



Creation of the entrepreneurial personality scale: Removing conceptual and empirical barriers from the study of personality and entrepreneurship

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ARTICLE INFO

Keywords:

Entrepreneurship
 Entrepreneur
 Personality
 Entrepreneurial personality
 Individual differences
 Scale development

ABSTRACT

The goal of the current article is to address systematic barriers that hamper modern research on Entrepreneurial Personality (EP). We provide conceptual clarity to the meaning of EP, which we conceptualize with the dimensions of innovativeness, risk-taking propensity, achievement orientation, proactiveness, locus of control, self-efficacy, and autonomy orientation. We also formalize two competing perspectives regarding EP's relations with relevant outcomes; the Pillar Conceptualization proposes that EP produces consistent relations with relevant outcomes, whereas the Wheel Conceptualization proposes that EP produces varying relations that depend on the specific phase of the entrepreneurial process. Then, we develop the Entrepreneurial Personality Scale (EPS) using five samples (total $n = 1877$), which include samples of general participants and samples of solely entrepreneurs. We show that the EPS produces appropriate psychometric and validity evidence across both types of samples, strongly supporting its use in future research. We also show that the EPS dimensions produce varying relations with relevant outcomes, which were determined by the phase of the entrepreneurial process – supporting the Wheel Conceptualization. Via these efforts, future researchers can investigate EP with greater confidence in their theoretical rationale and methodological soundness by applying the EPS. The Wheel Conceptualization is also a promising lens to understand EP moving forward, and a clear future direction for research is to integrate novel temporal theories and frameworks to add nuance to this perspective.

1. Introduction

The study of personality and entrepreneurship has increased in recent years, and personality is more regularly included in broader models detailing the entrepreneurial process (Brandstätter, 2011; Clark and Covin, 2021; Littunen, 2000; Vandor, 2021). Many researchers investigate multidimensional personality constructs of traits believed to represent entrepreneurial dispositions (e.g., Individual Entrepreneurial Orientation [IEO]) (DeNisi, 2015; Martins and Perez, 2020; Miller, 2015), and these multidimensional constructs tend to produce stronger relations with relevant outcomes than individual traits or broad personality frameworks (e.g., Big Five) (Leutner et al., 2014; Postigo et al., 2021; Rauch and Frese, 2007). While many labels have been given to these multidimensional constructs, they are often jointly referred to as entrepreneurial personality (EP) and defined as a collection of traits that make someone entrepreneurial and result in an inclination towards entrepreneurship (Altinay et al., 2022; Clark and Covin, 2021; Korunka et al., 2003; Leutner et al., 2014; Vandor, 2021). Recently, Howard and Boudreaux (2021) performed a systematic literature review and

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<https://doi.org/10.1016/j.jbvi.2023.e00398>

Received 14 March 2023; Received in revised form 30 April 2023; Accepted 2 May 2023
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meta-analysis that identified the most common traits used to represent EP. They also supported that these dimensions produce sizable interrelations and significantly relate to entrepreneurial attitudes, intent, status, and performance.

Despite these advancements, significant barriers are evident in research on EP, and we address these barriers to resolve tensions in the modern literature (DeNisi, 2015; Howard and Boudreaux, 2021; Miller, 2015). Dimensions and measures of EP differ from study to study, causing difficulties in the interpretation and generalization of results (Altinay et al., 2022; Martins and Perez, 2020; Vandom, 2021). Howard and Boudreaux (2021) made initial progress in addressing this concern, but researchers are unlikely to study their identified dimensions without adequate measurement tools. For this reason, we create the Entrepreneurial Personality Scale (EPS) via a five-sample process, showing that the scale produces appropriate psychometric and validity evidence with samples of both general participants and entrepreneurs alone. Creating this measure enables a more focused and accurate field of research, as researchers can study a common conceptualization of EP with a well-supported operationalization in the EPS.

Further, the nomological net of EP is unclear. Some perspectives suggest that the dimensions of EP produce consistent relations with relevant outcomes, which we label the Pillar Conceptualization (Howard and Boudreaux, 2021); but others suggest that these relations vary based on the phase of the entrepreneurial process, which we label the Wheel Conceptualization (Chapman, 2000; Rauch and Frese, 2007). These competing perspectives potentially limit the theoretical usefulness of EP, as its role is unclear in broader models, theories, and frameworks of entrepreneurship. For this reason, we assess whether the EPS's dimensions produce consistent or varying relations that depend on the phase of the entrepreneurial process. By supporting either the Pillar or Wheel Conceptualization, these results better position EP in broader models and frameworks of entrepreneurship, determine whether temporal theories may benefit the study of EP, and identify future research directions to add nuance to the supported perspective.

