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A data-driven approach exploring the entrepreneurial-managerial spectrum

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Entrepreneurs are responsible for starting new ventures, often with high risk and innovation, while managers oversee existing organizations, optimize operations, and achieve predefined goals. Although frequently seen as a dichotomy, entrepreneurs and managers share responsibilities for building and sustaining a business, and hence, this could also be studied as a spectrum. Previous research has individually examined specific aspects of entrepreneurial (vs. managerial) work, but limited studies have examined their effects holistically. Using a wide range of survey instruments, we took a data-driven approach to explore the entrepreneurial-managerial spectrum. Exploratory factor analysis revealed five latent factors driving variance in our data: Negative Emotions, Fulfillment and Support, Creative Capacity, Collaborative Personality, and Decision-Making Avoidance and Hypervigilance. When analyzed as a traditional dichotomy, we found that entrepreneurs scored lower than managers in Decision-Making Avoidance and Hypervigilance, and Collaborative Personality. As a spectrum, data suggested (1) an increase in Creative Capacity with more entrepreneurial experience and (2) a decrease in Decision-Making Avoidance & Hypervigilance with more entrepreneurial experience. On the other hand, emotional health and career success remained similar across groups. Overall, we explored the complex profile of entrepreneurs and managers as a step toward understanding the dynamic and unique combination of personality, cognition, and emotional health across the entrepreneurial-managerial spectrum. Our study provides a first step toward an integrative lens through which future work can extend to develop programs that improve entrepreneurial decision-making and creativity, with practical implications for organizational behavior, leadership development, and cultivating entrepreneurial mindsets within existing organizations.

KEYWORDS

organizational psychology, entrepreneur, managers, creativity, decision making

Introduction

Entrepreneurs play a critical role in creating novel value propositions, launching new ventures, and generating economic and societal impact. Understanding how entrepreneurs function—especially in comparison to those managing established organizations—is of growing relevance. However, entrepreneurship does not stem from any singular trait or background (Cardon et al., 2012; Foo et al., 2009; Rubenson and Runco, 1995; Sarasvathy, 2001). Instead, it is influenced by a dynamic interplay of experiences, skills, cognitive

strategies, and emotional health (Shepherd et al., 2015). This complexity has led to extensive studies within individual domains (e.g., personality, decision-making, emotional resilience), but relatively few have taken a holistic, integrative approach to understanding the entrepreneurial mindset.

Entrepreneurs are often contrasted with managers, who focus on optimizing existing systems and maintaining organizational stability. Research has documented differences between these groups across various demographic and experiential factors (Chadwick and Raver, 2019; Welter et al., 2017; Williamson et al., 2022), including age, education, and work history (Baron and Ensley, 2006; Dew et al., 2009). Yet, many professionals engage in both entrepreneurial and managerial roles across their careers (Begley and Boyd, 1987; Busenitz, 1992; Chen et al., 1998; Zhao and Seibert, 2006). These overlapping responsibilities suggest that entrepreneurship and management are better conceptualized as a *spectrum* rather than a dichotomy.

In this study, we use a data-driven, exploratory approach to examine the Entrepreneurial-Managerial Spectrum (EMS). We assess how individual differences in personality traits, cognitive tendencies, and emotional wellness map onto self-reported entrepreneurial and managerial experiences. Our goal is to develop a multifaceted profile that captures the psychological diversity across this spectrum and identify patterns that may guide future training and support programs. Three broad domains guided our investigation—personality, cognition, and emotional wellness.

First, using the trait theory as a lens, stable personality traits such as agreeableness and openness to experience have been shown to differ between entrepreneurs and non-entrepreneurs (Brandstätter, 2011; Zhao and Seibert, 2006). Entrepreneurs tend to score higher on openness, reflecting a greater receptivity to novel ideas, intellectual curiosity, and a preference for variety and autonomy. This trait may support innovation, adaptability, and the pursuit of unconventional paths—core characteristics of entrepreneurial activity. In contrast, they often score lower on agreeableness, which may indicate a reduced need for social harmony and a greater willingness to challenge norms or take independent stances. While lower agreeableness may sometimes be perceived negatively, in the entrepreneurial context, it may facilitate assertiveness in negotiations, critical thinking, and persistence in the face of skepticism or resistance. Some studies have also found that other traits such as conscientiousness and emotional stability may play nuanced roles depending on the type and stage of the entrepreneurial venture, suggesting that personality interacts with context to shape entrepreneurial behavior (Leutner et al., 2014; Obschonka and Stuetzer, 2017). These findings collectively support the notion that distinct personality patterns underlie entrepreneurial and managerial tendencies, making them a critical domain for investigation along the EMS.

Second, using the cognitive theoretical frameworks as a lens, cognitive processes such as decision-making and creativity are known to vary across entrepreneurial contexts. Entrepreneurial cognition has been defined as “the knowledge structures that people use to make assessments, judgments, or decisions involving opportunity evaluation, venture creation, and growth” (Mitchell et al., 2002). Entrepreneurs often operate in environments characterized by high uncertainty, ambiguity, and rapidly

shifting demands (Wu and Knott, 2006). Under such conditions, entrepreneurs are more likely to rely on intuitive, heuristic-based decision-making rather than exhaustive, deliberative processes (Busenitz, 1992; Gilbert-Saad et al., 2018). Traits such as impulsivity and hyperfocus have been positively associated with entrepreneurial success, enabling individuals to make rapid decisions and maintain intense concentration on goals despite environmental distractions (Lerner, 2016; Wiklund et al., 2016, 2017). While cognitive biases like overconfidence and generalization can sometimes be seen as liabilities, they may confer advantages in entrepreneurial contexts where speed and adaptability are critical (Busenitz, 1992).

