

ENTREPRENEURIAL PROFILE 10™

METHODOLOGY REPORT

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DECEMBER 2014

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Table of Contents

- Introduction** 1
- Psychology of Entrepreneurship: Review of the Research** 1
- PART I: Instrument Development Process** 3
 - Theoretical Considerations 3
 - Overview of Instrument Development Process 4
 - Conduct Qualitative Research* 4
 - Design and Administer the Pilot Study* 7
 - Analyze the Data and Develop the Field Assessment* 7
 - Overview of Validity Evidence 8
 - Support for the Use of Talent-Based Structured Assessments* 8
 - Analyses and Results From the Pilot Sample* 9
- PART II: Collecting Further Validity Evidence** 20
 - U.S. High School Sample 21
 - Findings* 23
 - Nationally Representative Sample of Entrepreneurs in the U.S. 25
 - Findings* 25
 - Mexico City High School Sample 30
 - Findings* 30
 - Conclusion 32
- PART III: Assessment Details** 33
 - Administration 33
 - Feedback 33
 - Improper Use of Assessment Outcomes 33
- References** 35

INTRODUCTION

Gallup developed the Entrepreneurial Profile 10 (EP10™) to assess an individual's entrepreneurial talent. Extending across disciplinary boundaries of economics, psychology and management, Gallup researchers wanted to understand entrepreneurship's psychological roots.

Scientists at Gallup developed the EP10 assessment based on qualitative and quantitative research using professional standards (i.e., American Educational Research Association/American Psychological Association/National Council on Measurement in Education, 1999; Society for Industrial and Organizational Psychology, 2003) and the Uniform Guidelines on Employee Selection Procedures. The result of Gallup's research and development was a structured, Web-based assessment designed to assess the talents needed for success in entrepreneurial activities. This report describes the development of the EP10 assessment and provides validity evidence to support its proper applications.

PSYCHOLOGY OF ENTREPRENEURSHIP: REVIEW OF THE RESEARCH

Personality research in industrial and organizational psychology has long tied personality variables to organizational (Hunter, 1986; Barrick & Mount, 1991) and leadership performance (Judge, Bono, Ilies & Gerhardt, 2002). Many researchers define personality traits as enduring dispositions that are relatively stable over time and across situations (Rauch & Frese, 2005). In the realm of entrepreneurship, traits explain entrepreneurial behavior. Numerous studies show that entrepreneurial attitudes toward autonomy, risk, work and income are more important than factors such as access to credit or location in determining the success of a firm (Davidsson & Honig, 2003; Dimov & Shepherd, 2005; Duchesneau & Gartner, 1990; Haber & Reichel, 2007; Lerner & Haber, 2001; Shaw & Williams, 1998). In other words, an individual's unique traits can influence his or her ability to recognize a business opportunity and act to make the most of that opportunity in ways that others cannot (Badal, 2010). So what are the characteristics that drive an individual to business creation under great resource scarcity and high uncertainty? How do these characteristics affect the entrepreneur's decision-making process leading to venture creation and success or failure? The answers lie in understanding the inherent traits that influence behaviors driving business creation and success.

Researchers have identified numerous traits, such as risk propensity (Arenius & Minniti, 2005; Engle, Mah & Sadri, 1997; Smith-Hunter, Kapp & Yonkers, 2003; Stewart & Roth, 2004), creativity (Engle, Mah & Sadri, 1997), problem-solving and overcoming obstacles (Morris, Avila & Allen, 1993; Smith-Hunter, Kapp & Yonkers, 2003), achievement orientation (Collins, Hanges & Locke, 2004; Smith-Hunter, Kapp & Yonkers, 2003), self-efficacy (Arenius & Minniti, 2005; Chen, Greene & Crick, 1998) and high sense of responsibility (Smith-Hunter, Kapp & Yonkers, 2003), as key characteristics of a successful entrepreneur. In addition, behavioral economists consider bounded rationality (Simon, Houghton & Aquino, 1999), inherent biases in probability perception (Kunreuther et al., 2002) and biases in self-perception (Koellinger, Minniti & Schade, 2007; Minniti & Nardone, 2007; Hoelzl & Rustichini, 2005) as significant factors affecting an entrepreneur's decision-making process, which ultimately affects business outcomes.

