THE RELATIONSHIP OF PERSONALITY TO ENTREPRENEURIAL PERFORMANCE: AN EXAMINATION OF OPENNESS TO EXPERIENCE FACETS

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Dedication

To Grandpa Smith

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Abstract

The role of personality has resurfaced in entrepreneurship research. The results surrounding the broad personality traits have varied. Although openness to experience has been found to generally have a positive relationship with entrepreneurial intentions and performance (e.g., Zhao, Seibert, & Lumpkin, 2010), conflicting and inconsistent results have emerged (e.g., Baron & Markman, 2004; Ciaverella, Buchholtz, Riordan, Gatewood, & Stokes, 2004). Therefore, an in-depth look at the facets of openness to experience may offer additional information.

The present investigation used a sample of founder/owners and examined the facets of openness to: fantasy, aesthetics, feelings, actions, ideas, and values. Specifically, it was hypothesized that openness to fantasy, aesthetics, and feelings were negatively related to entrepreneurial performance. Also, it was hypothesized that openness to actions, ideas, and values were positively related to entrepreneurial performance. Additionally, the grit construct (Duckworth, Peterson, Matthews, & Kelly, 2007) was explored as a possible moderator. Grit was hypothesized to improve each of the relationships between openness facets and entrepreneurial performance.

The hypotheses were tested using hierarchical multiple regression. Full support was only found for one hypothesis. One explanation could be that entrepreneurship is a process that goes through phases where each has a different set of activities and outcomes, and the effects of openness may change over the different phases of founding a new venture. Several results supported previous research findings. Contributions and future research ideas are discussed.

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CHAPTER I

Introduction

The role of personality in entrepreneurship is an area of research that has resurfaced in the last decade. During the 1980s, the personality approach was criticized, and the conclusion was that there was no consistent relationship between personality and entrepreneurship. However, recent research (e.g., Baum, Locke, & Smith, 2001; Shane, Locke, & Collins, 2003), including meta-analyses (e.g., Stewart & Roth, 2001, 2004, 2007), has shown that entrepreneurs differ from managers in terms of personality. To extend the understanding of personality in the entrepreneurial process, meta-analyses have started to examine the link between personality and both entrepreneurial intentions and entrepreneurial performance (Collins, Hanges, & Locke, 2004; Rauch & Frese, 2007; Zhao, Seibert, & Lumpkin, 2010). The aspects of personality that have been explored in relation to entrepreneurship include both general/broad traits, such as the Big Five, (e.g., Zhao, et al, 2010) and specific traits, such as need for achievement and risk propensity (e.g., Collins, et al, 2004; Stewart & Roth, 2001, 2004, 2007).

Entrepreneurship research exploring the implications of the entrepreneur's personality dates back several decades. However, most of the existing literature has focused on which personality traits affect an individual's intention to launch a new venture, or the differences between entrepreneurs and managers. Less research has addressed what personality variables contribute to and what variables hinder an entrepreneur's success (for exceptions see: Rauch & Frese, 2007; Zhao, et al, 2010). Additionally, the results surrounding the broad/general personality traits within the Five Factor Model have varied in previous research. Specifically, one dimension, 'Openness to Experience', has been the center of conflicting and inconsistent results (e.g., Ciaverella, Buchholtz, Riordan, Gatewood, & Stokes, 2004; Wooton &

Timmerman, 1999; Zhao, et al, 2010). Rauch & Frese (2007) found that general and broad traits were positively related to entrepreneurial success as a whole. However, when looking at each individual dimension separately, Baron and Markman (2004) found that openness to experience was negatively related to entrepreneurs' income, and they found no significant relationship with firm survival. However, it would be helpful to take a more detailed look at this dimension to help conclude whether or not there is a consistent relationship.

Openness to experience is a broad/general personality dimension that includes elements such as an active imagination, intellectual curiosity, and independence of judgment. Openness to experience is defined as the "proactive seeking and appreciation of experience for its own sake, and as toleration for and exploration of the unfamiliar" (Piedmont, 1998: 87). As a dimension within the Five Factor Model of personality, openness to experience has been investigated within the entrepreneurship context. Zhao and colleagues (2010) found that conscientiousness and openness to experience had the biggest effect on entrepreneurial intentions and entrepreneurial performance. However, openness to experience was previously found to be negatively related to firm survival (Ciaverella, et al, 2004). Ciaverella and colleagues suggested that perhaps openness to experience has more to do with starting business than survival. There may be a paradox in entrepreneurship, that what is needed to start a business is not always the same as what is required of individuals to continue to manage the firm. Therefore, the question remains, is openness to experience a positive or negative variable for the success of individuals who are entrepreneurs? Given the fact that it is unclear in the literature at this time, a more in-depth look at openness to experience may help us answer that question. Openness to experience has previously only been examined as a general construct. Nobody has looked at the facets of this dimension. It may be that the facets have additional information to offer, and that's what this

dissertation will attempt to determine. An in-depth look will be facilitated be examining the six facets that make up the openness to experience dimension. These facets include openness to: fantasy, aesthetics, feelings, actions, ideas, and values.

Research Objectives

Given the importance of small businesses to the economy (Small Business Administration, 2010), gaining a better understanding of entrepreneurs is of vital importance. A look at the variables surrounding small business performance is thus key. Firm performance is what allows an entrepreneur to remain in business. This starts with understanding as much as we can about the founder/owners of these businesses.

An entrepreneur is a person who has independent ownership, active management, or the expressed intention to start a new venture (Stewart & Roth, 2001). Said differently, an entrepreneur is an individual who recognizes and exploits new business opportunities by founding new ventures (Shane & Venkataraman, 2000).

A basic understanding of the individual entrepreneur starts with intelligence and personality (Rauch & Frese, 2007). Researchers prematurely concluded that the study of entrepreneurs' personal characteristics was a dead-end strategy (Gartner, 1988). However, as of late, research in these areas is resuming (Zhao, et al, 2010). This dissertation focuses on gaining a better understanding of the openness to experience domain within the performance of entrepreneurs.

It is important to understand the characteristics of entrepreneurs, and to ask how they influence the performance of small businesses. In the past, narrative reviews found there was no consistent relationship between personality and entrepreneurship outcomes (Brockhaus &

Horwitz, 1986; Gartner, 1988). However, it has been pointed out that the findings in the earlier literature may be due to weak theory and research artifacts (Rauch & Frese, 2007; Shane, Locke, & Collins, 2003). Recently, the use of meta-analysis has been able to bring greater clarity to the field. Rauch and Frese (2007) showed that personality traits related significantly to entrepreneurial performance.

Additionally, the results from Zhao and colleagues (2010) indicate that conscientiousness, openness to experience, emotional stability (neuroticism), extraversion, and risk propensity are each positively related to intentions to become an entrepreneur. They also found that conscientiousness, openness to experience, emotional stability, and extraversion are each positively related to entrepreneurial performance. When considering openness to experience, this is in contrast to the lack of significant findings with firm survival and negative findings with entrepreneurs' income (Baron & Markman, 2004) and negative findings with firm survival (Ciaverella, et al, 2004).

Openness to experience will be the focus of this dissertation because the common elements that run through definitions of entrepreneurship are creativity and innovation. Among the Big Five personality factors, creativity is uniquely related to openness to experience (McCrae, 1987). Also, entrepreneurs have to detect and exploit opportunities, they have to make decisions under uncertainty and in environments with scarce resources, they have to work harder than employees, and they have to have a wide variety of knowledge, skills, and abilities (e.g., leadership, management, marketing, innovating) (Sarasvathy, 2001; Shane, 2003). Open individuals are willing to entertain novel ideas, and are more likely to tolerate and explore the unfamiliar; thus, would seem better suited to perform well in entrepreneurial ventures. During

the critical entrepreneurial task of opportunity recognition, success is likely to be related to creativity, imagination, and openness to new ideas (Ciaveralla, et al, 2004; Morrison, 1997).

In order to recognize and harness an idea, entrepreneurs must not only have a creative imagination but must also have a high degree of perseverance (Beattie, 1999). This brings us to the grit construct, which will be examined in this dissertation as a moderator. Grit is perseverance and passion for long-term goals (Duckworth, Peterson, Mathews, & Kelly, 2007). This implies that an individual continues with what s/he starts. But in the context of the current study, while entrepreneurs exhibit a continued commitment to their firm, they maintain their level of openness to new sources of information, ideas, and resources. The entrepreneur's level of grit may influence the firm performance outcomes.

Firm performance underlies the individual's ability to continue as an entrepreneur. Firm performance is a multifaceted construct that no single indicator can fully capture (Brush & Wanderwerf, 1992). Therefore firm performance in this dissertation will be examined with composite indicators, using cash flow, market share, growth in sales, growth in employees, and growth in employees.

To address the main objectives of this dissertation, two research questions are posed:

1) Do different facets of an entrepreneur's openness to experience differentially predict entrepreneurial performance?

2) Do differences in entrepreneur's grit moderate the relationship between openness to experience facets and entrepreneurial performance?

Contributions

Research on entrepreneurial personality has examined both broad/general traits and specific traits. One of the most frequently used broad trait taxonomies is the Big Five model. Taxonomies such as this have been studied in organizational behavior. Meta-analyses have indicated positive relationships with employee job performance. In entrepreneurship research, broad taxonomies have been studied less frequently and with varying degrees of success.

This dissertation attempts to conceptually and empirically link openness to experience facets to entrepreneurial performance outcomes. Additionally, this research seeks to examine the construct of grit as a potential moderator of the relationship between entrepreneurial personality and entrepreneurial performance. The research has the potential to advance the entrepreneurship field's understanding of a dimension within a less frequently studied broad taxonomy, the Five Factor Model of personality, by getting an in-depth look at which openness to experience facets are driving the relationship. Further, this dissertation will extend the theoretical domain of a relatively new noncognitive trait: grit, and assess it empirically in entrepreneurial settings.

Do different facets of an entrepreneur's openness to experience differentially predict firm performance? Individual facets may be related to the entrepreneur's vision for the new venture, or may lead to the types of services and products offered, and some facets may have less to do with entrepreneurship than others (Zhao, et al, 2010). Perhaps openness to feelings helps the entrepreneur develop responsiveness to customers' needs. Could openness to action be the driving force behind entrepreneurs trying new business activities, perhaps even prematurely? Also, the argument here will be that openness to ideas may help entrepreneurs continuously search for new problems to solve. Does openness to aesthetics influence the type of business an

entrepreneur enters? These are the issues and questions that may underlie the relationship between openness facets and entrepreneurial outcomes.

According to Rauch and Frese (2007a), the high variation in the correlations between personality traits and entrepreneurship reported in the literature is an indication for the presence of moderator effects. The authors noted that "the function of moderator effects on the relationship between entrepreneur's personality and business success has been rarely studied…" (Rauch & Frese, 2007a: 58). Thus, as mentioned above, this dissertation will add to the literature by measuring entrepreneurial performance and exploring a possible moderator (grit).

Of great importance in entrepreneurship research is to extend the understanding of personality in the entrepreneurial process. Entrepreneurial firm performance underlies the individual's ability to continue as an entrepreneur. Therefore, this dissertation will study entrepreneurial performance to contribute to a better understanding of the link between personality and entrepreneurial performance. The goal within the literature should be to promote greater entrepreneurial success, and thus lead to fewer wasted financial and personal resources.

This study will make a novel contribution to the field because there have been conflicting results to date concerning openness to experience in entrepreneurship research. The question remains, are the results due to the validity of the openness construct in question? Or is it that facet-level constructs within the general openness to experience construct are actually differentially driving the outcomes of existing literature?

The current study will therefore examine data at the level of facets, as opposed to the broader domain level, to determine which particular facets are accounting for the positive results in some previous research; whereas different facets may be accounting for the negative outcomes in other previous research.

Definition of Key Terms

To facilitate the development of the theoretical arguments presented in this study, terms and definitions are provided. Although the focus will be openness to experience, all five dimensions of the Five Factor Model will be defined to provide clarity. Additionally, as the facets of openness to experience are the primary focus, definitions of all six facets will be vital moving forward. Also of importance, the definitions of grit and creativity will facilitate an understanding of future chapters. As a first step, personality will be defined.

Personality

Personality is all the consistent ways in which the behavior of one person differs from that of others. Personality traits are dispositions to display a certain kind of response across various situations (Caprana & Cervone, 2000). They are inclinations or propensities to act (McCrae & Costa, 1990). The Big Five (or Five Factor Model, FFM) personality dimensions consist of Extraversion, Neuroticism (or Emotional Stability), Agreeableness, Conscientiousness, and Openness to Experience. Looking at an individual's standing on each of the five factors, a comprehensive sketch is provided that summarizes his or her experiential, emotional, attitudinal, and motivational styles. One of the most widely used measures of the five factors was published by Costa & McCrae (1992); this is the revised NEO Personality Inventory (NEO PI-R). The most common personality framework is the five factor model.

Five Factor Model

The first domain of personality scales compares emotional stability with neuroticism. "The general tendency to experience negative affects such as fear, sadness, embarrassment, anger, guilt, and disgust is the core of the neuroticism domain" (Costa & McCrae, 1992: 14). Men and women high on neuroticism are also prone to have irrational ideas, to be less able to control their impulses, and to cope more poorly than others with stress.

The second domain is extraversion. In addition to liking people and preferring large groups and gatherings, extraverts are also talkative, assertive, and active. They like excitement and stimulation and tend to be cheerful in disposition. They are generally energetic, upbeat, and optimistic. Salespeople represent the prototypic extraverts (Costa, McCrae, & Holland, 1984).

According to Costa & McCrae (1992) the elements of openness to experience include: active imagination, aesthetic sensitivity, attentiveness to inner feelings, preference for variety, intellectual curiosity, and independence of judgment. "Open individuals are curious about both inner and outer worlds, and their lives are experientially richer. They are willing to entertain novel ideas and unconventional values, and they experience both positive and negative emotions more keenly than do closed individuals" (Costa & McCrae, 1992: 15).

Agreeableness is primarily a dimension of interpersonal tendencies. The agreeable person is fundamentally altruistic. According to Costa & McCrae "he or she is sympathetic to others and eager to help them, and believes that others will be equally helpful in return" (1992: 15). By contrast, the disagreeable person is skeptical of others' intentions and competitive rather than cooperative (Costa & McCrae, 1992).

The conscientious individual is purposeful, strong-willed, and determined. "On the positive side, high conscientiousness is associated with academic and occupational achievement;

on the negative side, it may lead to annoying fastidiousness, compulsive neatness, or workaholic behavior" (Costa & McCrae, 1992: 16).

The FFM of personality constructs work such that they are five broad constructs, but they have facet-level information that provides more specific information about an individual's personality (Barrick & Mount, 1991). Before examining any of the facets, a deeper look at the fifth factor, openness to experience is in order.

Openness to experience is defined as the "proactive seeking and appreciation of experience for its own sake, and as toleration for and exploration of the unfamiliar" (Piedmont, 1998: 87). This domain contrasts curious, original, untraditional, and creative individuals with those who are conventional, unartistic, and unanalytical (McCrae & Costa, 1985; McCrae, 1990, 1993, 1994).

Someone high on openness can be described as creative, innovative, untraditional, reflective, and imaginative. Someone low on openness can be characterized as conventional, unanalytical, and narrow in interests. Openness is positively correlated with intelligence, especially those aspects of intelligence that are related to creativity (such as divergent thinking) (McCrae, 1987). There is also a motivational aspect to openness to experience. Open people are characterized by an active pursuit of novelty, and a quest to "clarify, intensify, or otherwise enlarge their experience" (Canaday, 1980, p. 5) (McCrae, 1994; McCrae & Costa, 1987; Costa & McCrae, 1980). Now let us turn to the definitions of the openness to experience facets.

Openness to Experience Facets

The focus of the current dissertation will be the six facets of openness to experience within the NEO PI-R measure. Since there are six facets that make up the overall domain, using

the global dimension in entrepreneurship research may be missing a lot of data. Those facets include: fantasy, aesthetics, feelings, actions, ideas, and values.

The first facet is openness to fantasy. Costa and McCrae noted that, "individuals who are open to fantasy have a vivid imagination and an active fantasy life. They elaborate and develop their fantasies and believe that imagination contributes to a rich and creative life" (1992:17). Individuals who score low on this facet prefer to keep their minds on the task at hand and are described as practical (Costa & McCrae, 1978, 1992; McCrae, 1990; McCrae & Costa, 1997; Piedmont, 1998).

The second facet is openness to aesthetics. According to Costa and McCrae, "high scorers on the aesthetics [facet] have a deep appreciation for art and beauty. They are moved by poetry, absorbed by music, and intrigued by art. They need not have artist talent, nor even necessarily what most people would consider good taste, but for many of them, interest in the arts will lead them to develop a wider knowledge and appreciation than the average individual" (1992: 17). Low scorers are seen as being uninterested in art and beauty (Costa & McCrae, 1978, 1992; McCrae, 1990; McCrae & Costa, 1997; Piedmont, 1998).

The third facet is openness to feelings. "Openness to feelings implies receptivity to one's own inner feelings and emotions and the evaluation of emotion as an important part of life" (Costa & McCrae, 1992: 17). High scorers are described as emotionally responsive, empathic, and values own feelings. Low scorers on this facet are described as having a narrow range of emotions and being insensitive to surroundings (Costa & McCrae, 1978, 1992; McCrae, 1990; McCrae & Costa, 1997; Piedmont, 1998).

The fourth facet is openness to actions. "Openness is seen behaviorally in the willingness to try different activities, go new places, or eat unusual foods. High scorers on the actions facet

prefer novelty and variety to familiarity and routine. Over time, they may engage in a series of different hobbies" (Costa & McCrae, 1992: 17). Low scorers are seen as being set in their ways and preferring the familiar (Costa & McCrae, 1978, 1992; McCrae, 1990; McCrae & Costa, 1997; Piedmont, 1998).

The fifth facet is openness to ideas. According to Costa and McCrae, "intellectual curiosity is an aspect of openness that has long been recognized. Openness to ideas is seen not only in an active pursuit of intellectual interests for their own sake, but also in open-mindedness and a willingness to consider new, perhaps unconventional ideas" (1992: 17). Low scorers on this facet are seen as having limited curiosity and, if they are highly intelligent, generally focus their resources on limited topics (Costa & McCrae, 1978, 1992; McCrae, 1990; McCrae & Costa, 1997; Piedmont, 1998).

The sixth and final facet is openness to values. "Openness to values means the readiness to reexamine social, political, and religious values. High scorers on this facet are seen as tolerant, broad-minded, nonconforming, and open-minded" (Costa & McCrae, 1992: 17). Closed individuals tend to be conservative, accept authority, and honor tradition (Costa & McCrae, 1978, 1992; McCrae, 1990; McCrae & Costa, 1997; Piedmont, 1998).

Next a definition of creativity is presented to facilitate future discussion. Creativity is important within the context of entrepreneurship because creativity has been found to be significantly related to opportunity recognition (Hills, Shrader, & Lumpkin, 1999).

Creativity

Creativity is the ability to produce work that is both original and useful (Lubart, 1994; Ochse, 1990; Sternberg, 1988; Sternberg & Lubart, 1991, 1995, 1996). Creativity is a topic that

is important at both individual and societal levels. At an individual level, creativity is relevant for solving problems on the job and in daily life. At a societal level, creativity can lead to new inventions, new scientific findings, new movements in art, and new social programs. The economic importance of creativity is evident because new products and services create jobs. Furthermore, individuals, organizations, and societies must adapt existing resources to changing task demands to remain competitive (Sternberg & Lubart, 1999). And finally a definition of grit will provide needed clarity regarding the moderator being examined in this dissertation.

Grit

Grit, as defined by Duckworth, Peterson, Matthews, and Kelly (2007: 1087), is "perseverance and passion for long-term goals." Further, as described by Duckworth and colleagues (2007) grit entails working hard toward challenges, and maintaining interest and effort over years even in the face of adversity or failure. The authors noted that the gritty individual looks at achievement as a marathon, and they use their stamina as an advantage. The gritty individual maintains his or her course, even when boredom or disappointment may lead others to cut their losses or change their direction. Put another way, the gritty individual not only finishes the tasks in front of them but also takes aim at tasks set out over years. Individuals high on grit strive for extremely long-term goals, even without positive feedback (Duckworth, et al, 2007; Duckworth & Quinn, 2009).

Outline of Subsequent Chapters

This dissertation is organized into five chapters. Chapter II contains a review of the literature pertaining to the variables in the theoretical framework of entrepreneurial personality.

Also in Chapter II, specific research hypotheses are developed. Chapter III includes an explanation of the measures, sample, and statistical methodologies used in this study. Chapter IV includes the results of data analysis. Chapter V is a discussion of implications, limitations, and recommendations.

CHAPTER II

Literature Review

In the study of organizations, the CEO is often the focus. In the recent IBM Global CEO Study of CEOs all around the world, based on the complexity of the new economic environment, CEOs cited creativity as the most important leadership quality over the next five years (Capitalizing on Complexity, 2010). Creativity is the basis for innovation and reinvention. New threats and emerging opportunities require an ability to act despite some uncertainty. CEOs are learning to respond swiftly with new ideas to address changing environments. According to the study, CEOs must be able to test, tweak, and redesign their core activities continually. CEOs are embarking on a significant shift. By committing to creativity, they understand the need to challenge their most basic assumptions, and re-conceive what it takes to be successful (Capitalizing on Complexity, 2010).