Creativity also plays a central role in entrepreneurship, as successful venture creation often depends on identifying novel opportunities and adapting resources in flexible ways. Creativity is influenced not only by stable personality traits such as openness but also by environmental factors and situational demands (Weinberger et al., 2018). A rich literature has highlighted strategies to enhance creativity, including divergent thinking tasks, improvisation exercises, and cognitive training interventions (Bott et al., 2014; Saggar et al., 2017; Sternberg, 2009; Sun et al., 2019; Thompson, 2003). In particular, improvisational approaches—being able to think and act spontaneously without preplanning—have been shown to be critical for entrepreneurial success, especially during the early and resource-scarce stages of venture development (Baker et al., 2003; Fillis and Rentschler, 2010). Together, these cognitive traits and processes form a dynamic and adaptable profile that differentiates entrepreneurs from traditional managers. Importantly, they also underscore the need to conceptualize these roles not as mutually exclusive categories but as points along an EMS, where decision-making strategies and creative capacities may vary in degree rather than kind.

Third, we considered emotional resilience and wellbeing in the entrepreneurial context using the emotion regulation frameworks as a lens. Emotional wellness is a dynamic and often overlooked component of the entrepreneurial profile. Entrepreneurs face distinctive challenges that can significantly impact their emotional health, including financial instability, business failure, and emotional strain (Delgado García et al., 2015; Jenkins et al., 2014; Pollack et al., 2012; Shepherd et al., 2009). For example, economic stress from uncertain income streams, the personal and professional toll of failed ventures, and anticipatory grief associated with potential losses can each take a cumulative toll on mental wellbeing. The resulting emotional distress may manifest in burnout, anxiety, or depression, and can adversely affect decision-making quality, resilience, and interpersonal relationships within the business context.

Conversely, entrepreneurship is also associated with several psychological benefits. Entrepreneurs often report higher levels of happiness, autonomy, and job satisfaction compared to traditional employees or managers (Benz and Frey, 2004; Parker, 2014; Stephan and Roesler, 2010). The ability to exercise greater control over one's work, pursue personally meaningful goals, and create self-defined measures of success can contribute to positive wellbeing outcomes. However, the emotional highs and lows of entrepreneurship do not exist in isolation; they likely interact in complex ways with

personality traits such as openness and emotional stability, as well as with cognitive tendencies like risk-taking, impulsivity, and creative problem-solving.

Despite the recognition of these psychological dynamics, most prior studies have examined emotional wellness, cognition, and personality separately rather than as interconnected components of the entrepreneurial experience. This fragmentation limits our ability to fully understand the multidimensional factors that support or hinder entrepreneurial success. By adopting a holistic, data-driven perspective, as we do in this study, we aim to capture the interplay between stable traits (e.g., personality), flexible strategies (e.g., decision-making and creativity), and fluctuating states (e.g., emotional wellness). Such an integrated approach allows for a richer characterization of individuals across the EMS and may inform the development of more effective training, support, and intervention programs for aspiring entrepreneurs and managers alike.

Based on the reviewed literature, we expected systematic differences in personality, cognitive style, and emotional wellness across the Entrepreneurial-Managerial Spectrum. Specifically, prior work suggests that entrepreneurs score higher in openness to experience and lower in agreeableness compared to non-entrepreneurs (Zhao and Seibert, 2006). Openness is associated with creativity, adaptability, and a preference for novel experiences, all of which are critical in entrepreneurial contexts, while lower agreeableness may facilitate independent decision-making and willingness to challenge established norms. Therefore, we hypothesized that entrepreneurs would be more open and less agreeable than managers.

In terms of cognitive characteristics, entrepreneurship is often linked to faster, more heuristic-based decision-making and greater improvisational creativity (Baker et al., 2003; Busenitz, 1992; Mitchell et al., 2002). Thus, we hypothesized that individuals with more entrepreneurial experience would exhibit greater creative capacity and show greater tendencies toward impulsive and intuitive decision-making compared to individuals with less entrepreneurial experience or primarily managerial backgrounds.

With regard to emotional wellness, the literature presents a complex picture. Entrepreneurs frequently face stressors such as financial instability and risk of failure, yet they also report higher levels of job satisfaction and wellbeing due to increased autonomy and goal alignment (Delgado García et al., 2015; Benz and Frey, 2004; Parker, 2014). Therefore, we hypothesized that emotional wellness and perceived career success would not differ significantly between entrepreneurs and managers, suggesting that emotional resilience may be a common requirement across the EMS despite differences in other domains.

Broadly, we take an integrative theoretical perspective, positing that trait personality, cognitive strategies, and emotional wellness are interconnected aspects of entrepreneurial and managerial functioning. Although recent studies have begun to explore intersections between personality and cognition (Acharya and Berry, 2023; Altinay et al., 2022; Manolopoulos et al., 2024), holistic, data-driven studies focusing on entrepreneurial experience remain limited. By examining these factors together within a single exploratory framework, we aim to provide a more comprehensive understanding of how entrepreneurial and managerial profiles differ—and overlap—across the EMS.

To test these hypotheses, we employed a wide array of validated survey instruments and behavioral tasks from psychology and neuroscience, including the NIH Toolbox Emotion Measures, the Melbourne Decision-Making Questionnaire, the Alternative Uses Task, and others. This multimodal assessment generated a rich dataset encompassing cognition, wellbeing, and personality domains. Following prior approaches in psychological research (Fair et al., 2012), we performed an exploratory factor analysis (EFA) to uncover latent constructs across these domains, thereby reducing dimensionality and identifying underlying patterns. We then examined how the resulting factors varied as a function of entrepreneurial and managerial experience, including individuals who had engaged in both types of roles. This data-driven exploratory approach allowed us to characterize psychological profiles along the EMS in a nuanced and multifaceted manner.