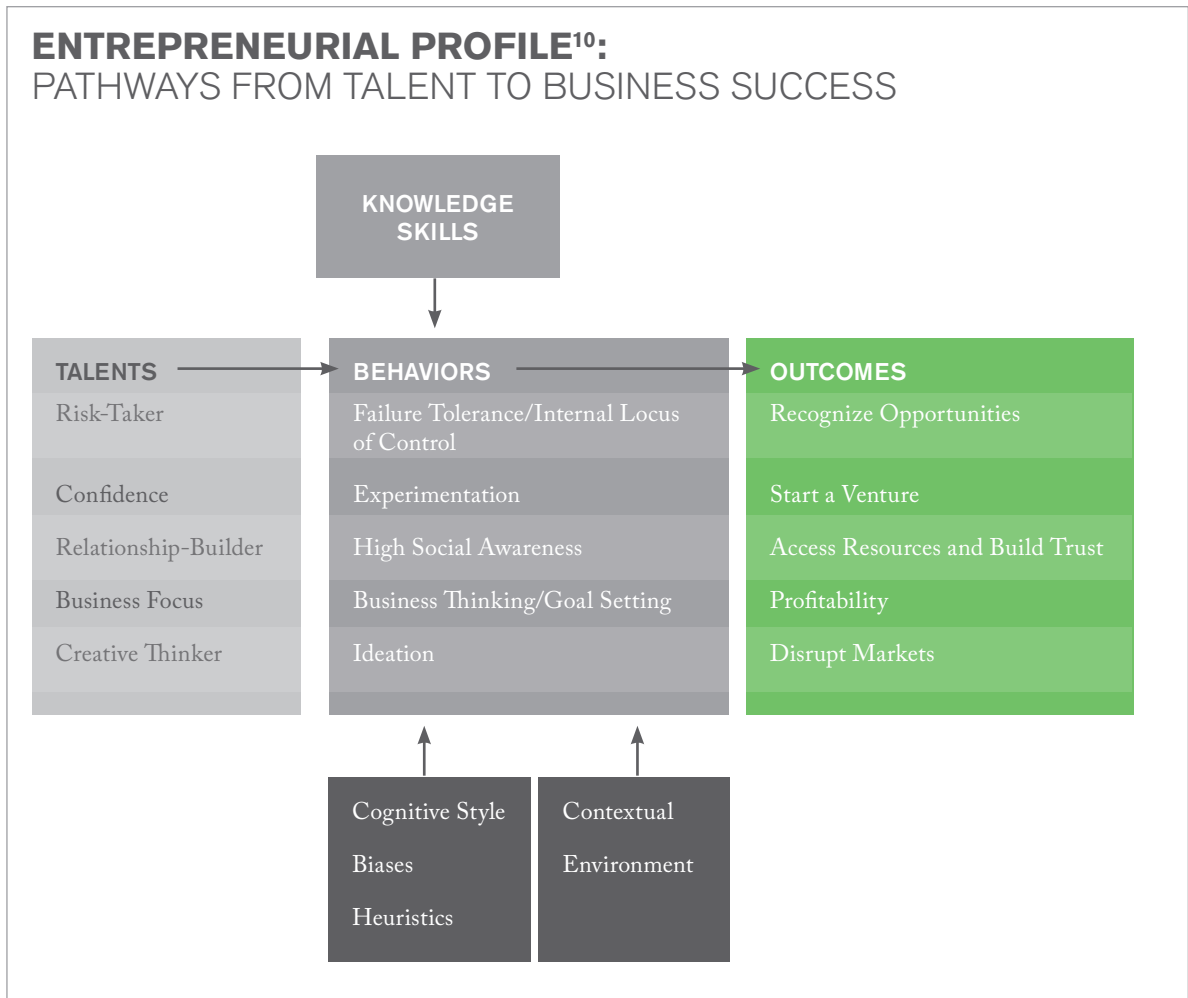
Gallup research indicates that an individual's inherent talent for a role — one's natural capacity for excellence in a role — results in greater efficiency and productivity in that activity and provides a more fulfilling experience for the individual. Talent is a broader concept than personality traits. Talent is a composite of innate personality traits, attitudes, motives, cognition and values. Using selection science, Gallup researchers could determine if a candidate possesses a critical mass of talent relative to the typical characteristics of the most successful people in a given role and predict whether that candidate was more likely to naturally and consistently behave in ways that lead to excellence in the role. Certain patterns are dominant and become salient descriptors of a person's approach to everyday experiences, including work. Consequently, these talents offer the greatest area for potential growth (Clifton & Nelson, 1992). These talents can be used to understand people and predict their behaviors in a particular context.

