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Personality and Entrepreneurial Behavior: Relations among Entrepreneurship-Relevant Traits and Entrepreneurial Status, Intentions, and Prior Venture Experiences

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Abstract: Increasing investments in incubators, accelerators, and academia coincide with current and historical perceptions of the United States as a world leader in creating new businesses, as well as an economic force dependent, in part, on entrepreneurship. Research identifies various personality characteristics related to entrepreneurship, however, entrepreneur-specific personality measures have rarely been studied. This study investigates relationships between the 11-factor Entrepreneur Core Characteristics Profile and entrepreneurial outcomes in a sample including students, working adults, and current entrepreneurs. Results expand our understanding of how entrepreneur-specific measures may be useful for predicting entrepreneurial outcomes, with implications for practitioners who work with entrepreneurs.

Keywords: entrepreneurship; personality; entrepreneurial intentions; business sale



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1. Introduction

Entrepreneurship refers to the activities involved in new business venture creation, and entrepreneurs are the individuals engaged in these activities [1]. Entrepreneurship is viewed as an integral part of national economies, especially the American economy, as highlighted by the existence of several widely-cited peer-reviewed research journals dedicated to the topic (e.g., *Entrepreneurship Theory & Practice*, *Journal of Business Venturing*). Further, the U.S. Bureau of Labor Statistics (BLS) labels entrepreneurship as “vital” and provides detailed analyses of trends in business creation and longevity [2]. Economists and sociologists have documented aggregate and immediate conditions that facilitate venture creation (e.g., economic climate), while psychologists have explored individual differences that may influence entrepreneurship. From this individual differences’ perspective, scientists have typically applied broad frameworks like the Big Five model of personality [3] to predict entrepreneurial phenomena (e.g., entrepreneurial intentions and status), rather than contextualized or entrepreneur-specific models of individual differences.

Many research domains within psychology and business are experiencing increased interest in the trait perspective of personality. A framework, variously labeled the Five Factor Model (FFM), or Big Five, guides contemporary trait research and includes: openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism [4]. Multiple meta-analyses have concluded that four of the Big Five (extraversion +, conscientiousness +, neuroticism −, and openness +) and several facet-level traits (e.g., achievement motivation, risk propensity, proactive personality) have small but consistent effects in predicting entrepreneurial intentions and performance [5–7]. While most measures used in previous research assess higher-order factors like the Big Five or more specific traits like risk propensity, few measures were specifically designed with entrepreneurs in mind.

On one hand, entrepreneurship is a complex and somewhat nebulous group of activities that may lend itself to better prediction using broader traits such as the Big Five. Results linking Big Five traits to entrepreneurial intentions and performance have supported the predictive validity of broad personality traits (see [5] for a review). While there have been enough studies to conduct meta-analyses on some narrow traits (i.e., need for achievement [8]), Brandstätter's review concludes that many narrow traits that are theoretically relevant to entrepreneurship have not been studied enough for firm conclusions. Further, some meta-analytic work has classified broad and narrow personality traits from primary studies according to the Big Five framework (i.e., need for achievement, conscientiousness, and responsibility are aggregated to "conscientiousness" [6]) leaving differences in the predictive validity of narrow versus broad traits unexamined.

Scientists have explored measures of narrow personality traits (e.g., proactive personality, [9]) or clusters of narrow traits (e.g., measure of entrepreneurial tendencies and abilities, META [10]) predicting entrepreneurial phenomena beyond measures of the Big Five. The META assessment, although one of the few tailored instruments found in the academic literature for entrepreneurs, remains unpublished (though validation research is underway; see [11]). Indeed, few measures have been published that were developed specifically to measure entrepreneurship-specific personality traits—which may be surprising given the growing interest in personality assessment and trait approaches to entrepreneurship.

Currently, there is no consensus as to the utility of entrepreneur-specific measures developed to describe and predict within the entrepreneurship domain. The present study addresses the lack of empirical evidence for entrepreneur-specific personality measures by examining relationships between the 11-factor Entrepreneur Core Characteristics Profile (ECCP, [12]) and entrepreneurial status (ES; entrepreneur versus non-entrepreneur), entrepreneurial intentions (EI), and previous business sale and failure. Given the increasing prevalence of developmental interventions that include individual assessment to inform coaching, in part, based on personality instruments, examination of entrepreneur-specific personality measures may have implications for the identification, cultivation, and success of potential and nascent entrepreneurs.

ECCP and Hypotheses Development

“... the degree of fit between the founder's personality and the needs of the new venture as it evolves, has a far-reaching impact on whether or not his or her goals are achieved. The key is to understand what personal characteristics are most likely to drive success for your new venture, honestly assess your own personality relative to these characteristics, and decide how to address any significant gaps.” [12] (p. 63)

Person-environment fit generally refers to the level of match or compatibility between individuals and their environment, where the environment can refer to their job (person-job fit), their organization (person-organization fit), or various other targets, and while the scope of these conceptualizations and their measurement are beyond the aims of this paper, it is notable for the increasing attention person-environment fit has garnered over recent decades (see [13] for a review and discussion). Importantly, meta-analytic work, such as that by Kristoff-Brown and colleagues, has demonstrated that fit predicts important work criteria (e.g., commitment, turnover, satisfaction, contextual performance), and entrepreneurship scholars have begun conceptualizing the fit between entrepreneurs and the demands of new venture creation [14].

In his seminal paper proposing the attraction-selection-attrition model, Benjamin Schneider [15] argued that dispositional determinants of individual behavior are also instrumental in creating, shaping, and maintaining the broader organizational behavior of organizational members. Further, Schneider alluded to the importance of a founder's personality in shaping both concrete organizational phenomena (e.g., structures and processes) and more abstract phenomena (e.g., climate and culture). Currently, many theorists that work in the organizational milieu assert that a leader's personality is critical to their own behavior, as well as the behavior of their employees [16–18]. The study of fit, with jobs

or with organizations, has informed the entrepreneurship literature, though the processes involved in entrepreneurial activities can be more varied and dynamic than those of job applicants or incumbent employees in established organizations.