Methods

Data collection

Participants were recruited between the months of July and December of 2020. Data collection was completed online due to COVID-19. The Stanford Institutional Review Board approved the study procedures. All methods were performed in accordance with appropriate guidelines and regulations. All participants gave written informed consent prior to participation and were compensated at \$20 per hour. The study recruited participants by word of mouth, email listservs, and social media, including LinkedIn and Craigslist. Potential participants completed a screening questionnaire designed to identify relevant participants. The inclusion criteria comprised managers or entrepreneurs over the age of 18. We included managers who were part of an existing organization and currently managing a team of over two employees. Entrepreneurs included in this study were founders of an organization with more than two employees. We screened out participants who were not managing a team of over two or more or had not founded a company of two or more people. We attempted to verify the participants' jobs on LinkedIn. No other exclusion criteria were applied.

The study includes 117 participants—77 males and 40 females. Seventeen participants were removed due to incompleteness of the online assessment, resulting in 100 subjects. Data were deemed incomplete when the participant did not finish all nine online tasks. Of the final dataset, 69% of the 100 participants identified themselves as male and 31% as female. They had an age range of 20 to 50 years old. They reported their income out of ten groups ranging from <\$10,000 to over \$200,000. Education levels included high school, bachelor's, master's, and Ph.D. Participants self-identified as one of the following races: African American, Asian/Pacific Islander/Asian Indian, Hispanic/Latino, White, or Multi-racial. Table 1 shows the population data of included participants in the data analysis of the two groups of entrepreneurs and managers. Entrepreneurs started between 1 and 8 companies in their careers. Managers supervised between 2 and 1,000 people. They had an average hierarchical position of 45 people away from the CEO of their company, a median hierarchical position of 10 people away from the CEO of their company, a range of 1 to

TABLE 1 Sample size and demographic data.

Demographics	Entrepreneurs	Managers
Total	44	56
Male	34	35
Female	10	21
Asian	9	6
African American	9	24
Hispanic/Latino	3	0
White	20	23
Multi-racial	1	2
Prefer not to answer	2	1
Average Age	33 years	35 years
Income Group	<\$10,000 = 3	<\$10,000 = 1
	\$10,001–\$20,999 = 5	\$10,001–\$20,999 = 0
	\$21,000–\$30,999 = 1	\$21,000–\$30,999 = 5
	\$31,000–\$50,999 = 4	\$31,000–\$50,999 = 6
	\$51,000–\$75,999 = 5	\$51,000–\$75,999 = 5
	\$76,000–\$100,999 = 8	\$76,000–\$100,999 = 20
	\$101,000–\$125,999 = 8	\$101,000–\$125,999 = 8
	\$126,000–\$150,999 = 4	\$126,000–\$150,999 = 3
	\$151,000–\$200,000 = 2	\$151,000–\$200,000 = 4
	Over \$200,000 = 2	Over \$200,000 = 3
Level of education	Prefer not to answer = 2	Prefer not to answer = 1
	High School = 4	High School = 3
	Bachelors = 25	Bachelors = 17
	Masters = 13	Masters = 25
	PhD = 2	PhD = 11

1,000 people away from the CEO, and a 5% trimmed mean of 24 people away from the CEO. Of the 44 entrepreneurs, 35 had prior managerial experience. Of the 56 managers, 38 had previous entrepreneurial experience. Our sample is relatively small and biased toward males, potentially reducing the generalizability of our study. We include analyses of race, gender, and age to determine the effect on our results (described in the data analysis section below).

Survey scoring

The data analysis followed the process of coding the different scores of each survey measurement, as outlined in Table 2. The Toronto Empathy answers were summed to derive totals according to the Toronto Empathy Questionnaire protocol (Spreng et al., 2009). The Melbourne Decision Making answers were split into four groups: buck-passing, hyper-vigilance, vigilance, and procrastination, and answers for each group were summed (Mann et al., 1997). General Self-Efficacy scores were summed to derive a total (Schwarzer and Jerusalem, 1995). The NEO Five-Factor Inventory scores were summed in each domain (Costa and McCrae,

2008) and converted into t-scores using the provided t-tables. The Creative Achievements and Activities answers were split into Creative Activities and Creative Achievements, each separated into eight domains. Domain-specific scores were averaged or summed across each question, and domain-general scores were summed across each domain score (Diedrich et al., 2018). NIH Toolbox instruments were used to collect the Emotion-Battery (Babakhanyan et al., 2018), and survey scores were calculated with the NIH Toolbox manual (www.nihtoolbox.org). Raw survey scores were converted into t-scores using the provided t-tables. The Alternative Uses Task (Guilford, 1967) was scored by two independent raters along two dimensions of fluency and originality. Fluency was defined as the number of uses listed, and Originality was defined as the frequency of the use across participants (i.e., one divided by the number of times any participant listed the use). There was limited discrepancy between what was considered both original and a “use” by each rater. An intraclass correlation was performed to ensure good reliability between the two raters and found an intraclass coefficient of 0.7 for originality and 0.94 for fluency. These survey instruments have been well-validated across diverse adult populations in psychological research contexts (Aluja et al., 2024; Carson et al., 2005; Janelt et al., 2024; Jonker et al., 2022; Luszczynska et al., 2005; Salsman et al., 2013; Young and Schinka, 2001). All instruments were administered without modification.

Data analysis

Following the scoring, we employed an Exploratory Factor Analysis (EFA) to reveal latent factors in the dataset. We employed comparative analyses as a dichotomy (between Entrepreneurs and Managers) and across the Entrepreneurial-Managerial spectrum. The groups were defined based on the participant’s responses to the Entrepreneur Manager Quotient, which established their experience in both entrepreneurship and management (Auernhammer et al., 2021). We removed participants who had substantial missing data across multiple instruments. To ensure the robustness of our findings, we re-performed all primary analyses, including participants with partial data. These analyses yielded highly similar results, with no meaningful differences in the significance or direction of key findings. We also employed analyses based on the number of companies founded and differences in career success measured through income and self-rated success. We looked for any group differences in sex, race, age, income, and education. A chi-squared test of race and education between entrepreneur and manager groups showed significant differences between the two groups ($p = 0.05$, $\chi = 9.4$ and $p = 0.015$, $\chi = 10.4$, respectively). Thus, race and education were used as covariates for all later analyses. Sex, age, and income were not significantly different between the two groups.