Additionally, everyone who studies organizations should be interested in entrepreneurship. After all, the majority of organizations start as small businesses. We can't ignore the individual entrepreneur when studying small businesses. In the case of small businesses, the entrepreneur (founder/owner) tends to have a direct influence on every aspect of the business. Therefore, what the entrepreneur thinks and wants tends to have an effect on organizational outcomes.

If relationships between personality traits and business performance are found in studies, then theories of entrepreneurship need to take the impact of personality into account. And models of entrepreneurship must consider personality factors when predicting entrepreneurial performance, just as they pay attention to industry and environmental conditions.

This chapter opens with background information on personality, and the emergence of the Five Factor Model (FFM) of personality. Following that overview, historical background information specifically addressing the openness to experience dimension will be presented. Additionally, literature focused on the facets of openness to experience will be covered. Also, a brief overview of creativity will be presented. Next, the literature concerning the grit construct will be presented. Then the focus of the chapter will turn to an examination of existing research discussing entrepreneurial personality and associated outcomes, with specific attention paid to performance. At this point, a short review of multidimensional entrepreneurial performance will be presented. Finally, the chapter will conclude with the development of hypotheses.

Developing a better understanding of entrepreneurial processes and the variables that attract people to entrepreneurship and that promote success in an entrepreneurial role is vital to today's economy. As mentioned earlier, the Big Five personality traits have been studied as predictors of entrepreneurial performance. Relationships have been found between performance and: extraversion, conscientiousness, emotional stability, and openness to experience (Collins, et al, 2004; Rauch & Frese, 2007; Zhao, et al, 2010). However, further research is needed about openness to experience, as the results have been mixed. Before we get to the specifics of openness to experience, the starting point is an explanation of the broad stokes of personality.

Personality

For years now, the Five Factor Model (FFM) of personality has dominated the literature (John, Naumann, & Soto, 2008). The reason for this is that it provides a framework for organizing personality variables (Digman, 1990). As an indication of its popularity, the most

frequently cited article of the 1990s was Barrick and Mount's (1991) meta-analysis of the Big Five personality dimensions and job performance.

When Barrick and Mount (1991) started their review of the literature, they found that thousands of personality traits had been studied or could be studied. Thus they tried to find a way to reduce these traits into a smaller number of factors. The work of Digman (1990) showed that personality researchers were beginning to converge on five basic factors of personality. The five factors were obtained across different theoretical frameworks, in different cultures, with different instruments, and in different languages. So Barrick and Mount (1991) explored the predictive validity of the five factors for performance criteria in different occupational groups. They found that conscientiousness correlated positively with job performance across occupations, and extraversion was a valid predictor for managers and sales. They also found that extraversion and openness to experience were valid predictors of training proficiency across occupations.

Five Factor Model of Personality

The FFM of personality is a representation of a structure of traits that was developed and built upon over more than four decades (Digman, 1990). According to Costa and McCrae "the five factors represent the most basic dimensions underlying the traits identified in both natural languages and psychological questionnaires" (1992: 14).

One way that the Five Factor Model was developed was through the lexical approach (John, Angleitner, & Ostendorf, 1988). In this line of research, trait adjectives from English and other languages were analyzed. Words like original, nervous, energetic, careful, and accommodating evolved over the course of centuries so that individuals could describe

themselves and others. Thousands of words like this are found in the dictionary, and trait theorists such as Cattell (1946) and Norman (1963) proposed that this list of terms could be considered an exhaustive lists of personality traits. The lexical approach is based on the assumption that "…all aspects of human personality which are or have been of importance, interest, or utility have already become recorded in the substance of language" (Cattell, 1943: 483). They argued that by factor analyzing ratings on this entire set of adjectives one should uncover the structure of personality traits. Through a series of studies, this research led to the identification of five factors (John, 1990).

Looking at an individual's standing on each of the five factors, a comprehensive sketch is provided that summarizes his or her experiential, emotional, attitudinal, and motivational styles. As previously mentioned, the revised NEO Personality Inventory is one measure of the FFM. NEO PI-R domain scales and factors measure personality at this level, whereas facets offer a more fine-grained analysis by measuring specific traits within each of the five domains. The NEO Personality Inventory is the most extensively validated measure of the FFM (Costa & McCrae, 1992).

Openness to Experience

As a dimension of personality, openness to experience is much less well known than neuroticism or extraversion. According to Costa & McCrae "the elements of openness (active imagination, aesthetic sensitivity, attentiveness to inner feelings, preference for variety, intellectual curiosity, and independence of judgment) have often played a role in theories and measures of personality, but their coherence into a single broad domain has seldom been

recognized" (1992: 15). The NEO PI-R Openness scale is perhaps the most widely researched measure of this broad domain (McCrae & Costa, 1985, 1997).

Alternative formulations of the five-factor model sometimes label this factor Intellect. And in fact openness scores are moderately associated with both education and measured intelligence. Openness is especially related to certain aspects of intelligence, such as divergent thinking, that contribute to creativity (McCrae, 1987). However, openness is not equivalent to intelligence. As Costa and McCrae (1992) pointed out, some intelligent people are closed to experience, and some open people are quite limited in intellectual capacity.

According to Costa & McCrae (1992), men and women who score low on openness tend to be conventional in behavior and conservative in outlook. They prefer the familiar to the novel, and their emotional responses are somewhat muted. "Open individuals are unconventional, willing to question authority, and prepared to entertain new ethical, social, and political ideas" (Costa & McCrae, 1992: 15).

The five major factors of personality were developed from two lines of research. The lines of research include the lexical tradition (natural language trait adjectives define the personality) and the questionnaire tradition (scales are developed to measure constructs suggested by personality theories). Across adjectives and scales, there were five recurrent factors. However, the fifth factor has been the center of some debate. The lexical tradition describes the fifth factor as Intellect, but the questionnaire tradition refers to this factor as openness to experience. According to McCrae (1994), openness to experience is a broader construct that can be used across cultural and geographical boundaries, and thus functions as a universal dimension of personality structure. The construct of Intellect overlaps with measured intelligence, conscientiousness, and openness to experience. At the same time, Intellect does not

encompass the full range of attributes that are related to the fifth factor (McCrae, 1994). Therefore, the argument is that the openness construct is more appropriate.

Openness to experience is a personality dimension that characterizes someone who is intellectually curious and tends to seek new experiences and explore novel ideas (Costa & McCrae, 1992). Openness is empirically distinct from mental ability but is correlated with aspects of intelligence related to creativity, such as divergent thinking (McCrae, 1987).

According to Costa & McCrae "individuals who score high on openness to experience are described as imaginative, original, unconventional, and independent" (1992: 15). Previous literature demonstrates that openness to experience is positively related to creativity and divergent thinking (McCrae, 1987). Looking at the literature on organizational creativity shows that the profile of a creative individual is someone who places value on aesthetic qualities in experience, has broad interests, is attracted to complexity, and displays independence of judgment and autonomy (Woodman, Sawyer, & Griffin, 1993). Since these terms have been used to describe individuals high on openness to experience (Costa & McCrae, 1992), the link between openness and creativity seems apparent. Creativity will be discussed at greater length shortly.

According to McCrae & Costa (1985) openness to experience is a major dimension of personality. However, it is a broad dimension of personality that has caused debate in the literature. Openness has been confused with conscientiousness, intelligence, and extraversion, just to name a few. The interpretation of openness as it stands today comes from reinterpreting the culture factor from the research of Norman (1963). Subsequently, they developed an Experience Inventory (Costa & McCrae, 1978) based on the work of Coan (1974). The facets within the openness dimension (fantasy, aesthetics, feelings, actions, ideas, and values) were first

measured with the Experience Inventory. The Experience Inventory was later refined and then combined with scales to measure neuroticism and extraversion, thus forming the NEO Inventory (Neuroticism-Extraversion-Openness) (Costa & McCrae, 1992).

According to McCrae (1987) creativity is related to openness to experience. Cognitive studies of creativity have focused on divergent thinking abilities (Guilford, 1967). In research conducted by McCrae (1987), divergent thinking was consistently found to be associated with openness to experience; however, divergent thinking was not associated with neuroticism (emotional stability), extraversion, agreeableness, or conscientiousness. These findings lend support to the notion that creativity may be uniquely related to openness to experience. The appreciation of novelty may be facilitated by the ability to think creatively.

Creativity

According to Costa, McCrae, & Holland (1984) vocational interests are strongly related to personality, particularly to extraversion and openness. Open individuals, for example, are more likely to choose artistic and investigative careers. Open individuals are more likely to express interest in a wide variety of occupations, including those that closed people prefer. Also, they may be indecisive because they like to entertain a range of possibilities (Holland & Nichols, 1964); and they are more likely to change careers at some point during midlife (McCrae & Costa, 1985).

Creativity is the ability to produce work that is both original and useful (Lubart, 1994; Ochse, 1990; Sternberg, 1988; Sternberg & Lubart, 1991, 1995, 1996). Creativity is a topic that is important at both individual and societal levels. At an individual level, creativity is relevant for solving problems on the job and in daily life. At a societal level, creativity can lead to new

inventions, new scientific findings, new movements in art, and new social programs. The economic importance of creativity is evident because new products and services create jobs. Furthermore, individuals, organizations, and societies must adapt existing resources to changing task demands to remain competitive (Sternberg & Lubart, 1999).

Researchers such as MacKinnon (1965), Barron (1968, 1969), Eysenck (1993), Gough (1979), and Amabile (1983) have noted that certain personality traits often characterize creative people. A large set of potentially relevant traits has been identified (Barron & Harrington, 1981). These traits include independence of judgment, self-confidence, attraction to complexity, aesthetic orientation, and risk taking.

Wehner, Csikszentmihalyi, and Magyari-Beck (1991) looked at doctoral dissertations on creativity. There were relevant dissertations from psychology, education, business, history, sociology, and political science. But, the different fields tended to use different terms and to focus on different aspects of what seemed to be the same basic phenomenon. For example, business dissertations used the term innovation and tended to look at the organizational level, whereas psychological dissertations used the term creativity and looked at the level of the individual.

Numerous research investigations (e.g., Lubart, 1994 and Sternberg & Lubart, 1991, 1995) have supported the importance of certain personality attributes for creative functioning. These attributes include, but are not limited to, self-efficacy and a willingness to overcome obstacles, take sensible risks, and tolerate ambiguity. Creative people typically have to defy the crowd, so one has to be willing to stand up to conventions if one wants to think and act in creative ways.

It has been argued that the defining characteristic of the entrepreneur is his or her emphasis on innovation (Schumpeter, 1942, 1976). Literature has also pointed out a strong desire of entrepreneurs is to be creative and to create something bigger than themselves (Engle, Mah, & Sadri, 1997). Founding a new venture is likely to require the entrepreneur to explore new or novel ideas, use his or her creativity to solve novel problems, and take an innovative approach to products, business methods, or strategies (Zhao & Seibert, 2006). Self-employment is a nontraditional mode of employment that is itself more likely to appeal to individuals who are willing to experiment with a new or unconventional lifestyle (Zhao, et al, 2010).

Creativity and the ability to discover innovative ways of protecting the firm from competition may be important factors in the performance of the venture. Entrepreneurs must be ready for changing markets, products, and technology in today's global business environment to survive. The uncertainty of the environment requires intelligence and curiosity to gain new knowledge of technological advances, and innovative thinking to develop new strategies to tap into new sources of revenue.

During the critical entrepreneurial task of opportunity recognition, success is likely to be related to creativity, imagination, and openness to new ideas (Ciavarella, et al, 2004; Morrison, 1997). Entrepreneurs are also likely to rely on their creativity to solve day-to-day problems and develop firm strategies using the limited resources at their disposal (Baron, 2007; Zhao & Seibert, 2006). Successful entrepreneurship is also likely to require constant information monitoring and learning to keep up with changing tastes and market trends.

Openness has been found to have a strong effect for entrepreneurs but has shown only weak and nonsignificant effects as a predictor of the job performance of traditionally employed managers (Barrick, Mount, & Judge, 2001; Hurtz & Donovan, 2000). Looking at these results it

appears the major personality construct distinguishing high performance in a managerial role from high performance in an entrepreneurial role may be openness to experience.

The Facet Scales

As mentioned earlier, each of the five domains of the NEO PI-R is made up of six, more specific scales that measure facets of the domain. According to Costa & McCrae (1992), there are several advantages to the strategy of assessing a variety of facets. By looking at multiple facets, it increases the likelihood that the items used to measure the domain will cover as wide a range of relevant actions, thoughts, and feelings as possible.

An important advantage to the multifaceted approach to the measurement of the five factors comes from the fact that meaningful individual differences can be seen within domains. Openness to fantasy, aesthetics, feelings, actions, ideas, and values covary to form the domain of openness, and individuals high on one facet are likely to be high on others. But this is only a statement of probability. Some people may be open to feelings but not aesthetics, or to new ideas but not values (Costa & McCrae, 1992).

The examination of facet scales can provide a more detailed analysis of individuals and groups. This can be particularly illuminating when the overall domain score is in the average range. For example, an individual who has an average score on one of the Big Five domains, including a low score on one facets but a very high score on a given second facet will react quite differently from an individual with an equal domain score but with a high score on the first facet and a low score on the second (Costa & McCrae, 1992).

Additionally, the detailed information available from considering facet scores can be useful in interpreting constructs and formulating theories. Since the openness to experience factor is the focus of the current study, let us look at those specific facets in greater detail.

Openness Facets

As noted earlier, "openness to experience is defined as the proactive seeking and appreciation of experience for its own sake, and as toleration for and exploration of the unfamiliar" (Costa & McCrae, 1992: 17). This domain contrasts original, curious, untraditional, and creative individuals with those who are conventional, unanalytical, and unartistic. Of all the domains, this one is the most controversial. In terms of its representativeness in the language, it has the fewest number of descriptors. Nonetheless, openness continues to show value (McCrae & Costa, 1985; McCrae, 1990, 1993, 1994).

The first facet is openness to fantasy. Reviewing the literature that has examined the openness to experience facets, one will find that the openness to fantasy facet has been linked to various outcomes from gpa to depression to political ideology (e.g., Carrillo et al, 2001; O'Connor & Paunonen, 2007; Van Hiel et al, 2000). Openness to fantasy has been found to be negatively correlated to gpa (O'Connor & Paunonen, 2007). Additionally, it is positively correlated with depression (Carrillo et al, 2001). Also, fantasy is negatively correlated with right-wing political ideology (Van Hiel et al, 2000) and conservative ideology (Van Hiel & Mervielde, 2004). These authors also found that 'boundaries in the mind' was negatively correlated with fantasy (Van Hiel & Mervielde, 2004). Another study found that openness to fantasy was positively correlated with importance of spirituality (Saroglou & Munoz-Garcia, 2008).

Other outcomes associated with openness to fantasy include a positive link to lucid dreaming frequency (Schredl & Erlacher, 2004) and successful aging (memory and everyday functioning) (Gregory et al, 2010). In another previous study, openness to fantasy was one of five facet scales used to predict various outcomes, such as: humanities courses (Paunonen & Ashton, 2001). Openness to fantasy has previously been positively correlated to assessment center ratings of the competency dimension 'openness' (Furnham et al, 2008). And finally, fantasy is positively correlated with creative interests (Griffin & McDermott, 1998).

The second facet is openness to aesthetics. Reviewing the literature that has examined the openness to experience facets, one will find that the openness to aesthetics facet has been linked to various outcomes from political ideology to creative activities and interests (Griffin & McDermott, 1998; Van Hiel & Mervielde, 2004). Openness to aesthetics has been found to be negatively correlated to gpa (O'Connor & Paunonen, 2007). Also, aesthetics is negatively correlated with right-wing authoritarianism (Butler, 2000) and conservative ideology (Van Hiel & Mervielde, 2004). These authors also found that boundaries in the mind was negatively correlated with openness to aesthetics (Van Hiel & Mervielde, 2004), as is conservative attitudes (Butler, 2000). Another study found that openness to aesthetics was positively correlated with importance of spirituality (Saroglou & Munoz-Garcia, 2008).

Openness to aesthetics was one of five facet scales used to predict various outcomes, such as: general knowledge, humanities courses, and social science courses (Paunonen & Ashton, 2001). Also, assessment center ratings of the competency dimension 'openness' has been positively correlated with aesthetics (Furnham, et al, 2008). And finally, aesthetics is positively correlated with creative activities and creative interests (Griffin & McDermott, 1998).

The third facet is openness to feelings. Reviewing the literature that has examined the openness to experience facets, one will find that the openness to feelings facet has been linked to various outcomes from social interests to authoritarianism to life satisfaction (Armstrong & Anthoney, 2009; Butler, 2000; Stephan, 2009). Openness to feelings has been found to be negatively correlated with right-wing authoritarianism (Butler, 2000) and conservative ideology (Van Hiel & Mervielde, 2004). These authors also found that 'boundaries in the mind' was negatively correlated with openness to feelings (Van Hiel & Mervielde, 2004). Another study found that openness to feelings was positively correlated with importance of spirituality (Saroglou & Munoz-Garcia, 2008).

Additionally, feelings is positively correlated with social interests (Armstrong & Anthoney, 2009). Also, older adults' life satisfaction has been positively correlated with openness to feelings (Stephan, 2009). Openness to feelings was one of five facet scales used to predict various outcomes, such as: humanities courses and social science courses (Paunonen & Ashton, 2001). Also, assessment center ratings of the competency dimension 'openness' has been correlated with feelings (Furnham et al, 2008). And finally, feelings is positively correlated with creative activities and creative interests (Griffin & McDermott, 1998).

The fourth facet is openness to actions. Reviewing the literature that has examined the openness to experience facets, one will find that the openness to actions facet has been linked to various outcomes from job dedication to religious measures (e.g., Denis, et al, 2010; Saroglou & Munoz-Garcia, 2008). Openness to actions has been found to be negatively correlated with depression (Carrillo et al, 2001). Also, actions is negatively correlated with right-wing political ideology (Van Hiel et al, 2000) and conservative ideology (Van Hiel & Mervielde, 2004). Additionally, openness to actions is negatively correlated with right-wing authoritarianism

(Butler, 2000). Another study found that openness to actions was negatively correlated with religious measures in general (Saroglou & Munoz-Garcia, 2008).

Other outcomes associated with openness to actions include a negative link to job dedication (contextual job performance) (Denis, et al, 2010). In another previous study, openness to actions was one of five facet scales used to predict various outcomes, such as: general knowledge and dating variety (Paunonen & Ashton, 2001). Openness to actions has previously been positively correlated to assessment center ratings of the competency dimension 'openness' (Furnham et al, 2008). And finally, actions is positively correlated with creative activities and interests (Griffin & McDermott, 1998).

The fifth facet is openness to ideas. Costa & McCrae (1992) noted that openness to ideas doesn't imply high intelligence, but can contribute to the potential. Reviewing the literature that has examined the openness to experience facets, one will find that the openness to ideas facet has been linked to various outcomes from scientific and creative interests to academic success to reactive rebelliousness (e.g., Armstrong & Anthoney, 2009; Griffin & McDermott, 1998; O'Connor & Paunonen, 2007). Openness to ideas has been found to be negatively correlated with reactive rebelliousness (Griffin & McDermott, 1998). Additionally, openness to ideas is positively correlated with forgiveness likelihood Brose, et al, 2005). Also, ideas is negatively correlated with right-wing political ideology (Van Hiel et al, 2000) and conservative ideology (Van Hiel & Mervielde, 2004). Additionally, openness to ideas is negatively correlated with right-wing authoritarianism (Akrami & Ekehamar, 2006; Butler, 2000).

Other outcomes associated with openness to ideas include a positive link to lucid dreaming frequency (Schredl & Erlacher, 2004) and successful aging (memory and everyday functioning) (Gregory et al, 2010). Also, older adults' life satisfaction is positively correlated

with ideas (Stephan, 2009). In another previous study, openness to ideas was one of five facet scales used to predict various outcomes, such as: gpa, numerical ability, general knowledge, humanities courses, and social science courses (Paunonen & Ashton, 2001). Openness to ideas has previously been positively correlated to assessment center ratings of the competency dimension 'openness' (Furnham et al, 2008). Additionally, ideas is positively correlated with academic success (O'Connor & Paunonen, 2007). And finally, openness to ideas is positively correlated with creative activities and interests (Griffin & McDermott, 1998), as well as scientific and creative interests (Armstrong & Anthoney, 2009).

The sixth and final facet is openness to values. Reviewing the literature that has examined the openness to experience facets, one will find that the openness to values facet has been linked to various outcomes from creative activities to interpersonal facilitation to successful aging (e.g., Denis, et al, 2010; Gregory, et al, 2010; Griffin & McDermott, 1998). Openness to values has been found to be positively correlated with importance of spirituality (Saroglou & Munoz-Garcia, 2008). Additionally, openness to values is negatively correlated with conservative attitudes (Butler, 2000). Also, values is negatively correlated with right-wing political ideology (Van Hiel et al, 2000) and conservative ideology (Van Hiel & Mervielde, 2004). Additionally, openness to values is negatively correlated with right-wing authoritarianism (Akrami & Ekehamar, 2006; Butler, 2000). And values is negatively correlated with social dominance orientation (Akrami & Ekehamar, 2006).