Considering the role of personality and person-environment fit, Bradberry [12] proposed 11 personality characteristics to be typical of successful entrepreneurs, and developed the ECCP to assess those dimensions and facilitate developmental feedback to current and prospective entrepreneurs. These dimensions are listed in Table 1 and taken directly from Bradberry [12] (pp. 63–65). The ECCP has been updated since the publication of Bradberry’s book and thus, current labels were updated as follows: commercial oriented to business oriented, conceptual to inventive, achievement oriented to driven, reliable/focused to reliable, and ethical to principled [19].

Table 1. Definitions for the Entrepreneurial Core Characteristics Profile.

Characteristic	Definition from Bradberry [12]
Business Oriented	They are interested in money and business and are driven to achieve bottom-line profitability. They focus on tapping new revenue opportunities and instilling their startup with financial discipline and cost-containment.
Inventive	They are idea people, continually unearthing new opportunities. They are “emergent learners”, adaptively learning from experience and experimentation. They are intelligent, are able to skillfully deal with ambiguity and complexity, and have the ability to discern useful patterns from large amounts of information.
Independent	They are willing or inclined to strike out on their own. The isolation of entrepreneurship is sometimes inescapable, and every founder must, at times, stand apart from the herd.
Driven	They are passionate, ambitious, competitive, and driven. They love a challenge, enjoy mastering new skills, display a strong work ethic, and set high standards for themselves and others. They are typically bored working for someone else and want to exert control over their environment.
Risk Tolerant	They evaluate and manage calculated risks. They understand that accomplishing significant goals or innovative breakthroughs usually requires risk-taking, but they evaluate the probability and impact of risks and manage accordingly. They show courage in the face of uncertainty, and they distinguish internal feelings of anxiety from more objective measures of actual risk.
Confident	They understand their own abilities and contribution, optimistically but realistically. They are not easily deterred by others’ negativity or criticism, and they demonstrate high self-esteem and possess an internal locus of control, a belief that success will be due largely to their own initiative and efforts rather than to external forces or chance events.
Persuasive	They appeal to others’ motives and values by tuning in to the needs and interests of others and adapting their message and behavior to match.
Resilient	They persistently work to overcome obstacles and do not allow setbacks to derail them. They persevere in the face of adversity.
Reliable	They follow through, delivering on commitments to others, as well as to themselves. This is foundational quality for execution, allowing a founder to gain traction and get things done. In most startup situations, this trait must be balanced with flexibility and openness (see “Conceptual”) in order to adapt to new data and unfolding events.
People Oriented	They value, understand, and leverage people. They possess strong social antennae and are gifted at working a room and building lasting relationships. This quality bundles together a number of related traits (amiability, extroversion, empathy, sociability, etc.) that are shaped and honed through early family and social life, as well as work experience.
Principled	They hold themselves to high personal and professional standards. Words and actions are aligned, forming the cornerstone for building trust and credibility with customers, team members, and partners.

Note. Dimension labels provided in this table reflect current labels [19]. Current labels differ from those in Bradberry [12] as follows: commercial oriented—business oriented, conceptual—inventive, achievement oriented—driven, reliable/focused—reliable, ethical—principled.

Bradberry suggested that ECCP characteristics are not all needed in conjunction with each other, nor do most entrepreneurs possess all of them. However, Bradberry argues that, considering where a startup is (idea phase, launch phase, etc.), the more of these traits that entrepreneurs possess the more likely they are to be successful. For example, there may be social resources, and social skills to execute on those resources, that are required

for entrepreneurs to secure funding [20,21], and empirical research has supported this claim [20,21]. Conversely, these social skills (e.g., interpersonal awareness) may not be important during idea generation.

Investigations of entrepreneurial status (entrepreneur vs. non-entrepreneur) report several factors that reliably distinguish entrepreneurs from non-entrepreneurs. A meta-analysis exploring Big Five differences between managers and entrepreneurs found that entrepreneurs were higher in openness and conscientiousness, while they scored lower on measures of agreeableness and neuroticism [6]. Intuitively, individuals who have created a new venture likely possess a higher inclination toward abstract thinking, imagination, and being open to new experiences (openness) than those who have not. It is important to note, however, that this meta-analysis involved the assignment of many disparate and narrow personality traits (from self-confidence to dependability) to corresponding Big Five categories. Thus, the precision afforded by narrower constructs may be obscured in their aggregation with less relevant constructs within the same conceptual Big Five domain. Alternatively, other meta-analyses that explored narrower personality characteristics have found entrepreneurs to have higher risk propensity [22] and higher achievement motivation than managers [23]. There is inherent risk in creating a new business that may explain differences between entrepreneurs and non-entrepreneurs in risk propensity and risk tolerance. Additionally, the active (versus passive) nature of new venture creation requires proactive behaviors and initiative, especially when translating a possible idea or service into a realized business. Thus, differences between entrepreneurs and non-entrepreneurs in achievement motivation may be a product of the necessity to act on new ideas.

Considering the conceptual overlap between ECCP dimensions and previously studied characteristics, these findings suggest that several ECCP dimensions should distinguish entrepreneurs from non-entrepreneurs. Review of Bradberry's [12] dimensions reveals substantial definitional overlap with personality traits explored in entrepreneur research. Since this study is the first to evaluate the predictive validity of the ECCP dimensions, there are no empirical linkages between these dimensions and other common traits to draw upon. Consequently, a rational approach was used to align ECCP dimensions with these previously studied traits to develop hypotheses. Specifically, we compared (a) Bradberry's [12] definitions (see Table 1) and the ECCP's item content with, (b) adjectives and facets reported or reviewed by trait psychologists Lewis Goldberg [24] and Oliver John and Sanjay Srivastava [25]. Given the semi-orthogonal and reductionist approach of these (and most) trait theorists, it was expected that any single ECCP dimension may overlap with the content of multiple Big Five factors and multiple ECCP dimensions would correspond with any single Big Five factor.