2. Entrepreneurial personality definition, dimensions, and measurement

Researchers frequently assess the joint effects of multiple personality traits believed to have a particular association with entrepreneurship (Korunka et al., 2003; Martins and Perez, 2020; Miller, 2015). Such traits are sometimes studied together solely because of their assumed heightened relation with entrepreneurial outcomes, including entrepreneurial attitudes, intent, status, and performance – and more recently entrepreneur well-being (Gish et al., 2022; Salmony et al., 2021). Researchers also regularly propose, however, that their studied traits have a joint conceptual meaningfulness that is, in part, defined by their association with entrepreneurship (Bolton and Lane, 2012; Clark and Covin, 2021; Kerr et al., 2018). These collections of traits are often referred to as EP. A common nominal definition for EP is the traits that make someone entrepreneurial and result in an inclination towards entrepreneurship (Clark and Covin, 2021; Leutner et al., 2014). Via this definition, researchers identify dimensions of EP by determining which aspects of personality are necessary for a person to engage and succeed in entrepreneurial activities. A common empirical definition for EP is traits that strongly relate to entrepreneurial outcomes across broad contexts (Howard and Boudreaux, 2021). Via this definition, researchers identify dimensions of EP by conducting empirical analyses. Dimensions that satisfy this nominal definition are typically believed to also satisfy this empirical definition (and vice versa).

Many multidimensional constructs satisfy the nominal and empirical definitions of EP. Perhaps the most popular is IEO (Koe, 2016; Kollmann et al., 2007; Kraus et al., 2019). IEO was adapted from research on entrepreneurial orientation (EO) at the firm-level. The construct was originally intended to contain the same five dimensions of EO, but two dimensions produced poor internal consistency estimates in the scale development of Bolton and Lane (2012), causing the construct to be operationalized with three dimensions: risk-taking propensity, innovativeness, and proactiveness. Many authors have supported that IEO and its dimensions broadly relate to entrepreneurial outcomes across many contexts, and they have integrated the construct into relatively complex models and frameworks (Bilal and Fatima, 2022; Covin et al., 2020; Özgen and Tangör, 2021). For instance, Kollmann et al. (2007) developed a cross-cultural framework, wherein the influences of environmental antecedents on entrepreneurial outcomes were mediated by IEO; Ferreira et al. (2017) produced a metacognitive decision making-based framework of IEO, which produces novel insights into its measurement and relations; and Gupta et al. (2016) integrated research on IEO with the technology acceptance model, supporting that those higher in IEO are more willing to adopt new technologies. These three examples demonstrate the wide breadth of models and frameworks integrated with IEO, emphasizing the importance of research on both IEO and EP. While IEO is popular, it is only one of

Table 1
Entrepreneurial personality dimensions and definitions.

Dimension	Definition
Innovativeness	Tendency to adopt practices early, experiment with possibilities, and produce original and effective outcomes (Midgley and Dowling, 1978; Rauch and Frese, 2007).
Risk-Taking Propensity	Tendency to perform behaviors with uncertain outcomes, often due to an increased focus on positive rather than negative consequences (Brockhaus, 1980).
Achievement Orientation	Desire and need for accomplishing tasks as well as meeting and exceeding standards of performance (McClelland, 1965).
Proactiveness	Tendency to be future-oriented, anticipate demand, seek out opportunities, and initiate action to complete tasks before others (Bolton and Lane, 2012).
Locus of Control	Belief that outcomes are determined by either internal (i.e., self) or external forces (Spector, 1982). Higher values indicate greater internal locus of control.
Self-Efficacy	Self-assessment of capabilities for succeeding at tasks (Bandura, 1982).
Autonomy Orientation	Desire and need for freedom, independence, and discretion to schedule, decide, and enact the methods to complete tasks (Morgeson and Humphrey, 2006).

many conceptualizations of EP, and authors have provided significant support that other dimensions should be included within EP (Gürol and Atsan, 2006; Howard and Floyd, 2021; Santos et al., 2020).

These alternative conceptualizations typically include some combination of the three constructs above along with achievement orientation, locus of control, self-efficacy, and/or autonomy orientation (Embi et al., 2019; Ibdunni et al., 2020; Obschonka et al., 2013). Labels for these multidimensional constructs include EP (Lee and Tsang, 2001), EP profile (Obschonka et al., 2013), entrepreneurial characteristics (Koh, 1996), enterprising personality (Mayer et al., 2014), general enterprising tendency (Caird, 2013), and others. To synthesize conceptualizations of EP, Howard and Boudreaux (2021) conducted a systematic literature review of over 600 sources. The authors identified that seven dimensions are included within EP significantly more often than any other traits, although few researchers include all seven dimensions in their conceptualizations. Table 1 provides these seven dimensions and their descriptions.

Howard and Boudreaux (2021) also conducted a meta-analysis, showing that these seven dimensions have sizable intercorrelations and correlations with entrepreneurial attitudes, intent, status, and performance. From these efforts, the authors supported that these dimensions are representations of EP. An entrepreneurial person is forward-thinking and identifies opportunities (proactiveness). Because opportunities rarely have clear outcomes, and the person must also be willing to take risks (risk-taking propensity) and try new things (innovativeness). Entrepreneurship is often discouraging, however, and the person needs to believe that they control their future (locus of control), believe that they can achieve their goals (self-efficacy), and have a drive for achieving their goals (achievement orientation). Lastly, entrepreneurs must be comfortable with making decisions for themselves and others (autonomy orientation). Thus, these dimensions satisfy the common empirical and nominal definitions of EP.

