

# Towards More Specific Personality Research in Entrepreneurship: Relating Conscientiousness Facets to Venture Performance



Hacia una investigación de personalidad más específica en el emprendimiento: relacionando facetas de la responsabilidad con el desempeño empresarial

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Francisco J. Conejo<sup>1</sup>  
Jiban Khuntia<sup>2</sup>  
Madhavan Parthasarathy<sup>3</sup>

1. Associate Professor of Marketing, INCAE Business School, Alajuela, Costa Rica, [francisco.conejo@incae.edu](mailto:francisco.conejo@incae.edu), <https://orcid.org/0000-0001-8489-7107>
2. Associate Professor of Information Systems, Health Administration, & Managing for Sustainability, University of Colorado, Denver, United States, [jiban.khuntia@ucdenver.edu](mailto:jiban.khuntia@ucdenver.edu), <https://orcid.org/0000-0002-8280-3231>
3. Professor of Marketing and Entrepreneurship, University of Colorado, Denver, United States, [madhavan.parthasarathy@ucdenver.edu](mailto:madhavan.parthasarathy@ucdenver.edu), <https://orcid.org/0000-0001-8865-8840>

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## ABSTRACT

**Purpose.** The literature has long recognized the importance of the conscientious entrepreneurial personality. This study explores how seven of its facets/sub-dimensions (*Achievement-Striving, Efficiency, Responsibility, Industriousness, Self-Control, Conventionality, and Persistence*) relate to three performance outcomes (*Ventures Started, Years at Current Venture, and Annual Sales*).

**Design/methodology/approach.** 166 active entrepreneurs were surveyed via an entrepreneurship center at a Western US university. Data was then modeled via Ordinary Least Squares to obtain regression estimates for the dependent variables.

**Findings.** Counter to expectations, results indicate that facet measures relate very differently in terms of magnitude, direction, and significance to the performance outcomes. These more nuanced relations are lost when using broad/aggregate dimensional measures.

**Research implications.** Broad personality measures, as conventionally used, are suboptimal for entrepreneurial research as they potentially yield misleading results. Studies should instead apply the more-specific facet measures, which offer more accurate personality assessments.

**Practical implications.** Practitioners should also use the more-specific facet measures. Doing so will be of value across a variety of public, private, and educational settings.

**Originality/Value.** For decades, entrepreneurship has addressed the effects of broad/aggregate personality dimensions. This article is the first to approach the entrepreneurial personality from a more-specific facet level, an approach offering substantial research opportunities.

## RESUMEN

**Propósito.** La literatura ha reconocido desde hace mucho tiempo la importancia de la personalidad emprendedora consciente. Este estudio explora cómo siete de sus facetas o subdimensiones (*Búsqueda de logros, Eficiencia, Responsabilidad, Dedicación, Autodisciplina, Convencionalidad y Persistencia*) se relacionan con tres resultados de desempeño (*Empresas iniciadas, Años en la empresa actual y Ventas anuales*).

**Diseño/metodología/enfoque.** Se encuestó a 166 emprendedores activos a través de un centro de emprendimiento en una universidad del oeste de Estados Unidos. Los datos se modelaron utilizando Mínimos Cuadrados Ordinarios para obtener estimaciones de regresión para las variables dependientes.

**Hallazgos.** Contrariamente a las expectativas, los resultados indican que las medidas de las facetas se relacionan de manera muy diferente en términos de magnitud, dirección y significancia para los resultados de desempeño. Estas relaciones más sutiles se pierden al utilizar medidas dimensionales amplias/agregadas.

**Implicaciones para la investigación.** Las medidas amplias de personalidad, como se utilizan convencionalmente, son subóptimas para la investigación empresarial, ya que pueden generar resultados engañosos. En cambio, los estudios deberían utilizar medidas de facetas más específicas, que ofrecen evaluaciones de personalidad más precisas.

**Implicaciones prácticas.** Los profesionales también deben utilizar medidas de facetas más específicas. Hacerlo será valioso en una variedad de entornos públicos, privados y educativos.

**Originalidad/Valor.** Durante décadas, el emprendimiento ha abordado los efectos de las dimensiones amplias/agregadas de la personalidad. Este artículo es el primero en abordar la personalidad emprendedora desde un nivel de faceta más específico, un enfoque que ofrece importantes oportunidades de investigación.

## KEYWORDS:

ENTREPRENEUR, PERSONALITY, BIG FIVE, CONSCIENTIOUSNESS, DIMENSION, FACET, MEASURE, VENTURE, PERFORMANCE.

## PALABRAS CLAVE:

EMPRENDEDOR, PERSONALIDAD, BIG FIVE, CONSCIENCIA, DIMENSIÓN, FACETA, MEDIDA, EMPRESA, DESEMPEÑO.





## RÉSUMÉ

**Objectif.** La littérature reconnaît depuis longtemps l'importance de la personnalité entrepreneuriale consciencieuse. Cette étude explore comment sept de ses facettes ou sous-dimensions (l'orientation vers la réussite, l'efficacité, la responsabilité, le travail acharné, le contrôle de soi, la conformité et la persistance) sont liées à trois résultats de performance (nombre de projets lancés, années dans le projet actuel et ventes annuelles).

**Conception/méthodologie/approche.** 166 entrepreneurs actifs ont été interrogés via un centre d'entrepreneuriat dans une université de l'ouest des États-Unis. Les données ont ensuite été modélisées à l'aide de la méthode des moindres carrés ordinaires pour obtenir des estimations de régression pour les variables dépendantes.

**Résultats.** Contrairement aux attentes, les résultats indiquent que les mesures des facettes sont liées de manière très différente en termes d'amplitude, de direction et de signification pour les résultats de performance. Ces relations plus nuancées sont perdues lors de l'utilisation de mesures dimensionnelles larges ou agrégées.

**Implications pour la recherche.** Les mesures de personnalité larges, telles qu'elles sont conventionnellement utilisées, sont suboptimales pour la recherche en entrepreneuriat car elles peuvent conduire à des résultats trompeurs. Les études devraient plutôt utiliser des mesures de facettes plus spécifiques, qui offrent des évaluations de personnalité plus précises.

**Implications pratiques.** Les praticiens devraient également utiliser des mesures de facettes plus spécifiques. Ce faisant, cela sera utile dans différents contextes publics, privés et éducatifs.