Additionally, a comparative approach was undertaken to compare ECCP dimensions to the most commonly studied personality traits considered distinct from the Big Five: proactive personality, achievement motivation (sometimes included as a facet of conscientiousness), risk propensity, and generalized self-efficacy. Since the aforementioned meta-analytic studies have documented differences between entrepreneurs and non-entrepreneurs on these characteristics, definitions and inclusion criteria from the reviews were compared to ECCP definitions (Table 1) and item content.

Extant literature on personality differences between entrepreneurs and non-entrepreneurs prompt the following hypotheses:

Hypothesis 1 (H1a). *Entrepreneurs will score higher on the inventive dimension than non-entrepreneurs.*

Hypothesis 1 (H1b). *Entrepreneurs will score higher on the risk tolerant dimension than non-entrepreneurs.*

Hypothesis 1 (H1c). *Entrepreneurs will score higher on the independent dimension than non-entrepreneurs.*

Hypothesis 1 (H1d). *Entrepreneurs will score higher on the driven dimension than non-entrepreneurs.*

Hypothesis 1 (H1e). *Entrepreneurs will score higher on the resilient dimension than non-entrepreneurs.*

Hypothesis 1 (H1f). *Entrepreneurs will score higher on the confident dimension than non-entrepreneurs.*

Hypothesis 1 (H1g). *Entrepreneurs will score higher on the business oriented dimension than non-entrepreneurs.*

The hypotheses above are suggested by previous literature and conceptual links between established predictors of entrepreneurial status and ECCP dimensions that appear related to multiple predictors (e.g., independent, driven, risk tolerant). However, the remaining ECCP dimensions do not share as many of these conceptual links to previously researched traits, so there is less basis for hypothesizing specific relations. Therefore, the remaining dimensions will be examined in exploratory fashion, as follows:

Research Question 1: Do reliable, people oriented, principled, and persuasive scores differ between entrepreneurs and non-entrepreneurs?

Research Question 2: Do reliable, people oriented, principled, and persuasive scores predict entrepreneur status beyond the seven other dimensions?

The ECCP was developed and intended for feedback regarding all eleven factors, so its ability to predict phenomena as a whole is important. It is also informative, however, to explore which dimensions contribute most to predicting entrepreneur status. Since the importance of predictors may change across entrepreneurial status, intentions, and experience, providing a test of each dimension's relative contribution will provide a more complete understanding of ECCP—entrepreneurship relationships. Given that all dimensions were created to describe entrepreneurially relevant characteristics, correlations among ECCP scales may limit inferences regarding the relative importance of individual predictors in multiple regression models. As an alternative, Tonidandel and LeBreton [26] recommend Relative Weights Analysis (RWA) to circumvent the limitations associated with multiple regression by offering more precise estimates of unique variance explained by the predictor variables. Therefore, this study also asks:

Research Question 3: Which ECCP dimensions are the most predictive of entrepreneurial status?

Another potential application of the ECCP is identifying those that intend to start a business. The term “entrepreneurial intentions” has been variously applied to situations as different as desire to someday own a business [27] and preference for self-employment [28], however, here the term entrepreneurial intentions (EI) is operationalized by individuals who positively endorse “considering starting a new business”. Research on personality and EI is plentiful, due in parts to (a) resurgence from the trait perspective, (b) the necessity of EI preceding actual venture creation, and (c) robust evidence regarding intentional models of entrepreneurship (e.g., Theory of Planned Behavior [29,30]).

A quantitative review from Zhao, Seibert, and Lumpkin [7] reported the Big Five personality factors contributed to 13% of the variance explained in EI and 10% of variance in performance (broadly: growth, failure, success, survival) with conscientiousness and openness having the strongest relationships. A review of personality-entrepreneurship meta-analyses by Brandstätter [5] also concluded that conscientiousness, openness, and extraversion were all positively related, and neuroticism negatively related, to EI and entrepreneurial performance. Additionally, several narrower traits have been explored in relation to EI and performance. Risk propensity has been positively linked to EI but not entrepreneurial performance [7], while research has found achievement motivation to be related to both EI and entrepreneurial performance [31]. Proactive personality, the propensity for an individual to identify and act on opportunities to influence their environment, has been linked to EI [27] and performance [8]. Stress tolerance has also been linked to entrepreneurial success, however, its relationship with entrepreneurial intentions is less clear [8]. Rauch and Frese's meta-analysis also found need for achievement, self-efficacy, innovativeness, and need for autonomy to be related to intentions and performance.

Considering the conceptual definitions in Table 1 and the empirical findings of previous research, the following predictions are made:

Hypothesis 2 (H2a). *Risk tolerant will be positively related to entrepreneurial intentions.*

Hypothesis 2 (H2b). *Independent will be positively related to entrepreneurial intentions.*

Hypothesis 2 (H2c). *Inventive will be positively related to entrepreneurial intentions.*

Hypothesis 2 (H2d). *Resilient will be positively related to entrepreneurial intentions.*

Hypothesis 2 (H2e). *Confident will be positively related to entrepreneurial intentions.*

Hypothesis 2 (H2f). *Driven will be positively related to entrepreneurial intentions.*

Hypothesis 2 (H2g). *Business oriented will be positively related to entrepreneurial intentions.*

Two research questions are proposed to examine, (a) incremental validity of the four ECCP dimensions reflecting previously unstudied traits, and (b) the relative contribution of each predictor to EI.

Research Question 4: Do scores on the reliable, people oriented, principled, and persuasive dimensions predict entrepreneurial intentions beyond the other eight dimensions?

Research Question 5: Which ECCP dimensions are the most predictive of entrepreneurial intentions?

