research, and Evaluation, 10*. Retrieved from http://pareonline.net/pdf/v10n7.pdf

Covington, M. V. (1984). The self-worth theory of achievement motivation: Findings and implications. *The Elementary School Journal*, *85*(1), 5-20.

Covington, M. V. (1992). *Making the grade: A self-worth perspective on motivation and school reform.* New York: Cambridge University Press.

Csikszentmihalyi, M. (1985). Reflections on enjoyment. *Perspectives in Biology and Medicine, 28,* 469-497.

Cury, F., Elliot, A. J., Da Fonseca, D., & Moller, A. C. (2006). The social-cognitive model of achievement motivation and the 2×2 achievement goal framework. *Journal of Personality and Social Psychology, 90,* 666-679.

Darr, C., Ferral, H., & Stephanou, A. (2008, January). *The development of a scale to measure student engagement.* Paper presented at the Third International Rasch Measurement Conference, Perth, Western Australia.

Da Raad, B., & Schouwenburg, H. C. (1998). Personality in learning and education: A review. *European Journal of Personality, 10*(5), 303-336.

Dauphinee, T. L., Schau, C., & Stevens, J. J. (1997). Survey of attitudes toward statistics: factor structure and factorial invariance for women and men. *Structural Equation Modeling, 4,* 129-141.

Day, E. A., Radosevich, D. J., & Chasteen, C. S. (2003). Construct-and-criterion-related validity of four commonly used goal orientation instruments. *Contemporary Educational Psychology, 28,* 434-464.

de Charms, R. (1976). *Enhancing motivation: Change in the classroom.* New York: Irvington.

Deci, E. L., & Ryan, R. M. (1985). Intrinsic motivation and self-determination in human behavior. New York: Plenum.

Deci, E. L., Schwartz, A. J., Sheinman, L., & Ryan, R. M. (1981). An instrument to assess adults' orientation toward control versus autonomy with children: Reflections on intrinsic motivation and perceived competence. *Journal of Educational Psychology, 73,* 642-650.

De Feyter, T., Caers, R., Vigna, C., & Berings, D. (2012). Unraveling the impact of the Big Five personality traits on academic performance: The moderating and mediating effects of self-efficacy and academic motivation. *Learning and Individual Differences, 22*(4) 439-448.

De Guzman, I. N., Calderon, A., & Cassaretto, M. (2003). Personality and academic achievement in university students. *Revista de Psicologia, 21,* 119-143.

De Raad, B. (1996). Personality traits in learning and education. *European Journal of Personality, 10,* 185-200.

De Raad, B. & Perugini, M. (2002). *Big Five assessment.* Gottingen: Hogrefe & Huber.

De Raad, B., & Schouwenburg, H. C. (1996). Personality in learning and education: A review. *European Journal of Personality, 10,* 303-336.

De Volder, M., & Lens, W. (1982). Academic achievement and future time perspective as a cognitive-motivational concept. *Journal of Personality and Social Psychology, 42*(3), 566-571.

Diener, E. (2000). Introduction to the special section on personality development. *Journal of Personality and Social Psychology*, *8*(1), 120-121.

Digman, J. M. (1990). Personality structure: Emergence of the five-factor model. *Annual Review of Psychology, 41,* 417-440.

Digman, J. M., & Inouye, J. (1986). Further specification of the five robust factors of personality. *Journal of Personality and Social Psychology, 50*(1), 16-23.

Digman, J. M., & Takemoto-Chock, N. K. (1981). Factors in natural language of personality: Re-analysis and comparison of six major studies. *Multivariate Behavioral Research, 16,* 149-170.

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2009). *Mail and Internet Surveys: The Tailored Design Method, (3rd ed.).* New York: John Wiley and Sons

Dimitrov, D.M. (2006). Comparing groups on latent variables: A structural equation modeling approach**.** *WORK: A Journal of Prevention, Assessment, & Rehabilitation, 26,* 429-436.

Dion, P. A. (2008). Interpreting structural equation modeling results: A reply to Martin and Cullen. *Journal of Business Ethics, 83,* 365-368.

Diseth, A. (2003). Personality and approaches to learning as predictors of academic achievement. *European Journal of Personality, 17*(2), 143-155.

Do, C. B., & Batzoglou, S. (2008). What is the expectation maximization algorithm? *Nature Biotechnology, 26*(8), 897-899.

Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology, 92,* 1087-1101.

Duda, J. L. (1989). Relationship between task and ego orientation and the perceived purpose of sport among high school athletes. *Journal of Sport and Exercise Psychology, 11,* 318-335.

Dweck, C. S. (1975). The role of expectations and attributions in the alleviation of learned helplessness. *Journal of Personality and Social Psychology, 31,* 674-685.

Dweck, C. S. (1986). Motivational processes affecting learning. *American Psychologist, 41,* 1040-1048.

Dweck, C, S. (1989). Motivation. In A. Lesgold & R. Glaser (Eds.), *Foundations for a psychology of education* (pp. 87 – 136). Hillsdale, NJ: Erlbaum.

Dweck, C. S., Hong, Y., & Chiu, C. (1993). Implicit theories: Individual differences in the likelihood and meaning of dispositional inference. *Personality and Social Psychology Bulletin, 19,* 644-656.

Dweck, C. S., & Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review, 95,* 256-273.

Eccles, J., & Wang, M. (2012). Part I commentary: So what is engagement anyway? In S. L. Christenson, A. L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 133 – 145). New York: Springer.