While combinations of these dimensions are frequently used to represent EP, no single measure assesses all seven dimensions together (Howard and Boudreaux, 2021). Authors have utilized many different measures to assess these dimensions, and the choice of measures typically differs from study to study. This practice poses a number of concerns. First, many applied measures have had modest investigation into their psychometric properties and validity, and it is unclear whether they accurately represent their constructs of interest (Clark and Covin, 2021; Kerr et al., 2018). Second, even when studies have investigated individual measures, it cannot be assumed that they perform adequately when utilized together to represent EP (Judge et al., 2003). Undetected cross-loadings may emerge, and measures assumed to represent independent constructs may inadvertently assess a common factor. Third, scales for common constructs are known to produce differing relations (Yamauchi and Doi, 1977), and heterogeneity across studies may be unknowingly due to the use of different measures rather than substantive aspects. These concerns pose significant barriers to the study and understanding of EP.

Given these concerns, the current article provides the results of a five-sample process to develop the EPS. We create a concise measure of these seven dimensions that produces appropriate psychometric and validity evidence across samples of both the general population and solely entrepreneurs alike. We show that the measure produces sufficient incremental validity evidence beyond IEO and entrepreneurial attitude orientation (EAO), as doing so supports that the EPS is a more complete conceptualization of EP. We likewise show that the EPS produces incremental validity evidence beyond the Big Five, which is the most commonly studied personality framework (Soto and John, 2017). Providing this support emphasizes the benefits of studying a more specific and relevant conceptualization of personality rather than a broad framework, encouraging future investigations using the EPS. To assess the validity of this measure, however, the nomological net of EP must first be discussed.

2.1. Nomological net - Wheel Conceptualization vs. Pillar Conceptualization

Entrepreneurship is a process (Davidsson and Gruenhagen, 2022; Hikkerova et al., 2016). While models of entrepreneurship differ on its phases, most include earlier phases associated with entrepreneurial entry. These phases, also called pre-action or entrepreneurial potential, often describe steps associated with becoming interested, building motivation, developing skills, gathering resources, identifying opportunities, and planning procedures to start entrepreneurial endeavor(s) (Hikkerova et al., 2016; Mishra and Zachary, 2015). Most models also include latter phases associated with entrepreneurial management. These phases, also called action or active entrepreneurship, often describe steps associated with exploiting opportunities, actively marketing, and overseeing employees (Guerrero et al., 2021; Hikkerova et al., 2016). All phases of the process are important to entrepreneurial success, and researchers regularly study outcomes associated with all phases of the entrepreneurial process. In the current article, we consider the outcomes of entrepreneurial attitudes, intent, and status to be more associated with the earlier phases (i.e., entry), whereas we consider the outcomes of entrepreneurial performance and entrepreneur well-being to be more associated with the latter phases (i.e., management).

As mentioned above, a common empirical definition of EP is traits that strongly relate to entrepreneurial outcomes across broad contexts (Howard and Boudreaux, 2021). We consider this the Pillar Conceptualization of EP. The traits can be thought of as pillars holding up a ceiling; their strength has a consistent importance throughout all phases of the entrepreneurial process, and an entrepreneurial endeavor suffers without the prerequisite traits at any given moment. Via this perspective, each dimension of EP could be expected to broadly relate to all entrepreneurial outcomes. On the other hand, some researchers incorporate temporal dynamics into EP (Chapman, 2000; Rauch and Frese, 2007). These authors consider EP to be a collection of traits that strongly relate any number of entrepreneurial outcomes, and these relations are typically differentiated by the phase of the entrepreneurial process associated with the outcomes. A dimension of EP, innovativeness for example, could be expected to relate to outcomes associated with entrepreneurial entry (e.g., attitudes, intent, and status) but not entrepreneurial management (e.g., performance and well-being). We consider this the Wheel Conceptualization of EP. The traits can be thought of as spokes in a wheel; their strength is important only at certain moments, but an entrepreneurial endeavor suffers without the prerequisite traits at that given moment.

These two conceptualizations are the dominant perspectives of EP, as research has not yet become nuanced enough to propose specific differing relations for EP's dimensions. Supporting either the Pillar or Wheel Conceptualization is essential for the current and

future research. It is necessary to test both perspectives to interpret our validity evidence. If the EPS was interpreted via only one lens, then it would be difficult to determine whether our results support the measure. Further, understanding these relations can link EP to relevant theory. If the relations of EP vary, then the construct could be integrated with temporal theories, such as time-calibrated entrepreneurial action theory (Wood et al., 2021) and temporal construal theory (Hallam et al., 2016). Researchers could better understand how people navigate the entrepreneurial process – and how their personal characteristics benefit them through these phases.

3. Methods

Due to space limitations, Supplemental Materials A-E fully report our methods and results.