Another possible application of the ECCP is to describe profiles of individuals who have created a venture and sold it, as well as those who have owned a business that failed. Although selling a business could be considered success or a level of performance, we instead consider selling a business and owning a business that failed to be experiences that warrant attention in their own right. While entrepreneur success and performance, broadly considered, have been predicted with personality traits, the heterogeneity of success/performance measures prompt the current study to approach prediction in an exploratory fashion, and with the caveat that the outcomes being “predicted” are being measured retrospectively, asking the following:

Research Question 6a: Does the ECCP predict having previously sold a business?

Research Question 6b: What ECCP dimensions are predictive of having previously sold a business?

Research Question 7a: Does the ECCP predict previous business failure?

Research Question 7b: Which ECCP dimensions are predictive of previous business failure?

2. Materials and Methods

2.1. Participants and Procedure

The data for the current study was obtained from Entrepreneurial Performance Labs (EPL), whereby participants ($n = 1938$) were recruited from multiple sources and included: students enrolled in entrepreneurship classes at multiple universities across the eastern United States, adults recruited from Amazon’s Mechanical Turk (mTurk) and Craigslist, and current entrepreneurs participating in developmental programs. Participants ranged from 17 to 81 years of age ($M = 27.7$, $SD = 11.7$), with male (54%) and white (80%) being the most frequently reported demographics. It is important to note that students were sometimes currently engaged in entrepreneurial activities and current entrepreneurs may have been enrolled in coursework at the time. Therefore, the distinction between entrepreneurs and potential entrepreneurs made in this study is delineated by an entrepreneur reporting one or more of the following characteristics: currently owns a business, previously sold a business, or previously had a business fail. All data were collected via internet-based forms.

2.2. Measures

2.2.1. Personality

Entrepreneurial personality characteristics were measured using the Entrepreneur Core Characteristics Profile (ECCP [19]). This measure is a proprietary, commercially available instrument developed specifically for measuring personality characteristics of current and prospective entrepreneurs, for the purpose of providing developmental feedback. As mentioned previously, the 11 dimensions were theorized by Bradberry [12] to influence entrepreneur success, and in developmental settings participants receive advice on how to leverage their personality dispositions in entrepreneurial settings, and how to avoid any counterproductive implications. The ECCP contains 70 items, ranging from five to seven items per dimension. Participants respond to each item on a five-point scale ranging from “not at all like me” to “exactly like me.” Coefficient alpha reliability estimates for the 11 scales ranged from 0.56 to 0.76, and are reported in Table 2.

Table 2. Intercorrelations Among Study Variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Age	-																
2. Gender	-0.07*	-															
3. ES	0.30*	0.11*	-														
4. EI	-0.10*	0.10*	0.01	-													
5. Previous Sale	0.16*	0.10*	0.39*	0.04	-												
6. Previous Failure	0.13*	0.11*	0.41*	0.14*	0.20*	-											
7. Reliable	-0.05*	-0.16*	-0.06*	0.02	-0.02	-0.05*	0.76										
8. Inventive	0.12*	0.06*	0.20*	0.12*	0.07*	0.04	0.13*	0.65									
9. Risk Tolerant	0.06*	0.26*	0.25*	0.18*	0.14*	0.10*	0.02	0.52*	0.60								
10. Resilient	0.02	0.14*	0.15*	0.09*	0.09*	0.00	0.30*	0.51*	0.48*	0.68							
11. Confident	0.11*	0.05*	0.18*	0.08*	0.07*	0.02	0.30*	0.25*	0.33*	0.46*	0.69						
12. Driven	-0.13*	0.05*	0.08*	0.09*	0.06*	-0.02	0.39*	0.46*	0.41*	0.49*	0.38*	0.68					
13. People Oriented	-0.03	-0.05*	0.06*	0.04	0.02	-0.01	0.18*	0.42*	0.32*	0.44*	0.30*	0.39*	0.58				
14. Principled	0.22*	-0.16*	0.08*	0.01	0.03	0.03	0.40*	0.29*	0.14*	0.31*	0.24*	0.35*	0.37*	0.56			
15. Business Oriented	0.00	0.28*	0.25*	0.18*	0.15*	0.09*	0.08*	0.50*	0.56*	0.41*	0.23*	0.39*	0.25*	0.07*	0.76		
16. Persuasive	-0.03	0.06*	0.15*	0.08*	0.08*	-0.01	0.25*	0.50*	0.46*	0.51*	0.42*	0.56*	0.57*	0.28*	0.46*	0.65	
17. Independent	0.16*	0.16*	0.31*	0.16*	0.14*	0.11*	0.10*	0.54*	0.62*	0.48*	0.48*	0.47*	0.33*	0.24*	0.48*	0.53*	0.66

Note. * denotes statistically significant correlations ($p < 0.05$). Correlations among continuous variables were calculated using Pearson’s product moment, while correlations involving dichotomous variables were calculated as point-biserial correlations. Values along the diagonal are coefficient alpha.

Entrepreneur biographical and attitudinal data were measured using a checklist format, with participants instructed to “check all that apply.” Participants reported current work status (work for a company, own my own business), past business sale, past business failure, and entrepreneurial intentions. Note that, although some items referred to events that occurred in the past, we use the word “predict” below for simplicity and consistency with traditional regression-oriented terminology.

2.2.2. Entrepreneurial Status

Participants were classified as entrepreneurs if they responded yes to “Do you currently own a business?”. “Have you started and sold one or more businesses in the past?” or “Have you owned a business that failed in the past?”.

2.2.3. Entrepreneurial Intentions

A single item asked, [are you] “considering starting a new business?”.

2.2.4. Previous Business Sale

A single item asked, [have you] “started and sold one or more businesses in the past?”.

2.2.5. Previous Business Failure

A single item asked, [have you] “owned a business that failed in the past?”.

2.2.6. Demographics

Age and gender data were also collected from participants for both descriptive, as well as inferential purposes. Specifically, age and gender have been previously found to

be related to entrepreneurship phenomena [27,32] [32] and were therefore used as control variables in our predictive analyses.