Eccles, J. S., & Wigfield, A. (1995). In the mind of the actor: The structure of adolescents' achievement task values and expectancy-related beliefs. *Personality and Social Psychology Bulletin, 21*(3), 215-225.

Elliot, A. J., & Harackiewicz, J. M. (1996). Approach and avoidance achievement goals and intrinsic motivation: A mediational analysis. *Journal of Personality and Social Psychology, 70,* 461-475.

Elliot, A., & McGregor, H. (1999). Test anxiety and the hierarchical model of approach and avoidance achievement motivation. *Journal of Personality and Social Psychology, 76,* 628-644.

Elliot, A. J., & Sheldon, K. M. (1997). Avoidance achievement motivation: A personal goals analysis. *Journal of Personality and Social Psychology, 73,* 171-185.

Elliot, A. J., & Thrash, T. M. (2002). Approach-avoidance motivation in personality: Approach and avoidance temperaments and goals. *Journal of Personality and Social Psychology, 82,* 804-818.

Elliott, E. S., & Dweck, C. S. (1988). Goals: An approach to motivation and achievement. *Journal of Personality and Social Psychology, 54,* 5-12.

Engler, B. (2008). Personality theories: An introduction (8th ed.). Boston: Houghton Mifflin.

Eren, A. (2009). Self-efficacy beliefs and mental time travel ability: Uncovering a hidden relationship in educational settings. *Learning and Individual Differences, 19*(4), 513-517.

Eysenck, H. J. (1967). *The biological basis of personality.* Springfield, IL: Charles C. Thomas.

Eysenck, H. J., & Eysenck, S. B. G. (1964). *Manual of the Eysenck Personality Inventory.* London: University Press.

Eysenck, H. J., & Eysenck. S. B. G. (1975). *Manual of the Eysenck Personality Questionnaire.* San Diego: EdITS.

Eysenck, H. J, & Eysenck, S. B. G. (1976). *Psychoticism as a dimension of personality.* London: Hodder and Stroughton.

Eysenck, H. J. (1992). Four ways five-factors are not basic. *Personality and Individual Differences, 12,* 773-790.

Feist, J., & Feist, G. J. (2009). *Theories of Personality (7th ed.).* New York: McGraw-Hill.

Ferketich, S. (1991). Focus on psychometrics: Aspects of item analysis. *Research in Nursing and Health*, *14*, 165-168.

Filak, V. F., & Sheldon, K. M. (2008). Teacher support, student motivation, student need satisfaction, and college teacher course evaluations: Testing a sequential path model. *Educational Psychology, 28*(6), 711-724.

Finn, J. D. (1989). Withdrawing from school. *Review of Educational Research, 59,* 117-142.

Finn, J. D. (1993). *School engagement and students at risk* (NCES Report 93 – 470). Washington, DC: U.S. Department of Education, National Center for Education Statistics.

Finn, J. D., Pannozzo, G. M., & Voelkl, K. E. (1995). Disruptive and inattentive-withdrawn behavior and achievement among fourth graders. *The Elementary School Journal, 95,* 421-434.

Finn, J. D., & Rock, D. A. (1997). Academic success among students at risk for school failure. *Journal of Applied Psychology, 82,* 221-234.

Finn, J. D., & Zimmer, K. S. (2012). Student engagement: What is it? Why does it matter? In S. L. Christenson, A. L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 97 – 131). New York: Springer.

Fiske, D. W. (1949). Consistency of the factorial structures of personality ratings from different sources. *Journal of Abnormal and Social Psychology, 44,* 329-344.

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research, 74,* 59-109.

Furnham, A., Eracleous, A., & Chamorro-Premuzic, T. (2009). Personality, motivation and job satisfaction: Hertzberg meets The Big Five. *Journal of Managerial Psychology, 24*(8) 765-779.

Furrer, C., & Skinner, E. (2003). Sense of relatedness as a factor in children's academic engagement and performance. *Journal of Educational Psychology, 95*(1), 148-162.

Gellatly, I. R. (1996). Conscientiousness and task performance: Test of a cognitive process model. *Journal of Applied Psychology, 69,* 69-78.

Gerbing, D. W., & Hamilton, J. G. (1996). Viability of exploratory factor analysis as a precursor to confirmatory factor analysis. *Structural Equation Modeling, 3*, 62-72.

George, D., & Mallery, P. (2003). *SPSS for Windows step by step*. New York: Allyn and Bacon.

Goldberg, L. R. (1971). A historical survey of personality scales and inventories. In P. McReynolds (Ed.), *Advances in psychological assessment* (Vol. 2, pp. 293-336). Palo Alto, CA: Science and Behavior Books.

Goldberg, L. R. (1981). Language and individual differences. The search for universals in personality lexicons. In L. Wheeler (Ed.), *Review of personality and social psychology* (Vol. 2, pp. 141-165). Beverly Hills: Sage.

Goldberg, L. R. (1990). An alternative "description of personality": The big-five-factor structure. *Journal of Personality and Social Psychology, 59,* 1216-1229.

Goldberg, L. R. (1992). The development of markers for the Big-Five factor structure. *Psychological Assessment, 4,* 26-42.

Goldberg, L.R. (2005). *International personality item pool.* Retrieved from <http://ipip.ori.org/ipip/>.

Goodenow, C. (1993a). Classroom belonging among early adolescent students: Relationships to motivation and achievement. *The Journal of Early Adolescence, 13*(1), 21-43.

Goodenow, C. (1993b). The psychological sense of school membership among adolescents: Scale development and educational correlates. *Psychology in the Schools, 30,* 79-90.