**Originalité/Valeur.** Depuis des décennies, l'entrepreneuriat s'est intéressé aux effets des dimensions de personnalité larges ou agrégées. Cet article est le premier à aborder la personnalité entrepreneuriale à partir d'un niveau de facettes plus spécifique, une approche offrant d'importantes opportunités de recherche.

## RESUMO

**Objetivo.** A literatura há muito reconhece a importância da personalidade empreendedora consciencieuse. Este estudo explora como sete facetas/subdimensões dessa personalidade (Busca por Conquistas, Eficiência, Responsabilidade, Dedicção, Autodisciplina, Convencionalidade e Persistência) se relacionam com três resultados de desempenho (Empreendimentos Iniciados, Anos no Empreendimento Atual e Vendas Anuais).

**Desenho/metodologia/abordagem.** 166 empreendedores ativos foram pesquisados por meio de um centro de empreendedorismo de uma universidade no oeste dos Estados Unidos. Os dados foram modelados por meio de Mínimos Quadrados Ordinários para obter estimativas de regressão para as variáveis dependentes.

**Resultados.** Contrariamente às expectativas, os resultados indicam que as medidas das facetas se relacionam de maneira muito diferente em termos de magnitude, direção e significância para os resultados de desempenho. Essas relações mais sutis são perdidas ao usar medidas dimensionais amplas/agregadas.

**Implicações para a pesquisa.** Medidas de personalidade amplas, conforme usadas convencionalmente, são subótimas para pesquisas empreendedoras, pois podem levar a resultados enganosos. Os estudos devem aplicar medidas de facetas mais específicas, que oferecem avaliações de personalidade mais precisas.

**Implicações práticas.** Os profissionais também devem utilizar medidas de facetas mais específicas. Fazê-lo será valioso em uma variedade de configurações públicas, privadas e educacionais.

**Originalidade/Valor.** Por décadas, o empreendedorismo tem abordado os efeitos de dimensões de personalidade amplas/agregadas. Este artigo é o primeiro a abordar a personalidade empreendedora em um nível de faceta mais específico, uma abordagem que oferece substanciais oportunidades de pesquisa.

## MOTS-CLÉS:

ENTREPRENEUR, PERSONNALITÉ, BIG FIVE, CONSCIENTIOUSNESS (CONSCIENCE), DIMENSION, FACETTE, MESURE, ENTREPRISE, PERFORMANCE.

## PALAVRAS-CHAVE:

EMPREENDEDOR, PERSONALIDADE, CINCO GRANDES, CONSCIENCIOSIDADE, DIMENSÃO, FACETA, MEDIDA, EMPREENDIMENTO, DESEMPENHO.

## INTRODUCTION

Entrepreneurship contributes substantially toward socioeconomic development (Miller 2015). Much effort has thus gone into studying the factors that stimulate this activity. Environmental and organizational aspects are certainly important (Taormina and Lao 2007). However, entrepreneurship cannot be fully understood unless the people driving its processes are also considered. It is entrepreneurs who ultimately discover and develop opportunities (Rauch and Frese 2007; Mitchell et al. 2002; Shane and Venkataraman 2000).

Research has long addressed the individual characteristics of entrepreneurs (Ireland, Reutzell, and Webb 2005a). One of their most widely studied features is *personality* (Brandstätter 2011). The latter's importance resides in that entrepreneurs are fairly self-directed: Unlike employees or managers, they have more control over plans, resources, and actions. Entrepreneurs' personality thus directly impacts venture performance (Collins, Hanges, and Locke 2004; Chrisman, Bauerschmidt, and Hofer 1998). Especially among newer and smaller ventures, where owner-managers decidedly influence operations (Rauch 2014).

Entrepreneurship's personality research flourished over the past two decades. Improved theoretical frameworks and techniques yielded significant findings. Among others, personality has been found to impact opportunity perceptions (Yan 2010), start-up intention and creation (Zhao, Seibert, and Lumpkin 2010), and venture performance (Ciavarella et al. 2004). Rauch and Frese's (2007), Zhao *et al.*'s (2010), and Brandstätter's (2011) meta-analyses all conclude that personality indeed affects the various entrepreneurial processes and outcomes. These studies also indicate the importance of further researching the area.

However, entrepreneurship's personality research tends to focus on the effects of broad personality dimensions, say those offered by the Big Five framework. That general relationships are still being emphasized is typical of maturing disciplines. Though as entrepreneurship develops and gets more nuanced, identifying fine-grained relationships becomes essential for the field to advance further (Connelly et al. 2010; Most, Conejo, and Cunningham 2018).

The present methods paper heeds this need. It relates venture performance to the *Conscientiousness* personality dimension, chosen for its overall entrepreneurial relevance (Zhao and Seibert 2006; Zhao, Seibert, and Lumpkin 2010). Two features make this study unique: First, it approaches measurement from a facet/sub-dimensional perspective. By disaggregating the *Conscientiousness* dimension into some key components, it provides a more nuanced perspective of how personality relates to venture performance. This unorthodox approach derives from the entrepreneurship literature long calling for more focused research (Low and MacMillan 1988), the field's measures needing to capture constructs' specific aspects (Lumpkin and Dess 1996), and more narrowly-defined personality constructs better suited to understand entrepreneurial behaviors (Conejo et al. 2019).

The second feature making this study unique is its venture outcomes. Rather than focusing on a single one, this study also expands its dependent variables to reflect entrepreneurial performance more broadly. It relates entrepreneurs' Conscientiousness to three performance outcomes: number of ventures started, years at the current venture, and the latest annual revenue. In doing so, this study taps different performance types. It thereby offers a more nuanced picture of how personality relates to entrepreneurial success.

This methods paper thus expands both the dependent and independent variables. It shows how the more-specific facet-based personality measures are better suited to understand personality's impact, done via data from a dynamic Western US entrepreneurial ecosystem. The authors hope to raise awareness among entrepreneurship researchers and practitioners as to the nuances of personality, beyond its conventionally-used dimensions. Also, as to the importance of using more specific facet-level personality measures, a research direction that offers substantial opportunities.