3.1. Participants

The current article utilized five samples to develop and test the EPS. Sample 1 ($n = 531$, $age_{mean} = 39.08$; $age_{SD} = 11.73$; 44% female) and Sample 3 ($n = 301$, $age_{mean} = 36.35$; $age_{SD} = 10.32$; 41% female) were recruited from MTurk, whereas Sample 2 ($n = 553$, $age_{mean} = 32.97$; $age_{SD} = 12.72$; 70% female), Sample 4 ($n = 247$, $age_{mean} = 39.98$; $age_{SD} = 14.24$; 64% female), and Sample 5 ($n = 245$, $age_{mean} = 42.31$; $age_{SD} = 13.71$; 58% female) were recruited from Prolific. Studies have supported that results obtained from MTurk and Prolific samples produce valid results if proper precautions are taken (Aguinis et al., 2021; Burnette et al., 2022). We took those precautions, such as applying participation restrictions, removing participants that failed a certain number of attention checks, and inspecting user codes to ensure that participants did not participate in multiple studies. Samples 1 and 3 included primarily participants from Western English-speaking countries, whereas Samples 2, 4, and 5 solely included participants from the United States. Samples 4 and 5 solely included participants that reported owning a business.

3.2. Measures

EPS. An over-representative item list (57 items) was administered to Sample 1 with to be reduced via Exploratory Factor Analysis (EFA). The finalized EPS (28 items) was administered to Samples 2, 3, 4, and 5, and it is presented in [Appendix A](#).

Convergent and Incremental Validity. For Samples 3 and 4, we administered measures of IEO, EAO, creativity, locus of control, self-efficacy, and need for autonomy. For Sample 5, we gave measures of IEO and the Big Five personality dimensions.

Outcomes. Multiple outcomes were measured with each sample, which included entrepreneurial attitudes (all samples), entrepreneurial intent (1, 2, and 3), ever owned a business (1, 2, and 3), currently own a business (1, 2, and 3), number of businesses started (4 and 5), relative entrepreneurial performance (4 and 5), overall entrepreneurial performance (4 and 5), and well-being (5). We administered different scales for many of these outcomes across the studies to ensure that our results were not determined by our

Table 2
Exploratory factor analysis results of study 1.

	1	2	3	4	5	6	7
Innovativeness 1	.72						
Innovativeness 2	.76						
Innovativeness 3	.85						
Innovativeness 4	.85						
Risk-Taking Propensity 1		.81					
Risk-Taking Propensity 2		.84					
Risk-Taking Propensity 3		.84					
Risk-Taking Propensity 4		.75					
Achievement Orientation 1			.42				
Achievement Orientation 2			.54				
Achievement Orientation 3			.70				
Achievement Orientation 4			.55				
Proactiveness 1				.76			
Proactiveness 2				.43			
Proactiveness 3				.46			
Proactiveness 4				.65			
Locus of Control 1					.85		
Locus of Control 2					.93		
Locus of Control 3					.85		
Locus of Control 4					.72		
Self-Efficacy 1						.73	
Self-Efficacy 2						.69	
Self-Efficacy 3						.80	
Self-Efficacy 4						.76	
Autonomy Orientation 1							.75
Autonomy Orientation 2							.81
Autonomy Orientation 3							.65
Autonomy Orientation 4							.60

Note. Values presented below are extracted factor eigenvalues, and they therefore do not pertain to the Kaiser criterion cutoff. Initial Extracted Eigenvalues = 20.77, 4.88, 2.78, 2.63, 1.47, 1.10, 0.76, 0.58. Initial Parallel Analysis Eigenvalues = 0.88, 0.80, 0.75, 0.70, 0.66, 0.62, 0.59, 0.55. Final Extracted Eigenvalues = 10.66, 2.62, 1.83, 1.50, 0.57, 0.71, 0.47, Final Parallel Analysis Eigenvalues = 0.57, 0.49, 0.43, 0.38, 0.34, 0.31, 0.27.

choice of measure.

3.3. Procedure

Samples 1 and 2 were collected with a cross-sectional survey design. Samples 3, 4, and 5 were collected with a time-separated survey design, wherein the EPS, convergent validity, and incremental validity measures were given one week before the outcome measures.

4. Results

With Sample 1, we performed an EFA following modern guidelines (Brown, 2015; Howard, 2016; Howard and Henderson, 2023) to reduce the over-representative item list and support the factor structure of our measure. Our goal was to create a concise scale with four items per dimension. We used principal axis factoring with a direct oblimin rotation, and we determined the number of factors to retain via a visual scree plot analysis, parallel analysis, and comparison data method. We removed items in a stepwise manner based on their primary loadings and cross-loadings. Table 2 provides the final EFA result. Seven dimensions were found, each represented by four items. All items passed Howard's 0.40-0.30-0.20 rule (Howard, 2016; Howard and Henderson, 2023), wherein all items had a primary loading above 0.40, cross-loadings below 0.30, and a difference between all primary and cross-loadings of at least 0.20.

With Sample 2, we performed a confirmatory factor analysis (CFA) following modern guidelines (Brown, 2015; Harrington, 2009; Hurley et al., 1997) to confirm the factor structure of our measure with a general sample. Each set of four items loaded solely onto their respective first-order factors, and the seven first-order factors loaded onto a single second-order factor. Table 3 presents the CFA results. Our model fit indices met or very closely approached desired cutoffs ($CFI = 0.95$, $IFI = 0.95$, $RMSEA = 0.05$, $SRMR = 0.06$, $\chi^2/df = 2.56$). All item loadings were 0.49 or larger, and the loadings of each first-order factor onto the second-order factor was 0.45 or larger. Modification indices indicated that model fit could not be meaningfully improved. Therefore, these results provide strong support for the psychometric properties of the EPS.