Goodenow, C., & Grady, K. E. (1993). The relationship of school belonging and friends' values to academic motivation among urban adolescent students. *The Journal of Experimental Education, 62,* 60-71.

Goodlad, J. I. (1984). *A place called school: Prospects for the future.* New York: McGraw-Hill.

Gottfried, M. A. (2009). Excused versus unexcused: How student absences in elementary school affect academic achievement. *Education Evaluation and Policy Analysis, 31,* 392-415.

Gow, A. J., Whiteman, M. C., Pattie, A., & Deary, I. J. (2005). Goldberg's Big-Five factor markers: Internal consistency and concurrent validation in Scotland. *Personality and Individual DiVerences, 39*, 317-330.

Graham, S., & Weiner, B. (1996). Theorie and principles of motivation. In D. C. Berliner & R. C. Calfee (Eds.), *Handbook of educational psychology* (pp. 63-84). New York: Simon and Schuster Macmillan.

Greene, B. A., Miller, R. B., Crowson, H. M., Duke, B. L., & Akey, K. L. (2004). Predicting high school students' cognitive engagement and achievement: Contributions of classroom perceptions and motivation. *Contemporary Educational Psychology, 29,* 462-482.

Greenwood, C. R., Horton, B. T., & Utley, C. A. (2002). Academic engagement: Current perspectives on research and practice. *School Psychology Review, 31*(3), 328-349.

Grolnick, W. S., & Ryan, R. M. (1987). Autonomy in children's learning: An experimental and individual difference investigation. *Journal of Personality and Social Psychology, 52*(5), 890-898.

Hakel, M. D. (1974). Normative personality factors recovered from ratings of personality descriptors: The beholder's eye. *Personnel Psychology, 27,* 409-421.

Harackiewicz, J., Barron, K., Carter, S., Lehto, A., & Elliot, A. (1997). Determinants and consequences of achievement goals in the college classroom. *Journal of Personality and Social Psychology, 73,* 1284-1295.

Harackiewicz, J., Barron, K., Tauer, J. M., & Elliot, A. J. (2002). Predicting success in college: A longitudinal study of achievement goals and ability measures as predictors of interest and performance from freshman year through graduation. *Journal of Educational Psychology, 94,* 562-575.

Hassan, G. (2008). Attitudes toward science among Australian tertiary and secondary school students. *Research in Science and Technological Education, 26*(2), 129-147.

Heaven, P. L. (1989). Attitudinal and personality correlates of achievement motivation among high school students. *Personality and Individual Differences, 11,* 705-710.

Harter, S. (1982). The perceived competence scale for children. *Child Development, 53,* 87-97.

Hidi, S., & Renninger, K. A. (2006). The four-phase model of interest development. *Educational Psychologist, 41*(2), 111-127.

Hilton, S. C., Schau, C., & Olsen, J. A. (2004). Survey of attitudes toward statistics: factor structure invariance by gender and by administration time. *Structural Equation Modeling: A Multidisciplinary Journal, 11*, 92-109.

Hinton, L., & Kern, L. (1999). Increasing homework completion by incorporating student interests. *Journal of Positive Behavior Intervention,1*(4), 231-241.

Huges, C. (1997). Mystifying through coalescence: The underlying politics of methodological choices. In K. Watson, C. Modgil, and S. Modgil (Eds.), *Educational dilemmas: Debate and diversity, quality in education* (pp. 413 – 420). London: Cassell.

Hogan. R. (1983). Socioanalytic theory of personality. In M.M. Page (Ed.), *1982 Nebraska Symposium on Motivation: Personality—current theory and research* (pp. 55-89). Lincoln: University of Nebraska Press.

Hogan. R. (1986). *Hogan Personality Inventory manual.* Minneapolis: National Computer Systems.

Hogan, R., & Roberts, B. W. (2001). Personality and I/O psychology. In B. W. Roberts & R. T. Hogan (Eds.), *Personality psychology in the workplace* (pp. 3-18). Washington, D. C.: American Psychological Association.

Howarth, E. (1976). Personality characteristics of volunteers. *Psychological Reports, 38,* 855-858.

Howse, R. B., Lange, G., Farran, D. C., & Boyles, C. D. (2003). Motivation and self-regulation as predictors of achievement in economically disadvantaged young children. *The Journal of Experimental Education, 71,* 151-174.

Jimerson, S. R., Campos, E., & Greif, J. L. (2003). Toward an understanding of definitions and measures of school engagement and related terms. *California School Psychologist,* 8, 7-27.

John. O. P. (1989a, November). Big Five prototypes for the adjective check list using observer data. In O. P. John (Chair). *The Big Five: Historical perspective and current research.* Symposium conducted at the annual meeting of the Society for Multivariate Experimental Psychology. Honolulu.

John, O. P. (1989b). Towards a taxonomy of personality descriptors. In D. M. Buss & N. Cantor (Eds.). *Personality psychology: Recent trends and emerging directions* (pp. 261-271). New York: Springer-Verlag.

John. O. P. (1990a). The "big five" factor taxonomy: Dimensions of personality in the natural language and in questionnaires. In L. Pervin (Ed.), *Handbook of personality theory and research* (pp. 66-100). New York: Guilford.

John, O. P., Donahue, E. M., & Kentle, R. L. (1991). *The Big Five inventory – Versions 4a and 54.* Berkeley, CA: University of California, Berkley, Institute of Personality and Social Research.