3. Results

Several analytic techniques were used to test hypotheses and research questions. Specifically, mean differences between entrepreneurs and non-entrepreneurs were tested with multivariate analysis of variance (MANOVA; Hypotheses 1a–g, research question 1), the predictive and incremental validities of ECCP dimensions were tested using hierarchical logistic regression (Hypotheses 2a–g, research questions 2, 4, 6a, and 7a) and relative weights analysis (RWA) was used to examine the relative importance of predictors on outcome variables (research questions 3, 5, 6b, and 7b).

3.1. Mean Differences between Entrepreneurs and Non-Entrepreneurs

Mean differences across all personality characteristics were calculated to test hypotheses 1a–g. Individuals reporting current or past business creation were coded as entrepreneurs ($n = 410$) and all others were coded as non-entrepreneurs ($n = 1517$).

Results from MANOVA substantiated differences between entrepreneurs and non-entrepreneurs on the hypothesized seven ECCP dimensions as a whole ($F(7, 1919) = 39.15$, $p < 0.01$; $\eta^2 = 0.13$). Planned univariate comparison tests provided support for hypotheses 1a–g, with entrepreneurs scoring higher on inventive ($F(1, 1926) = 79.39$, $p < 0.01$), risk tolerant ($F(1, 1926) = 128.92$, $p < 0.01$), independent ($F(1, 1926) = 197.84$, $p < 0.01$), driven ($F(1, 1926) = 11.24$, $p < 0.01$), resilient ($F(1, 1926) = 42.78$, $p < 0.01$), confident ($F(1, 1926) = 66.79$, $p < 0.01$), and business oriented ($F(1, 1926) = 128.30$, $p < 0.01$) dimensions than non-entrepreneurs.

Research Question 1 asked whether the four previously unresearched dimensions, for which hypotheses were not developed, differ between entrepreneurs and non-entrepreneurs. Although there was no theoretical basis for a test of group differences on these four dimensions as a whole, a MANOVA did reveal overall group differences ($F(4, 1922) = 18.74$, $p < 0.01$; $\eta^2 = 0.04$). Results of univariate comparisons revealed that entrepreneurs scored higher on people oriented ($F(1, 1926) = 8.01$, $p < 0.01$), persuasive ($F(1, 1926) = 41.81$, $p < 0.01$), and principled dimensions ($F(1, 1926) = 11.70$, $p < 0.01$) while non-entrepreneurs scored higher on the reliable dimension ($F(1, 1926) = 5.98$, $p < 0.05$). The results of the mean difference comparisons between entrepreneurs and non-entrepreneurs are shown in Table 3.

Hypotheses 2a–g predicted that risk tolerant, independent, inventive, resilient, confident, driven, and business oriented dimensions would be positively related to entrepreneurial intentions. Correlations between these dimensions and EI were positive and significant, providing support for Hypotheses 2a–g (see Table 2). Results of a MANOVA, and subsequent univariate comparisons, provided further support for Hypotheses 2a–g as those with entrepreneurial intentions had higher scores on the hypothesized seven dimensions compared to those not reporting entrepreneurial intentions ($F(7, 1910) = 12.92$, $p < 0.01$; $\eta^2 = 0.05$). Among dimensions for which hypotheses were not developed, only persuasive shared a significant correlation with EI ($r = 0.08$, $p < 0.05$) and a small, but statistically significant, mean difference between those reporting EI ($M = 3.02$) and those not reporting EI ($M = 2.90$).

Results from mean difference tests revealed that entrepreneurs differed from non-entrepreneurs on 11 of the 11 ECCP dimensions and individuals reporting EI differed from those not reporting EI on 8 of the 11 ECCP dimensions. Next, logistic regression was used to regress our dichotomous outcome variables (ES, EI, previous sale, and previous failure) on ECCP dimensions in order to investigate the predictive validity of the measure. Further, a hierarchical approach was used to examine incremental validity of the four dimensions predicting ES and EI beyond the hypothesized seven.

Table 3. ECCP Characteristics' Means, Standard Deviations, and Cohen's d.

ECCP Characteristics	Total (n = 1927)			Entrepreneur (n = 410)			Non-Entrepreneur (n = 1517)			d
	M	SD	SE	M	SD	SE	M	SD	SE	
Reliable	2.974	0.617	0.01	20.908	0.628	0.03	20.992	0.613	0.02	−0.135 *
Inventive	2.640	0.669	0.02	20.896	0.630	0.03	20.571	0.662	0.02	0.503 **
Risk Tolerance	2.460	0.613	0.01	20.755	0.569	0.03	20.380	0.600	0.02	0.641 **
Resilient	2.654	0.615	0.01	20.828	0.591	0.03	20.607	0.613	0.02	0.367 **
Confident	3.098	0.616	0.01	30.315	0.524	0.03	30.040	0.626	0.02	0.476 **
Driven	3.247	0.558	0.01	30.329	0.514	0.03	30.225	0.567	0.01	0.192 **
People Oriented	2.796	0.578	0.01	20.867	0.571	0.03	20.776	0.579	0.01	0.158 *
Principled	3.192	0.544	0.01	30.274	0.530	0.03	30.170	0.546	0.01	0.193 *
Business Oriented	2.040	0.857	0.02	20.452	0.826	0.04	10.929	0.831	0.02	0.631 **
Persuasive	2.934	0.609	0.01	30.104	0.594	0.03	20.887	0.605	0.02	0.360 *
Independent	2.785	0.592	0.01	30.132	0.496	0.02	20.691	0.581	0.01	0.783 **

* $p < 0.05$ ** $p < 0.01$.