A major component of Gallup's efforts involves identifying and studying patterns of excellence among successful people. This study focuses on recurring and consistent patterns of thought, feeling or behavior of successful entrepreneurs — manifestations that consistently occur when talented entrepreneurs are exposed to specific stimuli. Through Gallup researchers' more than 40 years of qualitative and quantitative research, it was determined that, when objectively assessed, successful people respond differently than less successful people. The development of the EP10 Index used this cumulative experience and knowledge. Gallup used its database and senior researchers' experience and expertise to develop a pilot selection assessment with the potential to understand the patterns of excellence that characterize outstanding entrepreneurs.

PART I: INSTRUMENT DEVELOPMENT PROCESS

THEORETICAL CONSIDERATIONS

The conceptual foundation on which Gallup researchers built the final EP10 Index begins with delineating the demands of the role and the desirable behavioral responses to meet such demands, and hypothesizing the talents that enable those desirable behavioral responses that lead to entrepreneurial success. An adaptation of the Giessen-Amsterdam model (Rauch & Frese, 2000) appears below and shows the link between individual differences and entrepreneurial performance.



This modified model shows how talents affect key behaviors that enable an entrepreneur to meet the demands of the job and ultimately lead to business creation or success. Thus, the talent-based assessment solutions predictive of successful performance in the role are those that effectively capture the talents that could enable the key behaviors. Many other factors also play a role in determining entrepreneurial performance, such as knowledge/skills, cognitive styles, biases and several contextual factors (industry type, life stage, economic and political environment, access to credit and others), but this report focuses on an entrepreneur’s innate talents and their relationship to business outcomes.

Following the model previously mentioned, the development of a talent-based assessment begins with the study of a role and the successful incumbents in that role. These two interrelated topics become the focal point of the qualitative research. Specifically, the qualitative research intends to:

- define the target roles by describing the demands they place on the individuals in the role
- delineate the behavioral responses needed to meet the demands of the role
- differentiate the behavioral responses according to the extent that they meet the job demands, from low to high
- derive the talent constructs that might enable those behavioral responses

OVERVIEW OF THE INSTRUMENT DEVELOPMENT PROCESS

The foundation for building the EP10 assessment began in the late 1980s, when Gallup researchers developed a framework for the process of new venture creation and studied the psychological factors that drive successful entrepreneurship (SRI/Gallup, 1989). In 2008, Gallup collaborated with NaturTalent Stiftung in Baden-Württemberg, Germany, to study the talents that differentiate entrepreneurs from non-entrepreneurs (von, Dabiri & Truscott-Smith, 2009). Learnings from the qualitative research conducted in 1989 and 2008 led to the development of the current EP10 assessment. The present EP10 assessment further extends the talent model to differentiate successful entrepreneurs from less successful ones.

The development of the EP10 assessment involved the following steps:

1. Conduct qualitative research.
2. Design and administer the pilot study.
3. Analyze the data and develop the final assessment.