Other outcomes associated with openness to values include a positive link to interpersonal facilitation (contextual job performance) (Denis, et al, 2010). Also, successful aging (memory and everyday functioning) is positively correlated with values (Gregory et al, 2010). In another previous study, openness to values was one of five facet scales used to predict

various outcomes, such as: religiosity, numerical ability, general knowledge, humanities courses, social science courses, and dating variety (Paunonen & Ashton, 2001). Openness to values has previously been positively correlated to assessment center ratings of the competency dimension 'openness' (Furnham et al, 2008). And finally, values is positively correlated with creative activities (Griffin & McDermott, 1998).

In this dissertation, the relationship between entrepreneurs' openness facets and entrepreneurial performance will be explored. However, as mentioned earlier, these relationships may be moderated by grit. Next, let us further examine the grit construct.

Grit

As discussed in Chapter I, grit is defined by Duckworth and colleagues (2007: 1087) as "perseverance and passion for long-term goals." Duckworth and colleagues (2007) set out to determine what individual differences (other than intelligence) predict success. They found that grit demonstrated incremental predictive validity in success outcomes, above and beyond IQ. In a series of studies, the authors found that grit accounted for variance in educational attainment, grade point average, military academy retention, and spelling bee ranking. Their findings suggest that the achievement of difficult goals goes beyond talent, and includes the "sustained and focused application of talent over time" (Duckworth, et al, 2007: 1087).

The question the authors sought to answer was "why do some individuals accomplish more than others of equal intelligence?" (Duckworth, et al, 2007: 1087). In developing their measure of grit, Duckworth and colleagues (2007) wanted it to have face validity for adolescents and adults pursing goals across a variety of situations. As noted above, they were able to explain significant incremental variance in success outcomes with their measure. Additionally,

Duckworth and Quinn (2009) developed and validated a Short Grit Scale. The short version of the measure was associated with educational attainment and fewer career changes among adults (Duckworth & Quinn, 2009).

Due to the relatively short length of time since the grit scale was published, there is little additional research that has made use of the measure to date. Several additional studies have cited the work done by Duckworth and colleagues (e.g., Chamorro-Premuzic & Furnham, 2009; Komarraju, Karau, & Schmeck, 2009; Matthews, 2008; Simonton, 2009), but little application of the scale beyond the original authors has been found. In the following sections the literature on outcomes associated with entrepreneurial personality are reviewed.

Entrepreneurial Personality and Associated Outcomes

Entrepreneurs have to detect and exploit opportunities, they have to make decisions under uncertainty and in environments with scarce resources, they have to work harder than employees, and they have to have a wide variety of knowledge, skills, and abilities (e.g., leadership, management, marketing, innovating) (Sarasvathy, 2001; Shane, 2003).

In the past, narrative reviews found there was no consistent relationship between personality and entrepreneurship (Brockhaus & Horwitz, 1986; Gartner, 1988). However, it has been pointed out that the findings in the earlier literature may be due to weak theory and research artifacts (Rauch & Frese, 2007; Shane, Locke, & Collins, 2003). Recently, the use of meta-analysis has been able to bring greater clarity to the field. Additionally, Rauch & Frese (2007) showed that general and broad personality traits related significantly to entrepreneurial performance.

The method of meta-analysis has changed our conceptualization of many variables in research, and that includes personality. Narrative reviews are particularly susceptible to biases in the topic area of the research. Also, narrative reviews place equal weight on studies; however, this is not always fitting as individual studies can have problems with sample, power, and reliability (Rauch & Frese, 2007). A large number of different traits of entrepreneurs were studied in the 1970s and 1980s. This seemed to signal that there was no theoretical consensus. Because of conflicting and inconsistent evidence, the personality approach was heavily criticized by Gartner (1988) and many others. The technique of meta-analysis can be used in this situation to correct for artifacts. Meta-analyses have helped reveal clear and important relationships that were easy to overlook in narrative reviews. It has become obvious that multiple determinants work together to predict performance.

However, studies have found that personality factors can be more predictive of venture survival than start-up experience, age and gender of the entrepreneur, or the industry (Ciavarella et al, 2004). These findings are important for potential entrepreneurs who are evaluating their likelihood of success, people who provide counseling to prospective entrepreneurs, and those who fund entrepreneurial new ventures. Recently, the literature on entrepreneurship has made great strides to define essential parameters or roles of entrepreneurs.

Successful entrepreneurial performance appears to be promoted by a disposition toward new or unconventional ideas, values, and actions. Openness to experience is the personality dimension most closely associated with creativity and performance in learning situations (Barrick & Mount, 1991).

Personality theories point to the importance of personal predispositions for venture performance (McClelland, 1965), and venture capitalists have reported that entrepreneurial

characteristics are important for venture performance (MacMillan, Siegel, & SuhbaNarisimha, 1985). The characteristics of entrepreneurs that have been studied as predictors of performance include: risk propensity, tenacity, tolerance of ambiguity, need for achievement, internal locus of control, and the Big Five personality traits (e.g., Collins, et al, 2004; Stewart & Roth, 2001, 2004, 2007; Zhao, et al, 2010). It has been said that traits of entrepreneurs have an effect on new venture performance through constructs such as growth goals, vision communication, motivation, and strategic choice.

One theoretical issue in the personality literature relates to the impact of the situation. Personality traits can affect behavior only if the situational constraints allow their expression (Mischel, 1968). Typically, weak situations that are characterized by high autonomy, little and ambiguous information, and low structure allow the expression of individual differences (Hattrupp & Jackson, 1996). When comparing the work of employees whose organizational settings are usually strongly influenced by guidelines, rules, and reward structures (Davis-Blake & Pfeffer, 1989), there would appear to be more room to function for entrepreneurs. Entrepreneurs usually determine business strategy, rules, decisions, and reward structures. This suggests that entrepreneurs act within weak situations because they work in situations of low structure, high autonomy, and they have to make decisions based on ambiguous and uncertain information. Thus, personality traits should be related to business creation and performance.

Brockhaus & Horwitz (1986) reviewed psychological influences on the individual, effects of previous experience, and personal characteristics of entrepreneurs. In their narrative review they discussed need for achievement, locus of control, risk-taking propensity, innovativeness, and values. Based on the research they examined, they came to the conclusion that few psychological characteristics differentiate the entrepreneur from managers. Their

review noted that this is the case when looking at the intention to become an entrepreneur or when looking at entrepreneurial success. However, it is important to note that they stated "…a well-defined entrepreneurial population does not exist and research findings are often difficult to compare" (Brockhaus & Horwitz, 1986: 26). The authors concluded by noting the possibility that the psychological instruments to find significant relationships in entrepreneurship may not have been present at the time.

Low and MacMillan (1988) also reviewed the entrepreneurship literature. They looked at design dimensions. Up front the authors noted that entrepreneurship cuts across various disciplines, and thus has been plagued by differing definitions of entrepreneurship. The definitions at the time did not capture the whole picture of entrepreneurship. Thus, without enough common ground in the existing literature, it is difficult to combine the findings. The lack of common definitions at the time undoubtedly hurt the progress of research in the area. Low and MacMillan (1988) also discussed early entrepreneurship studies that focused on the personality background of the individual. The authors pointed out that the definitional and methodological problems (e.g., noncomparable samples) make interpretation of the results difficult.

As just stated, when Gartner (1988) and others proposed that the study of personality in entrepreneurship research be discontinued, they did so based on narrative reviews of the literature. However, more recently, meta-analysis approaches have argued that it is often difficult to detect small but important relationships with a narrative review (Hunter & Schmidt, 2004). It has often been the case that small relationships are often hard to detect, because they may be hidden by nonsignificant findings (which may be the result of lack of power). Also, the unreliability of measures may lead to small attenuated correlations (whereas meta-analyses

usually correct for reliability issues). It has been pointed out that this can lead to a more negative view of the results than is appropriate (Hunter & Schmidt, 1996; Tett, Jackson, & Rothstein, 1991).

Additionally, since Gartner's (1988) work was published, there have been advances in personality research and measurement. Most notably, the work of Digman (1990), Barrick & Mount (1991), and Costa & McCrae (1992) have brought the framework and measurement of broad personality traits a long way since Gartner called for research in this area to end.

Additionally, Aldrich (1999) argued that research on personality traits seemed to have reached an empirical dead end because the correlations between personality traits and entrepreneurial behavior were too small to matter. As noted earlier, previous research concurred with this verdict (Brockhaus & Horwitz, 1986; Gartner, 1988; Low & MacMillan, 1988); however, all of these conclusions were based on narrative reviews. Meta-analyses such as Rauch & Frese (2007) show a different picture of the relationships between personality traits and entrepreneurial behavior. They found that entrepreneurs' personality traits were positively related to business creation and business success. While the size of the relationships can only be considered moderate (Cohen, 1977), they are about the same as the correlations between personality and performance in general (Barrick & Mount, 1991) and the correlation between personality traits and both leadership emergence and leadership effectiveness (Judge, Bono, Ilies, & Gerhardt, 2002). Therefore, entrepreneurship research needs to take personality as seriously as research on employees' personality has done.

Rauch and Frese (2000) stated that the field of entrepreneurship is indeed a challenging area for academic research. The authors addressed the call of Gartner (1988) to stop looking at personality variables in entrepreneurship research. They found in their review that there are

differences between entrepreneurs and managers, and that there is a positive relationship between personality traits and success. The authors noted that Gartner's (1988) position and the trait theory do not actually contradict each other. Gartner recommended studying a very specific level of entrepreneurial behavior, whereas personality traits represent broad classes of behavior. Rauch and Frese pointed out that advances in personality research had occurred since Gartner's paper.

Zhao & Seibert (2006) used the FFM of personality to sort the personality variables that had been used in previous research into the five factors of the Big Five model. They then used meta-analytical techniques to look at the relationship between personality and entrepreneurial status. They felt it was time to reexamine this area that narrative reviews in the 1980s had decided was dead (e.g., Brockhaus & Horwitz, 1986; Gartner, 1988). Literature on person-environment fit suggests that individuals prefer jobs that match their personalities (Kristof, 1996). Thus, Zhao & Seibert (2006) examined differences in personality between entrepreneurs and managers. The authors found significant differences between entrepreneurs and managers on the dimensions of agreeableness, neuroticism (emotional stability), conscientiousness, and openness to experience (however no difference was found for extraversion).

Other meta-analyses studied the two specific personality traits, risk taking and achievement motive, which are related to the domain of entrepreneurship. For example, entrepreneurs risk losing their investments in contrast to managers; thus, they should be high in risk taking. Stewart and Roth (2001, 2004) found small and significant differences in risk propensity between entrepreneurs and managers. Need for achievement is another trait that has been related to economic outcomes and business performance (McClelland, 1961). Another recent meta-analysis addressed need for achievement of entrepreneurs. A moderate difference

between entrepreneurs and nonentrepreneurs was found (Collins, et al, 2004). Need for achievement was also positively related to success (Collins, et al, 2004).

Rauch and Frese (2007) built on the prior work, and extended it because the previous meta-analyses had primarily studied only differences between entrepreneurs and managers. They noted that entrepreneurship theory needs to know not only how entrepreneurs' personality is different from nonentrepreneurs but also whether or not personality traits are related to business success (Rauch & Frese, 2007).

It may be useful to compare Rauch & Frese's (2007) results with the study by Zhao and Seibert (2006), as their study replicates the findings on Zhao and Seibert on business creation and extends them by including business success. Similar to Zhao and Seibert, Rauch and Frese also found that personality is related to business creation.

Rauch and Frese (2007) found similar results concerning need for achievement and risk taking as those found in previous meta-analyses on those two traits of entrepreneurs (Collins, et al, 2004; Stewart & Roth, 2001, 2004a, 2004b). Rauch and Frese also found additional traits that are important predictors of entrepreneurial behavior, including: innovativeness, proactive personality, generalized self-efficacy, stress tolerance, need for autonomy, and internal locus of control were related to entrepreneurial behavior.

While previous meta-analyses focused only on differences between entrepreneurs and nonentrepreneurs (with the exception of Collins, et al, 2004), Rauch and Frese (2007) tested whether or not traits are differentially related to different types of entrepreneurial behaviors: business creation and business success. Some authors argued that personality traits affect the decision to start an enterprise more strongly than subsequent business success, because the impact of the individual business owner decreases with increasing size of the enterprise (Begley

& Boyd, 1987; Frese, van Gelderen, & Ombach, 2000). While this may be the case, the results from Rauch and Frese's study, as well as the meta-analysis by Collins and colleagues (2004), challenged this proposition. Traits were valid predictors of both business creation and business success in the same way.

Beyond examining differences between entrepreneurs and managers, Ciaverella and colleagues (2004) looked at the relationship between the entrepreneur's personality and long-term venture survival. The authors found that conscientiousness was positively related to venture survival. Additionally, they found that openness to experience was negatively related to long-term venture survival. Agreeableness, extraversion, and emotional stability were unrelated to venture survival. The negative relationship found for openness was contrary to their hypotheses. The explanations offered for these results include the notion that individuals high on openness may not be able to shift from a creative mindset to a managerial mindset as the firm matures. Also, individuals high on openness may explore too many opportunities, instead of concentrating on one most fitting for success. And finally, later stages of venture development may not offer the challenge and outlet for creativity that is present during the startup phase. Their results require re-examination, and looking at facet level information may help clarify the relationship.

Zhao and colleagues (2010) conducted a meta-analysis to look at the relationship of personality to the entrepreneurial process. Specifically, they looked at the stages of entrepreneurial intentions and entrepreneurial performance. The authors used the framework of the FFM to synthesize previous results. This is the first study to use the framework of the FFM to look at the full set of results from studies on personality and entrepreneurial intentions and

performance. In addition to the Big Five, they also included the personality trait of risk propensity.

The results from Zhao and colleagues (2010) indicate that conscientiousness, openness to experience, emotional stability (neuroticism), extraversion, and risk propensity are each positively related to intentions to become an entrepreneur. They also found that conscientiousness, openness to experience, emotional stability, and extraversion are each positively related to entrepreneurial performance. The largest effect size was found for openness. From their findings, openness to experience and conscientiousness appear to be the personality constructs most strongly and consistently associated with entrepreneurial intentions and entrepreneurial performance. However, given that inconsistent results have been found with regards to openness across meta-analyses, this current study will explore facet-level data in an attempt to determine which facets are driving the results.

Firm Performance

Measuring the performance of new ventures is important because improvement in performance is crucial to the firms' growth and survival. Measuring performance in entrepreneurial firms can be problematic. The availability of traditional firm performance data can be an issue. The lack of historical data and problems with accessibility are faced. However, Brush and Vanderwerf (1992) found evidence of the reliability of founder-reported performance measures. In this investigation, Brush and Vanderwerf gathered information on annual sales, number of employees, return on sales, growth in sales, and growth in employees. The authors used both objective and subjective measures. In their review of past research, they found that most studies used multiple objective measures.

It has also been pointed out by Lumpkin & Dess (1996) that it is important to recognize the multidimensional nature of the firm performance construct. The reasoning here is that entrepreneurial activity may lead to positive outcomes in one performance dimension, and at the same time, negative outcomes in another performance dimension. Big investments may set a firm up for sales growth in the long-term, but the commitment of those resources will surely hurt short-term profitability. Lumpkin & Dess (1996) note that research considering only a single indicator or narrow range of performance, may result in misleading results. The authors also observed that factors such as nonfinancial goals and overall satisfaction may need to be considered.

Firm performance in entrepreneurial firms is frequently tested with growth as the indicator. Work in this area has drawn from that done by Baum, Locke, and Kirkpatrick (1998). To explore venture growth, Baum and colleagues gathered data on average annual sales growth, average annual employment growth, and average annual profit growth (Baum, et al, 1998; Baum, et al, 2001). Data were gathered using a questionnaire. Then the authors checked the reliability of a random sample of entrepreneur responses, comparing the raw performance data with Dun and Bradstreet, Inc. reports. They found that the correlations were high and significant.

As previously mentioned, firm performance has also been evaluated based on entrepreneurs' perceived success, by comparing their businesses' performance to their competitors' performance. This has been done in previous research using a scale developed by Chandler and Hanks (1994). In this scale, the authors gather data on cash flow, market share, sales growth, sales, earnings, and net worth of the company. Self-reported data offer greater opportunities for testing multiple dimensions of performance (Rauch, et al, 2009).

The empirical literature reports a high diversity of performance indicators. In addition to what has been mentioned above, firm performance has been explored as a multidimensional construct in past research based on the work of Venkatraman and Ramanujam (1986). The authors discussed different conceptualizations of business performance in strategy research. Venkatraman and Ramanujam (1986) noted that a narrow conception of business performance uses simple outcome-based financial indicators. This financial performance is assumed to represent the economic goals of the firm. The authors pointed out that this approach can examine sales growth, profitability, and/or earnings per share. However, a broader conceptualization of business performance includes indicators of operational performance in addition to financial performance (Venkatraman & Ramanujam, 1986). These nonfinancial measures include market share, new product introduction, manufacturing value added, product quality, and marketing effectiveness. According to the authors, including operational performance helps move beyond the "black box" approach that characterizes the use of only financial indicators, and moves toward the key factors that might lead to financial performance (Venkatraman & Ramanujam, 1986).

Hypothesis Development

Personality relates to the odds of becoming an entrepreneur (Rauch & Frese, 2007; Zhao & Seibert, 2006). Further, person-job fit theory says that people remain in jobs that fit their personalities (Kristof, 1996). Entrepreneurship seems to be more appropriate for people who are open to experience as this allows them to explore new ideas and innovative practices (Zhao & Siebert, 2006). Thus, individuals higher on the openness to experience scale should perform better as entrepreneurs. However, as noted earlier, this has not been the finding in some previous

research. Based on the meta-analysis by Zhao and colleagues (2010), an individual's personality is linked to opportunity search, discovery, and exploitation. Therefore, the issue to be addressed is what facets of openness are related to the ability to discover and create opportunities, and in turn foster better entrepreneurial performance.

Griffin & Hesketh (2004) suggested that the six openness facets can be grouped into two categories: openness to external experience and openness to internal experience. The facets of fantasy, feelings, and aesthetics are labeled as internal, and the facets of actions, ideas, and values are labeled as external. A high score on the external facets would appear to be related to entrepreneurs who proactively seek external experience, scan the environment, and are more aware of and responsive to the environment (Griffin & Hesketh, 2004). A high score on the internal facets would seem to be related to entrepreneurs who are preoccupied with personal emotions and thoughts, and focus their attention inward. Thus, they may be less aware of changes in the environment, and a lack of awareness may result in missed opportunities (Griffin & Hesketh, 2004).

Based on this distinction, it would seem that entrepreneurs high on openness to external experience would have higher performing firms. Conversely, the performance of firms lead by more internally focused entrepreneurs would be lower. Hypotheses are presented in Table 1.

Table 1. Hypothesized Relationships: Main

Number	Hypothesis
H1:	Openness to fantasy is negatively related to entrepreneurial performance.
H2:	Openness to aesthetics is negatively related to entrepreneurial performance.
H3:	Openness to feelings is negatively related to entrepreneurial performance.
H4:	Openness to actions is positively related to entrepreneurial performance.
H5:	Openness to ideas is positively related to entrepreneurial performance.
H6:	Openness to values is positively related to entrepreneurial performance.

CEO psychology literature contends that the personalities of top managers play an important role in determining their field of vision, their perception of select information, and how they interpret the information (Hiller & Hambrick, 2005). These information processing steps determine the options that are evaluated and selected (Hiller & Hambrick, 2005).

Psychological attributes determine how CEOs search for information, what they scan, and how they learn from internal and external sources (Miller & Toulouse, 1986). This complements the assertion that an entrepreneur's personality is linked to opportunity search, discovery, and exploitation (Zhao, et al, 2010). However, research on top managers suggests that they only perceive a small fraction of the stimuli in their field of vision (Starbuck & Milliken, 1988).

Individuals high on openness to fantasy enjoy a vivid imagination and develop detailed fantasies. Openness to fantasy pertains to individuals daydreaming rather than focusing on current affairs (Costa & McCrae, 1978, 1992; McCrae, 1990; McCrae & Costa, 1997; Piedmont, 1998). Individuals who score high score on openness to fantasy lack the awareness of the environment (Griffin & Hesketh, 2004). External threats and opportunities require entrepreneurs to act despite uncertainty. Entrepreneurs who are unaware of the changing environment will not be able to respond as quickly.

Opportunity identification has been said to have three parts: recognition, development, and evaluation (Ardichvili, Cardozo, & Ray, 2003). Entrepreneurs who are open to fantasy may be less likely to recognize opportunities. Within that framework just mentioned, opportunity recognition includes perception, discovery, and creation (Ardichvili, et al, 2003). Specifically, entrepreneurs who are open to fantasy may be less likely to create a fit between external needs and resources. Entrepreneurs who are open to fantasy may be less aware of ways to redirect

resources to provide customer value. This may be because entrepreneurs open to fantasy do not have a heighten state of alertness to external information (Ardichvili, et al, 2003).