3.2. Hierarchical Logistic Regression

Research Question 2 asked whether reliable, people oriented, principled, and persuasive dimensions predict entrepreneurial status beyond the seven previously researched dimensions (for which hypotheses were formed). Hierarchical logistic regression was performed in order to examine the predictive and incremental validity of the ECCP dimensions (see Table 4). First, control variables (age and gender) and the seven hypothesized dimensions were entered in step one and the remaining four entered in step two. The variables entered in the first step predicted a significant portion of variance in entrepreneurial status ($\chi^2 = 343.44$, $p < 0.01$, classification accuracy = 81%), but the four remaining dimensions did not demonstrate incremental validity beyond the hypothesized seven dimensions ($\Delta\chi^2 = 7.86$, $p > 0.05$, classification accuracy = 81.1%).

Table 4. Logistic Regression Analyses Predicting Entrepreneurial Status.

	b	Odds Ratio	Wald	SE	Full Model	b	Odds Ratio	Wald	SE	Full Model
Age	0.05	1.06	106.98 *	0.01		0.05	1.05	93.34 *	0.01	
Gender	0.30	1.35	4.56 *	0.14		0.23	1.26	2.55	0.14	
Reliable						−0.30	0.74	5.93 *	0.12	
Inventive	0.06	1.06	0.17	0.13		0.08	1.08	0.31	0.14	
Risk Tolerant	0.30	1.35	3.91 *	0.15		0.25	1.29	2.73	0.15	
Resilient	−0.13	0.88	0.85	0.14		−0.04	0.97	0.06	0.15	
Confident	0.31	1.36	4.99 *	0.14		0.40	1.49	7.80 *	0.14	
Driven	−0.42	0.66	7.46 *	0.16		−0.28	0.75	2.88	0.17	
People Oriented						−0.13	0.88	0.78	0.15	
Principled						0.02	1.02	0.02	0.15	
Business Oriented	0.51	1.67	25.87 *	0.10		0.54	1.71	26.98 *	0.10	
Persuasive						−0.06	0.94	0.16	0.16	
Independent	0.91	2.48	27.92 *	0.17		0.87	2.38	24.92 *	0.17	
Nagelkerke R ²					0.28					0.29
Classification					81%					81.1%
χ^2					373.44 *					381.29 *
$\Delta\chi^2$										7.86

* $p < 0.05$.

Research question 4 asked whether the reliable, people oriented, principled, and persuasive dimensions predict EI beyond the hypothesized seven dimensions (hypotheses 2a-g; Research Question 3 is discussed below). Hierarchical logistic regression procedures were used with control variables and the seven dimensions entered first, and the remaining four entered second (see Table 5). Although the seven dimensions and control variables predicted a statistically significant portion of variance in EI ($\chi^2 = 113.22$, $p < 0.05$, classification accuracy = 73.6%), only age, risk tolerant, business oriented, and independent were significant predictors in the first model. Entering the remaining four dimensions in step two did not significantly improve the predictive validity of the model ($\Delta\chi^2 = 7.59$, $p > 0.05$, classification accuracy = 73.9%), thereby failing to establish the incremental validity of the remaining four dimensions.

Table 5. Logistic Regression Analyses Predicting Entrepreneurial Intentions.

	<i>b</i>	Odds Ratio	Wald	SE	Full Model	<i>b</i>	Odds Ratio	Wald	SE	Full Model
Age	−0.03	0.97	29.02 *	0.01		−0.03	0.97	31.35 *	0.01	
Gender	0.16	1.17	1.87	0.12		0.15	1.16	1.49	0.12	
Reliable						0.04	1.04	0.16	0.11	
Inventive	0.11	1.12	1.00	0.11		0.16	1.17	1.79	0.12	
Risk Tolerant	0.34	1.41	6.96 *	0.13		0.38	1.46	8.30 *	0.13	
Resilient	−0.12	0.89	0.99	0.12		−0.08	0.92	0.48	0.12	
Confident	0.07	1.07	0.38	0.11		0.10	1.10	0.75	0.11	
Driven	−0.19	0.82	2.28	0.13		−0.17	0.84	1.49	0.14	
People Oriented						−0.12	0.89	0.92	0.12	
Principled						0.13	1.13	1.01	0.12	
Business Oriented	0.23	1.25	7.32 *	0.08		0.26	1.29	9.07 *	0.09	
Persuasive						−0.26	0.77	3.54	0.14	
Independent	0.37	1.45	6.90 *	0.14		0.41	1.51	8.20 *	0.14	
Nagelkerke R^2					0.09					0.09
Classification					73.6%					73.9%
χ^2					113.22 *					120.81 *
$\Delta\chi^2$										7.59

* $p < 0.05$.

Research questions 6a and 7a asked whether ECCP dimensions predicted previous business sale and failure, respectively. Since no hypotheses were made regarding specific dimensions, control variables were entered at step one and all ECCP dimensions were entered at step two. Results from logistic regression analyses supported the ECCP's predictive validity in relation to previous business sale, with age and gender predicting 12% of variance in step one ($\chi^2 = 65.72$, $p < 0.01$) and the full model (age, gender, and ECCP dimensions) predicting 20% of variance in step two ($\Delta\chi^2 = 43.85$, $p < 0.05$). Similarly, ECCP's predictive validity in relation to previous business failure was also supported, with age and gender predicting 9% of variance in step one ($\chi^2 = 52.53$, $p < 0.01$) and the full model predicting 15% of variance in step two ($\Delta\chi^2 = 33.12$, $p < 0.05$). Predictive accuracy rates varied little between models due to the skewed distributions in previous business sale and failure, and are therefore not reported here. For instance, ignoring study variables and predicting all cases to have not sold would correctly classify/hit 96.1% of cases. Adding the study variables did not change classification accuracy, as the accuracy rate with all ECCP dimensions and control variables was also 96.1%. Additionally, the classification accuracy for all models predicting previous business failure were 95.8%.

3.3. Relative Weights Analysis

Although multiple regression can identify statistically significant predictors of a criterion and estimate the proportion of variance explained by a set of predictors, regression

coefficients are not reliable indicators of the relative importance of individual predictors when the predictors are correlated [33]. Specifically, correlation among predictor variables can bias both the standardized beta coefficients and, by extension, individual estimates of variance explained (R^2), thereby limiting inferences drawn from regression analyses [34]. Similarly, correlation among dependent variables can limit inferences drawn from MANOVA [35].