Exploratory factor analysis (EFA)

We analyzed the data through an EFA to determine the underlying latent factors between numerous measured variables. We found latent factors that account for variation between the

TABLE 2 Cognitive capacities, behaviors, and entrepreneur-manager spectrum assessments.

Assessment	Measurement
Entrepreneur manager quotient	A survey to determine where an individual lies on a spectrum from entrepreneur to manager.
Toronto empathy	A representation of empathy as primarily an emotional process and component of social cognition. High empathy means accurately perceiving the emotional state of another person. Higher scores indicate higher empathy.
Melbourne decision making	Asks from 0 to 2 how true a series of statements are in each of the four categories: <ul style="list-style-type: none"> Procrastination: feeling pressured and pessimistic about decision-making Hypervigilance: delaying decision-making Buck-passing: avoiding decisions and leaving decision-making to others Vigilance: the consideration of information and alternatives
NEO Five-factor inventory	A measure of five domains of personality: <ul style="list-style-type: none"> Neuroticism: emotional instability Extraversion: sociability, emotionally expressive Agreeableness: altruism, kindness, cooperativeness Openness: curiosity, creativity Conscientiousness: thoughtful, good impulse control, preparedness
Inventory of Creative Activities and Achievements (ICAA)	Asks to report creative activities (CAct) and achievements (ICAA; CAch). The inventory contains eight different domains (literature, music, art/craft, creative cooking, sports, visual art, performing art, and science) and 3 questions for each of these domains. <ul style="list-style-type: none"> CAct: the number of times an activity has been carried out CAch: the level of achievement
Reward responsiveness	<ul style="list-style-type: none"> Reward Responsiveness (RR): measures sensitivity to rewards independent of punishment Behavioral inhibition system (BIS): measures responses to anxiety cues in the environment
General Self-efficacy Scale (GSE)	Measures confidence in one's ability to cope, solve problems and accomplish goals. Scored from 'not true' to 'exactly true'. A higher score indicates more self-efficacy.
Alternative Uses Test (AUT)	Participants have 2 min to come up with as many uses different from the common use for six common objects. Scored across two domains: <ul style="list-style-type: none"> Fluency: how many uses participants list Originality: how unique these uses are
NIH-toolbox emotion battery	Questions on emotional health are answered on five- or seven-point Likert scales. Measured across multiple subdomains: <ul style="list-style-type: none"> Positive Affect, General Life Satisfaction, Emotional Support, Friendship, Loneliness, Perceived Rejection, Perceived Hostility, Sadness, Perceived Stress, Somatic Fear, Affective Fear, Aggressive Anger, Affective Anger, Hostile Anger, Meaning and Purpose, and Instrumental Support.

variables and drive differences across the EMS. The EFA also allowed us to reduce the data and avoid the problem of multiple comparisons. To test the appropriateness of an EFA, we first performed Bartlett's test for sphericity. This was significant ($p <$

0.0001), suggesting the correlation of our variables was different from zero. Then, we performed a Kaiser-Meyer-Olkin test to check sampling adequacy. We found the overall Measures of Sampling Adequacy (MSA) to be 0.76, suggesting a large enough sample size and enough variance for an EFA to be appropriate.

A Parallel Analysis computed with maximum likelihood extraction and oblique rotation determined that five to six factors had eigenvalues greater than those of chance (Figure 1A). We tested the five-factor model, which explained 48% of the variance with a strong loading of variables on all five factors. The loading values at ~ 0.5 and above were included in each factor, following the accepted guidelines and for the theoretical interpretation of the factors (Fabrigar et al., 1999; Stevens and Stevens, 2001). The five-factor model resulted in a root mean square of residuals of 0.064, a root mean squared error of approximations of 0.076 and a comparative fit index of 0.852. We also tested and compared a six-factor model, resulting in a model explaining 52% of the variance and an additional factor that only had two loading value above our threshold of 0.5. The six-factor model resulted in a root mean square of residuals of 0.053, a root mean squared error of approximations of 0.066, and a comparative fit index of 0.896. For simplicity we choose the five-factor model. Cronbach's alphas and factor loadings are reported in Results section.

Analysis of the difference between entrepreneurs and managers

We compared the resulting factors from the EFA between entrepreneurs and managers to identify the difference in cognitive capacity and behavior between the two groups, while controlling for covariates. Given any significant group differences, significance was determined with a Multivariate Analysis of Covariance (MANCOVA) using education and race as covariates. We corrected for multiple comparisons using the Benjamini-Hochberg method. When appropriate, we performed *post-hoc* ANOVAs to examine group differences for each of the five factors.

Analysis of differences among the entrepreneurial-managerial spectrum

We examined differences between levels of entrepreneurial/managerial experiences to understand differences in capacities and behaviors with experience. We quantified EMS using the Entrepreneur-Manager Quotient (Auernhammer et al., 2021). This questionnaire asks participants about their entrepreneurial experience, managerial experience, motivations, feelings of success, and position within their company. According to their responses to the quotient, participants were separated into four levels of experience: (1) entrepreneurs with no managerial experience, (2) entrepreneurs with managerial experience, (3) managers who were previously entrepreneurs, and (4) managers who were never entrepreneurs. We performed a MANCOVA to assess differences between the four levels of experience regarding the five factors from the EFA, with education and race as covariates and corrected using the Benjamini-Hochberg method. We then