Conduct Qualitative Research

The qualitative research provided initial evidence regarding the content relevance of the EP10 assessment to the entrepreneurial role. Gallup researchers conducted systematic investigations of high-performing entrepreneurs in a study of U.S. entrepreneurs in 1989 and in a study of German entrepreneurs in Baden-Württemberg, Germany, in 2008. Researchers conducted stakeholder interviews and focus groups with existing entrepreneurs who had successful company operations. With participants' agreement, researchers recorded all interviews and focus groups (conducted face to face or via telephone). Participants in these discussions answered many questions about the functions they routinely perform. Researchers paid particular attention to the attitudes and behaviors that outstanding entrepreneurs exhibited and used information collected through the discussions to identify the talents that enable success in an entrepreneurial role. The research led to a description of the role, the job demands and the initial talent model.

In 2009, Gallup researchers conducted a comprehensive literature review that led to the further refinement of the talent model and development of the current EP10 instrument. Researchers identified additional constructs to differentiate a successful entrepreneur from a less successful one. To ensure the content appropriateness of the EP10 assessment to the role of a successful

entrepreneur, Gallup researchers used information gathered through stakeholder interviews and focus groups in Nebraska and Germany and the extensive literature review. The goal of the EP10 assessment is to identify entrepreneurs who are likely to significantly grow their business.

Findings From the Qualitative Research

The Target Role

An “entrepreneur” is someone who builds economic value by creating products and services for the market. Following Timmons’ (1994) conception of entrepreneurship as the “process of creating or seizing an opportunity and pursuing it,” Gallup researchers focused on entrepreneurs who are driven to fulfil a gap in the market rather than starting businesses to make ends meet. Though the reasons for starting a business can be complex, Bogenhold (1987) differentiated “opportunity-driven” entrepreneurs, who are motivated to enter entrepreneurship more out of choice to exploit an opportunity, from “necessity-driven” entrepreneurs, who are pushed into entrepreneurial activity in the absence of other options for work. Studies show that opportunity-driven entrepreneurs differ from their necessity-driven counterparts in their entrepreneurial behaviors and growth aspirations and business growth (Acs, Desai & Hessels, 2008). Because opportunity-driven entrepreneurs expect higher growth and create more jobs (Acs et al., 2008), Gallup researchers focused on the individuals engaged in the more desirable opportunity-driven entrepreneurship rather than the necessity-induced entrepreneurship.

To accomplish their objective of creating goods and services for the market, entrepreneurs must engage in various tasks or activities to start and subsequently grow a business. The phases of business setup: 1) recognizing opportunities that arise because of changing economic, social or technological conditions; 2) pursuing these opportunities proactively; 3) gathering human and financial resources that enable a startup; 4) creating a road map or a strategy to produce a product or service; 5) launching a new venture; and finally, 6) actively managing the company (Shane, 2003; Bygrave, 1989).

Each phase of the entrepreneurial process requires that the entrepreneur perform specific activities. For instance, in the early stages, recognizing opportunities leads to evaluating these opportunities, thinking through all the possibilities and practicalities and leveraging relationships to find partnerships to launch a venture. After establishing the company, actively managing the company means the entrepreneur must oversee a workforce, influence and motivate others, and conduct negotiations with customers or suppliers (Baron, 2006).

The study of the entrepreneur’s role revealed that successful entrepreneurs exhibited various behaviors allowing them to meet the needs of the role at each stage of the business. Table 1 provides a list of the behaviors successful entrepreneurs exhibit and the underlying talents that drive the behaviors that ultimately result in business creation and success. Though the table below matches a specific talent to a set of behaviors, in reality, multiple talents can drive a behavior. The table lists the talents that are dominant in driving specific behaviors.