Relative weights analysis addresses this limitation, and provides unbiased estimates of each predictor's contribution to the total R^2 , by sequentially (a) transforming predictors into orthogonal variables, (b) regressing the criterion on these orthogonal variables, and (c) transforming the resulting standardized beta coefficients into the original variables' metric. Resulting relative weight estimates are typically reported as the percent of total model R^2 explained by each predictor variable, and results are presented in such fashion in the current study. Thus, relative weights, as percentages, will sum to 100% for each criterion. Provided the distinctions and differing goals of regression and RWA, they allow us to ask different questions with the data. For RWA that question is which predictors have unique variance that contributes to the variance explained in our outcomes when controlling for the shared variance between the predictors.

Given that the current study measured constructs that are theoretically related, relative weights analysis was used to compare the relative importance of each predictor, or its relative contribution, in predicting entrepreneurship. Software and procedures outlined by Tonidandel and LeBreton [36] were used to estimate relative weights, confidence intervals, and proportion of variance explained.

Research questions 3, 5, 6b, and 7b asked which of the ECCP's eleven dimensions are most predictive of ES, EI, previous sale, and previous failure, respectively. Table 6 shows the results of the RWAs for each outcome, displaying the percentage of total variance explained (R^2) attributable to each predictor and control variable.

Table 6. Relative Importance as Percentage of Total Model R^2 .

	Entrepreneurial Status	Entrepreneurial Intentions	Previous Business Sale	Previous Business Failure
Age	28.24% *	26.42% *	22.31% *	17.21% *
Gender	3.24% *	5.81% *	16.95% *	23.82% *
Reliable	2.46%	0.19%	1.18%	2.97%
Inventive	5.38% *	6.94% *	2.17%	2.62%
Risk Tolerant	10.02% *	18.43% *	10.92%	12.16%
Resilient	2.45% *	2.07%	4.09%	2.75%
Confident	7.36% *	2.38%	1.59%	1.16%
Driven	1.76%	1.87%	3.15%	4.36%
People Oriented	0.63%	0.70%	0.89%	1.09%
Principled	0.96%	0.64%	0.89%	2.00%
Business Oriented	15.38% *	17.79% *	24.44% *	9.97%
Persuasive	2.55% *	1.93%	2.97%	4.50%
Independent	19.57% *	14.84% *	8.43%	15.38% *
R^2	0.21 *	0.06 *	0.07 *	0.06 *

* values which relative weights' 95% confidence intervals did not include 0.

Percentages of accounted variance are displayed (columns sum to 100%). Raw relative weights and confidence intervals are available from the first author upon request.

Research question 3, which asked which dimensions were most predictive of ES, was examined with relative weights analysis. Independent (19.6% of R^2), business oriented (15.4%), and risk tolerant (10%) dimensions contributed most to predicting entrepreneurial status. All of the seven hypothesized dimensions, except driven, were significant, and of the four remaining ECCP dimensions (reliable, people oriented, principled, and persuasive), only persuasive (2.6%) was identified as a statistically significant predictor of ES.

Research question 5 asked which dimensions were most predictive of EI. Table 6 shows that risk tolerant (18.4% of R^2), business oriented (17.8%), independent (14.8%), and inventive (6.9%) were the predictors contributing the most to the model R^2 .

Research question 6b asked which dimensions were most predictive of previous sale of a business. Results indicated that business oriented (24.4% of R^2) was the only significant predictor. Research question 7b asked which dimensions were most predictive of previous business failure, and results indicated that independent (15.4% of R^2) was the only significant predictor and was positively related to failure. Although previous sale and failure were both low variance outcomes, risk tolerant, business oriented, and independent dimensions accounted for 43.8% and 37.5% of the variance explained in sale and failure, respectively.

4. Discussion

The primary goal of this study was to examine evidence for the predictive validity of the ECCP. Hypotheses were constructed by integrating Bradberry's [12] conceptualization of core entrepreneurial personality traits with previous scholarly work in personality and entrepreneurship literatures. Additionally, several research questions were posited to address areas that were not immediately informed by previous theory and empirical work. Collectively, results demonstrated the usefulness of ECCP dimensions in predicting each of the outcomes in this study. A strength of the current study is that our sample included a diverse representation of non-entrepreneurs, as well as current and prospective entrepreneurs; previous research has tended to focus on individuals already in entrepreneurial and managerial roles.

Entrepreneurs differed from non-entrepreneurs on all 11 dimensions of the ECCP, with entrepreneurs scoring higher on every dimension except reliable. In retrospect, given the implications of the reliable dimension for a preference for structure and predictability, a negative relation with entrepreneurial behavior makes some sense. While mean differences were notably small for reliable and principled dimensions, differences in business oriented, risk tolerant, and independent dimensions were quite large. This may be expected given the centrality of business activities in creating a new venture and the autonomous and risky nature of "striking out on one's own." Indeed, risk taking, initiative, and autonomy are perhaps the dispositions most commonly posited to predict entrepreneurial behavior [5,37].

As hypothesized, the ECCP was found to predict the intention to start a new business (EI). Although we did not look at particular subgroups in our sample (e.g., previous versus nascent entrepreneurs), the finding that several ECCP characteristics were predictive of EI in the aggregate suggests that the ECCP may be a useful tool for understanding the dispositional antecedents of intentions within a heterogeneous population.

In addition to two commonly studied entrepreneurship variables, status and intentions, our research contributes to extant literature by examining relationships between ECCP characteristics and previous business sale and failure. Researchers have previously linked personality traits to business creation and indicators of performance, such as firm growth and profitability [7], although increasing attention is being given to serial entrepreneurs and the effect of previous experiences on future behaviors.