## THEORETICAL FOUNDATIONS

### The Big Five

Personality generally refers to an individual's innate, pervasive, and distinctive mental characteristics. These lead to consistent behaviors across situations and time (Cervone and Pervin 2008). Decades of research have converged on a five-factor personality structure. The so-called Big Five is now the most widely-used personality taxonomy. It consistently provides valid and reliable measures. Despite some variation, a significant body of literature shows factorial agreement across genders, age groups, and cultures. Researchers generally concur that the Big Five represent personality's fundamental and universal dimensions (Ashton and Lee 2005).

The Big Five portray human personality via several bipolar dimensions: 1) Extraversion, 2) Agreeableness, 3) Neuroticism, 4) Openness, and 5) Conscientiousness (Ashton, Lee, and Goldberg 2004). Each dimension is hierarchical, spanning progressively-specific sub-dimensions. Table 1, below, illustrates the Big Five through some emblematic facets/sub-dimensions, per Costa and McCrae (1994).

**Table 1: The Big Five with Representative Lower-Order Facets**

Extraversion	Agreeableness	Neuroticism	Openness	Conscientiousness
Warmth	Trust	Anxiety	Fantasy	Competence
Gregariousness	Straightforwardness	Anger	Aesthetics	Order
Assertiveness	Altruism	Depression	Feelings	Dutifulness
Activity	Compliance	Self-consciousness	Actions	Achievement
Excitement-seeking	Modesty	Impulsiveness	Ideas	Self-discipline
Positive emotions	Tendermindedness	Vulnerability	Values	Deliberation

## Conscientiousness

Conscientiousness plays a central role within the Big Five framework. Across studies, this dimension consistently accounts for a significant portion of personality's total variance (Ashton, Lee, and Goldberg 2004). This relevance stems from it comprising a spectrum of assertive and inhibitive features.

Assertive qualities encompass outward-directed traits linked, among others, to entrepreneurial achievement. Examples include being responsible, hard-working, or persistent (Rauch 2014). Conscientiousness thus closely relates to hallmark entrepreneurial traits, see McClelland (1987) or Brockhaus (1982). It especially relates to Locus of Control. The latter refers to the belief that things happen primarily due to individuals' own capabilities and efforts, not because of external forces like the environment, other people, or even luck/fate (Rotter 1966).

Conscientiousness also comprises inhibitive qualities. These traits relate to self-control. Examples include being orderly, cautious, or scrupulous (Rauch 2014). Despite being inward-directed, these features also contribute toward entrepreneurial achievement. Notably, they keep individuals in check. Entrepreneurs might otherwise become overconfident or careless, leading to venture underperformance, even failure (Singh 2020).

Given its assertive and inhibitive features, Conscientiousness generally associates with positive life outcomes. Within the professional realm, it links to superior job performance (Hogan et al. 1998), satisfaction (Judge, Heller, and Mount 2002), and success (Judge et al. 1999). Barrick *et al.*'s (2001) meta-analysis found that of all Big Five dimensions, only Conscientiousness consistently predicted performance outcomes across criteria and occupational groups. Its relational magnitudes also exceeded those of other Big Five dimensions. This derives from Conscientiousness comprising mostly performance-related traits: People with a sense of purpose and strong work ethic, both Conscientiousness antecedents, tend to perform above those lacking these qualities. Jackson *et al.* (2010) confirm the above. The authors found that of all Big Five dimensions, Conscientiousness associated the most with goal-directed behaviors. One might thus consider this personality aspect a core human capital determinant (Roberts *et al.* 2014).

Within the entrepreneurial realm, Zhao and Seibert's (2006) meta-analysis found entrepreneurs to be more conscientious than managers. As to specific outcomes, Conscientiousness strongly relates to venture intention (Zhao, Seibert, and Lumpkin 2010), venture creation (Zhao and Seibert 2006), and venture performance (Zhao, Seibert, and Lumpkin 2010). It also relates to entrepreneurial satisfaction (Judge, Heller, and Mount 2002) and overall success (Judge et al. 1999). The above stem from *Conscientiousness* comprising key entrepreneurial traits like *Achievement Striving*, *Risk-Taking*, and *Perseverance* (Rauch 2014). Despite their economic importance, roughly 60% of ventures fail within six years of being founded (Scarborough and Cornwall 2018). Facing considerable obstacles, lack of resources, and competition, conscientious entrepreneurs are essential to venture survival (Ciavarella et al. 2004).

## Dimensional Facets

The Big Five are efficient. They explain substantial personality variation through just a handful of dimensions (Ashton and Lee 2005). The framework's merits are undeniable. It has helped advance entrepreneurship's personality research considerably (Rauch 2014). However, and like any broad taxonomy, the Big Five also have important limitations.

A first one pertains to conceptual precision. Big Five dimensions might be statistically independent. Yet, they are not conceptually homogenous. Each factor instead aggregates a series of related constructs into broad overarching themes (Ashton and Lee 2005). But dimensions' conceptual breadth generates ambiguity. Personality's finer features thereby become lost (Saucier and Ostendorf 1999). Individuals with the same dimensional scores supposedly have identical personalities. However, they may differ significantly in how they think and act due to how their scores are distributed at the sub-dimensional level (Conejo et al. 2019).

A second limitation refers to predictive ability. The Big Five have been extensively used to forecast entrepreneurial behaviors and outcomes. Broad, amalgamated dimensions suffice for general situations. However, entrepreneurship comprises rather specific behaviors and outcomes (Rauch 2014). Omnibus dimensions, like the Big Five, thus do not suit prediction because they lack domain-specificity. This limitation complicates producing and comparing findings, essentially developing entrepreneurial theory, at all but the most general levels (Bandura 1997).

A way around these limitations, counter to conventional practice, is to use the Big Five's facets/sub-dimensions. These comprise traits semantically more similar to each other. Facets are thus conceptually more specific than their broad overarching dimensions. This allows facets to assess individuals' personality more precisely (Paunonen and Ashton 2001; Saucier and Ostendorf 1999). Despite involving more variables, facets still offer a sound aggregation level, balancing parsimony and precision (Briggs 1989; Perugini and Gallucci 1997).

Using facets literally takes personality research to another level with further-reaching implications (Roberts et al. 2014). Facets' more precise explanatory power, combined with their ability to better target behaviors, also allows them to predict outcomes better. Facets better capture criterion-related variance unexplained by their broader, overarching dimensions. The relationship between personality and other variables/outcomes can thereby be more accurately established (Carver 1989; Perugini and Gallucci 1997; Paunonen and Ashton 2001; Ashton and Lee 2005; Roberts et al. 2014).