According to Lumpkin (2005), opportunity recognition can be viewed using a creativity-based model. This involves two phases, namely discovery and formation. Within this framework the author offers the stages, including: preparation, incubation, insight, evaluation, and elaboration. An important feature of this model is that it is not limited to a single experience, but rather has a recursive nature. This parallels the activities that entrepreneurs engage in with emerging business concepts. Entrepreneurs who are open to fantasy may be less likely to experience the moment of recognition, labeled as insight. Using the framework of Dyer, Gregersen, and Christensen (2008) (discovery consisting of questioning, observing, and experimenting), entrepreneurs who are open to fantasy may be less likely to observe or pay attention to everyday experiences and the world around them to find new ideas. They are then also less likely to suddenly come up with the answer or solution that comes from a cognitive shift as a result of awareness (Lumpkin, 2005).

It is possible that elaborate fantasies help the entrepreneur develop the initial vision for a new venture. However, if the openness to fantasy remains unchecked, it may prove to be a distraction to the firm's performance. Spending time dreaming up products may help in the long run, but it may hurt short term effectiveness at the same time. Individuals daydream as an escape, and to create an interesting inner world (Costa & McCrae, 1992). On the other hand, low scorers prefer to keep their minds on the task at hand and would thus be likely to perform better (Costa & McCrae, 1978, 1992). Thus, the relationship between openness to fantasy and entrepreneurial performance is hypothesized to be negative.

Hypothesis 1: Openness to fantasy is negatively related to entrepreneurial performance.

Openness to aesthetics is related to an appreciation and sensitivity to art and beauty. High scorers are also absorbed by music and moved by poetry (Costa & McCrae, 1978, 1992; McCrae, 1990; McCrae & Costa, 1997; Piedmont, 1998). A high score on the openness to aesthetics facet should be related to entrepreneurs who are preoccupied with personal emotions and thoughts, and focus their attention inward. Thus, they are less aware of changes in the environment, and a lack of awareness may result in missed opportunities (Griffin & Hesketh, 2004). Successful entrepreneurship is likely to require constant information monitoring and learning to keep up with changing tasks and market trends. Entrepreneurs who are open to aesthetics, and thus more internally focused, will fall behind.

Thinking again about the opportunity process as presented by Ardichvili and colleagues (2003), entrepreneurs who are open to aesthetics may be less likely to discover opportunities. They may be less aware of opportunities to redeploy resources to more promising opportunities. Additionally, in the context of Kirzner's (1997) entrepreneurial alertness, entrepreneurs who are open to aesthetics may be less likely to be alert to recognizing the value of external information as it becomes available. As just mentioned with openness to fantasy, a framework of opportunity discovery was put forth by Dyer and colleagues (2008). Here the authors discussed innovative entrepreneurs and "…their propensity to frequently ask questions…the extent to which they spend time intensely observing the world around them…and the frequency with which they experiment in and explore the world with a hypothesis-testing mindset…" (Dyer, et al, 2008: 322). Looking at the behavioral patterns, entrepreneurs who are open to aesthetics may also be less likely to observe the everyday experiences around them.

Openness to aesthetics may influence the type of business an entrepreneur enters, but may have less to do with entrepreneurship after that. It is also possible that openness to

aesthetics may help entrepreneurs produce attractive products and services. However, individuals who are open to aesthetics may spend time reflecting on art and culture instead of focusing their attention on the external environment (Costa & McCrae, 1978, 1992). External threats and opportunities require entrepreneurs to act despite uncertainty. Entrepreneurs who are unaware of the changing environment will not be able to respond as quickly. The performance of firms lead by more internally focused entrepreneurs is hypothesized to be lower, as they are less likely to be able to discover and create opportunities, and in turn will result in lower entrepreneurial performance.

Hypothesis 2: Openness to aesthetics is negatively related to entrepreneurial performance.

Openness to feelings deals with an individual's awareness of their own emotions and receptivity to inner feelings. High scorers view the evaluation of emotion as important (Costa & McCrae, 1978, 1992; McCrae, 1990; McCrae & Costa, 1997; Piedmont, 1998). A high score on the openness to feelings facet should be related to entrepreneurs who focus their attention inward (Griffin & Hesketh, 2004).

According to Ardichvili and colleagues (2003) opportunity identification consists of three parts, including: recognition, development, and evaluation. Entrepreneurs who are open to feelings may be less likely to evaluate market needs and resources during opportunity development. Evaluation may lead to recognition of additional opportunities, but entrepreneurs open to feelings may be less alert to additional external information (Ardichvili, et al, 2003). In addition to what was described in the openness to fantasy section above, entrepreneurs who are open to feelings are also less likely to experience insights (Lumpkin, 2005). They may be less likely to experience the sudden recognition of a business opportunity if they are preoccupied with the internal environment over the external environment. Turning once again to the

behavioral patterns involved in opportunity discovery (Dyer, et al, 2008), entrepreneurs who are open to feelings may be less likely to experiment. They may be less likely to visit new places, seek new information, and experiment with new things in the world.

Openness to feelings may help the entrepreneur develop responsiveness to customers' needs. However, if they are preoccupied with their own emotions, they may miss other signals in the environment and the industry.

Hypothesis 3: Openness to feelings is negatively related to entrepreneurial performance.

Now let's move from the facets hypothesized to be negatively related to entrepreneurial performance to the facets hypothesized to be positively related to entrepreneurial performance, starting with openness to actions. Openness to actions is related to preferring new experiences and being comfortable with change (Costa & McCrae, 1978, 1992). According to Griffin & Hesketh (2004) a high score on the openness to actions facet should be related to entrepreneurs who are more aware of the environment. Being willing to meet new people and try new things may help entrepreneurs in the creative process.

Again, opportunity recognition includes perception, discovery, and creation (Ardichvili, et al, 2003). Entrepreneurs who are open to actions should fall into the category of people who are better able to perceive possibilities. Also, entrepreneurs who are open to actions should be better suited with concept creation as they can see new ways to recombine resources to deliver customers superior value (Ardichvili, et al, 2003).

Additionally, entrepreneurs who are open to actions should be more alert and receptive to recognizing the value of new information that becomes available (Ardichvili, et al, 2003; Kaish & Gilad, 1991; Kirzner, 1997). According to Dyer and colleagues (2008) opportunity discovery behaviors include questioning, observing, and experimenting. Entrepreneurs who are open to

actions should experiment to learn new things and explore the world by seeking new information and visiting new places.

Openness to actions may be the driving force behind entrepreneurs trying new business activities. These may be appropriately timed or premature. High scorers prefer novelty and variety (Costa & McCrae, 1978, 1992; McCrae, 1990; McCrae & Costa, 1997; Piedmont, 1998). This preference for novelty may become an issue if the entrepreneur frequently jumps from one new venture to the next. In contrast to the first three hypotheses, the performance of firms lead by more externally focused entrepreneurs is hypothesized to be higher, as they are more likely to be able to discover and create opportunities, and in turn foster better entrepreneurial performance.

Hypothesis 4: Openness to actions is positively related to entrepreneurial performance.

Individuals high on openness to ideas show a willingness to consider unconventional ideas. Openness to ideas relates to exploring complex ideas and being intellectually curious (Costa & McCrae, 1978, 1992; McCrae, 1990; McCrae & Costa, 1997; Piedmont, 1998). Also, creative individuals are interested in ideas that have growth potential, but may currently be out of favor or unknown (Sternberg & Lubart, 1999). A high score on openness to ideas should be related to entrepreneurs who are responsive to the environment (Griffin & Hesketh, 2004). External threats and opportunities require entrepreneurs to act despite uncertainty. Entrepreneurs who are aware of the changing environment can respond swiftly with new ideas. The uncertainty in the environment requires curiosity to gain knowledge of technological advances, and innovative thinking to develop new strategies to find new sources of revenue.

In addition to Ardichvili and colleagues (2003) mentioned earlier, Baron (2008) also noted that perception plays a role in identifying opportunities. Entrepreneurs who are open to

ideas should have a greater capacity to notice stimuli due to broader perceptual fields. Within the context of Lumpkin's (2005) stages (preparation, incubation, insight, evaluation, and elaboration), entrepreneurs who are open to ideas should develop a sensitivity to the issues and problems in their field. Any prior knowledge and experience will prepare the entrepreneur for the opportunity recognition process (Lumpkin, 2005). Additionally, entrepreneurs who are open to ideas should be better suited for the evaluation phase where ideas are put to the test in the market (Lumpkin, 2005). Within the framework of opportunity discovery mentioned earlier (Dyer, et al, 2008), entrepreneurs who are open to ideas should spend time observing the world around them and find new ideas by paying attention to everyday experiences.

It is possible that being open to unconventional ideas will help develop the basis for the entrepreneurs' initial vision for a new venture. Additionally, openness to ideas may help entrepreneurs continuously search for new problems to solve. Therefore, openness to ideas is hypothesized to be positively related to entrepreneurial performance.

Hypothesis 5: Openness to ideas is positively related to entrepreneurial performance.

Individuals high on openness to values are ready to reexamine traditional social, political, and religious issues. Openness to values is related to individuals tolerating diverse lifestyles. Additionally, these individuals believe that there are few hard-and-fast rules that everyone should follow (Costa & McCrae, 1978, 1992; McCrae, 1990; McCrae & Costa, 1997; Piedmont, 1998). A high score on the openness to values facet should be related to entrepreneurs who proactively seek external experience, scan the environment, and are more aware of and responsive to the environment (Griffin & Hesketh, 2004). External threats and opportunities require entrepreneurs to act despite uncertainty. Entrepreneurs will be able to respond quicker if they are aware of the changing environment. The uncertainty in the environment requires

curiosity to gain knowledge of technological advances, and innovative thinking to develop new strategies to find new sources of revenue.

Looking at the opportunity process from the standpoint of Ardichvili and colleagues (2003) again, entrepreneurs who are open to values should also be more perceptive and sensitive to opportunities to deliver customer value. Gaglio (2004) discussed entrepreneurial alertness, and the notion that entrepreneurs reason and perceive in different ways than nonentrepreneurs. Within this context, alert entrepreneurs are more likely to abandon the established way of doing things, and develop best guesses about the future. Entrepreneurs who are open to values should engage in counterfactual thinking (Gaglio, 2004), and thinking contrary to existing facts. Again looking at the framework of opportunity discovery mentioned earlier (Dyer, et al, 2008), entrepreneurs who are open to values should have a propensity to challenge the status quo and frequently ask questions about the future.

It is possible that openness to values may be the driving force behind the entrepreneur's willingness to question the established ways of doing business. This may lead entrepreneurs to offer services and products that cater to new lifestyles or social arrangements. The performance of firms lead by entrepreneurs who are open to values is hypothesized to be higher.

Hypothesis 6: Openness to values is positively related to entrepreneurial performance.

Now the focus will turn to the moderating role of grit. Grit entails working hard toward challenges, and maintaining interest and effort over years even in the face of adversity or failure. The gritty individual not only finishes the tasks in front of them but also takes aim at tasks set out over years (Duckworth, et al, 2007; Duckworth & Quinn, 2009). It would seem that entrepreneurs with higher grit scores would see improvements in entrepreneurial performance.

Table 2. Hypothesized Relationships: Moderator

Number	Hypothesis
H7:	Grit moderates the relationship between openness to fantasy and entrepreneurial performance in such a way that the negative relationship is lessened in firms owned by entrepreneurs with high grit scores more than in firms owned by entrepreneurs with low grit scores.
H8:	Grit moderates the relationship between openness to aesthetics and entrepreneurial performance in such a way that the negative relationship is lessened in firms owned by entrepreneurs with high grit scores more than in firms owned by entrepreneurs with low grit scores.
H9:	Grit moderates the relationship between openness to feelings and entrepreneurial performance in such a way that the negative relationship is lessened in firms owned by entrepreneurs with high grit scores more than in firms owned by entrepreneurs with low grit scores.
H10:	Grit moderates the relationship between openness to actions and entrepreneurial performance in such a way that the relationship is stronger in firms owned by entrepreneurs with high grit scores than in firms owned by entrepreneurs with low grit scores.
H11:	Grit moderates the relationship between openness to ideas and entrepreneurial performance in such a way that the relationship is stronger in firms owned by entrepreneurs with high grit scores than in firms owned by entrepreneurs with low grit scores.
H12:	Grit moderates the relationship between openness to values and entrepreneurial performance in such a way that the relationship is stronger in firms owned by entrepreneurs with high grit scores than in firms owned by entrepreneurs with low grit scores.

One criticism of entrepreneurs with high openness to experience scores is that they will find more than one venture idea, and move from business to business (Ciavarella, et al, 2004). However, if an entrepreneur has a commitment to long-term goals, this should keep them focused on the venture at hand, and relate to improvements in entrepreneurial performance. If an entrepreneur is committed to the firm's long-term goals, then being open to unrelated business endeavors should not be as big of a distraction.

As previously discussed, grit is a construct described by passion and perseverance in the face of adversity or failure (Duckworth, et al, 2007). Individuals with high grit scores strive for long-term goals and look at achievement as a marathon. The gritty individual takes aim at tasks set out over years (Duckworth, et al, 2007; Duckworth & Quinn, 2009). If an entrepreneur has a higher grit score, this should keep them focused on the venture at hand, and relate to improvements in entrepreneurial performance.

The first facet is openness to fantasy. Individuals who are open to fantasy enjoy daydreaming and can be described as imaginative. Individuals who score low on this facet prefer to keep their minds on the task at hand and are described as realistic thinkers and practical (Costa & McCrae, 1978, 1992; McCrae, 1990; McCrae & Costa, 1997; Piedmont, 1998).

Gritty individuals are more likely to be successful than their less gritty counterparts (Duckworth, et al, 2007). Achievement of difficult goals seems to entail sustained and focused effort over time. Accordingly, grit may affect the degree to which openness to fantasy hinders entrepreneurial performance. Having a long-term outlook is an organizational mindset that affects the strategy making and decision processes of firms.

Because of all the external opportunities and threats faced by entrepreneurs as they strive for positive performance, it is likely that the relationship between entrepreneurial performance

and openness to fantasy will be moderated by grit. The negative impact of openness to fantasy on entrepreneurial performance should lessen when entrepreneurs exhibit perseverance and passion for long-term goals. The focused effort that is associated with high grit may help entrepreneurs sustain their awareness of ways to redirect resources to provide customer value (Ardichvili, et al, 2003) that may be an issue for entrepreneurs who are open to fantasy. In the case of openness to fantasy accompanied by lower grit, entrepreneurs may still lack a heighten state of alertness to external information (Ardichvili, et al, 2003). However, it is expected that grit will decrease the negative effects openness to fantasy has on entrepreneurial performance.

If the assumption that an entrepreneur's goal is positive performance and growth holds, then higher grit scores will interact with openness, resulting in maintenance of their effort and interest in the current venture. The entrepreneur's sustained commitment to their ambitions is predicted to lessen the negative effects of openness to fantasy on entrepreneurial performance by sustaining focus on information monitoring and learning to keep up with the market. Entrepreneurs who are open to fantasy but exhibit higher grit, may be more likely than entrepreneurs with lower grit scores to observe the world around them to find new ideas (Dyer, et al, 2008). The relationship between entrepreneurial performance and openness to fantasy will not have such a negative effect due to an internal focus (Griffin & Hesketh, 2004) when accompanied by grit and the tendency to stay the course when disappointment and boredom normally signal a time for change (Duckworth, et al, 2007).

Hypothesis 7: Grit moderates the relationship between openness to fantasy and entrepreneurial performance in such a way that the negative relationship is lessened in firms owned by entrepreneurs with high grit scores more than in firms owned by entrepreneurs with low grit scores.

Similar arguments can be made for the second facet, openness to aesthetics. Individuals who are open to aesthetics are sensitive to art and beauty, are absorbed by music, and are moved by poetry. Their interests in these areas help them develop a wide knowledge base. High scorers are moved by art and beauty, and value aesthetic experiences (Costa & McCrae, 1978, 1992; McCrae, 1990; McCrae & Costa, 1997; Piedmont, 1998).

Grit may affect the degree to which openness to aesthetics hinders entrepreneurial performance. As noted with the first hypothesis concerning openness to aesthetics on entrepreneurial performance, a negative relationship is expected. However, this should lessen when entrepreneurs exhibit perseverance and passion and thus are better able to discover opportunities. Entrepreneurs who are focused on their long-term goals may be more aware of opportunities to redeploy resources (Ardichvili, et al, 2003) and more likely to observe everyday experiences (Dyer, et al, 2008). Gritty individuals stay the course amid disappointment (Duckworth, et al, 2007) and should maintain their interest in the current venture. Therefore, the relationship between entrepreneurial performance and openness to aesthetics will not have such a negative effect due to the entrepreneur being internally focused (Griffin & Hesketh, 2004), if they sustain their focus on information monitoring and the market.

Hypothesis 8: Grit moderates the relationship between openness to aesthetics and entrepreneurial performance in such a way that the negative relationship is lessened in firms owned by entrepreneurs with high grit scores more than in firms owned by entrepreneurs with low grit scores.

The third facet is openness to feelings. Openness to feelings pertains to an individual's awareness of their own emotions and feelings. High scorers are described as emotionally responsive, empathic, and values own feelings. They also feel happiness and unhappiness more

intensely (Costa & McCrae, 1978, 1992; McCrae, 1990; McCrae & Costa, 1997; Piedmont, 1998).

Entrepreneurs who have higher grit scores should be more successful than their less gritty counterparts (Duckworth, et al, 2007). Focused effort over time may decrease the negative impact of openness to feelings, as entrepreneurs may be slightly more likely to evaluate market needs during opportunity development (Ardichvili, et al, 2003). The high grit entrepreneur's sustained commitment to their ambitions may lessen the negative effect of being less likely to experiment with new things and new information (Dyer, et al, 2008). Entrepreneurs who are focused on their long-term goals may spend less time preoccupied with their emotions, and may not miss signals in the industry and the environment (Griffin & Hesketh, 2004). This would result in the relationship between entrepreneurial performance and openness to feelings not having such a negative effect.

Hypothesis 9: Grit moderates the relationship between openness to feelings and entrepreneurial performance in such a way that the negative relationship is lessened in firms owned by entrepreneurs with high grit scores more than in firms owned by entrepreneurs with low grit scores.

Now let's turn from the negatively related facets to the positively related facets, starting with openness to actions. Openness to actions is related to being comfortable with change and a preference for new experiences. High scorers prefer variety and novelty (Costa & McCrae, 1978, 1992; McCrae, 1990; McCrae & Costa, 1997; Piedmont, 1998). Entrepreneurs with a willingness to try new things and meet new people may perform better in the creative process.

High scorers on openness to actions may be open to moving from one new venture to the next because they prefer novelty. If recognizing the value of new information becomes a

distraction, the entrepreneur's current firm could be affected. However, the positive impact of openness to actions on entrepreneurial performance should become more pronounced when entrepreneurs exhibit perseverance and passion for long-term goals (Duckworth, et al, 2007). Maintaining a focus on what information will help deliver a superior value to your customers would be beneficial. Entrepreneurs who are more perceptive in the opportunity recognition process may be more aware of possibilities in the market (Ardichvili, et al, 2003). Additionally, if openness to actions is accompanied with higher grit, this may result in seeing new ways to combine resources and help with concept creation in the venture at hand (Ardichvili, et al, 2003). Gritty individuals are more likely to maintain their interest. As a result, it is hypothesized that grit will amplify the positive effects openness to actions has on entrepreneurial performance.
Hypothesis 10: Grit moderates the relationship between openness to actions and entrepreneurial performance in such a way that the relationship is stronger in firms owned by entrepreneurs with high grit scores than in firms owned by entrepreneurs with low grit scores.

Similar arguments can be made for the fifth facet, openness to ideas. Openness to ideas relates to exploring complex ideas and considering unconventional ideas. High scorers are intellectually curious and enjoy philosophical arguments. It has been noted that openness to ideas doesn't imply high intelligence, but can contribute to the potential. Low scorers on this facet are seen as having limited curiosity and, if they are highly intelligent, generally focus their resources on limited topics (Costa & McCrae, 1978, 1992; McCrae, 1990; McCrae & Costa, 1997; Piedmont, 1998).

Grit may affect the degree to which openness to ideas influences entrepreneurial performance. Entrepreneurs who are open to ideas should have a broader perceptual field (Baron, 2008). Openness to ideas, specifically unconventional ideas, may be the basis for the

vision of the firm. However, high scorers on openness to ideas may actually continually search for too many problems to solve. The sensitivity to issues and problems in the marketplace should not occur unrestrained. When openness to ideas is accompanied by higher grit, higher entrepreneurial performance is likely to occur. In this case, the perseverance and focus entailed in the grit construct may actually serve to constrain the time that entrepreneurs spend observing the world and finding new ideas for unrelated products or ventures (Dyer, et al, 2008). Additionally, grit may help to constrain the evaluation of ideas to a more specific set to be tested in the market (Lumpkin, 2005). Learning and information monitoring are needed, but effort should not be directed at unrelated issues. Also, the curiosity to gain knowledge of innovative advances should be more focused on new sources of revenue for the current venture. The anticipated end result in this instance is that grit will amplify the positive effects openness to ideas has on entrepreneurial performance. Grit, and a passion for the current venture, may prove to be essential to improved performance.

Hypothesis 11: Grit moderates the relationship between openness to ideas and entrepreneurial performance in such a way that the relationship is stronger in firms owned by entrepreneurs with high grit scores than in firms owned by entrepreneurs with low grit scores.