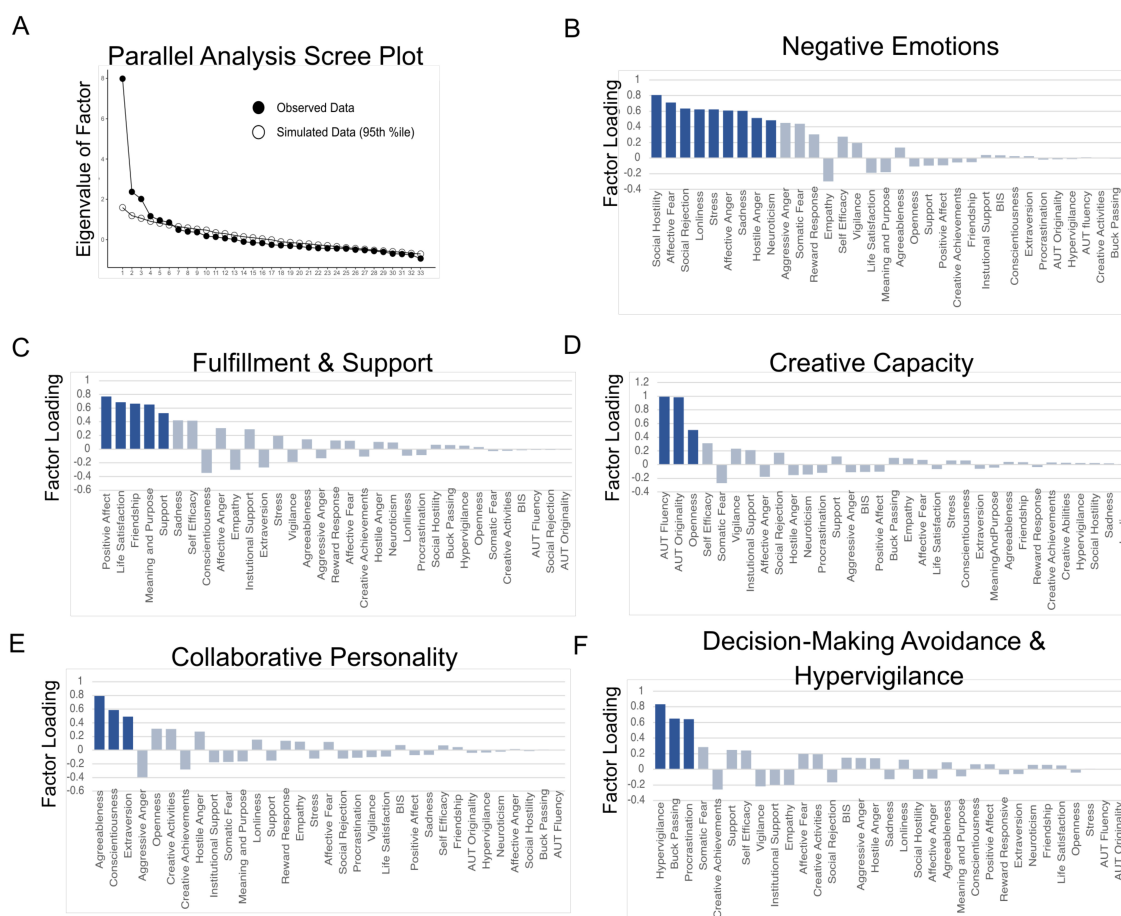


FIGURE 1

Results of the exploratory factor analysis. **(A)** A scree plot was used to determine the number of factors to retain. The dark line with filled circles shows the eigenvalues from the actual data. The gray line with empty circles represents the simulated and resampled data against which the actual data is compared. **(B–F)** Five latent factors were found in the exploratory factor analysis. Blue bars denote the variables comprising each factor, with height being the factor loading score. The label for each factor was determined based on the underlying factors with the highest loadings.

performed *post-hoc* ANOVAs to examine group differences for each of the five factors.

Analysis of the difference in terms of the number of companies founded across all participants

We examined the relationship between the number of companies founded and the five factors of the EFA. We performed a MANCOVA with education and race as covariates to investigate the difference between participants who founded zero, one, two, or three+ companies, with companies founded defined by the Entrepreneur-Manager Quotient and study criteria. The number of companies founded was combined into a single group after three, as only a few founded more than three companies. We corrected *p*-values using the Benjamini-Hochberg method and when appropriate, we then performed *post-hoc* ANOVAs to examine group differences for each of the five factors.

Analysis of the difference in terms of career success across all participants

The last analysis included the measurements of career success based on income and self-reported success. We performed a MANCOVA with education and race as covariates to investigate the effect of income and self-reported success on the five factors of the EFA. We corrected *p*-values using the Benjamini-Hochberg method and when appropriate, we then performed *post-hoc* ANOVAs to examine group differences for each of the five factors.

Results

The analysis resulted in five factors from the EFA, allowing us to compare the groups as a dichotomy as well as a spectrum. Overall, our analyses revealed (1) significant differences between the two groups of Entrepreneurs and Managers, (2) significant differences in groups based on the level of entrepreneurial and managerial experience, and (3) no significant differences in Career Success.

Exploratory factor analysis results

The exploratory factor analysis resulted in five latent factors: Negative Emotions, Fulfillment and Support, Creative Capacity, Collaborative Personality, and Decision-Making Avoidance and Hypervigilance. Figure 1 shows the scree plot and factor loadings of each factor of the exploratory factor analysis.