John, O. P., Hampson, S. E., & Goldberg, L. R. (1991). Is there a basic level of personality description? *Journal of Personality and Social Psychology, 60,* 348-361.

John, O. P., Naumann, L. P., & Soto, C. J. (2008). Paradigm shift to the integrative Big-Five trait taxonomy: History, measurement, and conceptual issues. In O. P. John, R. W. Robins, & L. A. Pervin (Eds.), *Handbook of personality: Theory and research* (pp. 114-158). New York, NY: Guilford Press.

John, O. P., & Srivastava, S. (1999). The Big Five trait taxonomy: History, measurement, and theoretical perspectives. In L. A. Pervin & O. P. John (Eds.), *Handbook of personality: Theory and research* (2nd ed., pp. 102-138). New York: Guildford Press.

Johnson, D. W., Johnson, R. & Anderson, A. (1983). Social interdependence and classroom climate. *Journal of Psychology, 114*(1), 135-142.

Jones, B. D. (2009). Motivating students to engage in learning: The MUSIC Model of Academic Motivation. *International Journal of Teaching and Learning in Higher Education, 21*(2), 272-285.

Jones, B. D. (2010). An examination of motivation model components in face-to-face and online instruction. *Electronic Journal of Research in Educational Psychology, 8*(3), 915-944.

Jones, B. D. (2012, August). *Factors that impact students' motivation, instructor ratings, and course ratings in an online course*. Research presented at the International Conference on Motivation 2012. Frankfurt, Germany.

Jones, B. D. (2015). *User guide for assessing the components of the MUSIC^{SM} Model of Motivation*. Retrieved from http://www.theMUSICmodel.com

Jones, B. D., & Skaggs, G. E. (in press). Measuring students' motivation: Validity evidence for the MUSIC Model of Academic Motivation Inventory. *International Journal for the Scholarship of Teaching and Learning*. Jones, B. D., & Wilkins, J. L. M. (2013). Testing the MUSIC Model of Academic Motivation through confirmatory factor analysis. *Educational Psychology: An International Journal of Experimental Psychology*. doi:10.1080/01443410.2013.785044.

Jöreskog, K. G. (1969). A general approach to confirmatory maximum likelihood factor analysis. *Psychometrika, 34,* 183-202.

Jöreskog, K. G., & Sörbom, D. (1993). *LISREL 8: Structural equation modeling with the SIMPLIS command language*. Hillsdale, NJ: Lawrence Erlbaum.

Judge T. A., Ilies, R. (2002). Relationship of personality to performance motivation: A meta-analytic review. *Journal of Applied Psychology, 87,* 797-807.

Juliebo, M., Malicky, G. V., & Norman, C. (1998). Metacognition of young readers in an early intervention programme. *Journal of Research in Reading, 21,* 24-35.

Kanfer, R. (1990). Motivation theory and industrial and organizational psychology. In M. D. Dunnette (Ed.), *Handbook of industrial and organizational psychology* (Vol. 1, 2nd ed., pp. 75-130). Palo Alto, CA: Consulting Psychologists Press.

Kanfer, R., Ackerman, P. L., & Heggestad, E. D. (1996). Motivational skills and self-regulation for learning: A trait perspective. *Learning and Individual Differences, 8,* 185-204.

Kaplan, A., & Maehr, M. L. (2007). The contributions and prospects of goal orientation theory. *Educational Psychology Review, 19,* 141-181.

Kazemian, L., & Farrington, D. (2005). Comparing the validity of prospective, retrospective, and official onset for different offending categories. *Journal of Quantitative Criminology, 21*(2), 127-147.

Klem, A. M., & Connell, J. P. (2004). Relationships matter: Linking teacher support to student engagement and achievement. *Journal of School Health, 74,* 262-273.

Kuhl, J., & Kraska, K. (1993). Self-regulation: Psychometric properties of a computer-aided instrument. *German Journal of Psychology, 17,* 11-24.

Komarraju, M., & Karau, S. J. (2005). The relationship between the Big Five personality traits and academic motivation. *Personality and Individual Differences, 39,* 557-567.

Komarraju, M., Karau, S. J., & Schmeck, R. R. (2009). Role of the Big Five personality traits in predicting college students' academic motivation and achievement. *Learning and Individual Differences, 19*(1), 47-52.

Köseoğlu, Y. (2014). Academic motivation and the big five. *Journal of Emerging Trends in Educational Research and Policy Studies, 5*(3), 344-351.

Krug, S. E., & Johns, E. F. (1986). A large-scale cross-validation of the second-order personality structure defined by the 16PF. *Psychological Reports, 59,* 683-693.

Lawler, E., Porter. L., & Vroom, V. (2009). Motivation and management: Vroom's expectancy theory. *Value Based Management Website.* Retrieved from: http://www.valuebasedmanagement.net/methods_vroom_expectancy_theory.html

Lei, H., & Skinner, H. A. (1982). What difference does language make? Structural analysis of the personality research form. *Multivariate Behavioral Research, 17,* 33-46.

Libbey, H. P. (2004). Measuring student relationships to school: Attachment, bonding, connectedness, and engagement. *Journal of School Health, 74,* 274-283.

Luckner, A. E., Englund, M. M., Coffey, T., & Nuno, A. A. (2006). Validation of a global measure of school engagement in early and middle adolescence. In M. M. Englund (Chair.), *Adolescent engagement in school: Issues of definition and measurement.* Symposium conducted at the biennial meeting of the Society for Research on Adolescence, San Francisco, CA.