Further, we performed a CFA with only those who reported owning a business in Samples 2, 3, 4, and 5 to confirm the factor structure when administered to entrepreneurs ($n = 627$). Our modeling strategy was the same as above. Model fit again met or closely approaches our cutoffs ($CFI = 0.95$, $IFI = 0.95$, $RMSEA = 0.06$, $SRMR = 0.06$, $\chi^2/df = 2.86$), and modification indices did not lead to substantial improvements in model fit. All first-order factor loadings were 0.60 or larger, and all second-order factor loadings were 0.42 or larger. This analysis provides strong support for the psychometric properties of the EPS when administered to entrepreneurs.

We then assessed the convergent validity of the EPS with Samples 3 and 4. Authors have argued that older cutoffs for convergent validity may be too strong, and these guidelines do not account for the unreliability of measures (Carlson and Herdman, 2012; Duckworth and Kern, 2011; Webster et al., 2017). For this reason, we used convergent validity cutoffs of 0.50 for uncorrected

Table 3
Confirmatory factor analysis results of study 2.

	1	2	3	4	5	6	7
Innovativeness 1	.83						
Innovativeness 2	.84						
Innovativeness 3	.89						
Innovativeness 4	.88						
Risk-Taking Propensity 1		.84					
Risk-Taking Propensity 2		.88					
Risk-Taking Propensity 3		.82					
Risk-Taking Propensity 4		.65					
Achievement Orientation 1			.49				
Achievement Orientation 2			.84				
Achievement Orientation 3			.92				
Achievement Orientation 4			.87				
Proactiveness 1				.50			
Proactiveness 2				.82			
Proactiveness 3				.85			
Proactiveness 4				.65			
Locus of Control 1					.94		
Locus of Control 2					.93		
Locus of Control 3					.94		
Locus of Control 4					.79		
Self-Efficacy 1						.73	
Self-Efficacy 2						.82	
Self-Efficacy 3						.84	
Self-Efficacy 4						.85	
Autonomy Orientation 1							.74
Autonomy Orientation 2							.86
Autonomy Orientation 3							.71
Autonomy Orientation 4							.79
Second-Order Factor Loading	.62	.45	.78	.84	.46	.75	.49

Note. Second-Order Factor Loading indicates the factor loading of the first-order latent factor indicated in the column heading with the second-order latent factor representing Entrepreneurial Personality. Model Fit: $CFI = 0.95$, $IFI = 0.95$, $RMSEA = 0.05$, $SRMR = 0.06$, $\chi^2/df = 2.56$.

Table 4
Summary of regression results.

	Entre. Attitude	Entre. Intent	Ever Owned a Business	Currently Own a Business	Number of Businesses Started	Relative Entre. Perf.	Overall Entre. Perf.	Well-Being
1.) Inno.	1, 2, 3	1, 2, 3	1, 2	1, 2	4			
2.) Risk	1, 2, 3	1, 2, 3	1	1	4			
3.) Ach.	1, 2, 4	1, 2				5(-)		5
4.) Proact.		3				5	5	5
5.) LoC						4, 5	4, 5	5
6.) S. Eff.			3			4	4	5
7.) Auto.	4, 5	1(-)	1(-)	1(-), 2		5(-)		
Sig. R ²	1, 2, 3, 4, 5	1, 2, 3	1, 2	1, 2, 3	4	4, 5	4, 5	5
Studies	1, 2, 3, 4, 5	1, 2, 3	1, 2, 3	1, 2, 3	4, 5	4, 5	4, 5	5

Note. Entre. = Entrepreneurial; EPS = Entrepreneurial Personality Scale; Inno. = Innovativeness; Risk = Risk-Taking Orientation; Ach. = Achievement Orientation; Proact. = Proactiveness; LoC = Locus of Control; S. Eff. = Self-Efficacy; Auto. = Autonomy Orientation. Results represent linear regression analyses with all seven dimensions of EP simultaneously included as predictors. Columns indicate outcomes, and the first seven rows indicate the predictors. The eighth row indicates whether the overall model R² was statistically significant, and the ninth row indicates the studies in which the outcome was measured. Studies 1, 2, and 3 included general samples of participants, whereas Studies 4 and 5 included samples of solely entrepreneurs. All effects are positive except those notified with (-). The number indicates which studies produced significant effects for the relation of the predictor (row) with the outcome (column). For instance, the 1, 2, and 3 listed in the first column indicates that the regression analyses for Studies 1, 2, and 3 produced significant relations between innovativeness and entrepreneurial attitudes.

correlations and 0.70 for correlations corrected for unreliability. Six dimensions met these cutoffs with at least one indicator of convergent validity. Autonomy orientation produced correlations that only approached these cutoffs. This is likely because autonomy orientation in the EPS refers to a general preference for autonomy, whereas its indicator of convergent validity, need for autonomy, refers to the experience of detrimental emotional states when autonomy is not provided. These two concepts are not identical, and it is logical that their correlations would be strong but not strictly meet the expected cutoffs for convergent validity. Overall, these results support the convergent validity of the EPS dimensions.