Table 1: Entrepreneurial Behaviors and Talents

Behaviors That Enable Entrepreneurs to Meet the Demands of the Role	Talents That Drive the Behaviors
<ul style="list-style-type: none"> • Know themselves and present themselves effectively and with confidence — even in the face of rejection • Clearly understand others • Build trust and invest in people • Able to articulate the competitive advantage of their firm in the marketplace • Align employee activities with their individual strengths, leading to business growth 	Confidence
<ul style="list-style-type: none"> • Show a strong personality and are charismatic and confident • Show enthusiasm and emotion in taking on challenges • Have highly optimistic perception of risk • Can easily make decisions in complex situations • Can easily establish emotional connections with customers, are more likely to understand what customers need, share new ideas with customers and are more likely to exceed customer expectations 	Risk-Taker
<ul style="list-style-type: none"> • Imagine beyond the boundaries of what exists now • Explore options and can think their way through problems • Are constantly thinking of creating new products and/or services for their customers • Have minds that are typically firing with many different ideas • Are curious and quick learners 	Creative Thinker
<ul style="list-style-type: none"> • Have a clear, strong voice and speak boldly on behalf of their company • Have the ability to make their case effectively and have others follow their decisions • Communicate their vision of their company to employees and customers • Have a clear growth strategy 	Promoter
<ul style="list-style-type: none"> • Are profit-oriented • Establish clear goals and objectively measure their progress toward the goal • Judge the value of an opportunity, a relationship or a decision by its effect on business • Invest time in planning growth strategies • Align employee responsibilities with company goals 	Business Focus
<ul style="list-style-type: none"> • Seek knowledge that is relevant to growing their business • Push themselves to acquire in-depth information about every aspect of their business • Have a preoccupation with their business that borders on obsession • Anticipate knowledge needs and use knowledge well 	Knowledge-Seeker
<ul style="list-style-type: none"> • Depend on themselves to get the job done • Have a strong sense of responsibility • Can handle multiple tasks successfully • Are resolute, with a high level of competence in every aspect of managing a business 	Independent
<ul style="list-style-type: none"> • Push to achieve more and have a tremendous work ethic • Instigate the action to get something started • Are eager to make decisions and quick to act • Confront obstacles directly and overcome them • Are persistent and undeterred by failure and/or roadblocks 	Determination
<ul style="list-style-type: none"> • Understand that they cannot do everything themselves if the business is going to expand • Can readily delegate authority and responsibility • Can proactively collaborate with others • Recognize and draw on people’s special abilities • Help ensure that team members become effective contributors to the company 	Delegator
<ul style="list-style-type: none"> • Have high social awareness • Can attract and maintain a constituency • Build mutually beneficial relationships • Use their relationship talents to access internal and external resources • Forge relationships with employees and customers that go beyond work or products or services • Have an open demeanor, positive attitude and personal integrity that helps build trust 	Relationship-Builder

The 10 talents described in Table 1 influence behaviors that best explain success in an entrepreneurial role. An individual's inherent talents and acquired ability (skills, knowledge and experience) influence how successfully and by what means he or she responds to the needs of the role. The individual's dispositions or talents enable appropriate behavioral responses. Typically, the more prevalent the talent, the higher the likelihood of success in the role.

Design and Administer the Pilot Study

Using a talent-based description of a successful entrepreneur, Gallup researchers created an online (Web-based) interview to assess the existence of the attributes listed in the talent model. The pilot assessment included 113 items. Researchers selected a combination of multiple-choice and Likert items based on their content relevance and statistical properties indicated by item histories. The items came from the Gallup Item Bank. The Item Bank contains more than 9,000 items of different types that Gallup has used previously. Many of these items tap into entrepreneurial talents specifically. An item history includes information about each item's performance with past research participants, including statistics on item characteristics, relationships between item responses and performance measures, and relationships between item responses and race, gender and age variables.

In addition, Gallup researchers included a series of questions about participants' business backgrounds and demographics to ensure that those who Gallup classified as successful entrepreneurs were correctly assigned to each group. These questions asked about the number of businesses participants had started, business successes and failures they may have had, number of employees, profit, sales goals and expectations of business performance in the future.