Lorr, M., & Manning, T. T. (1978). Higher-order personality factors of the ISI. *Multivariate Behavioral Research, 13,* 3-7.

Markey, C. N., Markey, P. M., & Tinsley, B. J. (2003). Personality, puberty, and preadolescent girls' risky behaviors: Examining the predictive value of the Five-Factor Model of Personality. *Journal of Research in Personality, 37,* 405-419.

Marks, H. M. (2000). Student engagement in instructional activity: Patterns in the elementary, middle and high school years. *American Educational Research Journal, 37,* 153-184.

Marsh, H. W. (1990). A multidimensional, hierarchical self-concept: Theoretical and empirical justification. *Educational Psychology Review, 2,* 77-172.

Marsh, H. W., & Parker, J. (1984). Determinants of student self-concept: Is it better to be a relatively large fish in a small pond even if you don't learn to swim as well? *Journal of Personality and Social Psychology, 47,* 213-231.

Mathieu, J. E., Tannenbaum, S. I., & Salas, E. (1992). Influences of individual and situational characteristics on measures of training effectiveness. *Academy of Management Journal, 35,* 828-847.

McCrae, R. R., & Allik, J. (Eds.). (2002). *The five-factor model of personality across cultures.* New York: Kluwer Academic/Plenum Publishers.

McCrae, R. R., & Costa, P. T., Jr. (1983). Social desirability scales: More substance than style. *Journal of Consulting and Clinical Psychology, 51,* 882-888.

McCrae, R. R., & Costa, P. T., Jr. (1985a). Updating Norman's adequate taxonomy: Intelligence and personality dimensions in natural language and in questionnaires. *Journal of Personality and Social Psychology, 49,* 710-721.

McCrae, R. R., & Costa, P. T., Jr. (1985b). Openness to experience. In R. Hogan & W. H. Jones (Eds.), *Perspectives in personality* (Vol. 1, pp. 145-172). Greewich, CT: JAI Press.

McCrae, R. R., & Costa, P. T., Jr. (1985c). Comparisons of EPI and psychoticism scales with measures of the five-factor model of personality. *Personality and Individual Differences, 6,* 587-597.

McCrae R. R., & Costa, P.T., Jr. (1987). Validation of the five-factor model of personality across instruments and observers. *Journal of Personality & Social Psychology, 52,* 81-90.

McCrae, R. R., & Costa, P. T., Jr. (1989a). Reinterpreting the Myers-Briggs Type Indicator from the perspective of the five-factor model of personality. *Journal of Personality, 57,* 17-40.

McCrae, R. R., & Costa, P. T., Jr. (1989b). Rotation to maximize the construct validity of factors in the NEO Personality Inventory. *Multivariate Behavioral Research, 24,* 107-124.

McCrae. R. R., & Costa, P. T., Jr. (1989c). The structure of interpersonal traits: Wiggins's circumplex and the five-factor model. *Journal of Personality and Social Psychology, 56,* 586-595.

McCrae, R. R., & John, O. P. (1992). An introduction to the five-factor model and its applications. *Journal of Personality, 60,* 175-215.

McCrae, R. R., & Costa, P. T., Jr. (1996). Toward a new generation of personality theories: Theoretical contexts for the five-factor model. In J. S. Wiggins (Ed.), *The five-factor model of personality: Theoretical perspectives* (pp. 51-87). New York: Guilford.

McCrae, R.R., & Costa, P.T. (1997) Personality trait structure as a human universal. *American Psychologist, 52,* 509-516.

McCrae, R. R., & Costa, P. T., Jr. (2007) Brief versions of the NEO-PI-3. *Journal of Individual Differences, 28,* 116-128.

McDougall, W. (1932). Of the words character and personality. *Character Personality, 1,* 3-16.

McAdams, D. P. (1995). What do we know when we know a person? *Journal of Personality, 63,* 365-396.

Mervielde, I. (1992). The B5BBS-25: A Flemish set of bipolar markers for the ''Big-Five'' personality factors. *Psychologica Belgica, 32,* 195-210.

Midley, C., Kaplan, A., Middleton, M., Maehr, M. L., Urdan, T., Anderman, L. H., Anderman, E., & Roser, R. (1998). The development and validation of scales assessing students' achievement goal orientations. *Contemporary Educational Psychology, 23,* 113-131.

Mulaik, S. A., & Millsap, R. E. (2000) Doing the four-step right. *Structural Equation Modeling, 7,* 36-74.

Moen, R., & Doyle, K. O., Jr. (1977). Constmction and development of the academic motivations inventory (AMI). *Educational and Psychological Measurement. 37,* 509-512.

Multon, K. D., Brown, S. D., & Lent, R. W. (1991). Relation of self-efficacy beliefs to academic outcomes: A meta-analytic investigation. *Journal of Counseling Psychology, 18,* 30-38.

Murdock, T. B. (1999). The social context of risk: Status and motivational predictors of alienation in middle school. *Journal of Educational Psychology, 91*, 62-75.

Nachtigall, C., Kroehne, U., Funke, F., & Steyer, R. (2003). (Why) should we use SEM? Pros and cons of structural equation modeling. *Methods of psychological research online 8*(2), 1-22.

Newmann, F. M. (1981). Reducing student alienation in high schools: Implications of theory. *Harvard Educational Review, 51,* 546-564.

Newmann, F. M. (1992). *Student engagement and achievement in American secondary schools.* New York: Teachers College Press.