The sixth and final facet is openness to values. Individuals who score high on openness to values generally tolerate diverse lifestyles and are willing to reexamine political, religious, and social values. Closed individuals tend to be conservative, accept authority, and honor tradition. They can be described as conforming and conservative (Costa & McCrae, 1978, 1992; McCrae, 1990; McCrae & Costa, 1997; Piedmont, 1998).

The influence of openness to values on entrepreneurial performance may be affected by grit. Entrepreneurs who are open to values should be more sensitive and perceptive of

opportunities (Ardichvili, et al, 2003) and be more likely to abandon the established way of doing things (Gaglio, 2004). However, high scorers on openness to values may be open to reexamining too many diverse issues. Here, the passion for long-term goals and consistency of interest within the grit construct may actually serve to constrain the entrepreneur's propensity to challenge the status quo in unrelated arenas (Dyer, et al, 2008). Gritty individuals stay the course when boredom signals to others that they should change (Duckworth, et al, 2007). Within this context, it is expected that grit will amplify the positive effects that openness to values has on entrepreneurial performance.

Hypothesis 12: Grit moderates the relationship between openness to values and entrepreneurial performance in such a way that the relationship is stronger in firms owned by entrepreneurs with high grit scores than in firms owned by entrepreneurs with low grit scores.

Chapter III

Methods

Overview

A survey-based study of founder-owners was designed. In order to test the hypotheses the relationships between the facets of openness to experience and entrepreneurial performance were analyzed. Also, the impact of the grit construct was analyzed. The purpose of this chapter is to describe the research methodology used in this dissertation. The first sections discuss the sample and research design. Next, the variables and measures are presented. Finally, the analyses will be the focus.

Sample

The sample for this dissertation consisted exclusively of founder/owners. The sampling frame was members of the entrepreneurial association 'Entrepreneurs of Knoxville' and additional members of the community associated with the Anderson Center for Entrepreneurship & Innovation. The sampling frame for this study is firms that are eight years and younger. This is due to the fact that during the first eight years firms are in the developmental stage, and can be considered new ventures (McDougall & Robinson, 1990; Miller & Camp, 1985). A required sample size was calculated based on an effect size of 0.21 for openness (with entrepreneurial performance), 6 predictors, and power = 0.95. The a priori sample size of 100 was calculated using G*Power software (Faul, Erdfelder, Lang, & Buchner, 2007) to assure adequate statistical testing of the hypotheses. Organizations were sampled across multiple industries, and from varying size firms, to enhance the generalizability of the results.

Research design

Data for this dissertation were collected with survey instruments using web-based surveys. Potential participants were sent emails explaining the study and providing them a link to complete the online survey. Literature on survey research has shown an increase in web-based surveys (Couper, Traugott, & Lamias, 2001). Additionally, advantages and disadvantages of internet surveys have been explored. The disadvantages include sampling bias, sampling frame, and questionnaire design (Simsek & Veiga, 2001). However, articles have found that results are similar between methods; online vs. paper-and-pencil (Arthur, Glaze, Villado, & Taylor, 2010; Ployhart, Weekley, Holtz, & Kemp, 2003). In fact, Ployhart and colleagues (2003) found that in some cases web-based personality tests showed better distributional properties than paper-and-pencil personality tests. The advantages of using web-based surveys include ease of administration, data collection speed, and cost (Simsek & Veiga, 2001). Therefore, the added advantages made this the approach of choice in this study.

Participants were contacted multiple times to increase response rate. Advanced notice was given to members of Entrepreneurs of Knoxville (EOK) about the survey at weekly meetings, and follow-up continued at the meetings. An appeal was made regarding the respondent's importance in completing the survey and for their help with this project (Simsek & Veiga, 2001). An initial email was sent out to over 780 members, and was endorsed by a member of the EOK Board of Directors to ensure that potential respondents perceived the survey as trustworthy. Additionally, follow-up emails were sent out on a bi-weekly basis to all entrepreneurs who had not responded. Based on the recommendations of Simsek and Veiga (2001), an introduction to the survey was included in an effort to increase response rate. It was also mentioned that the survey was sponsored by The University of Tennessee to improve

response rate. Participants completed these measures through an online survey using Qualtrics research software. The survey items will be discussed later in this chapter.

Variables

The measures for constructs explored in this dissertation are based on existing scales used in previous research. Therefore, there is preexisting evidence for the reliability and validity of the measures included in this study. This is of great importance because Chandler & Lyon (2001) noted that lack of attention to reliability and validity in construct measurement by entrepreneurship researchers has been an issue in the past. Additionally, construct measurement is particularly critical in survey data in general.

Independent Variables

Openness to experience. Openness to experience dimensions were assessed using the Revised NEO Personality Inventory (NEO PI-R). The NEO PI-R is a comprehensive instrument that measures the Big Five personality traits (Costa & McCrae, 1992) and is a widely used and accepted measure of normal personality. Respondents are presented with 48 items in the openness to experience subscale, and are asked to indicate their level of agreement about how accurately each statement describes them. The openness domain is divided into six facets, with each facets consisting of eight items. Sample items include "I sometimes lose interest when people talk about very abstract, theoretical matters" (openness to ideas) and "Once I find the right way to do something, I stick to it" (openness to actions). Items are rated using a 5-point Likert-type scale ranging from 1 (Strongly disagree) to 5 (Strongly agree), and the scores are obtained by summing the responses to questions for each facet. The NEO PI-R is an instrument

with well-established reliability and validity. The NEO PI-R Professional Manual reports high internal consistency, coefficient alpha = .87 (Costa & McCrae, 1992). Due to copyright restrictions, the complete measure cannot be included in this paper.

Moderator Variables

Grit. Attitudes and behaviors characteristic of high-achieving individuals were captured using the Grit Scale. Items were developed by Duckworth and colleagues (2007) to be face valid for both adolescents and adults, and do not specify a particular life domain (school, work, etc.). Respondents are presented with 12 items that measure consistency of interests and perseverance of effort (Duckworth, et al, 2007). Items are rated on a 5-point Likert-type scale ranging from 1 (Not at all like me) to 5 (Very much like me). Sample items include "I have overcome setbacks to conquer an important challenge" and "I have difficulty maintaining my focus on projects that take more than a few months to complete". The overall scale has demonstrated adequate to high internal consistency, coefficient alpha ranging from .77 to .85 (Duckworth, et al, 2007). The complete measure may be found in the Appendix.

Dependent Variable

The dependent variable in this study was entrepreneurial performance indicators. Performance was measured via subjective self-reported items since objective measures of performance are not available for privately owned firms. However, subjective self-assessments have been found to be highly correlated with objective data in previous research (Dess & Robinson, 1984). According to Brush and Vanderwerf (1992), performance is a multifaceted

construct that no single indicator can fully capture. Growth is often cited as the most important indicator of new venture success (Brush & Vanderwerf, 1992).

Evidence has been found to support the reliability and validity of founder-reported performance measures (Brush & Vanderwerf, 1992; Chandler & Hanks, 1994). Therefore, the founder/owners were asked to assess how their firm's growth compared to that of their competitors (Kellermanns & Eddleston, 2006). This comparison also indirectly controls for industry effects (Kellermanns & Eddleston, 2006). Growth was measured with items on sales, market share, and number of employees (Chandler & Hanks, 1994). Items may be found in the Appendix.

Demographic Information & Control Variables

General demographic information questions were asked of the participants in this dissertation. Information was obtained from participants regarding: age, gender, race, education, previous managerial experience, industry experience, entrepreneurial experience, top management team, advisors, and growth goals. Also, participants were asked to provide firm age, industry, and whether or not it is a family business.

The entrepreneur's age was collected because age at start-up has been linked to performance. Harada (2003) found that profitability, sales, and income had a tendency to decrease with age. Gender is also a predictor of entrepreneurial success. A negative effect on profitability and sales has suggested that female entrepreneurs are less likely to succeed (Harada, 2003). Education and previous managerial experience have been found to influence new venture success (Baron & Markman, 2004; Baum, et al, 2001). These variables help entrepreneurs develop the social networks, knowledge, and skills necessary for running successful ventures. In

addition to managerial experience, industry experience and entrepreneurial experience was collected as possible control variables because prior experience has been found to be an important predictor of entrepreneurial performance (Lee & Tsang, 2001). Items include "How many years of managerial experience did you have before your first venture?", "How many years of industry-specific experience did you have before your first venture?", and "How many years of total entrepreneurial experience do you have?". Items may be found in the Appendix.

An entrepreneur's attitude toward growth is likely to influence the goals they strive to achieve. It has been noted that motives for starting a venture are important when it comes to growth aspirations (Morris, Miyasaki, Watters, & Coombes, 2006). Additionally, Baum and colleagues (2001) noted that growth goals have demonstrated empirical relationships with business performance. Baum and Locke (2004) found that goals were significantly related to venture growth. The entrepreneur's growth goal was collected as a control variable. Items include "What was your main goal when you started the business?" and "What is your main goal currently?". Items may be found in the Appendix.

Firm age has previously been used as a control variable. Firm age was used to account for the fact that percentage of growth may be influenced by the age of the firm (Hmieleski & Baron, 2008). Also, the early years of existence is an important time period in the development of the firm to consider growth (Hmieleski & Baron, 2008). Firm industry has been shown to affect entrepreneurial performance (Harada, 2003); therefore, it was included as a possible control variable. Harada (2003) found that entrepreneurs in the business services and construction sectors had higher probabilities of success, whereas entrepreneurs in the food services sector had lower probabilities of success. The author noted that this may be due to entry barriers in these sectors.

Whether or not a firm is a family business was assessed as a possible control variable. This issue was explored because family businesses often become conservative and lose their entrepreneurial momentum after a few years (Morris, 1998; Zahra, Hayton, & Salvato, 2004). Information was collected on family involvement, family ownership percentage, and generational planning. Items include "Is your family involved in management of the business?", "Percentage of family ownership?", and "Do you plan to hand the business down to the next generation?". The items may be found in the Appendix.

Data Analyses

First, diagnostic checks were performed to determine if skewness and kurtosis were problems with the data. Next, a reliability analysis was conducted to examine internal consistencies. Also, a series of confirmatory factor analyses (CFA) were conducted to ensure the validity of the measures. The resulting factor structures were examined to determine if the factors emerge to support the structure of the previously developed measures. Additionally, item parcels were used to explore model fit.

As the openness facets have been developed to measure the same openness domain, multicolinearity may be a problem to address. Thus, this issue was examined further by calculating the variance inflation factor (VIF) to look into tolerance. Calculating VIFs helps determine if the independent variables are multicolinear to the point that standard error inflation is likely to occur. Conventional statistical rules of thumb are that a VIF of 10 or more or a condition index of 30 or more indicates severe problems of multicolinearity (Cohen, Cohen, West, & Aiken, 2003).

Since the data will be collected using an online survey, common method bias is a cause for concern. Testing for common method bias was done following Podsakoff and Organ (1986), and Podsakoff, MacKenzie, Lee, and Podsakoff (2003) in order to address this potential problem. All items (independent, moderator, dependent) are entered in a factor analysis, and hypothesized to load on a single factor representing the common method. The factors are then examined to determine if a factor accounts for the majority of the variance. If not, this will indicate that common method bias was not an issue for the study.

A one-way analysis of variance (ANOVA) was conducted to examine the differences between samples used in this study. Final data analysis was conducted with a sub-set of the original data collected. Next descriptive statistics and bivariate correlations were calculated. The next step was hypothesis testing.

To examine the relationships in this dissertation, hierarchical multiple regression analysis was used. The hypotheses were tested in four models. The control variables were entered first in model 1. Then entrepreneurial performance was regressed onto the openness facets to test the first six hypotheses. To test the hypothesized moderation effects, the moderator was entered in model 3, and the interaction terms in model 4. The difference between the models indicates if the added variables explain variance. The change in R^2 is explored to determine this. Finally, robustness tests were conducted.

Chapter IV

Results

Overview

This chapter provides a comprehensive review of the empirical results, including the statistical analyses utilized to test the hypotheses. The sections of the chapter include demographics, analysis of data, hypotheses testing, and summary.

As mentioned in Chapter III, an email invitation to participate in a survey was emailed to all current members of EOK. Additionally, an email invitation was also extended to numerous members of Tech 2020, as well as to the contacts of several University of Tennessee lecturers associated with the Anderson Center for Entrepreneurship & Innovation. A total of 787 past, current, and future entrepreneurs were emailed. Multiple reminder emails were sent to all individuals, and EOK members were encouraged to participate at weekly meetings.

A filter question was asked to ensure that each individual was currently a business owner (26 respondents were eliminated because they no longer own a business). A total of 194 current founder/owners participated. Two businesses that were non-profit and one business in the pre-venture stage were eliminated. Additionally 30 respondents who did not fully complete the survey on each item of the study variables (openness, grit, performance) were eliminated, resulting in 161 usable responses for a response rate of 20.5 percent.

Demographic Characteristics

Respondents were asked to indicate their gender, age, race, level of education, firm age, and industry. Table 3.1 and Table 3.2 provide a summary of the demographic characteristics of the sample.

Slightly more than seven out of every ten respondents were male. The overwhelming majority of the respondents (90.7%) were Caucasian. Industry classifications were more dispersed, with roughly 1 in 5 in business services and approximately 1 in 5 in technology. On the other hand, 29.8% classified themselves in the 'Other' category, ranging from advertising to product development to healthcare to real estate.

Table 3.1. Entrepreneur Demographics

Variable	Category	Percentage	N
Gender	Male	72.0%	116
	Female	26.1%	42
	Missing	1.9%	3
Age (years)			
	Under 21	0%	
	21-25	5%	8
	26-30	5%	8
	31-35	5.6%	9
	36-40	11.2%	18
	41-45	18.0%	29
	46-50	14.3%	23
	51-55	16.1%	26
	56-60	6.2%	10
	61-65	11.8%	19
	Over 65	4.3%	7
	Prefer not to reply	0.6%	1
	Missing	1.9%	3
Race			
	African American	3.1%	5
	Asian	0.6%	1
	American Indian	0.6%	1
	Hispanic	1.9%	3
	White	90.7%	146
	Other	0.6%	1
	Missing	2.5%	4
Education			
	Less than high school graduate	0.6%	1
	High school graduate	1.2%	2
	Some college	10.6%	17
	Associate’s degree	2.5%	4
	Bachelor’s degree	37.3%	60
	Some graduate work	6.8%	11
	Post graduate degree	38.5%	62
	Missing	2.5%	4

Table 3.2. Firm Demographics

Variable	Category	Percentage	N
Industry			
	Manufacturing	5.6%	9
	Financial/insurance/real estate	6.8%	11
	Retail trade (including wholesale/distribution)	9.9%	16
	Transportation	1.2%	2
	Technology/software	19.3%	31
	Business services/consulting	21.7%	35
	Construction	3.7%	6
	Other	29.8%	48
	Missing	1.9%	3
Firm age (years)			
	Under 4	39.9%	63
	4-8	32.9%	52
	9-12	12.0%	19
	13-16	7%	11
	Over 16	8.2%	14
	Missing	1.9%	3

Data Analysis

Diagnostic checks were performed to determine if skewness and kurtosis were problems with the data. Skewness and kurtosis statistics fell well within the boundaries for normality (Curran, West, & Finch, 1996). Additionally, mean substitution was the method used to address missing data for the control variables. Next, let's turn to the reliability analysis.

Internal consistencies for the grit subscales (α = .71-.82) and performance scales (α = .89) were adequate to high, and generally consistent with previous research (Duckworth, et al, 2007; Kellermanns & Eddleston, 2006).

Internal consistencies for the NEO PI-R openness facet scales varied (α = .64-.85). However, the openness to ideas (α = .74), openness to values (α = .76), openness to feelings (α = .78), openness to fantasy (α = .83), and openness to aesthetics scales (α = .85) all exhibited adequate to high levels of internal consistency. The openness to actions scale (α = .64) was the only scale below the traditionally accepted threshold; however, it was still consistent with previous research (Costa & McCrae, 1992). In fact, the internal consistencies for each subscale were consistent with the previously published development and validation research (Costa & McCrae, 1992).

The mini IPIP scale exhibited varying levels of internal consistency (α = .64-.81). Internal consistencies for the extraversion (α = .81) and agreeableness scales (α = .78) were adequate and generally consistent with previous research. However, the conscientiousness (α = .66) and neuroticism scales (α = .64) fell just below the tradition threshold. Nonetheless, they were still generally consistent with previous research (Cooper Smillie, & Corr, 2010; Donnellan, Oswald, Baird, & Lucas, 2006).

A series of confirmatory factor analyses (CFA) were conducted to assess the factor structure of the study measures. Maximum likelihood estimation was used in this study. The analyses were conducted using AMOS 19.

The first CFA (independent, moderator, dependent) began by fitting the model with 8 items for each openness facets (and all 6 facets), 6 items for both grit dimensions, and 8 items for the performance construct. Results indicated the following estimates of model fit for the 9 factor solution: $\chi^2 = 3695.9$, df = 2186, $p < .001$, standardized root mean square residual (SRMR) .093, root-mean-square error of approximation (RMSEA) .066, comparative fit index (CFI) .657. The SRMR suggests marginal fit, and the RMSEA value suggests adequate fit (Hu & Bentler, 1999). The CFI number is below the suggested cutoff, however it was noted that it may be too strict for small sample sizes. Additionally, the ratio of the difference in chi-square to the difference in degrees of freedom (χ^2/df) can be used as another estimate of fit (Kline, 2005).

As a point of reference, a ratio for χ^2/df of less than 3.00 was interpreted as good fit (Kline, 2005). Other cutoffs for estimates of model fit that indicate adequate fit include an SRMR value of .08 or less, an RMSEA value of .06 or less (with .06-.08 as an indication of fair fit), and an CFI value of .95 (Hu & Bentler, 1999).

In an effort to look for better fitting solutions, item parcels were used as indicators. Parceling involves averaging item scores based on the factor loadings, and using the parcels in place of the item scores (Cattell & Burdsall, 1975). With the current data, numerous item parcel solutions were explored. Overall, it is not recommend to use only two items per parcel with a small sample size (Hau & Marsh, 2004). Thus models with one and two parcels per construct (facet, etc) were used. A model with 2 item parcels per construct was examined first ($\chi^2 = 476.70$, df = 322, $p < .001$, SRMR = .064, RMSEA = .069, CFI = .745). For comparison a

model with 1 item parcel for each openness facet, 1 for each grit factor, and 1 for performance was examined (χ^2 = 417.42, df = 318, p < .001, SRMR = .051, RMSEA = .055, CFI = .836). While this results in an improvement in the RMSEA value, it still does not improve the CFI value to an adequate level. Therefore, item parceling did not lead to a model with good fit.

Next, sub-scale CFAs were performed. For the openness dimension, a 6 factor solution with 8 items each (χ^2 = 2027.39, df = 1080, p < .001, SRMR .176, RMSEA .074, CFI .629) was examined. Additionally, a 6 factor solution with reduced items (6, 6, 6, 6, 4, 3) was also examined (χ^2 = 711.48, df = 434, p < .001, SRMR .167, RMSEA .069, CFI .751). The reduced item model produced a significant improvement in Chi-square over the 48 item model, $\Delta\chi^2$ (646) = 1315.91, p < .001, suggesting a better fit.

Grit was the next to be analyzed. The 2 factor solution, with 6 items each, was examined first (χ^2 = 193.58, df = 54, p < .001, SRMR .178, RMSEA .127, CFI .748). Next, a reduced item (6, 4) 2 factor model resulted in the following estimates: χ^2 = 90.97, df = 35, p < .001, SRMR .149, RMSEA .125, CFI .813. For comparison, a 1 factor model was also examined (χ^2 = 161.16, df = 54, p < .001, SRMR .104, RMSEA .139, CFI .714). The reduced item 2 factor solution displayed the best fit. The reduced item 2 factor model also produced a significant improvement in Chi-square over the 12 item model, $\Delta\chi^2$ (19) = 102.61, p < .001, suggesting a better fit.

Finally, the performance construct was analyzed. Fitting a model with 8 items and 1 factor resulted in the following estimates of model fit: χ^2 = 253.97, df = 20, p < .001, SRMR .127, RMSEA .270, CFI .725. And for a 2 factor solution, the results indicated: χ^2 = 282.49, df = 20, p < .001, SRMR .348, RMSEA .175, CFI .632. The 2 factor model did not produce a significant improvement over the 1 factor model. Thus the 1 factor model was the best solution.

Variables such as gender were dummy coded (1 = male, 0 = not male), and scales were summed. Also, as required for the interpretation of data, items were reverse scored that needed to be. This included items within the NEO-PI-R scale and items within the Grit scale.

Further diagnostics were performed to determine whether or not multicolinearity was an issue. Results showed that the highest observed variance inflation factor (VIF) was 3.12; well below the value of 10 that is seen as problematic. Thus, it was concluded that multicollinearity is not a major threat to the integrity of the results (Cohen, Cohen, West, & Aiken, 2003).

Following the recommendations of Podsakoff and colleagues (2003), to reduce common method bias problems from questionnaire surveys, several post hoc tests were conducted. First, recall from the previous chapter that during survey administration participants were assured there were no right or wrong answers, and thus should answer questions as honestly as possible. Additionally during survey administration, question order was randomized within sections. Also, scale items were separated in the questionnaire to reduce the likelihood of respondents guessing the relationship between predictor and criterion variables. These tactics were used to address method bias.