## HYPOTHESES

The preceding sections highlighted the Conscientiousness dimension's positive impact on entrepreneurial outcomes. Also, the advantages of conducting facet-level personality research. This study therefore explores how facet-level Conscientiousness measures relate to diverse types of venture performance. Based on the literature, it is hypothesized that a broad Conscientiousness measure (included as a benchmark) will relate positively to all performance outcomes. Given Conscientiousness's overall positive impact, it is further posited that the relationships between its facets and all performance outcomes will also be positive. These relations will likely differ, some larger and more significant than others. Nevertheless, facet relationships should all be robust and positive.

## METHODOLOGY

### Facet Identification

Which *Conscientiousness* facets to evaluate was first determined. Disagreement remains as to *Conscientiousness*'s lower-order structure (Roberts et al. 2014). Some studies portray it through a few broad facets. Others via several more-specific ones. Given the discrepancy, psychology's personality literature was revisited. Doing so follows personality theory stemming from the field of psychology. Not business or entrepreneurship, which sometimes reinterpret psychological theory according to their theoretical perspectives or empirical requirements (Conejo et al. 2019).

Taxonomical studies addressing Conscientiousness's lower-order structure were thus collected. Though only ones adhering to the Big Five framework. Doing so ensured theoretical consistency and increased validity (Arthur, Bell, and Edwards 2007). It also aligned the present effort with other studies: Over the past three decades, the Big Five have become the standard within entrepreneurship's personality research (Rauch 2014). Studies using different frameworks were consulted for reference purposes, say Cattell *et al.*'s (1970) 16 Personality Factors or Eysenck's

(1965) 3 Factors. While their taxonomies do relate to the Big Five, they were omitted from the present analysis given their discrepant theoretical underpinnings (Goldberg 1982).

The identified taxonomies were then cross-referenced (Goldberg (1990), Costa *et al.* (1991), Hofstee *et al.* (1992), Saucier and Goldberg (1996), Paunonen and Jackson (1996), Perugini and Gallucci (1997), Saucier and Ostendorf (1999), Goldberg (1999), Peabody and De Raad (2002), Roberts *et al.* (2004), Ashton and Lee (2005), De Raad and Peabody (2005), Roberts *et al.* (2005), De Young *et al.* (2007), MacCann *et al.* (2009), and Jackson *et al.* (2010).) Together, the cross-referenced taxonomies yielded 15 potential *Conscientiousness* facets: 1) *Responsibility* 2) *Organization*, 3) *Competence*, 4) *Caution*, 5) *Self-Control*, 6) *Decisiveness*, 7) *Persistence*, 8) *Perfectionism*, 9) *Industriousness*, 10) *Virtue*, 11) *Conventionality*, 12) *Achievement-Striving*, 13) *Efficiency*, 14) *Logic*, and 15) *Consistency*.

*Conscientiousness* becomes somewhat unique when applied to entrepreneurial settings (Robinson *et al.* 1991). Facets were thus reduced to those most entrepreneurially relevant. The reduction was done empirically to improve objectivity, per Schriesheim *et al.*'s. (1993) guidelines.

Undergrad students are sometimes used in entrepreneurial research. Yet the literature long recognizes their inability to gauge adult behaviors and attitudes properly. However, older, more experienced graduate students can be reasonable surrogates for adults (James and Sonner 2001). After a briefing on the 15 *Conscientiousness* facets identified, 37 graduate entrepreneurship students at a Western US university indicated which facets best applied to the entrepreneurial domain. All these students worked. Some of them were already entrepreneurs. Checklists were used as they minimize cognitive load while providing reliable rankings (Romaniuk 2008). Facets were randomized and order-inverted to reduce biases. Responses were then tabulated, facets ordered by endorsement frequency. Per Hardesty and Bearden (2004), an 80% minimum consensus criterion supported facet retention. This process resulted in seven facets being deemed most relevant to the entrepreneurial domain: 1) *Responsibility*, 2) *Industriousness*, 3) *Self-Control*, 4) *Conventionality*, 5) *Achievement-Striving*, 6) *Efficiency*, and 7) *Persistence*.

## Trait Identification

Constructs are typically operationalized via items from prior research (De Vellis 2012). However, that approach was here unviable: Extant *Conscientiousness* scales pursue different construct notions. Their items tend to emphasize certain aspects over others. Because of this, and items needing to reflect the identified facets closely, operationalization was done anew.

Entrepreneurial personality research is mostly trait-based (Zhao and Seibert 2006). Item generation thus began with Goldberg's (1982) 1,710 personality adjectives. This list, as opposed to an empirically-derived subset, provided a more comprehensive, albeit less methodologically-tainted initial pool. Initial traits were then reduced to those most relevant following several criteria: 1) Dimensionality: This effort focuses on *Conscientiousness*, and no other personality dimension. Per Goldberg's (2008a) 1,710 taxonomy, only traits with robust *Conscientiousness* loadings were retained ( $> .700$ ) 2) Valence: *Conscientiousness* is generally considered desirable. Following Goldberg's (2008b) 1,710 norms, only positive traits were kept ( $>5$ , 1-9 scale). 3) Clarity: Misunderstood items increase error. Per Goldberg's (2008b) norms, only well-understood traits were retained ( $>90$  per cent of respondents).

Following Cattell's (1946) lexical reduction process, synonyms were consolidated into simpler forms while ambiguous traits excluded. To lessen subjectivity, three trained judges (the lead author plus two research assistants) independently consolidated and disambiguated traits. Inter-rater reliabilities averaged an acceptable 87% (Hardesty and Bearden 2004). The above steps yielded 26 positive, well-understood, non-redundant *Conscientiousness* traits. These were then used to develop items.

## Item Development

Personality research sometimes uses standalone traits as questionnaire items. However, adjectives' multiple meanings result ambiguous, thereby inducing response error. Phrased items, which elaborate on the trait, are instead advised. Their explicitness helps clarify what is meant, improving data quality (Costa and Mc Crae 1998; John and Srivastava 1999). Adjectives were thus transformed into self-attribution phrases, self-reports able to describe entrepreneurs' characteristics accurately (Uhlener 2005). Traits were first defined. A basic dictionary ([www.oxforddictionaries.com](http://www.oxforddictionaries.com)) reflected respondents' average English level. Items were then formatted as self-attribution statements, e.g. "I am *responsible*, *accountable* for outcomes."