We assessed the relation of the EPS dimensions with outcomes, which tested the Pillar and Wheel Conceptualizations of EP. To do so, we used all five samples to perform a series of regressions with each outcome regressed onto the EP seven dimensions. Table 4 presents the results of our regression analyses, whereas Fig. 1 provides a visual representation. Due to the large number of analyses across the five samples, we holistically interpret these results.

Innovativeness, risk-taking, and achievement orientation were consistently significantly related to entrepreneurial attitude and intent with our general samples (Samples 1, 2, and 3). Innovativeness and risk-taking were significantly related to ever owning a business and currently owning a business in these samples, and they were also related to number of businesses started in our entrepreneur samples (Samples 4 and 5). Autonomy was less often but still significantly related to entrepreneurial attitude and currently owning a business across the samples. These results indicate that innovativeness, risk-taking, achievement orientation, and autonomy are more strongly related to outcomes associated with the earlier phases of the entrepreneurial process. Proactiveness, locus of control, and self-efficacy were consistently significantly related with relative entrepreneurial performance, overall entrepreneurial performance, and entrepreneur well-being (Samples 4 and 5). These results indicate that proactiveness, locus of control, and self-efficacy are more strongly related to outcomes associated with the latter phases of the entrepreneurial process. Few significant relations were seen between innovativeness, risk-taking, achievement orientation, and autonomy with outcomes associated with the latter phases of the entrepreneurial process, and few significant relations were seen between proactiveness, locus of control, and self-efficacy with outcomes associated with the earlier phases of the entrepreneurial process. Thus, these results support that the EPS dimensions significantly relate to relevant entrepreneurial outcomes, and they also support the Wheel Conceptualization of EP.

Lastly, we tested the incremental validity of the EPS. With Samples 3 and 4, the EPS dimensions alone significantly predicted 7 outcomes (i.e., $p < .05$ of R²), and they still significantly predicted 6 outcomes when controlling for EAO. With Samples 3, 4, and 5, the EPS dimensions alone significantly predicted 11 outcomes, and they still significantly predicted 10 outcomes when controlling for IEO. With Sample 5, the EPS dimensions alone significantly predicted 4 outcomes, and they still significantly predicted all 4 outcomes when controlling for the Big Five. These results strongly support the incremental validity of the EPS, as its dimensions explain more variance in entrepreneurial outcomes than EAO, IEO, and the Big Five.

5. Discussion

The goal of the current article was to address significant barriers that hinder modern research on EP. Our findings across five samples (1) provided robust psychometric and validity evidence for the EPS, with both samples of general participants and entrepreneurs alone; (2) supported that the EPS explains more variance in relevant outcomes than IEO, EAO, and the Big Five; and (3) showed that EPS's dimensions produced relations that vary based on the associated phase of the entrepreneurial process, supporting the Wheel Conceptualization. Innovativeness, risk-taking propensity, achievement orientation, and autonomy are more associated with the earlier phases of the entrepreneurial process, whereas proactiveness, locus of control, and self-efficacy are more associated with the latter phases of the entrepreneurial process. These findings provide several implications for research and practice that are discussed below.

5.1. Theoretical implications and future research directions

Future research can now progress in a more unified, accurate, and generalizable manner using the EPS. Nevertheless, it is commonly said that the scale development process is never complete. Future researchers should continuously reevaluate the psychometric properties and validity of the EPS with novel contexts and constructs. In doing so, researchers should also test alternative factor structures of the EPS. We assessed a unidimensional model because prior research has not provided substantial support to investigate alternative model structures, but future advancements in personality theory may provide justifications to test alternative factor structures. Supporting an alternative factor structure could provide insights into both the manner in which EP emerges and causes of the dimensions' differing relations with outcomes.

We demonstrated the incremental validity of the EPS beyond measures of IEO, EAO, and the Big Five. Future researchers should reinvestigate hypothesis and models originally tested with these other conceptualizations of personality (Ferreira et al., 2015; Koe, 2016; Kraus et al., 2019), as prior observations may have underestimated the strength of EP's effects due to applying these other conceptualizations. This possibility is particularly encouraging because many of these prior investigations found the alternative conceptualizations to predict relevant outcomes and play significant roles in relevant theories and frameworks (Brandstätter, 2011; Clark and Covin, 2021; Littunen, 2000; Vandor, 2021). When studied with EPS, these theories and frameworks may even need to be adapted to reflect the more dominant role of EP.

The current article supported the Wheel Conceptualization. This finding indicates that temporal dynamics should be incorporated into models of EP, as each dimension is particularly important for certain phases but less important for others. Several models of entrepreneurship already include temporal considerations, especially those focused on the identification and exploitation of opportunities (Alvarez and Barney, 2020). Wood et al. (2021) proposed a time-calibrated entrepreneurial action theory that identifies the initialization, pace, and chronology of an opportunity to be primary influences on entrepreneurial action, but they also highlight that certain entrepreneur behaviors can moderate these effects – particularly (hyper)vigilance and (hyper)externalization. Dimensions of