The next step was to test for common method bias using Harman's one-factor test (Podsakoff & Organ, 1986). If a substantial amount of common method bias exists in data, a single or general factor that accounts for most of the variance will emerge when all variables are entered together. In the current sample, an unrotated principal components factor analysis did not exhibit a single factor, but revealed three factors with eigenvalues greater than 1.0, which accounted for 55.06 percent of the total variance. The first factor did not account for the majority of the variance (26.66%).

Further evidence of this was obtained using CFA. Following Podsakoff and colleagues (2003) a single-method-factor approach was employed, which included a common method factor in the model. The indicators of this factor included all the principal constructs' indicators. The results of this analysis indicated that the method factor did not improve model fit (CFI decreased by 0.80). Also, chi-square did not significantly change, $\chi^2 = 3676.33$, df = 2118, $p < .001$, SRMR .099, RMSEA .085, CFI .577. Overall, the fit indices did not show an increased fit. Thus, it is reasonable to conclude that the results for this study were not inflated due to the existence of common method bias.

As discussed in the previous chapter, firms 8 years and under (considered early growth stage for new ventures) were used for hypotheses testing. Thus, the sample consisted of 115 firms, but was reduced down to 103 firms that had been in business for at least one year. Therefore, from this point forward the sample size is 103 firms that had been in business from 1-8 years at the time of data collection. Table 3.3 and Table 3.4 provide a summary of the demographic characteristics of the sample.

A one-way analysis of variance (ANOVA) was conducted to examine the differences between samples. Gender distribution did not differ from the full sample to the reduced sample: $F(1, 156) = .975$, not significant [*ns*]. No difference was found with respect to industry characteristics between the full sample and the reduced sample: $F(1, 156) = .235$, *ns*. The education level in the reduced sample was not significantly different than the full sample: $F(1, 155) = 3.138$, *ns*. Additionally, the ethnicity distribution did not differ significantly between samples: $F(1, 155) = 2.871$, *ns*. Therefore, the samples should behave in a similar manner.

Table 3.3. Entrepreneur Demographics (Firms 8 years and under)

Variable	Category	Percentage	N
Gender	Male	70.9%	73
	Female	29.1%	30
Age (years)			
	Under 21	0%	
	21-25	5.8%	6
	26-30	5.8%	6
	31-35	7.8%	8
	36-40	12.6%	13
	41-45	23.3%	24
	46-50	10.7%	11
	51-55	18.4%	19
	56-60	3.9%	4
	61-65	8.7%	9
	Over 65	1.9%	2
	Prefer not to reply	1.0%	1
Race			
	African American	1.9%	2
	Asian	0%	0
	American Indian	1.0%	1
	Hispanic	1.0%	1
	White	95.1%	98
	Other	1.0%	1
Education			
	Less than high school graduate	1.0%	1
	High school graduate	1.9%	2
	Some college	8.7%	9
	Associate's degree	2.9%	3
	Bachelor's degree	32.0%	33
	Some graduate work	6.8%	7
	Post graduate degree	46.6%	48

Table 3.4. Firm Demographics (Firms 8 years and under)

Variable	Category	Percentage	N
Industry			
	Manufacturing	4.9%	5
	Financial/insurance/real estate	7.8%	8
	Retail trade (including wholesale/distribution)	10.7%	11
	Transportation	1.0%	1
	Technology/software	23.3%	24
	Business services/consulting	19.4%	20
	Construction	3.9%	4
	Other	29.1%	30
Firm age (years)			
	1	17.5%	18
	2	12.6%	13
	3	19.4%	20
	4	17.5%	18
	5	7.8%	8
	6	14.6%	15
	7	7.8%	8
	8	2.9%	3

Descriptive statistics and bivariate correlations can be found in Table 4. Several correlations are worth noting. An inspection of the correlations reveals that the 'main goal currently' was positively related to the entrepreneur's 'main goal at start-up' ($r = .64$, $p < .01$).

Agreeableness is positively related to four of the openness to experience facets. The relationships were significant with openness to aesthetics ($r = .54$, $p < .01$), openness to fantasy ($r = .27$, $p < .01$), openness to feelings ($r = .58$, $p < .01$), and openness to actions ($r = .20$, $p < .05$). Extraversion is positively related to openness to feelings ($r = .24$, $p < .05$), and neuroticism is also related to openness to feelings ($r = .27$, $p < .01$). Also, conscientiousness and openness to ideas are positively related ($r = .34$, $p < .01$).

Next, there are some intercorrelations between openness facets to note. Openness to aesthetics was positively related to both openness to fantasy ($r = .53$, $p < .01$) and openness to feelings ($r = .43$, $p < .01$). Also, openness to fantasy was positively related to openness to feelings ($r = .45$, $p < .01$), openness to values ($r = .28$, $p < .01$), openness to ideas ($r = .31$, $p < .01$), and openness to actions ($r = .26$, $p < .01$). Openness to values was significantly correlated with openness to ideas ($r = .32$, $p < .01$). And openness to ideas was significantly related to openness to actions ($r = .22$, $p < .05$). One final relationship with the openness facets to note was that the entrepreneur's age was related to openness to actions ($r = .25$, $p < .05$).

Table 4. Descriptive Statistics and Correlations

Variable	Mean	s.d.	1	2	3	4	5	6	7	8	9	10
1. Entrepreneurial Exp.	11.53	9.85										
2. Managerial Experience	7.43	8.73	.06									
3. Industry Experience	7.23	8.84	-.09	.38**								
4. Main Goal at Start-up	4.17	1.71	-.08	.11	.05							
5. Main Goal Currently	3.57	1.74	-.08	.19+	.13	.64**						
6. Firm Age	3.75	2.02	.15	.13	.05	-.03	.02					
7. Extroversion	3.37	.84	.04	.15	.10	-.04	.06	.07				
8. Agreeableness	3.88	.68	.19+	-.04	-.07	.17+	.14	.05	.33**			
9. Conscientiousness	3.69	.66	-.11	.00	.04	-.07	-.12	-.01	.00	-.15		
10. Neuroticism	2.45	.71	-.03	-.03	-.02	.09	.09	.08	.01	-.11	.08	
11. Top Management Team	2.97	1.54	.26**	-.02	-.03	-.11	-.14	.18+	-.10	.04	.23*	-.02
12. Education	5.70	1.47	-.14	.07	.10	-.28**	.13	.14	.06	-.06	.07	.07
13. Entrepreneur's Age	6.41	2.28	.41*	.47**	.27**	-.09	.04	.18+	.09	.11	-.13	-.16
14. Race	4.90	.60	.13	-.06	-.09	.05	-.03	-.03	-.14	-.06	-.20*	.06
15. Advisors	.84	.37	-.04	.00	-.12	-.28**	-.26**	-.04	.13	.00	.08	-.21*
16. Gender	.71	.46	.21*	-.04	-.06	-.24*	-.27**	.02	-.27**	-.25*	.03	.02
17. Openness to Aesthetics	3.22	.81	.09	-.13	-.05	.00	-.12	.03	.11	.54**	-.15	-.07
18. Openness to Fantasy	3.33	.73	-.01	-.07	-.03	-.06	-.29**	-.09	.16	.27**	-.14	.03
19. Openness to Feelings	3.78	.66	.10	-.04	-.11	.34**	.08	.03	.24*	.58**	-.16	.27**
20. Openness to Values	3.38	.75	-.07	.01	.10	-.04	.00	-.02	.02	.09	.10	.07
21. Openness to Ideas	4.14	.61	-.16	-.21*	-.09	-.19+	-.26**	-.16	.06	.02	.34**	-.03
22. Openness to Actions	3.18	.73	.12	.04	.03	-.10	-.08	-.09	.18+	.20*	.01	.09
23. Grit Perseverance	4.47	.58	.03	-.03	-.17+	-.16	-.23*	.21*	.11	.07	.22*	-.01
24. Grit Consistency	3.32	.89	-.18+	.07	.00	-.06	-.09	.04	.13	-.10	.21*	-.07
25. Ent. Performance	3.21	.84	.16	.06	-.07	.00	-.16	.12	-.01	-.10	.28**	.12

Table 4. Continued.

Variable	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1. Entrepreneurial Exp.														
2. Managerial Experience														
3. Industry Experience														
4. Main Goal at Start-up														
5. Main Goal Currently														
6. Firm Age														
7. Extroversion														
8. Agreeableness														
9. Conscientious.														
10. Neuroticism														
11. Top Management Team														
12. Education	.08													
13. Entrepreneur's Age	.10	.13												
14. Race	.04	-.07	.02											
15. Advisors	.01	.03	.03	-.07										
16. Gender	.30**	-.03	-.05	.15	-.06									
17. Open. to Aesthetics	-.12	-.07	.12	-.12	.03	-.31**								
18. Open. to Fantasy	-.12	-.09	-.01	-.03	-.01	-.13	.53**							
19. Open. to Feelings	-.01	-.05	-.07	.00	-.12	-.17+	.43**	.45**						
20. Open. to Values	-.14	.00	.02	-.01	.13	-.05	.07	.28**	.05					
21. Open. to Ideas	-.03	.07	-.14	-.08	.07	-.10	.17+	.31**	.03	.32**				
22. Open. to Actions	-.08	.07	.25*	-.06	-.13	.03	.18+	.26**	.14	.16	.22*			
23. Grit Perseverance	.15	.01	-.03	-.01	.14	-.07	.03	-.12	.04	-.12	.17+	-.12		
24. Grit Consistency	.10	.02	.10	-.10	.20*	-.07	-.02	-.13	-.08	-.12	.00	-.09	.35**	
25. Ent. Performance	.27**	.09	.08	.20*	.09	.10	-.16	-.14	.12	-.04	.09	.11	.15	.15

n = 103
+p < .10; *p < .05; **p < .01

Hypotheses Testing Results

The following section depicts the analysis of the hypothesized relationships. Table 5 presents the results of the hierarchical multiple regression analysis testing the hypotheses. Entrepreneurial performance was regressed on the predictors in four steps. Model 1 presents the results of the control variables. This model explains 28.8% of the variance of the dependent variable. Model 2 adds all of the independent variables (openness to experience facets). This model explains 38.9% of the variance. Model 3 adds the moderator variables. Model 4 includes the interaction effects (openness to experience X grit) and explains 50.1% of the variance.

In order to test the suggested moderation effects, the moderator variables were entered independently in model 3 and then interaction terms were entered in model 4. In order to mitigate multicollinearity concerns, grit was mean centered before creating the interaction terms (Cohen, Cohen, West, & Aiken, 2003). If the change in R^2 is significant for model 4, then one can conclude the moderation is significant. However, the observed change in R^2 in model 4 was not found to be significant ($\Delta R^2 = .107$, not significant [*ns*]).

In model 1, the goal at start-up ($\beta = .314$, $p < .05$), conscientiousness ($\beta = .258$, $p < .05$), and race ($\beta = .224$, $p < .05$) are positively associated with entrepreneurial performance. Moreover, level of education is positive and marginally significant ($\beta = .188$, $p < .10$). The goal currently is negatively associated with entrepreneurial performance ($\beta = -.298$, $p < .05$).

In model 2, the goal currently ($\beta = -.277$, $p < .10$) and agreeableness ($\beta = -.238$, $p < .10$) are negatively associated with entrepreneurial performance. Race ($\beta = .228$, $p < .05$) and conscientiousness ($\beta = .226$, $p < .05$) are positively associated with entrepreneurial performance. Examining the independent variables shows a positive relationship with openness to feelings ($\beta = .395$, $p < .01$). Additionally, the relationship is positive and approaching significance with

openness to actions ($\beta = .191$, $p < .10$). But the relationship is negative with openness to fantasy ($\beta = -.273$, $p < .05$).

Table 5.
Results of Hierarchical Moderated Regression Analysis for Entrepreneurial Performance

Variables	Model 1	Model 2	Model 3	Model 4
Controls				
Entrepreneurial Experience	.131	.105	.132	.090
Managerial Experience	.063	.061	.067	.068
Industry Experience	-.086	-.042	-.043	-.039
Main Goal at Start-up	.314*	.178	.172	.267
Main Goal Currently	-.298*	-.277+	-.280	-.316+
Firm Age	.058	.084	.093+	.097
Extroversion	.056	-.002	-.014	.091
Agreeableness	-.104	-.238+	-.217	-.275+
Conscientiousness	.258*	.226*	.217+	.176
Neuroticism	.090	-.026	-.021	.003
Top Management Team	.144	.141	.133	.127
Education	.188+	.113	.118	.266*
Entrepreneur's Age	.058	.040	.016	.081
Race	.224*	.228*	.233*	.231*
Advisors	.092	.119	.110	.069
Gender	-.022	-.083	-.087	-.035
Independent variables				
Openness to Aesthetics		-.091	-.102	-.098
Openness to Fantasy		-.273*	-.271*	-.246*
Openness to Feelings		.395**	.392**	.411*
Openness to Values		-.013	-.012	-.019
Openness to Ideas		.068	.083	.085
Openness to Actions		.191+	.189+	.214+
Moderator				
Grit Perseverance			-.049	.754
Grit Consistency			.087	.726
Interaction effect				
Openness to Aesthetics × Grit Perseverance				-.511
Openness to Fantasy × Grit Perseverance				-.710
Openness to Feelings × Grit Perseverance				.056
Openness to Values × Grit Perseverance				.869
Openness to Ideas × Grit Perseverance				-.386
Openness to Actions × Grit Perseverance				-.151
Openness to Aesthetics × Grit Consistency				-.306
Openness to Fantasy × Grit Consistency				.148
Openness to Feelings × Grit Consistency				-.180
Openness to Values × Grit Consistency				-.141
Openness to Ideas × Grit Consistency				-.734
Openness to Actions × Grit Consistency				-.452

Table 5. Continued.

	Model 1	Model 2	Model 3	Model 4
% of total variance explained	.288	.389	.395	.501
ΔR^2	.288	.101	.006	.107
Adjusted R^2	.156	.221	.209	.229
ΔF	2.174*	2.210*	.359	1.175
Full model statistics	Total R^2 = .501		F(36, 66) = 1.843*	

n = 103; standardized regression coefficients are reported.
+p < .10
*p < .05
**p < .01

Main Effects

Hypothesis 1 predicted that openness to fantasy would be negatively related to entrepreneurial performance. Openness to fantasy ($\beta = -.273$, $p < .05$) was found to have a significant negative impact on entrepreneurial performance, thus supporting hypothesis 1.

The relationship in Hypothesis 2 predicted that openness to aesthetics would be negatively related to entrepreneurial performance. The results for openness to aesthetics ($\beta = -.091$, *ns*) indicate that there was not a significant impact on entrepreneurial performance, thus hypothesis 2 was not supported.

Hypothesis 3 predicted that openness to feelings would be negatively related to entrepreneurial performance. Contrary to the proposed relationship, openness to feelings ($\beta = .395$, $p < .01$) was found to have a significant positive impact on entrepreneurial performance. This finding was in the opposite direction of hypothesis 3.

The resulted predicted by Hypothesis 4 was that openness to actions would be positively related to entrepreneurial performance. While the relationship with openness to actions ($\beta = .191$, $p < .10$) was found to be in the positive direction, the impact on entrepreneurial performance was only approaching significance.

Next, recall that Hypothesis 5 predicted that openness to ideas would be positively related to entrepreneurial performance. Openness to ideas ($\beta = .068$, *ns*) was not found to have a significant impact on entrepreneurial performance, thus hypothesis 5 was not supported.

The predicted outcome with respect to Hypothesis 6 was that openness to values would have a positive relationship to entrepreneurial performance. However, it was determined that openness to values (β = -.013, *ns*) did not have a significant impact on entrepreneurial performance, therefore hypothesis 6 was not supported.

Interaction Effects

Model 4 of the regression analysis was non-significant. Thus, grit was not found to moderate the relationships between openness to experience facets and entrepreneurial performance. Support was not found for hypothesis 7 with regard to grit perseverance (β = -.710, *ns*) or grit consistency (β = -.148, *ns*), nor was support found for hypothesis 8 for grit perseverance (β = -.511, *ns*) or grit consistency (β = -.306, *ns*). No support was found for hypothesis 9 for either grit perseverance (β = .056, *ns*) or grit consistency (β = -.180, *ns*), and hypothesis 10 was not supported for grit perseverance (β = -.151, *ns*) or grit consistency (β = -.452, *ns*). Additionally, support was not found for hypothesis 11 with regard to grit perseverance (β = -.386, *ns*) or grit consistency (β = -.734, *ns*), or for hypothesis 12 for grit perseverance (β = .869, *ns*) or grit consistency (β = -.141, *ns*).

Robustness Tests

Robustness checks were conducted. Robustness tests were run with one openness dimension and individual interaction effects at a time. Table 6 presents the results of the individual tests. A significant result was not obtained for openness to aesthetics: *F* (5,

97) = 1.743, *ns*. Additionally, the relationship was non-significant for openness to fantasy: *F* (5, 97) = 1.023, *ns*. Openness to feelings also failed to show a significant result: *F* (5, 97) = 1.195, *ns*. A significant result was not found for openness to values: *F* (5, 97) = .759, *ns*. And the relationship was non-significant for openness to ideas: *F* (5, 97) = 1.132, *ns*. Finally, the result was openness to actions was non-significant: *F* (5, 97) = 1.211, *ns*.

Table 6.
Results of Robustness Tests

Variables	IV	Moderator	Interaction
Openness to Aesthetics	-.162	-.164	.875
Grit Perseverance		.122	.561
Grit Consistency		.102	.437
Openness to Aesthetics × Grit Perseverance			-.989
Openness to Aesthetics × Grit Consistency			-.470
Openness to Fantasy	-.140	-.115	-.543
Grit Perseverance		.106	-.089
Grit Consistency		.095	-.045
Openness to Fantasy × Grit Perseverance			.356
Openness to Fantasy × Grit Consistency			.164
Openness to Feelings	.124	.130	-.344
Grit Perseverance		.105	-.078
Grit Consistency		.121	-.251
Openness to Feelings × Grit Perseverance			.296
Openness to Feelings × Grit Consistency			.434
Openness to Values	-.044	-.018	-.319
Grit Perseverance		.114	.036
Grit Consistency		.105	-.110
Openness to Values × Grit Perseverance			.134
Openness to Values × Grit Consistency			.272
Openness to Ideas	.088	.071	.454
Grit Perseverance		.102	.002
Grit Consistency		.112	.730
Openness to Ideas × Grit Perseverance			.171
Openness to Ideas × Grit Consistency			-.214
Openness to Actions	.106	.132	.887
Grit Perseverance		.129	.523
Grit Consistency		.114	.203
Openness to Actions × Grit Perseverance			-.767
Openness to Actions × Grit Consistency			-.083

n = 103; standardized regression coefficients are reported.
*p < .05
**p < .01

Additional tests were also performed. The sample was analyzed with the eliminated businesses (firms over 8 years) included. Regression analyses were conducted in steps, with moderator variables and interaction terms in the final models. For the whole model, the total R^2 value was lower ($R^2 = .312$) than the previously tested regression analysis. The observed change in R^2 was only significant for the control variables (step 1); change in R^2 was not significant for the independent variables (step 2), as it was for the previous test. Looking at the control variables entered in step 1, only the current goal ($\beta = -.263$, $p < .05$), conscientiousness ($\beta = .151$, $p < .05$), and top management team ($\beta = .168$, $p < .05$) were significantly associated with entrepreneurial performance. When examining the independent variables entered in step 2, only openness to feelings ($\beta = .229$, $p < .05$) showed a significant relationship with entrepreneurial performance. And finally, the additional tests for moderation were not significant.

Chapter summary

The purpose of this chapter was to present a statistical analysis of the data and empirical results of the dissertation hypotheses. The hypotheses are summarized in Table 7. In sum, only one of the six main effect hypotheses was fully supported. Additionally, none of the interaction hypotheses were supported. The implications will be discussed in the following chapter.

Table 7. Hypotheses Summary

Hypothesis	Results
H1: Openness to Fantasy negatively related to Entrepreneurial Performance	Supported
H2: Openness to Aesthetics negatively related to Entrepreneurial Performance	Not supported
H3: Openness to Feelings negatively related to Entrepreneurial Performance	Significant, opposite direction
H4: Openness to Actions positively related to Entrepreneurial Performance	Approaching significance
H5: Openness to Ideas positively related to Entrepreneurial Performance	Not supported
H6: Openness to Values positively related to Entrepreneurial Performance	Not supported
H7: Grit moderates the relationship between Openness to Fantasy and Entrepreneurial Performance	Not supported
H8: Grit moderates the relationship between Openness to Aesthetics and Entrepreneurial Performance	Not supported
H9: Grit moderates the relationship between Openness to Feelings and Entrepreneurial Performance	Not supported
H10: Grit moderates the relationship between Openness to Actions and Entrepreneurial Performance	Not supported
H11: Grit moderates the relationship between Openness to Ideas and Entrepreneurial Performance	Not supported
H12: Grit moderates the relationship between Openness to Values and Entrepreneurial Performance	Not supported

Chapter V

Discussion

The purpose of this chapter is to discuss the findings from the testing of the hypotheses in the previous chapter. Specifically, this will be a discussion of the results, limitations, contributions to the literature, recommendations for future research, and conclusions.