Gallup invited 1,736 self-employed Gallup Panel members (a probability-based, nationally representative panel of U.S. households) to participate in the Web-based pilot study to test the existence of the hypothetical talents and build the instrument. Of these Panel members, 1,188 identified themselves as "primary owners" of a business and provided valid responses to enough items for Gallup to use in the research sample.

Gallup researchers focused their attention on opportunity-driven entrepreneurs. These entrepreneurs identified "good startup opportunities in my area," "opportunity to be independent" or "opportunity to increase my income" as their main reason for starting a business. Of the 1,188 primary owners, 905 were opportunity-driven entrepreneurs based on their reason for starting a business. Researchers labeled respondents who gave their reason for starting a business as "no jobs available in my area" as necessity-based entrepreneurs and excluded them from the sample.

Analyze the Data and Develop the Final Assessment

Gallup researchers used the data gathered from the pilot assessment to evaluate the psychometric properties of each item and the assessment as a whole. This evaluation included, among others, analyses on:

- appropriateness of each item, and the assessment as a whole, as representation of the talents identified as important

- item characteristics such as item difficulty
- relationships between item responses and total scores and the performance variable
- relationships between item responses and demographic variables
- reliability of the total score

Conducting descriptive and inferential analyses, Gallup researchers studied which items best differentiated top-performing entrepreneurs from others. In addition to prior research, these analyses provided basis for questions retained for the field study. The field instrument contained 89 items that best cover the common talents needed for achieving high levels of success in starting or growing businesses. Researchers calculated the Index Total Score using these items. The score is an integer between zero and 100, which indicates the percentage of points an individual received out of the total possible points. Higher scores indicate potentially better performance in the entrepreneurial role. In addition, various demographic items, 42 nonscored research items, and nine contextual items that assess the environment in which the entrepreneur exists, are also included. The research and contextual items will allow for adjustments to the assessment in the future to enhance its efficiency and utility. As such, the assessment has a degree of flexibility, while maintaining the core foundational elements for estimating entrepreneurial talent. The assessment takes the average respondent 25 to 30 minutes to complete.

OVERVIEW OF VALIDITY EVIDENCE

Validity is the degree to which both theory and empirical evidence support inferences and actions based on an assessment. Validation is an ongoing process of developing sound arguments and gathering evidence that supports the intended interpretation and actions based on the assessment outcome. Validity evidence may be derived from empirical data, relevant literature, expert judgments and logical analysis.

Support for the Use of Talent-Based Structured Assessments

Published Meta-Analyses

The research exploring linkages between broad and specific traits to business performance has shown contradictory results. For instance, Brandstatter (1997) did not find any differences in broad traits between business owners and non-owners, but did find a positive link between emotional stability, independence and entrepreneurial success. On the other hand, Wooten and Timmerman (1999) found that openness to experience was negatively related to business startup. Another study (Ciaverella, Bucholtz, Riordan, Gatewood & Stokes, 2004) found a negative relationship between openness to experience and business survival, but a positive relationship between conscientiousness and business survival. Despite contradictory results in individual studies, a meta-analysis by Rauch and Frese (2005) showed that both broad ($r=0.151$) and specific traits ($r=0.231$) had a significant relationship to entrepreneurial success. Following this line of research, Gallup researchers developed the current EP10 assessment to usefully differentiate entrepreneurs from non-entrepreneurs.

Gallup Meta-Analyses

Schmidt and Rader (1999) conducted a meta-analysis of 107 of Gallup’s predictive validity studies and found the type of structured interview process Gallup researchers used (the in-depth interview) results in scores that are predictive of multiple performance criteria, including sales data, production records, absenteeism and employee retention. A more recent meta-analysis of Gallup selection assessments (based on 386 predictive validity studies and expanded to interactive voice response and Web modes) again indicated that Gallup’s selection assessment methodology produced positive and generalizable predictive validity across various criterion types and positions (Harter, Hayes & Schmidt, 2004). The EP10 is a structured Web assessment developed using the same methodology and is expected to be predictive of specific performance criteria such as sales and profit growth.