Newmann, F. M., Wehlage, G. G., & Lamborn, S. D. (1992). The significance and sources of student engagement. In F. M. Newmann (Ed.), *Student engagement and achievement in American secondary schools* (pp. 11-30). New York: Teachers College Press.

Newton, K. J. (2009). Instructional practices related to prospective elementary school teachers' motivation for fractions. *Journal of Mathematics Teacher Education, 12*(2), 89-109.

Nicholls, J. G. (1989). *The competitive ethos and democratic education.* Cambridge, MA: Harvard Univ. Press.

Nicholls, J. G., Patashnick, M., Chung Cheung, P., Thorkildsen, T. A., & Lauer, J. M. (1989). Can achievement motivation theory succeed with only one conception of success? In F. Halisch & J. H. L. Van den Bercken (Eds.), *International perspectives on achievement and task motivation* (pp. 187-208). Amsterdam: Swets en Zeitlinger.

Nicholls, J. G., Patashnick, M., & Nolen, S. B. (1985). Adolescents' theories of education. *Journal of Educational Psychology, 77,* 683-692.

Nolen, S. B. (1988). Reasons for studying: Motivational orientations and study strategies. *Cognition and Instruction, 5,* 269-287.

Noe, R. A. (1986). Trainee attributes and attitudes: Neglected influences on training effectiveness. *Academy of Management Review, 11,* 736-749.

Noe, R.A., & Schmitt, N. (1986). The influence of learner attitudes on training effectiveness: Test of a model. *Personnel Psychology, 39,* 497-523.

Noller, P., Law, H., & Comrey, A. L. (1987). Cattell, Comrey. and Eysenck personality factors compared: More evidence for the five robust factors? *Journal of Personality and Social Psychology, 53,* 775-782.

Norman, W. T. (1963). Toward an adequate taxonomy of personality attributes: Replicated factor structure in peer nomination personality ratings. *Journal of Abnormal and Social Psychology, 66,* 574-583.

O'Donnell, A. M., Reeve, J., & Smith, J. K. (2012). *Educational psychology: Reflection and action.* (3rd ed.). Hoboken, NJ: Wiley.

Ostendorf, F. (1990). *Language and personality structure: Toward the validation of the five-factor model of personality.* Regensburg, Germany: S. Roderer Verlag.

Osterman, K. F. (2000). Students' need for belonging in the school community. *Review of Educational Research, 70,* 323-367.

Pajares, F. (1996). Self–efficacy beliefs in academic settings. *Review of Educational Research, 66,* 543-578.

Pajares, F. (1997). Current directions in self-efficacy research. In M. Maehr & P. R. Pintrich (Eds.), *Advances in motivation and achievement* (Vol. 10, pp. 1-49).

Patrick, B., Skinner, E., & Connell, J. (1993). What motivates children's behavior and emotion? Joint effects of perceived control and autonomy in the academic domain. J*ournal of Personality and Social Psychology, 65,* 781-791.

Peabody, D., & Goldberg, L. R. (1989). Some determinants of factor structures from personality-trait descriptors. *Journal of Personality and Social Psychology, 57,* 552-567.

Payne, S. C., Youngcourt, S. S., & Beaubien, J. M. (2007). A meta-analytic examination of the goal orientation nomological net. *Journal of Applied Psychology, 92,* 128-150.

Peterson, P. L., Swing, S. R., Stark, K. D., & Waas, G. A. (1984). Students' cognitions and time on task during mathematics instruction. *American Educational Research Journal, 21,* 487-515.

Phan, H. P. (2009). Amalgamation of future time orientation, epistemological beliefs, achievement goals and study strategies: Empirical evidence established. *British Journal of Educational Psychology, 79*, 155-173.

Plant, R., & Ryan, R. M. (1985). Intrinsic motivation and the effects of self-consciousness, self-awareness and ego-involvement: An investigation of internally controlling styles. *Journal of Personality, 53,* 435-449.

Poropat, A. E. (2009). A meta-analysis of the five-factor model of personality and academic performance. *Psychological Bulletin, 135*(2), 322-338.

Quihuis, G., Bempechat, J., Jimenez, N., & Boulay, B. (2002). Implicit theories of intelligence across academic domains: A study of meaning making in adolescents of Mexican descent. *New Directions for Child and Adolescent Development, 96*, 87-100.

Rajiah, K., Coumaravelou, S., & Ying, O. W. (2014). Relationship of test anxiety, psychological distress, and academic motivation among first year undergraduate pharmacy students. *International Journal of Applied Psychology, 4*(2), 68-72.

Reeve, J. (2005). *Understanding motivation and emotion.* Hoboken, NJ: Wiley.

Reeve, J. (2009). *Understanding motivation and emotion* (5th ed.). Hoboken, NJ: Wiley.

Reschly, A. L., & Christenson, S. L. (2012). *Jingle, jangle, and conceptual haziness: Evolution and future directions of the engagement construct.* In S. L. Christenson, A. L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 3-19). New York: Springer.

Resnick, M. D., Bearman, P. S., Blum, R. W., Bauman, K. E., Harris, K. M., Jones, J., et al. (1997). Protecting adolescents from harm: Findings from the national longitudinal study on adolescent health. *Journal of the American Medical Association, 278,* 823-832.

Roberts, B. W., & Caspi, A. (2001). Personality development and the person-situation debate: It's deja vu all over again. *Psychological Inquiry*, *12*(2), 104-109.

Roby, D. E. (2004). Research on school attendance and student achievement: A study of Ohio schools. *Educational Research Quarterly, 28*(1), 3-14.