Discussion of Results

This dissertation draws upon theories of personality and individual differences (e.g., Costa & McCrae, 1992; Duckworth, et al, 2007) to discuss entrepreneurial intentions and entrepreneurial performance (e.g., Baum, et al, 2001; Collins, et al, 2004; Rauch & Frese, 2007; Shane, et al, 2003; Stewart & Roth, 2001, 2004, 2007; Zhao, et al, 2010). Specifically, the purpose of this dissertation was to explore the dimensions of openness to experience, and the grit construct, and their potential connections to entrepreneurial performance.

Two general research questions were investigated: 1) Do different facets of an entrepreneur's openness to experience differentially predict entrepreneurial performance? 2) Do differences in entrepreneur's grit moderate the relationship between openness to experience facets and entrepreneurial performance?

A set of hypotheses were developed based on these research questions. Twelve hypotheses in all were put forward to be used to explore the possible positive and

negative impact of the variables being examined. Support for the main effects varied. No support was found for the hypothesized moderator relationships.

Regarding the main effects, openness to fantasy was found to be negatively related to entrepreneurial performance, and openness to feelings was positively related to entrepreneurial performance. Openness to actions was related to entrepreneurial performance in the positive direction, and the relationship approached significance. No significant results were found for openness to aesthetics, openness to ideas, or openness to values. In reference to the moderator effects, grit did not significantly increase or decrease any of the hypothesized relationships between openness to experience facets and entrepreneurial performance. Although most of the hypothesized relationships were not supported in the present study, notable and interesting findings did emerge. Now let us turn to a discussion of each hypothesis.

Hypotheses

Hypothesis 1 stated that openness to fantasy is negatively related to entrepreneurial performance. Results yielded support for hypothesis one. Specifically, higher scores on openness to fantasy were related to lower entrepreneurial performance. The results indicate that entrepreneurs who are preoccupied with personal thoughts and fantasy, and focus their attention inward may be less aware of changes in the environment may miss opportunities for their firms (Griffin & Hesketh, 2004; Ardichvili, et al, 2003). Further, individuals who score low on openness to fantasy are described as practical and keep their minds on the task at hand (Costa & McCrae, 1978, 1992;

McCrae, 1990; McCrae & Costa, 1997; Piedmont, 1998). Thus, it is not surprising that a low score on openness to fantasy would be related to higher performance.

Hypothesis 2 indicated that openness to aesthetics is negatively related to entrepreneurial performance. Results of the analysis failed to yield support for hypothesis two. No significant results were observed. It was thought that entrepreneurs who scored high on openness to aesthetics would be focused inward (Griffin & Hesketh, 2004), and thus their performance would suffer. However, these results were not observed in this study. As was noted earlier in this dissertation, openness to aesthetics may influence the type of business an entrepreneur enters (Dyer, et al, 2008), or it may have little to do with entrepreneurship in general. While openness to aesthetics was not negatively related to performance, it would appear that in the current sample neither a high nor low level of appreciation for art and beauty (Costa & McCrae, 1978, 1992) was related to entrepreneurial performance. The relationship was not significant, and this may be due to the notion that even while higher openness to aesthetics could help entrepreneurs produce attractive products and services, that does not mean that the entrepreneurs in industries represented in this study are unable to produce effective products or services if they have lower levels of openness to aesthetics.

Hypothesis 3 proposed that openness to feelings is negatively related to entrepreneurial performance. The results for the relationship that is addressed in hypothesis three were significant, but in the opposite direction of what was expected. Specifically, higher scores on openness to feelings were related to higher levels of entrepreneurial performance. It would appear that high scorers were not internally

focused and preoccupied with personal emotions (Griffin & Hesketh, 2004; McCrae, 1990; McCrae & Costa, 1997; Piedmont, 1998). Another explanation may be that some entrepreneurs high on openness to feelings are better equipped to shift from a creative mindset to a managerial mindset during the lifecycle of the firm (Ciaverella, et al, 2004). As previously suggested in this dissertation, openness to feelings may help entrepreneurs develop responsiveness to customers' needs. While this was not directly measured, something along those lines may offer an explanation for the positive relationship that was found in the current research. High scorers on the openness to feelings facet are more sensitive to their surroundings (Costa & McCrae, 1978, 1992), and in this case it is quite possible that there is a connection with opportunity discovery (Dyer, et al, 2008). In turn, this would lead to a positive relationship with performance.

Hypothesis 4 stated that openness to actions is positively related to entrepreneurial performance. The results for hypothesis four where in the direction predicted, and were approaching significance. Specifically, high scores on openness to actions were related to higher levels of entrepreneurial performance. Openness to actions may be the driving force behind entrepreneurs trying new business activities, and when those new activities are successful a positive relationship would be found with performance. Low scorers on the openness to actions facet are said to be set in their ways and have a preference for the familiar (Costa & McCrae, 1978, 1992; McCrae, 1990; McCrae & Costa, 1997; Piedmont, 1998). As we know, we are living in an increasingly complex and ever-changing global economy. Therefore, entrepreneurs must be willing to try new tactics to solve the problems their firms face on a daily basis (Kaish & Gilad,

1991; Kirzner, 1997). Being more aware of the environment would thus benefit entrepreneurs (Griffin & Hesketh, 2004). Future research is warranted to more fully investigate the effects of openness to actions on entrepreneurial performance.

Hypothesis 5 indicated that openness to ideas is positively related to entrepreneurial performance. Results of the analysis failed to yield support for hypothesis five. No significant results were observed. Openness to ideas involves the consideration of unconventional ideas (Costa & McCrae, 1978, 1992; McCrae, 1990; McCrae & Costa, 1997). While this may prove to be successful for some entrepreneurs, it will not always be the most effective course of action. Entrepreneurs who scored low on the openness to ideas facet will generally focus their resources on limited topics (Piedmont, 1998; Griffin & Hesketh, 2004). However, there will not always be a simple solution for the problems that are encountered (Sternberg & Lubart, 1999). Additionally, if it was the case that high levels of openness to ideas led entrepreneurs to continuously search for new problems to solve (as opposed to the problems requiring their attention), this may offer an explanation for the failure to confirm the relationship in hypothesis five in the current study.

Hypothesis 6 proposed that openness to values is positively related to entrepreneurial performance. Results of the analysis failed to yield support for hypothesis six. As previously suggested in this dissertation, some openness to experience facets may have less to do with entrepreneurship than other facets. Concerning openness to values, and hypothesis six, this was the finding in the present sample. No significant results were observed. Perhaps challenging the status quo (Dyer, et al, 2008) and re-

examining social, political, and religious values (Costa & McCrae, 1978, 1992) is of little importance in most industries. On the other hand, being conservative and honoring tradition (Piedmont, 1998) may also be of little importance in many sectors. Thus, neither high nor low scores on openness to values may have a relationship with levels of entrepreneurial performance.

Hypothesis 7 stated that grit moderates the relationship between openness to fantasy and entrepreneurial performance. Results yielded no support for hypothesis seven. Specifically, while the achievement of difficult goals requires perseverance (Duckworth, et al, 2007), the grit construct did not moderate the relationship between openness to fantasy and entrepreneurial performance. While the age of the firms in the sample was restricted to new ventures because it is likely that during this time period openness to experience will have its greatest impact (e.g., McDougall & Robinson, 1990), this may not be the timeframe where grit has its greatest influence (Duckworth, et al, 2007; Duckworth & Quinn, 2009). The perseverance and passion for long-term goals will likely come into play later in the firm's lifecycle. Thus, grit did not affect the degree to which openness to fantasy hindered entrepreneurial performance in the current sample.

Hypothesis 8 indicated that grit moderates the relationship between openness to aesthetics and entrepreneurial performance. The results of the analysis failed to yield support for hypothesis eight. That is to say, neither higher nor lower grit scores changed the relationship between openness to aesthetics and entrepreneurial performance. A negative relationship was expected between aesthetics and entrepreneurial performance. While this was not the case, it also does not appear that gritty individuals in this sample

differed in their ability to observe everyday experiences (Dyer, et al, 2008), or were any more or less aware of opportunities to redeploy resources (Ardichvili, et al, 2003). Nor is this study able to conclude that the entrepreneurs with higher grit scores would stay the course amid disappointment (Duckworth, et al, 2007) or differ in their internal or external focus (Griffin & Hesketh, 2004) as was thought in connection with grit or openness. As noted above, openness to aesthetics did not display a significant relationship with entrepreneurial performance, and grit did not significantly improve that relationship.

Hypothesis 9 proposed that grit moderates the relationship between openness to feelings and entrepreneurial performance. Hypothesis nine was not supported. No significant results were observed. An entrepreneur's grit score did not affect the relationship between openness to feelings and entrepreneurial performance. The results of hypothesis three have shown that the entrepreneurs who are open to feelings were not limited by it, or constrained to a strictly internal focus (Griffin & Hesketh, 2004). The hypothesized negative main effect was not found, indicating perhaps these individuals are more responsive to their surroundings. In this sample, the grit construct does not appear to have an influence on whether or not entrepreneurs miss signals in the industry and the environment (Griffin & Hesketh, 2004). Additionally, the entrepreneur’s grit score did not appear to increase or decrease the likelihood of evaluating market needs during opportunity development (Ardichvili, et al, 2003). Also, the sustained commitment of gritty individuals did not seem to change the likelihood of experimenting with new information (Dyer, et al, 2008). The results of hypothesis three were in the opposite

direction of what was originally predicted; however, grit did not have a significant impact on the positive relationship.

Hypothesis 10 stated that grit moderates the relationship between openness to actions and entrepreneurial performance. The observed relationship between openness to actions and performance was not moderated by grit. Therefore, there was no support for hypothesis 10. The main effect for openness to actions was approaching significance, and this may be an indication that entrepreneurs with a willingness to try new things and meet new people (Costa & McCrae, 1978, 1992; McCrae, 1990; McCrae & Costa, 1997; Piedmont, 1998) will perform better in the creative process. In this sample, higher or lower levels of grit did not appear to have an influence on whether an entrepreneur was focused on their current firm or was distracted by new information and the novelty of another venture (Ciavarella, et al, 2004). The perseverance and passion for long-term goals (Duckworth, et al, 2007) was not found to have a significant impact. While entrepreneurs who are more perceptive in the opportunity recognition process may perform better (Ardichvili, et al, 2003), the grit construct did not have an impact on this outcome. Additionally, it was not found to be the case that higher grit resulted in seeing new ways to combine resources or helping with concept creation (Ardichvili, et al, 2003). While, the relationship in hypothesis four was approaching significance, grit scores did not significantly change that outcome. Future research should explore other variables that may moderate this relationship, and push it to a significant level.

Hypothesis 11 indicated that grit moderates the relationship between openness to ideas and entrepreneurial performance. No support was found in the current research for

hypothesis 11. The observed results did not yield a significant result. Scores on the grit construct did not moderate the relationship between openness to ideas and entrepreneurial performance. As was noted with the main effect, entrepreneurs exploring complex ideas and considering unconventional ideas (Costa & McCrae, 1978, 1992; McCrae, 1990; McCrae & Costa, 1997; Piedmont, 1998) did not significantly influence entrepreneurial performance. Additionally, neither higher nor lower grit scores appear to restrain the sensitivity to issues and problems in the marketplace (Dyer, et al, 2008). In this sample, the perseverance and focus entailed in the grit construct (Duckworth, et al, 2007) did not appear to have an influence on the time spent finding new ideas for unrelated products or ventures (Dyer, et al, 2008) or constrain the evaluation of specific ideas to be tested in the market (Lumpkin, 2005). Grit did not prove to be essential to improve performance, as was the thought in hypothesis development.

Hypothesis 12 proposed that grit moderates the relationship between openness to values and entrepreneurial performance. And finally, as with the previous hypotheses concerning the grit construct, hypothesis 12 was not supported. The relationship in hypothesis six was not significant, and grit did not significantly impact the relationship between openness to values and entrepreneurial performance. Just as the degree to which the entrepreneurs in the sample were either willing or unwilling to reexamine political, religious, and social values (Costa & McCrae, 1978, 1992; McCrae, 1990; McCrae & Costa, 1997; Piedmont, 1998) did not have a significant impact on entrepreneurial performance, the grit construct did not significantly change this relationship. While high scorers on openness to values may be more likely to abandon the established way of

doing things (Gaglio, 2004) or be open to reexamining too many diverse issues, the consistency of interest within the grit construct did not serve to constrain the entrepreneur's propensity to challenge the status quo in unrelated arenas (Dyer, et al, 2008). In this sample, grit did not appear to influence whether or not individuals stayed the course when boredom signaled the need for change (Duckworth, et al, 2007). A positive relationship with openness to values was not found, and grit did not amplify the effects on entrepreneurial performance either.

In addition to the hypothesized relationships, main effects for grit and the control variables were included in the results. The direct relationships in the results showed that grit was not significantly related to entrepreneurial performance in this sample. Within the control variables, the main goal at start-up was positively related to performance (a lower score on the goal scale represents a more aggressive growth goal). For instance, higher performance would be more closely associated with goals to 'stay in business' or 'make a living'; whereas lower performance would be more closely associated with entrepreneurs who started with more aggressive growth goals (Morris, et al, 2006). Conscientiousness had a positive relationship with entrepreneurial performance. Also, race was positively associated with entrepreneurial performance; meaning that Caucasian entrepreneurs were more likely to have higher performance levels in this sample. And finally, the entrepreneur's current goal was negatively related to performance. For instance, higher performance would be more closely associated with current goals for 'rapid growth' or to 'add employees' (Baum & Locke, 2004).

There are a few points to mention regarding the demographics of the sample of firms under 8 years old. First, the education level of the entrepreneurs in the sample is higher than many previous samples. While information was not obtained on specific degrees (e.g., MBA vs. science-based degrees), the sample consisted of 46.6% who had a post graduate degree. A great deal of studies in the area of psychology of entrepreneurship did not report education levels. However, it has been stated that entrepreneurs have an average education level that is higher than the general population (Cooper & Gimeno-Gascon, 1992). For reference, some examples from studies that report education level reported over 50% (Morrison, 1997) and over 60% (Stewart, et al, 1999) with some college education, over 45% with a university degree (Nga & Shamuganathan, 2010), and some samples only used university alumni (e.g., Chlosta, Patzelt, Klein, & Dormann, 2012). But the post graduate degree levels were not as high as they were in the sample for this dissertation. Implications of this research artifact will be discussed later in this chapter.

Second, the industry type for the businesses sampled is noteworthy. While it is not unusual in this area of research, the current sample consisted of 42.7% that operated in business services/consulting or technology/software. Examples of industry composition in past studies included 39% business and personal services (Harada, 2003) and 60% services (Muller & Gappisch, 2005). Also, some studies used samples consisting entirely of firms from one sector, such as hospitality (Wagener, et al, 2010). The demographics of the current sample were not unexpected, as the entrepreneurs who

own both service and technology firms were generally the most active individuals in the EOK organization (which make up the majority of the current sample).

Research Limitations

As with nearly every research endeavor, several research limitations are present in this dissertation. Some of the limitations are a function of the specific research design employed, while other limitations concern the methodological approach for measurement. First, the nature of the study was exploratory and cross-sectional; thus not allowing for conclusions about the causality of relationships. Entrepreneurs were relied on as a single source of data; therefore, spurious associations between some of the variables of interest may emerge due to common method bias (Podsakoff & Organ, 1986; Podsakoff, et al, 2003). Future research should address these issues by separating the collection of the independent and dependant variables.

Second, there are a few limitations regarding the sample used in this dissertation. The entrepreneurs were contacted via email; therefore, there may have been a non-response bias. Also, the collection period was over several months, and thus control over the settings in which participants filled out the survey instruments was lost. Even though an introduction to the survey was included in an effort to increase the response rate (Simsek & Veiga, 2001), the sample size for this study presented a limitation. Participants were also contacted multiple times to increase the response rate. However, as a result of constrained statistical power, small effect sizes can be more difficult to detect. A larger sample may have produced more fruitful results.

Due to the lack of significant results in hypothesis testing, an estimated sample size that would yield significant results across the board was investigated. A required sample size was calculated based on an observed effect size of 0.16, 24 total predictors (openness, grit, control variables), and power = 0.95. The sample size of 221 was calculated using G*Power software (Faul, et al, 2007) to ensure adequate statistical testing of the constructs in this study.

Nonresponse bias may have been an issue (Sax, Gilman, & Bryant, 2003). The data collection approach definitely resulted in a convenience sample, which may raise issues of representativeness. The sample in this study was not a random sample; therefore, it is not possible to fully exclude the possibility of a spurious relationship accounting for the observed outcomes. The current sample was tied to a specific region in the United States, and the majority of the sample is connected to one specific entrepreneurial networking organization. In an effort to address representativeness, potential participants from various industries were encouraged to participate at weekly meetings of the networking organization. Thus, considering that the data collection led to a sample in which firms operating in many different industries are represented, the concerns may be somewhat lessened. But that does not deal with the fact that the busiest entrepreneurs who would not have had time to respond to the survey may be at the extremes, either the most successful firms or those struggling to survive; thus, the range of the sample may have been truncated.

Perhaps a different time in the growth lifecycle of a firm would yield different results for openness to experience as well. For example, there may be a greater influence

in the pre-venture stage. Creativity, imagination, and openness to new ideas are critical during the entrepreneurial task of opportunity recognition (Ciavarella, et al, 2004; Morrison, 1997), and for the businesses included in the sample this may have been most influential prior to launch. Unfortunately, there was no way to determine this in the current sample. Openness to experience may have a stronger relationship when exploring what industry to open a firm in, when developing new products to launch, or when searching for new and unconventional ways to initially fill a void for customers.

Past research only looked at the overall domain of openness to experience (e.g., Zhao, et al, 2010). However, given the length of the survey as a result of including all the questions for each facet of openness to experience, busy entrepreneurs were reluctant to spend the time to complete the survey. Therefore, a sufficient sample size to find any differences will be harder to come by for data at the level of the six openness facets. Considering this, overall length of the survey was a major consideration, and the time it took to complete the survey to try to improve the likelihood of survey completion. We will come back to these issues shortly.

Additionally, self-report measurement was used as there are very few data sources for entrepreneurship research. This data collection approach admittedly has its disadvantages. These disadvantages include issues arising from individuals having their own theories about the constructs and respondents overestimating the strength of empirical relationships. Also, participants' mood during survey completion can bias measures, and problems can occur with social desirability and consistency motif (Podsakoff & Organ, 1986). Following the recommendations of Podsakoff and

colleagues (2003), steps were taken in survey design. To address potential bias during survey administration participants were assured there were no right or wrong answers, and thus should answer questions as honestly as possible. Additionally during survey administration, question order was randomized within sections. Also from a procedure standpoint, scale items were separated in the questionnaire to reduce the likelihood of respondents guessing the relationship between predictor and criterion variables.

Difficulties in the measurement of the performance of the firms in the sample is another potential issue. Measuring performance in entrepreneurial firms can be problematic. Traditional firm performance data is not available, and there is a reluctance to provide objective measures of performance. Thus, overestimation bias is a potential limitation as respondents may exaggerate their performance. In addition to that, it is difficult to compare performance measures for very young companies (which the sample consists of). This limitation is noted even though subjective self-assessments have been found to be highly correlated with objective data in previous research (Dess & Robinson, 1984). Also, evidence has been found to support the reliability and validity of founder-reported performance measures (Brush & Vanderwerf, 1992; Chandler & Hanks, 1994).

There are limitations regarding the survey itself. In an attempt to mitigate these limitations, a small scale pretest to gather feedback on question phrasing and administration was conducted before the survey went out to participants. The panel provided helpful insights with regard to the questionnaire, and provided an evaluation of the time needed to complete it. No major inconsistencies emerged from this pretest.

Still, different scale formats were used such as Likert-type scales, as well as reverse-coded and negatively worded items.

The openness to experience facets and grit construct are new to the literature. The research on the effects of grit is in the infancy phase (Duckworth, et al, 2007; Duckworth & Quinn, 2009). Based on the research examined at the time of data collection, this is the first study to examine grit in the entrepreneurship literature. Further exploratory research should be conducted. The grit construct has face validity and there is no doubt that perseverance and passion for long-term goals is of great importance for continued success. However, the question that needs to be addressed is whether or not grit is indeed the best way to measure this phenomenon in entrepreneurial research.

Also, although the personality measure (NEO PI-R) used in the present study has a long history (e.g., Costa & McCrae, 1978, 1992), other measures may be more accurate. While it is true that creativity and innovation are the common elements that run through the definitions of entrepreneurship (e.g., McCrae, 1987), perhaps the openness to experience dimension of the Big Five personality factors is not the best way to assess the relevance of these notions.

Based on the limitations of the current study, several possibilities for measurement improvement exist. Although they are previously published measures, the grit measure and the openness measure are not without faults. As previously mentioned, the reduced item models offered better fit in the current study. Therefore, the value of each item in these scales should be examined. Also, it is possible that there is room for improvement in the response scales of the published measures used. Measurement

improvements could be made to the survey used in this dissertation by using continuous instead of categorical scales (e.g., entrepreneur age), and by counter-balancing items for order. As mentioned in the paragraphs above, collecting performance data at a different point in time and gathering performance data from a separate source would both improve the measurement. Lastly, gathering data from a random sample would improve measurement.