Each factor relates to a different cognitive and social aspect of entrepreneurial and managerial activities: emotional and social health (positive and negative), personality, creativity, and decision-making. “**Negative Emotions**” comprises nine subscales relating to negative emotional states: social hostility, affective fear, social rejection, stress, loneliness, affective anger, sadness, neuroticism, and hostile anger (Figure 1B). The factor loadings reach between 0.81 and 0.51 with Cronbach’s alpha of $\alpha = 0.90$ and explain 15% of the variance. “**Fulfillment and Support**” consists of five subscales relating to general life fulfillment and social support. Factor loadings reach from 0.77 to 0.52 with Cronbach’s alpha of $\alpha = 0.86$. The factor explains 11% of the variance. This factor comprises positive affect, life satisfaction, meaning and purpose, friendship, and support (Figure 1C). “**Creative Capacity**” includes three subscales relating to creativity and openness to ideas: the alternative uses fluency score, the alternative uses originality score, and NEO openness (Figure 1D). The factor loadings reach from 0.99 to 0.51 with Cronbach’s alpha of $\alpha = 0.59$ and explain 8% of the variance. “**Collaborative Personality**” comprises three subscales from the NEO personality test: agreeableness, conscientiousness, and extraversion (Figure 1E). The factor incorporates loadings between 0.79 and 0.49 with a Cronbach’s alpha value of $\alpha = 0.75$, explaining 7% of the variance. “**Decision-Making Avoidance and Hypervigilance**” comprises three subscales from the Melbourne Decision Making Quotient. The factor incorporates factor loadings from 0.83 and 0.64 with Cronbach’s alpha of $\alpha = 0.78$, explaining 7% of the variance. The factors include hypervigilance, buck-passing, and procrastination (Figure 1F).

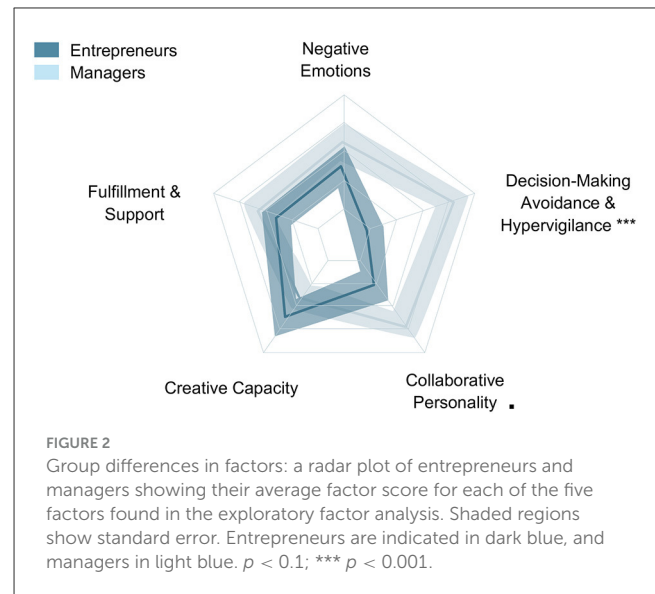
Examining the dichotomy between entrepreneurs and managers

The comparative analysis of the five factors between the two groups, Entrepreneurs and Managers, resulted in statistically significant differences in Decision-Making Avoidance and Hypervigilance, and trending toward significant differences in Collaborative Personality, as illustrated in Figure 2.

The MANCOVA results showed significant differences between Entrepreneurs and Managers ($F = 4.52$, adjusted $p = 0.002$). *Post hoc* ANOVAs showed that Entrepreneurs scored significantly lower than managers on Decision-Making Avoidance and Hypervigilance ($p < 0.001$, $F = 12.39$). Collaborative Personality showed near significance ($p = 0.08$, $F = 3.05$). Additionally, the analysis showed no significant differences in Creative Capacity, Negative Emotions, and Fulfillment and Support.

Examining differences across the entrepreneurial-managerial spectrum

Our MANCOVA results revealed a difference based on the EMS ($F = 2.57$, adjusted $p = 0.002$). *Post hoc* results showed that Creative



Capacity and Decision-Making Avoidance and Hypervigilance vary significantly with entrepreneurial experience ($p = 0.021$, $F = 3.38$ and $p = 0.002$, $F = 5.0$, respectively). The data suggested non-linear differences in Creative Capacity across the EMS spectrum and an increase in Decision-Making Avoidance and Hypervigilance with decreased entrepreneurial experience, as shown in Figure 3. See Supplementary Figures A–C for non-significant score plots.

Examining differences across the total number of companies founded across all participants

Our MANCOVA results revealed a significant difference based on the number of companies founded ($F = 5.37$, adjusted $p = 0.002$). *Post-hoc* results indicated significant differences in Collaborative Personality ($p = 0.021$, $F = 5.6$) and Decision-Making Avoidance and Hypervigilance ($p = 0.002$, $F = 10.3$) based on the total number of companies participants founded. Both factors tend to decrease with more companies founded, as shown in Figure 4. See Supplementary Figures D–F for non-significant score plots.

Examining differences in terms of career success across all participants

Our MANCOVA results revealed no significant differences in latent factors based on career success as measured by income and self-reported success. Similarly, the analysis of group differences in Entrepreneurs’ and Managers’ career success also resulted in no significant differences between groups. The size of the company and the number of people supervised were also insignificant between groups.

Discussion

This study explored the multifaceted profiles of entrepreneurs and managers as a dichotomy and a spectrum. We did this

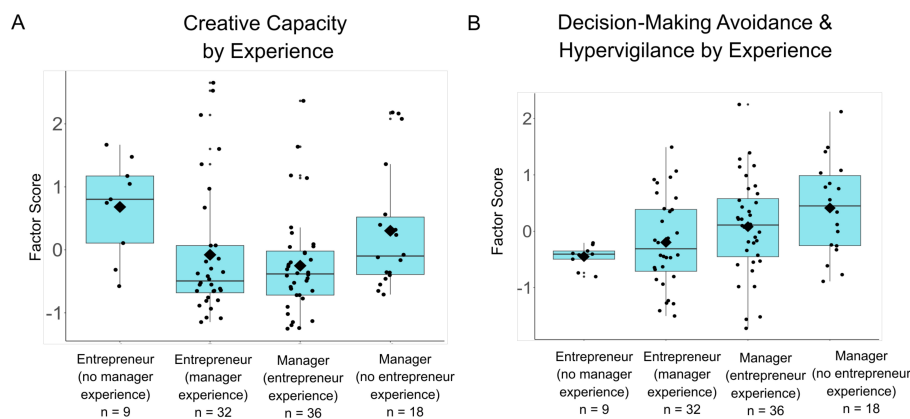


FIGURE 3

Score plots of entrepreneur-manager spectrum: significant differences between factors and entrepreneurial experience (A) Creative Capacity (B) Decision-Making Avoidance and Hypervigilance. Box plots with data overlaid showing the median and distribution of the significant factor scores grouped by entrepreneurial and managerial experience. Large dots denote the mean.