Rogers, C. R. (1961). *On becoming a person: A therapist's view of psychotherapy.* Boston: Houghton Mifflin.

Rokeach, M. (1960). *The open and closed mind.* New York: Basic Books.

Ross, S. R., Rausch, M. K., & Canada, K. E. (2003). Competition and cooperation in the five-factor model: Individual differences in achievement orientation. *Journal of Psychology, 137,* 323-337.

Rumberger, R. W., & Lim, S. A. (2008). *Why students drop out of school: A review of 25 years of research* (Project Report No. 15). Santa Barbara, CA: University of California, California Dropout Research Project.

Ryan, R. M., & Connell, J. P. (1989). Perceived locus of causality and internalization: Examining reasons for acting in two domains. *Journal of Personality and Social Psychology, 57,* 749-761.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*(1), 68-78.

Ryan, R. M., & Grolnick, W. S. (1986). Origins and pawns in the classroom: Self-report and projective assessment of individual differences in children's perceptions. *Journal of Personality and Social Psychology, 50,* 550-558.

Saucier, G. (1994). Mini-markers: A brief version of Goldberg's unipolar five markers. *Journal of Personality Assessment, 63*(3), 506-16.

Sax, L. J., Astin, A. W., Kom, W. S., & Mahoney, K. M. (1997). *The American freshman: National norms for fall 1997.* Los Angeles: University of California at Los Angeles.

Schau, C. (2003). *Students' attitudes: The "other" important outcome in statistics education.* Paper presented in the Joint Statistical Meetings, San Francisco, CA.

Schau, C., Dauphinee, T. L., Del Vecchio, A., & Stevens, J. (1999). *Survey of attitudes toward statistics (SATS).* Retrieved from <http://www.unm.edu/~cschau/downloadsats.pdf>.

Schau, C., Stevens, J., Dauphinee, T. L., & Del Vecchio, A. (1995). The development and validation of the survey of attitudes toward statistics. *Educational and Psychological Measurement, 55*, 868-875.

Schumacker, R. E., & Lomax, R. G. (2010) *A beginners guide to structural equation modeling* (3rd ed.). Hoboken: Taylor and Francis.

Schraw, G., & Lehman, S. (2001). Situational interest: A review of the literature and directions for future research. *Educational Psychology Review, 13*(1), 23-52.

Schunk, D. H. (2000). Coming to terms with motivation constructs. *Contemporary Educational Psychology, 25,* 116-119.

Schunk, D. H., & Pajares, F. (2005). Competence perceptions and academic functioning. In A. J. Elliot & C. S. Dweck (Eds.), *Handbook of competence and motivation* (pp. 141-163). New York: Guilford.

Schunk, D. H., & Pajares, F. (2009). Self-efficacy theory. In K. R. Wentzel & A. Wigfield (Eds.), *Handbook of motivation at school* (pp. 35-53). New York: Routledge.

Schunk, D. H., Pintrich, P. R., & Meece, J. L. (2008). *Motivation in education: Theory, research, and applications* (3rd ed.). Upper Saddle River, NJ: Pearson Education.

Schraw, G., & Lehman, S. (2001). Situational interest: A review of the literature and directions for future research. *Educational Psychology Review, 13*(1), 23-52.

Sedlak, M. W., Wheeler, C. W., Pullin, D. C., & Cusick, P. A. (1986). *Selling students short: Classroom bargains and academic reform in the American high school.* New York: Teachers College Press.

Shapira, Z. (1976). Expectancy determinants of intrinsically motivated behavior. *Journal of Personality and Social Psychology, 34,* 1235-1244.

Shiner, R. L. (1998). How shall we speak of children's personalities in middle childhood? A preliminary taxonomy. *Psychological Bulletin*, *124*(3), 308-332.

Shiner, R. L., & Caspi, A. (2003). Personality differences in childhood and adolescence: Measurement, development, and consequences. *Journal of Child Psychology and Psychiatry*, *44*(1), 2-32.

Shiner, R. L., Masten, A. S., & Roberts, J. M. (2003). Childhood personality foreshadows adult personality and life outcomes two decades later. *Journal of Personality*, *71,* 1145-1170.

Shiner, R. L., Tellegen, A., & Masten, A. (2001). Exploring personality across childhood into adulthood: Can one describe and predict a moving target? *Psychological Inquiry*, *12*(2), 96-101.

Simons, J., Vansteenkiste, M., Lens, W., & Lacante, M. (2004). Placing motivation and future time perspective theory in a temporal perspective. *Educational Psychology Review, 16*(2), 121-139.

Srivastava, S. (*2013*). *Measuring the Big Five Personality Factors.* Retrieved from http://psdlab.uoregon.edu/bigfive.html.

Srivatsava, S., John, O. P., Gosling, S. D., & Potter, J. (2003). Development of personality in early and middle adulthood: Set like plaster or persistent change? *Journal of Personality and Social Psychology, 84,* 1041-1053.

Skinner, E., Kindermann, T., Connell, J., & Wellborn, J. (2009). Engagement and disaffection as organizational constructs in the dynamics of motivational development. *In Handbook of motivation at school* (pp. 223-245). New York: Routledge/Taylor & Francis Group.

Skinner, E. A., & Pitzer, J. R. (2012). Developmental dynamics of student engagement, coping, and everyday resilience. In S. L. Christenson, A. L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 21-44). New York: Springer.

Slaats, A., Van der Sanden, J., & Lodewijks, J. (1997, March). *Relating personality characteristics and learning style factors to grades in vocational education.* Paper presented at the Annual Meeting of the American Educational Research Association, Chicago.