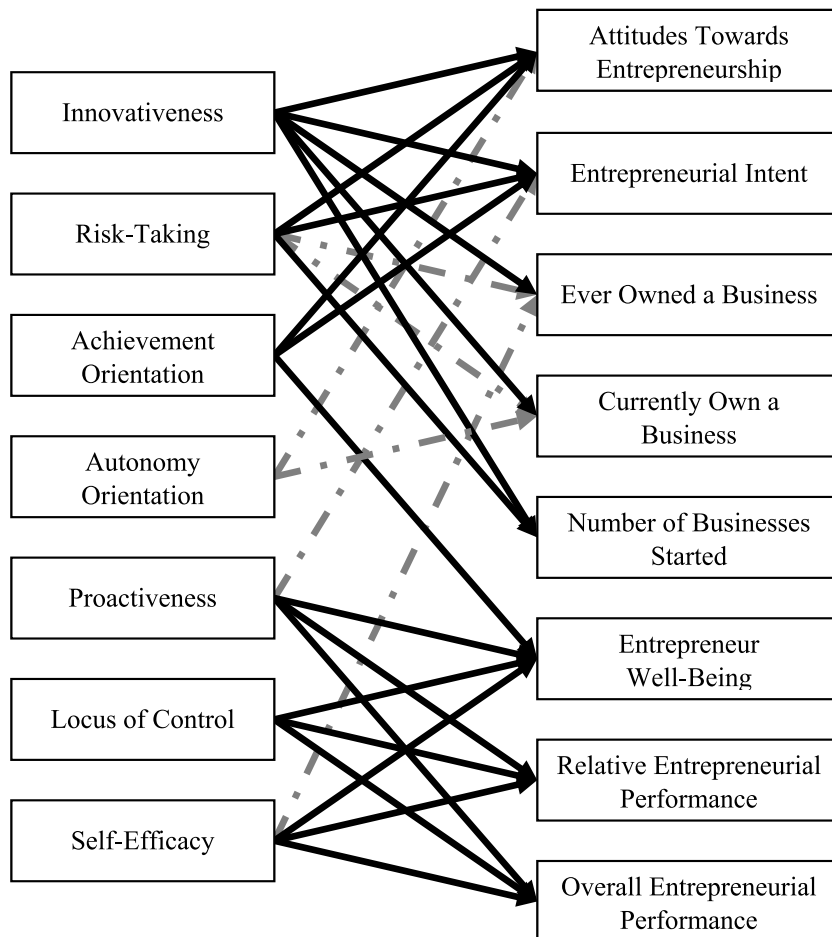


Fig. 1. Visual Representation of Current Results

Note: The order of Entrepreneurial Personality dimensions and outcomes differs from the presentation in primary text and tables to avoid overlapping lines and aid in the figure's clarity. Black solid lines indicate relations that were statistically significant in at least half of the studies in which it was tested, whereas gray dashed lines indicate relations that were statistically significant in at least one study but less than half in which it was tested.

EP associated with the earlier phases are particularly related to (hyper)vigilance, as they are associated with recognizing and acting on opportunities. This time-calibrated entrepreneurial action theory may thus be particularly useful in identifying how dimensions of EP can serve as boundary conditions to the temporal aspects of opportunities.

Researchers should also look beyond entrepreneurship theories when studying EP. We recommend theories associated with goal striving that detail the initiation and sustainment of motivation, as these may be respectively associated with entrepreneurial entry and management (i.e., phases of entrepreneurship process). Phase theories of self-regulation may be particularly apt. These theories “describe the distinct steps individuals go through when pursuing goals” (Diefendorff and Lord, 2008, p. 158), and Steel and Weinhardt (2018) developed the Goal Phase System (GPS) framework that proposes three major phases: goal choice, goal planning, and goal striving. The GPS framework incorporates several other theories to produce a meta-framework, which models the interrelations of constructs associated with motivation and self-regulation (e.g., expectancy, value, approach/avoidance sensitivity, etc.). In doing so, this framework proposes that these constructs function differently across the various goal phases, and the relations of individual differences with these constructs depend on their relevance to specific phases. For instance, expectancy is believed to have a positive effect on motivation only in the goal choice phase. Certain dimensions of EP have particularly strong associations with expectancies, such as risk-taking propensity, which may explain why they produced significant effects only with outcomes associated with entrepreneurial entry and not management. Thus, the GPS framework may delineate both when and how specific dimensions of EP influence entrepreneurial outcomes. Similar sentiments could be expressed for the other dimensions of EP with the GPS framework, and these goal phase models may become a primary lens to understand EP if supported.

5.2. Practical implications

Not only are the top employees of organizations benefitted by an EO, but research has supported that employees throughout the entire organizational hierarchy benefit from acting entrepreneurially (Bilal and Fatima, 2022; Covin et al., 2020). These employees are more likely to proactively develop solutions and achieve their goals. Organizations could leverage the current findings to improve their selection processes. Research has repeatedly shown that assessing personality in selection assessments can result in the identification of higher-performing employees and reduce adverse impact (Salgado and De Fruyt, 2017; Sosnowska et al., 2021), and researchers could adapt the current findings to develop selection tools.