Our findings indicate that the business oriented dimension explained the most variance in whether an individual had previously sold a venture. It is unclear whether business orientation had a causal effect on business sale; however, the strong linkages between business oriented scores and both status and intentions suggest that individuals reporting higher preference for business involvement and activities were more likely to engage, or be engaged, in entrepreneurial behavior and sell a business. Alternatively, individuals high in business orientation could also be more likely to sell a start-up than maintain ownership compared to their less business oriented peers. Attraction to the activities and environment of business creation may motivate individuals to sell and pivot for another opportunity, whereas those attracted to the activities and environment of idea creation and development may be more easily satisfied by continuing to build their initial venture. Although speculative, this interpretation is further supported by the finding that while the inventive characteristic was predictive of ES and EI, it was not predictive of business sale.

Aside from the independent dimension, ECCP characteristics did not appear to predict previous business failure. Extant research linking personality traits and entrepreneurs' business failures is notably sparse, as most studies have examined business failure as an antecedent of subsequent entrepreneur behavior and/or attitudes (see [38] for a review). There are many factors that can influence business failure, from political and economic climates to the innovation of competitors; however, there are similarly manifold reasons why a business could be sold. Nevertheless, one possible reason that the independent dimension predicted previous business failure is that individuals who most prefer independence and autonomy may be less likely to bring in outside help. If a current business owner highly values independence, she may be less likely to exit the venture via sale.

5. Conclusions

Research has routinely used the Big Five framework to (a) document differences between entrepreneurs and non-entrepreneurs [6], and (b) predict entrepreneurial intentions and success [7]. Although narrower traits, such as risk propensity [22], have been examined, the personality-entrepreneurship literature has produced calls for more research on narrower and entrepreneurially relevant personality constructs as they relate to entrepreneurship [5]

Rauch and Frese's [8] meta-analysis had expert raters classify personality traits as entrepreneurially relevant (e.g., need for autonomy) or unrelated to entrepreneurship, and their results supported the higher validity of relevant traits over irrelevant traits in predicting entrepreneurial status and business success (via an amalgamation of self-report and objective criteria). Nevertheless, Rauch and Frese's method was a post hoc classification of previously studied traits as relevant or not to entrepreneurs, many of which were conceptualized and developed independent of entrepreneurial relevance (e.g., stress tolerance and locus of control).

The aim of our study was to examine the relationship between personality traits, developed specifically with entrepreneurship in mind, and entrepreneurial phenomena. Using data collected from multiple sources over a period of several years, results supported relations between ECCP dimensions and entrepreneurial status, entrepreneurial intentions, previous sale, and previous failure of a business.

6. Limitations and Future Research

The fluid nature of entrepreneurial activity is a notable difficulty in defining, measuring, and predicting entrepreneurial behavior. Consequently, several judgments were made in the current study that could have affected our results. First, in classifying entrepreneurs versus non-entrepreneurs the decision was made to include individuals that (a) currently own a business, and/or (b) have started a business in the past as entrepreneurs. Since our study focused on predicting who would engage in the definitive entrepreneurial behavior, starting a business, we chose this inclusive criterion. It is entirely possible, and indeed likely, that the influence of personality on entrepreneurship waxes and wanes with where an individual is in the entrepreneurial cycle, however, we had no basis for predicting differences between entrepreneurs currently operating a business and entrepreneurs not currently operating a business. Further, supplemental analyses comparing our inclusive operationalization of entrepreneur (current or past) versus only current entrepreneurs revealed nearly identical results. Considering the scope of our study, questions regarding these differences are better served by research that can examine the innumerable external influences on entrepreneurial behavior. Additionally, the sample examined here was mostly white (80%) with males slightly over-represented (54%), so further research is needed to establish whether the relations identified here will hold in more diverse samples.

Another limitation of the current study was the use of dichotomous outcomes, which could have attenuated variance and made small effects more difficult to detect. Although it can be argued that some of the study variables, like whether one has ever started or sold a business, or had one fail, are truly dichotomous, other study variables, such as

entrepreneurial intentions, might be better measured as continuous dimensions. One implication of this limitation might be that we can have relatively more confidence in the findings of “some relation” than in the findings of “no relation”, since the dichotomous outcome variables were more likely to lead to Type II errors than Type I. We encourage future researchers to investigate the personality dimensions studied here with more continuous or ordinal outcome variables. We should also note that we employed an alpha level for statistical significance of $p < 0.05$ for all hypothesis tests, rather than controlling Type I error study-wise by dividing the alpha level by the number of tests performed. Applying such a correction for, say, the 11 dimension tests would have yielded an alpha level of $p < 0.0045$ to be required for significance, dramatically reducing statistical power. Our choice to control Type I error comparison-wise meant that we accepted a 0.55 probability of at least one Type I error for every 11 significance tests. However, most of the effects found were actually significant at far below the 0.05 level, so we do not believe Type I error to have been a major concern with our results.

One potentially fruitful avenue for the study of entrepreneur personality is finer-grained consideration of the entrepreneurial cycle and how entrepreneurship-relevant traits like those measured by the ECCP relate to entrepreneur and business outcomes. That is, it is possible and perhaps likely [12] that the influence of certain characteristics on entrepreneur behavior and business outcomes is moderated by the specific tasks and goals that are currently salient, or by current environmental conditions. For example, during times of economic uncertainty and high unemployment, risk tolerance may be even more predictive of EI as the perceived risk and desirability of business creation and self-employment varies. Further, although this may be true for individuals that are currently employed, risk tolerance may be a less important factor for those that are unemployed [39].

Similarly, the role of individual differences in entrepreneur behavior post-failure could be another valuable line of research with practical implications for fostering business creation. Research is increasingly addressing the consequences of business failure for entrepreneurs (e.g., [38]) and the influence of entrepreneur-specific personality constructs in the process of recovery may shed further light on how developmental programs and coaching may be tailored to assist nascent and serial entrepreneurs. In sum, nuanced investigations that can examine particular contexts may provide useful policy recommendations for handling economic recessions with targeted interventions.

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