Modified Likert responses provided the data. Per , subjects indicated their agreement with the statements. Six answer options were offered: 1-*Never*, 2-*Rarely*, 3-*Occasionally*, 4-*Frequently*, 5-*Mostly*, and 6-*Always*. These provided detail yet kept cognitive loads low. Options' even number, lacking a neutral category, forced committed answers. These helped discriminate responses, reducing error, and improving data (Suchman 1950).

## Data Collection

The instrument was successfully pretested with a different set of 24 graduate entrepreneurship students from the same Western US university. The primary collection then proceeded. Instead of using students, actual entrepreneurs comprised the sample to give this study more credence. Respondents were accessed via the entrepreneurship center at said Western US university. The latter's mailing list contained 254 active entrepreneurs. The center defined these as individuals working at ventures they had (co)founded. The entrepreneurs received participation requests linked to an online survey. Reminders were sent two weeks later to stimulate responses. A total of 197 responses were obtained. Incomplete or patterned responses, e.g. all answers "5-*Mostly*," were excluded to improve data (Tabachnick and Fidell 2013). Doing so left 166 responses, a 65% usable response rate.

Personality scales should reflect specific populations (Fineman 1977). To confirm the pure entrepreneur sample, surveys first asked how many ventures respondents had founded. This prequalification reflects Gartner's (1990) classic entrepreneurship definition. The latter conceives entrepreneurship as *the creation of organizations*. Other, broader entrepreneurship notions transcend venture creation. To mention but one, Shane and Venkataraman (2000) conceive entrepreneurship as *the discovery, evaluation, and exploitation of opportunities*. However, Gartner's venture-creation notion was still preferred. Being the most frequently used (Stewart and Roth 2007; Zhao, Seibert, and Lumpkin 2010), it aligns this study with a large body of research. Gartner's definition is also more specific from an operationalization perspective. Single, concrete behaviors (like venture creation) significantly reduce ambiguity and measurement error. This, in turn, improves the quality of the data, analyses, and findings (Tabachnick and Fidell 2013).

Qualified respondents answered the 26 Conscientiousness items. These were mixed with five other personality items to mask the survey's intent. Items were also randomized, order-inverted, and a third negatively-valenced to reduce biases. Responses were moreover anonymous to further increase the data quality. However, general demographic/venture-related questions were included for sampling/analysis purposes. Surveys were purposely kept brief (eight-minute average completion) to improve data quality yet further.

Diverse samples enhance the representativeness of results (Gorsuch 1997). The sample obtained was admittedly geographically concentrated (86% greater metro area, 11% in-state, and 3% out-of-state). The sample was also male-skewed (63%, normal in entrepreneurship (Kelley, Singer, and Herrington 2016).) However, the sample was otherwise diverse in terms of *age* (range = 22-71 years, mean = 44, median = 43); *number of ventures started* (range = 1-16, mean = 3, median = 2); *years with current venture* (range = 1-28, mean = 7, median = 6); *current annual revenue* (range = \$0-2,000,000, mean = \$590k, median = \$250k); and *business activity*, ranging from fitness, beauty, and tattoos; through accounting, law, and consulting; to agriculture, manufacturing, and energy. The sample was thus deemed to reasonably reflect the local entrepreneur population.

## Outcome Variables

Dependent variables in entrepreneurial research often encompass outcomes of interest to practitioners (Connelly et al. 2010). The dependent variables here used to reflect entrepreneurial performance were thus purposely specific: the number of ventures started by the entrepreneur, the number of years with the most current venture, and said venture's most recent annual sales. Below are these variables' respective rationales.

Conscientiousness relates to venture creation (Zhao, Seibert, and Lumpkin 2010; Zhao and Seibert 2006). The assertion is that all else equal, a higher number of ventures started reflects superior entrepreneurial performance. Poor-performing entrepreneurs will be less motivated to start further businesses. They will instead give up, and gravitate towards regular salaried employment. Conversely, successful entrepreneurs will be positively reinforced. They will be more inclined to start additional businesses. Hence this measure of entrepreneurial performance, which directly builds on Gartner *et al.*'s (2004; 1990) entrepreneurship definition. To note is that the number of ventures started grows as entrepreneurs age and accumulate experience. To account for this, and per Perry *et al.*

(2011), the number of ventures created was divided by age and then correlated.

Annual sales tend to reflect entrepreneurial success (Sambasivan et al. 2010; Delmar and Shane 2006). Performance was thus secondly assessed by the most recent sales of entrepreneurs' current venture. It is posited that all else equal, higher figures reflect superior entrepreneurial performance. Ventures with low revenues will drive entrepreneurs towards regular employment in search of better incomes. Conversely, ventures with larger annual sales will encourage entrepreneurs to stay in business and continue reaping the financial benefits offered.

Conscientiousness relates to venture survival. Its importance grows as post-launch time progresses (Ciavarella et al. 2004). Entrepreneurial performance was thus thirdly gauged by the number of years entrepreneurs had been with their current venture. The assertion is that all else equal, the longer this time, the better the entrepreneurial performance. Poor-performing ventures will tend to be closed/sold off more quickly. Entrepreneurs will thus be with these ventures for shorter periods. Conversely, well-performing ventures will last longer. Their superior performance encourages entrepreneurs to stay with the business and continue reaping its personal and financial benefits. Hence this other measure of entrepreneurial performance, which also builds on Gartner *et al.*'s (2004; 1990) definition.

Table 2, below, shows the three dependent variables. It also summarizes the independent variables, i.e., the seven Conscientiousness facets identified. The latter are operationalized via three to four trait items each. The internal consistency of facets' respective items is also shown via Cronbach Alphas.

Multi-item measures are generally considered superior to their single-item counterparts. However, single-item measures have been successfully used to assess personality constructs. They are oft reasonable proxies for their multi-item counterparts (Spörrle and Bekk 2014). Gosling *et al.*'s (2003, p. 508) single-item *Conscientiousness* measure was thus adapted and included to benchmark the relationships between facets and outcomes. Not only does this measure show adequate levels of validity, reliability, and external predictability. It is particularly well-suited for present purposes. It is structured as an all-encompassing mini vignette, addressing Conscientiousness as a broad, general construct.