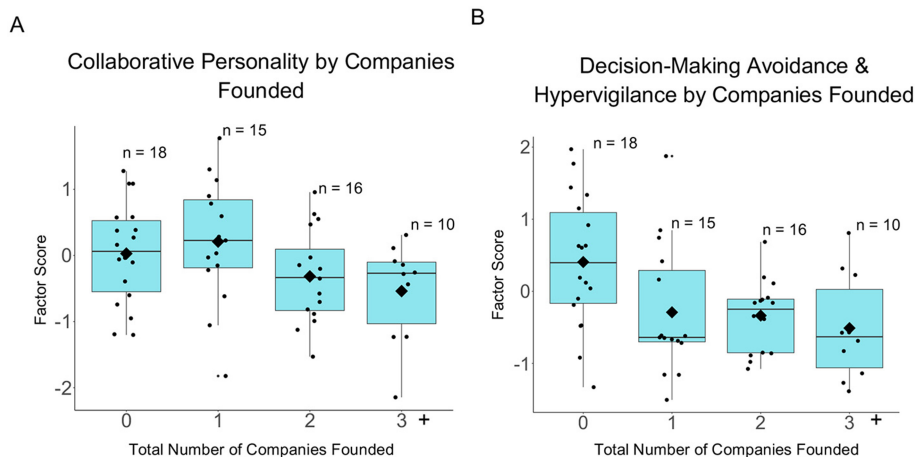


FIGURE 4

Score plots of companies founded: significant correlations between factors and the total number of companies founded. (A) Collaborative Personality (B) Decision-Making Avoidance and Hypervigilance. Box plots with data overlaid showing the median and distribution of the factor scores grouped by the number of companies founded: 0, 1, 2, 3, or more. Large dots denote the mean.

by including a variety of well-established surveys on self-identified entrepreneurs and managers. Using an exploratory factor analysis, we found five latent factors underlying our data: Decision-Making Avoidance and Hypervigilance, Collaborative Personality, Creative Capacity, Negative Emotions, and Fulfillment and Support. We also measured career success through self-reported success and income. Our findings showed significant differences in groups based on a spectrum of entrepreneurial and managerial experience: entrepreneurs with prior managerial experience, entrepreneurs without prior managerial experience, managers with prior entrepreneurial experience, and managers without prior entrepreneurial experience. We have three main results from the exploratory factor analysis. (1) Entrepreneurs scored significantly lower on Decision-Making Avoidance and Hypervigilance than managers. (2) Decision-Making Avoidance and Hypervigilance, Collaborative Personality, and Creative Capacity varied across the EMS and (3) Negative

Emotions, Fulfillment and Support, and Career Success remained indifferent to the EMS. Taken together, our results suggest key differences in both creativity and how people feel about decision-making that vary based on their entrepreneurial and managerial work experience.

Implications for decision-making

Our initial finding addressed the differences between entrepreneurs and managers as a dichotomy. These results indicate a potential difference in how entrepreneurs approach decision-making compared to managers. This is based on three decision-coping patterns identified in the Melbourne Decision Making Questionnaire: hypervigilance, buck-passing, and procrastination (Mann et al., 1997). These three subscales of our decision-making factor conveyed anxiety toward decision-making

and impulsivity, avoiding responsibility for decisions and leaving decisions to others, and indecisiveness toward decisions. The fourth coping pattern, vigilance, was not significantly loaded onto this factor, consistent with findings where vigilance is conceptually distinct from the other coping patterns. The Melbourne Decision Making Questionnaire framed questions regarding one's general preferences and feelings toward decision-making rather than one's ability to make decisions in one's current occupation. This is important as entrepreneurs generally have more freedom to make decisions unilaterally than managers.

Our results suggested that entrepreneurs feel less negatively about making decisions, are less likely to pass the responsibility of making decisions onto others, and are more inclined to make decisions. Entrepreneurs also have differences (trending toward significance) in their collaborativeness, measured across the personality domains of agreeableness, conscientiousness, and extraversion (Costa and McCrae, 2008). These personality domains are, on average, stable over time among adults and unrelated to life events (Cobb-Clark and Schurer, 2012). Thus, there may be a selection effect where people with certain personality traits related to less collaborativeness enter entrepreneurship, contributing to our decision-making differences. On the other hand, specific aspects of entrepreneurship may impact how entrepreneurs feel about making decisions. If this is the case, then interventions in decision-making can improve people's ability to become entrepreneurs.

To better understand the role of experience compared to personality selection bias on entrepreneurs, we looked more closely at the individual's prior work experiences. Significant differences suggested lower Decision-Making Avoidance and Hypervigilance scores with more entrepreneurial and less managerial experience. Additionally, Decision-Making Avoidance and Hypervigilance are higher for those entrepreneurs with prior management experience, which suggests that differences in Decision-Making Avoidance and Hypervigilance can arise irrespective of potential constraints on their ability to make decisions unilaterally. These results imply that decision-making tendencies may relate to an individual's professional experiences. It is possible that prior experience as a manager and working in a hierarchical structure could engrain one with decision-making avoidance or hypervigilant characteristics. Supporting this explanation, participants who founded more companies generally scored lower on Decision-Making Avoidance and Hypervigilance and Collaborative Personality. Practicing entrepreneurship may lower one's hesitancy toward decision-making by passively increasing familiarity and comfort with making decisions. On the other hand, the necessity to make decisions as an entrepreneur may result in experienced entrepreneurs developing active coping mechanisms for decision-related stress. Research testing this explicitly could be used to develop decision-making training programs.