While traits are relatively stable, several recent studies have shown that aspects of personality are malleable (Baranski et al., 2020; Thielmann and de Vries, 2021). Personality can be altered by external influences such as job circumstances, but it can also be altered by intentional efforts of the person (Baranski et al., 2020; Hudson et al., 2019; Thielmann and de Vries, 2021). Because EP has been supported to be important to entrepreneurial and general employee outcomes, organizations could consider developing programs to elevate the EP of their employees. For instance, Hudson et al. (2019) supported that people can alter their traits by completing trait-relevant weekly challenges. Organizations could develop such challenges for the dimensions of EP, such as assigning employees to adopt practices early, experiment with possibilities, and strive for novel problem-solving approaches (i.e., innovativeness). By doing so, organizations could perhaps improve their bottom-lines through increasing employee EP.

5.3. Limitations

As with any investigation, certain limitations should be noted. We applied a specific conceptualization of EP to create our measure due to its significant prior support, but this conceptualization is only one of several. While we supported that the applied conceptualization appropriately represents the construct of EP, we acknowledge that future researchers could explore alternative conceptualizations. Thus, future researchers should investigate how the EPS compares to other measures of EP and how the relations of EP differ when using other measures.

Many of our samples were collected with a time-separated design, wherein EP was measured at a different timepoint than outcomes to partially address common method bias (Aguinis et al., 2021). Nevertheless, more robust methodological designs could have been applied. Future researchers should explore the relations of EP with panel designs, wherein all constructs are measured at each measurement occasion. By doing so, researchers could provide support for causality in the effects of EP that cannot be firmly provided by the current article.

All variables were measured via self-report. While studies in entrepreneurship often use self-report to measure the variables collected in the current article (Garrett and Covin, 2015; Gillis et al., 2020; Lanivich, 2015), future research should reassess whether the relations of EP are consistent when obtaining other-reported or objective outcomes. It cannot be guaranteed, for example, that EP significantly relates to objective indicators of entrepreneurial performance.

We relied on samples largely representative of the United States, and it cannot be guaranteed that the scale functions properly in alternative contexts. Future researchers should replicate the current results in alternative contexts, and they should perform tests of measurement invariance to ensure that the EPS functions similarly across different cultures.

6. Conclusion

Recent years have seen an increase in the study of EP. Our clarification of the construct and creation of our measure may cause interest in EP to further grow, and it will enable future research to produce more accurate, interpretable, and generalizable results. We also highlighted several theoretical lenses that may be fruitful in understanding these dimensions, resulting in the creation of many important future directions. Notably, future researchers should consider the temporal dynamics and the association of EP with broader theories and frameworks. Together, we envision the current investigation as a spark to begin many future studies on EP.

Author statement

The authors agree on the order of authorship.

Declaration of competing interest

None.

Data availability

Data will be made available on request.

Appendix B. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jbvi.2023.e00398>.

Appendix A. Entrepreneurial Personality scale

Please indicate the extent that you disagree to agree with the following statements regarding yourself using the scale provided.

- 1 – Strongly Disagree
 - 2 – Disagree
 - 3 – Slightly Disagree
 - 4 – Neither Disagree or Agree
 - 5 – Slightly Agree
 - 6 – Agree
 - 7 – Strongly Agree
- 1.) I am an innovative person.
 - 2.) I often approach tasks in unique ways.
 - 3.) I am able to come up with new and different ideas.
 - 4.) I am good at finding creative ways to solve problems.
 - 5.) I am willing to take higher risks for higher returns.
 - 6.) I would rather take risks than be overly cautious.
 - 7.) I enjoy the challenge of situations that many consider risky.
 - 8.) I believe that you need to take risks to create something of value.
 - 9.) I have always wanted to achieve something in my life.
 - 10.) I work hard towards new goals, even if I have already succeeded at my original goals.
 - 11.) I am highly motivated toward success.
 - 12.) I strive for extraordinary success.
 - 13.) I usually act in anticipation of future problems, needs, or changes.
 - 14.) I take the initiative whenever I have the opportunity to do so.
 - 15.) I am very proactive.
 - 16.) I tend to plan ahead on projects.
 - 17.) I believe that whether I am successful in life depends mostly on myself.
 - 18.) I think that what happens in my life is mostly determined by myself.
 - 19.) I believe that my life is determined by my own actions.
 - 20.) I believe that my success depends on myself rather than luck.
 - 21.) I am confident that I could deal efficiently with unexpected events.
 - 22.) When facing difficult tasks, I am certain that I will accomplish them.
 - 23.) I am confident that I can perform effectively on many different tasks.
 - 24.) Even when things are tough, I can perform quite well.
 - 25.) I prefer to schedule my own activities.
 - 26.) I prefer to determine my own routine.
 - 27.) I like to have the autonomy to make decisions.
 - 28.) I like deciding how to complete tasks myself.

Appendix A. Continued – Entrepreneurial Personality Scale

Note. Items 1–4 represent Innovativeness. Items 5–8 represent Risk-Taking Propensity. Items 9–12 represent Achievement Orientation. Items 13–16 represent Proactiveness. Items 17–20 represent Locus of Control. Items 21–24 represent Self-Efficacy. Items 25–28 represent Autonomy Orientation. No items are reverse coded. As discussed in Supplemental Material A, most items were adopted or adapted from extant measures of these constructs.

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