**Table 2. Summary of Variables**

Variables	Description & Operationalization
Dependent	
<b>Ventures Started</b>	Number of ventures started by each entrepreneur (adjusted by age).
<b>Yrs. Current Venture</b>	Number of years spent by each entrepreneur at his/her current venture.
<b>Annual Sales</b>	Most recent annual sales of entrepreneurs' current venture (log-transformed).
Independent	
<b>Conscientiousness</b>	I am dependable and organized. That is, hard-working, responsible, self-disciplined, and thorough, but not careless or impulsive.
<b>1) Responsibility</b>	Refers to fulfilling obligations and being accountable for behaviors and outcomes. Traits: Responsible, reliable, dutiful, and punctual. Alpha: 0.90
<b>2) Industriousness</b>	Refers to putting higher effort and commitment into tasks undertaken. Traits: Hard-working, dedicated, and determined. Alpha: 0.87
<b>3) Self-control</b>	Refers to constraining impulses, emotions, or desires, especially in challenging situations. Traits: Self-restrained, self-disciplined, untemptable, and patient. Alpha: 0.78
<b>4) Conventionality</b>	Refers to following what is commonly done, believed, or accepted. Traits: Conforming, complaint, and tactful. Alpha: 0.65
<b>5) Achievement-Striving</b>	Refers to eagerly wanting to accomplish goals, thus vigorously pursuing them. Traits: Assertive, ambitious, competitive, and accomplished. Alpha: 0.96
<b>6) Efficiency</b>	Refers to achieving goals with minimal resource expenditure. Traits: Efficient, prompt, and speedy. Alpha: 0.82
<b>7) Persistence</b>	Refers to maintaining a course of action, especially when facing difficulties. Traits: Unwavering, persevering, undiscourageable, and consistent. Alpha: 0.65

Note: For the sake of space/brevity, complete trait items are not included, only their corresponding traits.



Entrepreneurship is a complex phenomenon. It results from multiple interacting personal, contextual, and moderating factors (Korunka et al. 2003; Yan 2010). By no means is it suggested that personality, much less Conscientiousness alone, explains venture performance. Nevertheless, this study applies different performance indicators and disaggregated Conscientiousness measures to better understand the relationship between entrepreneurs' personality and venture performance.

## ANALYSIS & RESULTS

### Model

Based on prior entrepreneurial personality research, e.g. Berglund *et al.* (2016) or Perry *et al.* (2011); and to control for the multiple variables on hand, Ordinary Least Squares were applied. The model estimations used the following specifications:

$$Y_i = \beta X_i + \epsilon \quad (A)$$

Where  $Y_i$  is the dependent variable,  $X_i$  the set of explanatory variables,  $\beta$  the parameter vector, and  $\epsilon$  the possible observation disturbances. Table 3, below, shows model correlations and summary statistics. Tables 4 and 5, thereafter, provide regression estimates for the dependent variables with respect to the aggregate and disaggregate measures.

**Table 3. Summary Statistics and Correlations Among Model Variables**

	Variables	Mean	SD	Min	Max	1	2	3	4	5	6	7	8	9	10	11
1	Ventures Start.	2.53	1.64	1.00	15.00	1.00										
2	Yrs. Cur. Vent.	7.36	5.82	1.00	28.00	0.40	1.00									
3	Annual Sales	12.56	1.14	9.21	16.52	0.58	0.59	1.00								
4	Conscientious.	2.56	0.92	1.00	6.00	0.21	0.03	-0.02	1.00							
5	Responsibility	4.35	0.84	2.75	6.00	-0.02	-0.01	-0.01	-0.06	1.00						
6	Industriousness	4.18	0.87	2.33	6.00	-0.04	0.07	0.02	-0.12	0.86	1.00					
7	Self-Control	3.38	0.74	2.00	5.25	0.09	0.08	0.14	0.09	0.08	0.00	1.00				
8	Conventionality	3.32	0.74	2.00	5.67	0.23	0.10	0.11	0.67	0.01	-0.07	0.59	1.00			
9	Achieve. Strive.	3.31	1.03	1.50	5.75	0.12	0.03	0.02	0.31	0.16	0.12	0.65	0.69	1.00		
10	Persistence	3.83	0.68	2.50	5.50	0.02	0.01	0.00	0.00	0.70	0.76	0.32	0.24	0.36	1.00	
11	Efficiency	3.82	0.76	2.50	5.75	-0.10	0.03	-0.01	-0.09	0.78	0.72	0.01	-0.06	0.02	0.58	1.00

Prior research found Conscientiousness to correlate with venture performance significantly, see e.g. Zhao *et al.*'s (2010) meta-analysis. The single Conscientiousness measure was thus expected to relate positively with all performance outcomes. Table 4, below, shows how it significantly related to the number of ventures started (0.399\*\*) and years at the current venture (0.006\*\*\*). However, it did not relate to ventures' latest annual revenue. This relationship was not only insignificant but surprisingly negative (-0.007). These findings suggest that Conscientiousness in aggregate does not necessarily relate to venture performance positively and strongly, as might be inferred from the literature. Depending on the performance outcomes used, its relation may vary in magnitude, directionality, and significance.

**Table 4. Aggregate Conscientiousness and Performance Outcomes**

	Ventures Started	Years Current Venture	Annual Revenue
Conscientiousness	0.399*** (0.115)	0.006*** (0.002)	-0.007 (0.064)
Constant	-2.117*** (0.567)	0.018 (0.011)	8.973*** (0.312)
R-squared	0.336	0.079	0.587
Adj. R-squared	0.319	0.056	0.577

N=166. Std. errors parenthesized. One-tailed significance: \*\*\*p<.01, \*\*p<.05, \*p<.10. Controls omitted for brevity.

Facets exacerbate the above finding. We refrain from discussing single relations as there are many: seven facets times three outcomes equal 21 different relations. The discussion of single relations is also beyond the scope of this paper, which instead focuses on more fundamental methodological issues, i.e., the use of facet measures. Table 5, below, thus summarizes how facets relate to performance outcomes. Suffice it to say that the relations found are erratic. Counter to expectations, their significance, magnitude, and directionality fluctuate markedly. Only one facet, Conventionality, relates positively and significantly to all three outcomes. All other facets relate significantly to only one or sometimes two outcomes. Furthermore, several correlations operate negatively, counter to what might be expected from the literature. Facet results thus confirm/extend what was found with the aggregate Conscientiousness measure.