Implications for creativity

Creative Capacity was different across the EMS spectrum. The creative capacity factor contained the Alternate Uses Task and the NEO personality openness score. NEO openness

has been previously associated with creativity, and creativity has been identified as an essential aspect of entrepreneurship (Griffin and McDermott, 1998; Li et al., 2015; Wolfradt and Pretz, 2001). The difference in creativity across experience suggests that, similar to decision-making, creativity can be improved with experience and/or environment. This is supported by interventions that attempt to improve certain aspects of entrepreneurship through practice. For example, what is known as a metacognitive perspective enhances the ability to adapt cognitively and can improve decision-making and creativity (Haynie et al., 2010). Metacognition improves through training and can enhance an individual's adaptability, creativity, and communication in various contexts (Batha and Carroll, 2007; Kramarski and Mevarech, 2003; Schmidt and Ford, 2003; Shepherd and Patzelt, 2018). Creative enhancement is also possible through a design-thinking-based Creative Capacity Building Program that has been shown to lead to longitudinal changes in brain activity associated with spontaneous improvisation (Saggar et al., 2017). In addition to training interventions and programs, an optimal environment can improve wellbeing and, by extension, creativity. Environmental and situational factors like good role models, resources, and freedom from criticism have influenced creativity in people (Amabile and Gryskiewicz, 1989; Runco, 2004; Witt and Beorkrem, 1989). Many people have the potential to become entrepreneurs but don't, and maximizing these factors could foster not only entrepreneurship but creativity more broadly.

Implications for emotional health

Our results also demonstrated similarities between entrepreneurs and managers. There were no significant differences in Negative Emotions or Fulfillment and Support between any groupings. This factor includes measures of personal and social fulfillment, support, and life satisfaction. There were also no significant differences in career success between the groupings for any of the five factors. This is interesting because the uncertainty of entrepreneurship presents unique challenges that have the potential to impact entrepreneurs' wellbeing negatively (Patzelt and Shepherd, 2011). However, certain stressors have less of a negative impact on entrepreneurs' wellbeing compared to non-entrepreneurs (Lerman et al., 2021), and entrepreneurial experience moderates how individuals perceive stressors (Kollmann et al., 2019). Our results support the idea that entrepreneurs are better able to handle the stressors of their situations, resulting in no overall negative impact on their wellbeing. Future longitudinal research could examine how entrepreneurs' wellbeing changes over time due to social or economic challenges. The stress management skills needed to cope with the specific difficulties of entrepreneurship could prepare entrepreneurs to cope with stress more generally. Therefore, any techniques that entrepreneurs use to maintain wellbeing and manage stress could be developed and shared with others in different contexts. This has the potential to improve not only emotional factors of wellbeing but also cognitive factors such as creativity.

Limitations and future research directions

One main limitation of our study is the relatively small sample size ($n = 100$), which reduces the generalizability of our findings and may limit the stability of the exploratory factor analysis results. Our sample was predominantly male (69%), which may introduce gender bias. Although gender was included as a covariate in our analyses and no significant effects were observed, future studies should aim for larger and more balanced samples across gender and other social factors, such as race and ethnicity, to examine potential moderating effects more thoroughly.

Another limitation is that many entrepreneurs in our sample had prior managerial experience; conversely, many managers reported previous entrepreneurial experience. While this overlap reflects real-world career paths and allowed us to examine a spectrum of entrepreneurial-managerial experience, future research could benefit from recruiting larger samples of individuals with more clearly distinct career trajectories to isolate group differences better.

Despite these limitations, our findings open several promising avenues for future research. First, longitudinal studies are needed to examine how cognitive, emotional, and personality profiles evolve across the entrepreneurial-managerial spectrum over time. For example, does repeated entrepreneurial decision-making practice reduce decision-making avoidance and enhance creative capacity longitudinally? Tracking individuals transitioning between entrepreneurial and managerial roles could show how personality traits and cognitive strategies adapt through experience.

Second, future research should explore the influence of external environmental factors on the EMS. Industry characteristics (e.g., dynamic vs. stable sectors), organizational culture (e.g., hierarchical vs. flat structures), and broader economic conditions (e.g., boom vs. recession periods) may shape how individuals develop entrepreneurial or managerial cognitive profiles. Investigating whether individuals in highly volatile industries exhibit faster shifts in decision-making and creativity than those in stable industries would provide important insights.

Third, more objective cognitive assessments should complement self-report measures. Classic tasks such as functional fixedness tests or novel, real-world problem-solving exercises could provide deeper insights into entrepreneurial creativity and flexibility beyond self-perception biases.

Finally, future studies could aim to validate new scales derived from the latent factors identified in our exploratory analysis, using larger and more representative samples to replicate and extend our findings. Overall, a deeper understanding of how personality, cognition, emotional wellness, environment, and experience interact will provide a more comprehensive framework for supporting both entrepreneurs and managers across their careers.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by Stanford University Institutional Review Board. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

AB: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Visualization, Writing – original draft, Writing – review & editing. JA: Conceptualization, Data curation, Investigation, Methodology, Validation, Writing – original draft, Writing – review & editing. KM: Conceptualization, Data curation, Investigation, Methodology, Validation, Writing – original draft, Writing – review & editing. JB: Conceptualization, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing. SJ: Conceptualization, Data curation, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing. HX: Conceptualization, Data curation, Writing – original draft, Writing – review & editing. NS: Conceptualization, Funding acquisition, Writing – original draft, Writing – review & editing. MS: Conceptualization, Data curation, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Writing – original draft, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Generative AI statement

The author(s) declare that no Gen AI was used in the creation of this manuscript.

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Supplementary material

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/forgp.2025.1513122/full#supplementary-material>

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