Smith, G. M. (1967). Usefulness of peer ratings of personality in educational research. *Educational Psychology Measures, 27,* 967-984.

Sorge, C., & Schau, C. (2002, April). *Impact of engineering students' attitudes on achievement in statistics.* Paper presented at the Annual Meeting of the American Educational Research Association, New Orleans, LA.

Stajkovic, A. D., & Luthans, F. (1988). Self-efficacy and work-related performance: A meta-analysis. *Psychological Bulletin, 124*(2), 240-261.

Steinberg, L. (1996). *Beyond the classroom: Why school reform has failed and what parents need to do.* New York: Simon and Schuster.

Steinberg, L., & Avenevoli, S. (1998). Disengagement from school and problem behavior in adolescence: A developmental-contextual analysis of the influences of family and part-time work. In R. Jessor (Ed.), *New perspectives in adolescent risk behavior* (pp. 392-424). New York: Cambridge University Press.

Steward, R. J., Steward, A. D., Blair, J., Hanik, J., & Hill, M. F. (2008). School attendance revisited: A study of urban African American students' grade point averages and coping strategies. *Urban Education, 43,* 518-536.

Swanberg, A. B., & Martinsen, O. L. (2010). Personality, approaches to learning and adjustment. *Educational Psychology, 30*(1), 75-88.

Tabachnick, S. E., Miller, R. B., & Telyea, G. E. (2008). The relationships among students' future-oriented goals and subgoals, perceived task instrumentality, and task-oriented self-regulation strategies in academic environment. *Journal of Educational Psychology, 100*(3), 629-642.

Tempelaar, D. T., Gijselaers, W. H., van der Loeff, S. S., & Nijhuis, J. F. H. (2007). A structural equation model analyzing the relationship of student achievement motivations and personality factors in a range of academic subject-matter areas. *Contemporary Educational Psychology, 32,* 105-131.

Tupes, E. C , & Christal, R. E. (1961). Recurrent personality factors based on trait ratings (USAF ASD Tech. Rep. No. 61-97). Lackland Air Force Base, TX: U.S. Air Force.

Tupes, E. C., & Christal, R. C. (1992). Recurrent personality factors based on trait ratings. *Journal of Personality, 60,* 225-251.

Vallerand, R. J., & Bissonnette, R. (1992). Intrinsic, extrinsic, and amotivational styles as predictors of behavior: A perspective study. Journal of Personality, 60, 599-620.

Van Calster, K., Lens, W., & Nuttin, J. R. (1987). Affective attitude towards the personal future: Impact on motivation in high school boys. *American Journal of Psychology, 100,* 1-13.

VandeWalle, D. (1997). Development and validation of a work domain goal orientation instrument. *Educational and Psychological Measurement, 57,* 995-1015.

Vermetten, Y. J., Lodewijks, H. G., & Vermunt, J. D. (2001). The role of personality traits and goal orientations in strategy use. *Contemporary Educational Psychology, 26,* 149-170.

Voelkl, K. E. (1997). Identification with school. *American Journal of Education, 105,* 294-318.

Walker, C. O., & Greene, B. A. (2009). The relations between student motivational beliefs and cognitive engagement in high school. *Journal of Educational Research, 102*(6), 463-472.

Watson, D., & Clark, L. A. (1984). Negative affectivity: The disposition to experience aversive emotional states. *Psychological Bulletin, 96,* 465-490.

Wehlage, G. G., Rutter, R. A., Smith, G. A., Lesko, N., & Fernandez, R. R. (1989). *Reducing the risk: Schools as communities of support.* Philadelphia: Falmer Press.

Wentzel, K. R. (1993). Does being good make the grade? Social behavior and academic competence in middle school. *Journal of Educational Psychology, 85,* 357-364.

White, R. (1959). Motivation reconsidered: The concept of competence. *Psychological Review, 66,* 297-333.

Wigfield, A., & Eccles, J. S. (1992). The development of achievement task values: A theoretical analysis. *Developmental Review, 12,* 265-310.

Wigfield, A., & Eccles, J. S. (2000). Expectancy-value theory of achievement motivation. *Contemporary Educational Psychology, 25,* 68-81.

Wigfield, A., Guthrie, J. T., Perencevich, K. C., Taboada, A., Klauda, S. L., McRae, A., et al. (2008). Role of reading engagement in mediating effects of reading comprehension instruction on reading outcomes. *Psychology in the Schools, 45,* 432-445.

Wiggins, J. S. (1979). A psychological taxonomy of trait-descriptive terms: The interpersonal domain. *Journal of Interpersonal and Social Psychology, 37,* 395-412.

Wiggins, J. S. (2003). *Paradigms of personality assessment*. New York: Guilford Press.

Williams, G. C., & Deci, E. L. (1996). Internalization of biopsychosocial values by medical students: A test of self-determination theory. *Journal of Personality and Social Psychology, 70*(4), 767-779.

Wrzus, C. & Mehl, M. R. (2015). Lab and/or field? Measuring personality processes and their social consequences. *European Journal of Personality, 29*(2), 250-271.

Zhang, L. (2003). Does The Big Five predict learning approaches? *Personality and Individual Differences, 34,* 1431-1446.

Zonderman, A. B., Stone. S. V., & Costa, P. T., Jr. (1989, August). *Age and neuroticism as risk factors for the incidence of diagnoses of psychotic and neurotic disorders.* Paper presented at the annual convention of the American Psychological Association, New Orleans.