**Table 5. Conscientiousness Facets and Performance Outcomes**

	Ventures Started	Years Current Venture	Annual Revenue
Responsibility	0.201 (0.333)	-2.245** (1.185)	-0.195 (0.234)
Industriousness	0.045 (0.343)	3.435*** (1.222)	0.429** (0.241)
Self-Control	-0.077 (0.244)	1.225* (0.868)	0.386*** (0.171)
Conventionality	0.652*** (0.248)	1.550** (0.883)	0.284* (0.174)
Achievement	-0.132 (0.193)	-0.702* (0.686)	-0.244** (0.135)
Persistence	0.017 (0.335)	-2.131** (1.192)	-0.305* (0.235)
Efficiency	-0.379* (0.271)	0.579 (0.966)	-0.021 (0.190)
Constant	1.386 (0.976)	1.763 (3.475)	11.429*** (0.685)
R-Squared	0.069	0.067	0.060
Adj. R-Squared	0.028	0.026	0.018

N=166. Std. errors parenthesized. One-tailed significance: \*\*\*p<.01, \*\*p<.05, \*p<.10. Controls omitted for brevity.

Most effect sizes obtained are small to medium. This range is consistent with those commonly found in the psychology literature, e.g. Ward (2002) or Aguinis *et al.* (2005). Effect sizes are also consistent with Connelly *et al.*'s (2010) meta-analysis of entrepreneurial studies. Specifically with respect to personal traits and individual-level research. That said, the modest effects do not necessarily imply less meaningful relationships. Martell *et al.* (1996)

or Breaugh (2003) offer several instances where small effects significantly impact theory and practice. Particularly when these are compounded over time. The relevance of the effects here identified is supported by over half of them being statistically significant.

## Robustness Checks

Given the unexpected relations here uncovered, additional analyses were conducted to verify the results. Models were first tested by adding control variables, i.e., entrepreneurs' age, gender, location, and sector. None of these showed major differences. Overall results remained consistent. Despite their linear intervals, the *years at current venture and annual revenue* variables might be unequally spaced. Ordered probit estimations were thus done. Results remained similar. The *number of ventures started* variable is a count measure. Poisson and negative binomial regressions were thus conducted. Results remained similar. The study followed a multi-item survey design, which might have introduced response biases. Partial least square analyses were thus conducted. Results remained similar. We refrain from presenting the results of these extensive checks for the sake of brevity. Yet they all confirm that the results initially obtained are not sensitive to the estimation methods followed.

We examined convergent validity via factor analyses. Item loadings all exceeded .600, per Bagozzi and Yi (1988). Convergent validity was confirmed through the Average Variance Extracted (AVE). All values exceeded .500, see Fornell and Larcker (1981). Discriminant validity is assured when rooted AVEs exceed squared correlations (Fornell and Larcker 1981). This was also the case. Dependent and independent variables came from the same instrument. Harman's one-factor test thus assessed common method bias. Factoring yielded multiple dimensions with eigenvalues  $>1$ . Since no single factor accounted for most variance, common method was also not a problem. We tested for lack of multicollinearity via condition indices for all models. The maximum Variance Inflation Factor (VIF) was  $<7.0$ , while the mean VIF  $<5.0$ , both within prescribed limits.

## DISCUSSION

### Methodological Implications

This study set out to explore how aggregate and disaggregate Conscientiousness measures related to three different venture performance outcomes. It thereby hoped to attain a more nuanced understanding of how the entrepreneurial personality might operate. Counter to expectations, the Conscientiousness facets did not necessarily relate strongly and positively to the different outcomes. Relations were instead erratic. Their significance, magnitude, and directionality fluctuated markedly.

This finding has implications for research. Most evident is that Conscientiousness does not necessarily operate consistently (which presumably also applies to other personality dimensions.) Despite its statistical independence, Conscientiousness comprises related, albeit semantically unique facets. These produce rather nuanced relations with outcomes. Some facets operate as expected. Others do so in unforeseen, even contradictory ways. Results thus support changing how personality is researched. Instead of using broad dimensions, as conventionally done, studies should use specific facet measures to uncover these nuanced underlying dynamics.

Another implication is that broad personality dimensions may actually obscure the more-specific facet-level relations. To mention but one instance, the single Conscientiousness measure did not significantly relate to annual sales. However, five of its seven facets did. Two of these relations were negative, possibly cancelling out the three positive ones. These facet interactions might have led to the insignificant/near-null relation with the single, broad measure. Aggregate Conscientiousness measures might thus obscure underlying dynamics. This might explain why some studies fail to relate Conscientiousness significantly to entrepreneurial outcomes, despite the dimensions' overwhelming relevance (Barrick, Mount, and Judge 2001). To reduce the possibility of broad dimensions obscuring outcomes, and better understand the effects of personality, entrepreneurship research should incorporate facet-level measures.

Entrepreneurship comprises specific behaviors and outcomes (Rauch 2014). Broad dimensions are therefore not really suited for predictive purposes within the field. Lacking domain-specificity, not only do they prevent underlying relations from being detected. Broad dimensional measures actually obscure these underlying relations. This complicates producing and comparing findings, essentially developing theory, at all but the most general levels (Bandura 1997). Facet-level measures thus better suit personality research. They are conceptually more



specific than their broad, overarching dimensions. This allows them to assess individuals' personality more precisely (Paunonen and Ashton 2001; Saucier and Ostendorf 1999). Facets' more detailed explanatory power, combined with their ability to more relevantly target behaviors, also allows them to capture criterion-related variance better. The relationship between personality and other variables is thereby more accurately established (Carver 1989; Perugini and Gallucci 1997; Paunonen and Ashton 2001; Ashton and Lee 2005; Roberts et al. 2014).

A more macro implication is that how personality is operationalized impacts measurement outcomes. Depending on which sub-dimensions/items are used, relations may vastly differ. More importantly, the relational outcomes obtained may also affect theoretical development, potentially leading it astray: Instruments that emphasize only certain construct aspects provide biased or incomplete measures (Robinson et al. 1991). How constructs are operationalized and measured is particularly relevant to entrepreneurship's personality research. The field has become beset by multiple and divergent construct notions (DeNisi 2015). These nominal and substantive discrepancies then hinder comparing and accumulating results into coherent theoretical bodies (Covin and Wales 2012). This situation underscores the need for some degree of consensus and standardization if working at the facet level.