Additionally, personality traits can affect behavior only if the situational constraints allow their expression (Mischel, 1968). However, whether or not the entrepreneurs were only acting within weak situations (based on structure, information, and autonomy) was not measured in the current research. Also, the notion that personality traits affect the decision to start an enterprise more strongly than subsequent business success (Frese, et al, 2000), may in fact be the case. It should also be noted that the model deliberately leaves out factors that have been studied by previous scholars as likely determinants of entrepreneurial outcomes.

The concept of fit may also have an impact in this line of research. In addition to the idea that person-job or person-organization fit is important (Kristof, 1996), it is possible that there may be an element of fit between entrepreneurs and the strategy of the businesses they own. However, data on business strategy was not collected in this study. Thus, a potential limitation of the current study concerns the idea that different facets of openness to experience may play a larger or smaller role in different firms due to their chosen strategy. For example, openness to aesthetics could play a more important role in

certain types of businesses where strategy would be tied to the value of art and beauty (as that is the focus of aesthetics).

Due to length considerations, other characteristics of entrepreneurs such as perception of risk, tolerance of ambiguity, stress tolerance, need for achievement, optimism, imagination, alertness, knowledge, self-efficacy, locus of control, and capital (human, financial, and social) were not included in the study (e.g., Collins, et al, 2004; Stewart & Roth, 2001, 2004, 2007; Zhao, Seibert, & Hills, 2005). Thus, there are other variables that may need to be included to offer a full explanation of the individual differences of entrepreneurs. Performance improvement at the firm level may come about not just through individual differences of entrepreneurs, but also based on economic conditions, access to venture capital, and competitor performance (e.g., Chandler & Hanks, 1993, 1994 1998).

Another possible explanation for the findings can be viewed from the perspective that entrepreneurship is a process that goes through phases where each has a different set of activities and outcomes. The effects of openness may change over the different phases of founding a new venture (Baron & Markman, 2005). In this context, personality variables such as conscientiousness are of more importance in the post-launch phase when the entrepreneur should pay more attention to customers and product delivery. Therefore, while the hypotheses test specific relationships, the observed associations do not imply causal relationships as there might be other explanatory processes not included in the model.

Contributions to Literature and Future Research

Despite these limitations, this research provides several important contributions to the area of the psychology of entrepreneurship. First, this dissertation extends the notion of individual differences in entrepreneurship research. The results show that openness to fantasy, openness to feelings, and openness to actions have an impact on entrepreneurial performance.

This dissertation is not about whether or not managers and entrepreneurs differ, rather the main concern here is what variables make some entrepreneurs more successful than other entrepreneurs. However, it is worth noting that Brockhaus & Horwitz (1986) reviewed psychological influences on the individual, effects of previous experience, and personal characteristics of entrepreneurs. Based on the research they examined, they came to the conclusion that few psychological characteristics differentiate the entrepreneur from managers. However, it is important to note that they stated "…a well-defined entrepreneurial population does not exist and research findings are often difficult to compare" (Brockhaus & Horwitz, 1986: 26). The authors concluded by noting the possibility that the psychological instruments to find significant relationships in entrepreneurship may not have been present at the time.

In the coming years, Rauch and Frese (2000) addressed the call of Gartner (1988) to stop looking at personality variables in entrepreneurship research. They found in their review that there are differences between entrepreneurs and managers, and that there is a positive relationship between personality traits and success. The authors noted that Gartner's (1988) position and the trait theory do not actually contradict each other.

Gartner recommended studying a very specific level of entrepreneurial behavior, whereas personality traits represent broad classes of behavior. Rauch and Frese pointed out that advances in personality research had occurred since Gartner's paper.

Additionally, as noted earlier in this dissertation, literature on person-environment fit suggests that individuals prefer jobs that match their personalities (Kristof, 1996). Thus, Zhao & Seibert (2006) examined differences in personality between entrepreneurs and managers. The authors found significant differences between entrepreneurs and managers on the dimensions of agreeableness, neuroticism (emotional stability), conscientiousness, and openness to experience (however no difference was found for extraversion). In other studies, openness has been found to have a strong effect for entrepreneurs but has shown only weak and nonsignificant effects as a predictor of the job performance of traditionally employed managers (Barrick, Mount, & Judge, 2001; Hurtz & Donovan, 2000). Stewart and Roth (2001, 2004) found small and significant differences in risk propensity between entrepreneurs and managers. Need for achievement is another trait that has been related to economic outcomes and business performance (McClelland, 1961). Another recent meta-analysis addressed need for achievement of entrepreneurs. A moderate difference between entrepreneurs and nonentrepreneurs was found (Collins, et al, 2004).

Small, young, new ventures will have flat organizational structures, and as a result, what an entrepreneur wants to do or intends to do will not have to go through layers or filters. Entrepreneurs are operating in highly dynamic industries, characterized by high growth rates, with high innovation potential. And the greater the amount of

opportunities individuals perceive and believe they can exploit, the greater their likelihood of success (Ardichvili, et al, 2003). This is where the facets of openness will impact decision making, as the perceptual field of entrepreneurs is influenced by openness to experience (Baron, 2008). Thus, the contribution of the current study is another step in the direction of understanding what traits may or may not play a role in determining the effectiveness of entrepreneurs in certain industries, with new products, and in a given strategic direction.

However, the question remains, what is the role of this personality trait (openness to experience) in the formation of entrepreneurial intentions and resulting venture performances? Personality affects an entrepreneur's perceived fit with what is required to start a business and then this relationship impacts the performance of the ventures founded (Collins, et al, 2004; Frank, Lueger, & Korunka, 2007; Nga & Shamuganathan, 2010; Rauch & Frese, 2007; Zhao, et al, 2010). While the data does not provide information about the individual's perceived fit, this approach provides a better understanding of the different influences shaping an entrepreneur's openness.

In this dissertation it has been recognized that there is a limited understanding of the openness facets and grit construct within the context of entrepreneurship. This dissertation is a contribution in that direction. The results also show that several openness to experience facets fail to predict entrepreneurial performance. Overall, only one of the research hypotheses garnered full support. However, the results do provide a basis for future inquiry.

Research on personality at a facet level in the context of entrepreneurship did not previously exist. Therefore the current study contributes to the entrepreneurship literature by identifying facet-level variance within the overall openness construct and helps to develop a framework for future research. Previous studies have shown that openness influences entrepreneurial intentions and performance (Collins, et al, 2004; Rauch & Frese, 2007; Zhao, et al, 2010), but these studies do not explain why some relationships have been negative while others were positive. The results imply that the facets of openness may help to explain why some studies have found negative results while others did not. Also, the overall openness domain did not have a significant relationship with entrepreneurial performance in the current sample; therefore as expected, facets did offer additional information.

Also, while the high variation in the correlations between personality traits and entrepreneurship reported in the literature may be an indication of the presence of moderator effects (Rauch & Frese, 2007), a significant moderator effect was not found in the current study. This research sought to examine the construct of grit and its potential relationship with entrepreneurial personality and entrepreneurial performance.

The performance of a new venture is more likely to be determined by the ability to recognize and exploit multiple opportunities than that of more established firms. Opportunity recognition is relevant for all businesses, and at every stage in their development (Ardichvili, et al, 2003). However, being open to new ideas and new opportunities is vital in the first few years of operation. Since this is the case, the sample in this study was restricted to firms during the new venture stage of development. Thus,

this study contributes to the current research dialogue by focusing on businesses in these very early stages.

Additionally, although many of the hypothesized relationships were not supported in the current study, other notable and interesting contributions can be made to the literature. The first place to start is the other personality variables outside of openness to experience. Extraversion and neuroticism were positively correlated with openness to feelings. These findings are consistent with, and extend past personality research (Costa & McCrae, 1992). Next, agreeableness was positively correlated with openness to aesthetics, openness to fantasy, openness to feelings, and openness to actions. These findings are consistent with past research on openness to aesthetics, but are in the opposite direction of previous findings for openness to fantasy (Costa & McCrae, 1992). As expected based on previous research (e.g., Costa & McCrae, 1992), conscientiousness was positively correlated with openness to ideas. Lastly within the other personality variables, conscientiousness was positively correlated with entrepreneurial performance. This contributes to the existing entrepreneurship literature as another verification of previous research finding (e.g., Zhao, et al, 2010).

Other notable contributions include the finding that top management team (TMT) size (Haleblian & Finkelstein, 1993) was positively correlated with both years of entrepreneurial experience and conscientiousness. Thus, entrepreneurs who are purposeful and strong-willed, and who have more experience as entrepreneurs, are more likely to be supported by a larger TMT. TMT size was also correlated with entrepreneurial performance.

Next, a contribution of the current study is that there was a significant relationship between education and the main growth goal at start-up (Morris, et al, 2006). The results imply that entrepreneurs in this sample with a higher level of education set more aggressive goals for initial venture growth. Additionally, there were significant associations found between advisors and goals. A greater number of external advisors meant that entrepreneurs were more likely to set aggressive growth goals for both initial venture growth and current growth. Therefore, education and advisors may serve to increase entrepreneurs' comfort level with taking calculated risks in the pursuit of aggressive growth.

Additional contributions concerning goals include the relationship between less aggressive start up growth goals and performance, and the relationship between more aggressive current goals and performance in this sample. The practical takeaway regarding the findings on goals is that entrepreneurs who are prepared and set realistic goals at first are more likely to get through the early years (goals include: stay in business), followed by the entrepreneurs aiming for sustained growth (goals include: rapid growth and add employees) after a few years in business.

As expected, entrepreneur's age was positively correlated with entrepreneurial, managerial, and industry experience. However, of note was the finding that entrepreneur's age was positively correlated with openness to actions. As discussed by Costa & McCrae (1992), this would imply that older entrepreneurs were more likely to try new things and prefer variety. This is a contribution to the entrepreneurship literature with regard to openness facets.

There were a couple other interesting relationships that would be expected based on the literature. A positive correlation was found between grit factors; grit perseverance and grit consistency. Also, conscientiousness was positively related to both grit perseverance and grit consistency. These findings further extend the previous findings and developing literature concerning grit (Duckworth, et al, 2007). In summary, although the majority of hypothesized relationships were not significant, other interesting relationships were found that add to or support the entrepreneurship literature.

Between openness to experience and entrepreneurial performance there may be other variables operating in the "black box" that may offer explanations for the non-significant findings in this dissertation. Examples of variables that could be operating between openness and performance include goal setting and top management team (TMT) processes. The past experiences TMT members have working together with other members at previous firms (Eisenhardt & Schoonhoven, 1990) is an unmeasured variable in this study that might offer an explanation for the current non-findings.

Also, as mentioned earlier in this chapter, the average level of education in the current sample was high. It is possible that education level operates in the black box between personality and performance, and may actually reduce the need for grit. Thus, this may offer further explanation for the non-findings regarding grit in the current study.

In response to the original criticisms of Gartner (1988), traits should not be ignored, and should be included in the overall model of entrepreneurship. The key in the field of psychology of entrepreneurship is to determine the most appropriate traits, and where they fit in the overall model. The takeaway from this study regarding traits in

entrepreneurial research is that more specific traits (e.g., need for achievement, alertness, self-efficacy, tolerance for ambiguity) may have more to offer in the overall prediction of performance than general traits (e.g., Big 5).

Now the focus will turn to suggestions for future research. While the expected results were not obtained in the current study, there is a need for future examination of the grit construct in entrepreneurial research. While the current study contributes to the entrepreneurship literature by identifying that the grit construct does not moderate the effect of openness on performance, we can continue to explore grit in other relationships. Future research should explore grit with other non-personality variables. And the impact of grit may be greater at a different point in the firm's lifecycle. Thus, this should be explored in future empirical work.

The study of grit is new to the literature (Duckworth, et al, 2007), and various approaches should be explored to supplement the findings herein. This might include exploring grit in other contexts as a mediator, measuring grit in the context of entrepreneurial intention in pre-venture stages, or looking at it in a longitudinal study to examine possible significance with firm survival. Future research can make important contributions if it continues to explore grit in other relationships, and with other predictors of entrepreneurial success. Additionally, as it takes approximately three years for new ventures to overcome the liability of newness (Mellahi & Wilkinson, 2004), future work may look to see if the characteristics differ from that point forward.

The age of the firms in the sample is a double-edged sword. While research needs young firms to look for the greatest influence, one should be careful to not limit this to

too young where performance data is not yet fully established or predictable for most firms (must capture at just the right point in the growth cycle). However, the future sample cut-off may need to have an upper limit of 4 years in age to capture firms in the adolescence lifecycle stage (Korunka, Kessler, Frank, & Lueger, 2010) to gather data before the importance of the founder starts to decline over time.

Next, the current study only taps into a few variables associated with entrepreneurial activity, therefore the scope of the explanatory power is limited. Future research should devote more attention to exploring the differences in values, missions, and culture of the firms in the sample. Additionally, as openness to experience has shown a non-significant or negative impact on firm survival in past research (Baron & Markman, 2004; Ciavarella, et al, 2004), future research should include entrepreneurs who have been forced to close their businesses.

Entrepreneurs forced out of business were not captured in this sample. If there is indeed a negative relationship with survival, this should be apparent rather quickly when surveying entrepreneurs who went out of business. Future research in this area could specifically search for and sample these entrepreneurs, or possibly capture them in a sample during a longitudinal study when following up years after initial data collection. Additionally, serial entrepreneurs between start-ups are not captured, thus relationships over time may need to be accounted for.

Future research may also explore the possibility of openness to experience as a moderator in different entrepreneurial performance relationships. As an example, it may be necessary to shift the focus from the direct effects of personality, and look at

moderation in the relationships between experience and performance. Openness may serve as a moderator to explain why some entrepreneurs open businesses in certain industries or become successful serial entrepreneurs who move from one new venture to the next, while others do not. Using openness as a moderator may open up additional research opportunities, and expand the understanding of the psychology of entrepreneurship.

In addition to looking at openness to experience as a moderator, future directions also include examining other variables as moderators in the relationship. Growth goals and goal setting should be studied as a moderator in the relationship between personality and entrepreneurial performance. Industry and entrepreneurial experience could also be researched as possible moderators. Sticking to the openness facets from the current study, future research may need to explore the possibility of curvilinear relationships existing. Also, the role of conscientiousness and possible contributions at the facet level of this variable is another future direction.

Future research directions also include a longitudinal study to look at goal setting. In this realm, research could include a sample of students in entrepreneurship programs and examining their goal setting. This could even include the possibility of an intervention to work with the students to educate them on goal setting after the initial data are collected. Then follow up at different intervals in time down the road to measure performance, and gather data on possible goal changes at those points would be needed. This would address the issues related to having the entrepreneurs retroactively trying to remember their start up goals.

Another avenue for future exploration deals with the definitional issue of entrepreneurs versus small business owners. All small businesses are not necessarily entrepreneurial in nature, and thus a debate over the similarities and difference has existed for years (Carland, Hoy, Boulton, & Carland, 1984). Although the business owners in the sample in this current dissertation self-identified as entrepreneurs (through membership in an entrepreneurship organization), it does not mean they all fit the definition. Therefore, future research should be conducted using samples that apply a stricter definition of entrepreneurial firms.

Finally, future research should examine in more detail whether similar patterns emerge for different demographics. Based on an alternative definition of an entrepreneur as "the owner or co-owner of a business with five or more employees" (Djankov, Miguel, Qian, Roland, & Zhuravskaya, 2005: 589), a sample restricted to firms with employees may have a better handle on performance measurement. Also, extending the analysis to other areas to determine whether the results hold for other geographical regions would increase the representativeness of the sample. In sum, future research should attempt to remedy some of the limitations brought forth in this study and improve upon the hypotheses presented.

Conclusion

In sum, this dissertation attempted to expand and further the literatures regarding personality, individual differences, and entrepreneurial performance (the area of psychology of entrepreneurship). Although less attention has been directed toward

personality facets, this dissertation suggested not only that facet level data should be examined in entrepreneurial research, but that different facets within a single domain (openness to experience) can simultaneously have nonsignificant, positive, and negative relationships to performance. Further, while grit is still a potentially important component of entrepreneurial research, it was not found to have a significant impact in this study. Much of the results of this research are relatively new to the literature and more focus and empirical testing is needed to further the ideas brought forth in this dissertation.

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APPENDIX

NEO PI-R (Costa & McCrae, 1992)

Openness to experience facets

Due to copyright restrictions, the complete measure could not be included in this paper.

Grit scale (Duckworth, et al, 2007)

	Not at all like me				Very much like me
I often set a goal but later choose to pursue a different one.	1	2	3	4	5
New ideas and new projects sometimes distract me from previous ones.	1	2	3	4	5
I become interested in new pursuits every few months.	1	2	3	4	5
My interests change from year to year.	1	2	3	4	5
I have been obsessed with a certain idea or project for a short time but later lost interest.	1	2	3	4	5
I have difficulty maintaining my focus on projects that take more than a few months to complete.	1	2	3	4	5
I have achieved a goal that took years of work.	1	2	3	4	5
I have overcome setbacks to conquer an important challenge.	1	2	3	4	5
I finish whatever I begin.	1	2	3	4	5
Setbacks don’t discourage me.	1	2	3	4	5
I am a hard worker.	1	2	3	4	5
I am diligent.	1	2	3	4	5

Performance (Kellermanns & Eddleston, 2006)

How would you rate your firm's performance as compared to your competitors?

	Much worse				Much better
Growth in sales	1	2	3	4	5
Growth in market share	1	2	3	4	5
Growth in number of employees	1	2	3	4	5
Growth in profitability	1	2	3	4	5
Return on equity	1	2	3	4	5
Return on total assets	1	2	3	4	5
Profit margin on sales	1	2	3	4	5
Ability to fund growth from profits	1	2	3	4	5

Demographic Information & Control Variables

1. Do you currently own a business?

	Yes
	No

2. Have you founded any past ventures?

	Yes	
		Profitably sold?
		Closed?
	No	

3. How long has it been since you founded your current business?

	Years		Months

4. What is your age?

	Under 21
	21-25
	26-30
	31-35
	36-40
	41-45
	46-50
	51-55
	56-60
	61-65
	Over 65
	Prefer not to reply

5. What is your gender?

	Male
	Female

6. What is your race?

	African American
	Asian
	American Indian

	Hispanic
	White
	Other

7. What is the highest level of education you have completed?

	Less than high school
	High school graduate
	Some college
	Associate's degree
	Bachelor's degree
	Some graduate work
	Postcollege graduate degree

8. How many years of managerial experience did you have before your first venture (or this venture if it is your first)?

9. How many years of industry-specific experience did you have before your first venture (or this venture if it is your first)?

10. How many years of total entrepreneurial experience do you have?

11. In what industry would you classify your business?

	Manufacturing
	Financial/insurance/real estate
	Retail trade (including wholesale/distribution)
	Transportation
	Technology/software
	Business services/consulting
	Construction
	Other services

12. Is your family involved in management of the business?

	Yes
	No

13. Percentage of family ownership?

14. Do you plan to hand the business down to the next generation?

Definitely will not			Might or might not			Definitely will
1	2	3	4	5	6	7

15. What was your **main** goal when you started the business?

	Get rich
	Rapid growth
	Add employees
	Sustainable income
	Stay in business
	Make a living
	Minimize losses

16. What is your **main** goal currently?

	Get rich
	Rapid growth
	Add employees
	Sustainable income
	Stay in business
	Make a living
	Minimize losses

17. How many people in your firm do you consider to be in full time executive-level positions?

18. Do you look to any advisors external to your firm when making important decisions?

	Yes
	If yes, how many people?
	No

Mini IPIP (Goldberg, 1999)

Extraversion

	Strongly disagree		Neutral		Strongly agree
I am the life of the party	1	2	3	4	5
I don't talk a lot	1	2	3	4	5
I talk to a lot of different people at parties	1	2	3	4	5
I keep in the background	1	2	3	4	5

Agreeableness

	Strongly disagree		Neutral		Strongly agree
I sympathize with others' feelings	1	2	3	4	5
I am not interested in other people's problems	1	2	3	4	5
I feel others' emotions	1	2	3	4	5
I am not really interested in others	1	2	3	4	5

Conscientiousness

	Strongly disagree		Neutral		Strongly agree
I get chores done right away	1	2	3	4	5
I often forget to put things back in their proper place	1	2	3	4	5
I like order	1	2	3	4	5
I make a mess of things	1	2	3	4	5

Neuroticism (emotional stability)

	Strongly disagree		Neutral		Strongly agree
I have frequent mood swings	1	2	3	4	5
I am relaxed most of the time	1	2	3	4	5
I get upset easily	1	2	3	4	5
I seldom feel blue	1	2	3	4	5

Vita

Adam Robert Smith was born and raised in Green Bay, Wisconsin. He lived in Tempe, Arizona for several years and attended McKemy Middle School. He graduated from Green Bay Preble High School in 2001. He attended the University of Wisconsin-Platteville and graduated with a Bachelor of Science degree in Psychology with a minor in Business Administration in 2005. He married Amy Sue Walter in 2006 and they have one son, Declan, born in 2013. He began his graduate education at the University of Tennessee (UT) in the Industrial/Organizational Psychology program. In 2008, he transferred to the Organizations & Strategy program. After Dennis Duchon (his first dissertation chair) left UT, he began working with a new dissertation chair, Franz Kellermanns. His Doctor of Philosophy degree in Business Administration from the University of Tennessee was conferred in 2013. Adam will pursue a career in academia, and is currently an Assistant Professor of Management at Indiana University Kokomo.