A final implication is that the temporal nature of performance outcomes may also impact relations vis-a-vis personality variables. To illustrate, the single Conscientiousness measure related significantly to the number of ventures started (long-term) and the years at the current venture (mid-term). However, it did not do so with annual revenue (short-term). These results are consistent with Ciaverella *et al.* (2004). The authors found that Conscientiousness' importance towards venture survival increased over time. In contrast, facets related significantly with mostly short and mid-term outcomes. It seems that facets, given their specificity, become more operational performance antecedents. This suggests that performance antecedents and outcomes must purposefully address specific timeframes. Both should be developed in line with the overall research objectives. Results might otherwise become confounded.

## PRACTICAL IMPLICATIONS

This study also has implications for practitioners in the public, private, and educational sectors. Present findings offer a more detailed picture of how Conscientiousness, and presumably other personality dimensions, might operate. Based thereupon, it is suggested that practitioners also adopt facet-level personality measures. Assessing individuals at a more nuanced level stands to benefit entrepreneurial practice across a variety of applications.

To mention but a couple of instances, venture capitalists might use facet-level instruments to evaluate the entrepreneurs that are seeking funding more precisely, see e.g. Vieira et al. (2020). Investors could thereby identify potential issues and better mitigate their risk. To illustrate, a strong composite Conscientiousness score might seem reassuring. However, this aggregate score could mask underlying issues. A facet-level diagnostic, in addition to an overall score, would let investors know that while an entrepreneur is, say, high in Achievement Striving, he/she is also low in Persistence. The candidate is thus unlikely to sustain his/her effort long-term; especially when faced with difficulties, which will probably happen. This facet-level information would then help investors re-direct their capital towards more enduring (and profitable) candidates, ones with a higher likelihood of success.

Similarly, the educational sector might use facet-level measures to assess the effectiveness of entrepreneurship training programs. Evaluations might occur before applicants enter said programs. This would reveal their suitability, and if later accepted, identify areas of improvement, see e.g. López-Núñez et al. (2020). Assessments could also be ongoing to monitor the effectiveness of training efforts. An example of the latter would be a program module designed to strengthen participants' *Responsibility*, teaching them to be more accountable for obligations and actions. Such improvement efforts would then increase participants' entrepreneurial success in real-world settings.

In sum, results from this study support assessing entrepreneurs' personality differently. Facet-level measures better suit entrepreneurship research and practice. Their specificity leads to a more nuanced understanding of how personality links to entrepreneurial outcomes. While this study focused on Conscientiousness, its findings likely apply to other personality dimensions, perhaps even other entrepreneurial constructs.



## LIMITATIONS AND FUTURE RESEARCH

Despite the insights offered, this study is not exempt from limitations. Yet these also offer a series of interesting future research opportunities.

A first one pertains to sample size. Statistical power criteria might be slightly relaxed when the area researched is in its early stages of development (Connelly et al. 2010). However, and despite being an exploratory study, the 166-entrepreneur sample limited the statistical power of results and how they might apply generally. Future research must thus use larger samples. These will allow studies to address the effects of personality facets on entrepreneurial performance more thoroughly. They would yield a better understanding of the magnitude, directionality, and significance of the various relations. Studies might start by verifying and extending present results. Once differences and commonalities have been established, research can move on to other personality dimensions. Other broad entrepreneurial constructs might then be addressed. The more-specific facet-level measurement approach is bound to reveal new and interesting relations.

A second limitation refers to the nature of respondents. This study used a sample that reasonably reflected local entrepreneurs. However, results remain limited to a Western US context. The relations between the different facets and performance outcomes may vary in other locations. Future research should thus address these relationships in other US regions, western countries, and completely different cultures to assess the stability of the relations uncovered. Beyond the quantitative, the reasons behind the at-times odd relations obtained remain to be established. Future research might thus incorporate qualitative components to address these.

Moreover, this research approached entrepreneurs generally. However, entrepreneurs are rather diverse. The prevalence of certain Conscientiousness facets likely varies by entrepreneur type. Future research might thus assess different entrepreneur sub-samples. Comparing, say, survival, lifestyle, and growth-oriented entrepreneurs, see e.g. Morris and Kuratko (2020), or successful vs. unsuccessful entrepreneurs, see e.g. Singh (2020), should help further understand the operation of personality vis-à-vis the different performance outcomes. Research might also address entirely different populations at the facet level. Comparing entrepreneurs against, say, managers should provide further benchmarks against which to interpret the present and future findings.

A third limitation pertains to the facets used. Much effort was put into identifying and operationalizing the Conscientiousness facets. While those ultimately selected are considered robust, by no means are they exhaustive, optimal, nor final. Future research should thus consider increasing the number and variety of facets used. Doing so would allow to cover the construct more comprehensively. It would also provide a better picture of how its various facets relate to the different performance outcomes. Conversely, and now that a preliminary set of Conscientiousness facets has been advanced, future research may start studying the effects of one or a few of these facets in-depth. This is yet another research direction worth developing.

Directly related to the facets and items used is their origin. This study sourced them from taxonomical studies which applied Classical Test Theory to derive them. However, the nature and number of facets/items would have varied had they been obtained via alternative, non-traditional scaling methods. Future research might thus look into such studies, say those applying the COARSE, Guttman, or Rasch scaling techniques, e.g. Conejo *et al.* (2021; 2019; 2017). Future research might even consider studies that derive facets/items qualitatively to gain a yet broader assortment.

## CLOSING THOUGHTS

Over the years, researchers like Gilmore and Coviello (1999), Cornelius *et al.* (2006), and Welter and Lasch (2008) have called for methodological diversity within the field of entrepreneurship. Gartner (1989) goes further, indicating that entrepreneurship has *an obligation* to extend research beyond conventional boundaries. By no means is it suggested that dimensional-level personality research be discontinued. As the literature more than evidences, such an approach has been fruitful. Though as entrepreneurship develops and becomes more nuanced, identifying finer-grained relationships becomes essential for theory and practice to expand further (Connelly et al. 2010; Most, Conejo, and Cunningham 2018). It is thus suggested that entrepreneurship's personality research also adopts the more specific facet-level approach. This new direction stands to offer ample research opportunities.

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