Analyses and Results From the Pilot Sample

Sample

A total of 1,188 self-employed people from the Gallup Panel completed the research assessment. As explained previously, Gallup designated 905 of these people as opportunity-based entrepreneurs based on their responses to their reason for starting a business. Researchers identified the research sample to represent entrepreneurs who performed at low, average and high levels. The performance groups in the sample, so formed, are referred to as contrast, middle and study groups hereafter. The designations of the performance groups used a composite performance rating developed by combining several outcome variables.

Table 2 shows the number of entrepreneurs in the sample by performance category.

Table 2: Sample of Opportunity-Based Entrepreneurs

All Invitees	Total # of Opportunity-Based Entrepreneurs	Sample by Performance			
		Total	Contrast	Middle	Study
1,188	905	905	301	302	302

The companies in the analysis had been in existence from less than 10 years to more than 50 years (by 2009). Table 3 shows the distribution of businesses by start year.

Table 3: Distribution of Businesses by Start Year

Year Business Started	In Sample	Percentage
1959 or prior	2	0.2%
1960-1969	16	1.8%
1970-1979	46	5.1%
1980-1989	141	15.6%
1990-1999	244	27.0%
2000-2009	456	50.4%
Total	905	100%

Table 4 shows sample sizes broken out by race, gender and age. All research participants completed the assessment in U.S. English.

Table 4: Demographics

Variable	In Sample
Race	
White (not Hispanic or Latino)	825
All nonwhite (not Hispanic or Latino)	70
Black (not Hispanic or Latino)	13
Hispanic or Latino	0
Native American (not Hispanic or Latino)	22
Asian (not Hispanic or Latino)	7
Pacific Islander (not Hispanic or Latino)	3
Other	25
Missing race information	10
Gender	
Male	539
Female	366
Age	
Younger than 40	92
40 and older	759
Missing age information	54

Reliability of the Index Score

Reliability, in the context of measurement, refers to the degree of consistency and stability of outcomes produced by a measurement process (e.g., a selection assessment administered via the Web) across the replications of some aspects of the process. There are many types of reliability indexes; each characterizes somewhat different aspects of error in a measurement process. The magnitude of different aspects of measurement errors can be described by the standard error of measurement (SEM), which directly relates to the magnitude of the reliability coefficient of the corresponding type.

Internal Consistency Reliability

The assessment development study allows for evaluation of the internal consistency reliability. A higher degree of internal consistency is desirable because it indicates an assessment is able to obtain consistent responses from the respondents. Gallup’s minimum standard for total score reliability on its assessments is 0.70. Table 5 reports the internal consistency reliability (Cronbach’s alpha coefficient) of the EP10 assessment.

Table 5: Reliability and Descriptive Statistics for EP10 Assessment

Index	Number of Items	<i>a</i>	Mean	SD	SEM
EP10	89	.90	58.02	9.59	3.03

Note:

a = Cronbach’s alpha

SD = standard deviation

SEM = standard error of measurement

Identifying the Talent Themes: Factor Analyses

In addition to the Total Index Score, which is indicative of overall entrepreneurial potential, researchers conducted factor analysis to parse items into talent themes. Researchers used principal components analysis because the primary purpose was to identify and calculate composite scores for the talent themes underlying the EP10 assessment.

Researchers defined a-priori 10-factor structure based on theoretical support for talents entrepreneurs need to be successful in the role. Using varimax and oblimin rotations of the factor-loading matrix, researchers examined solutions for 10 factors. Results of both methods were similar. The 10-factor structure explained 41% of the variance. Items with a factor loading of 0.30 or above on a factor were retained. To label the factors in the model, researchers examined the factor pattern to see which items loaded highly (0.30 or above) on which factors and then determined the common theme of the items. For the most part, the items loaded on the correct factors (all nine Confidence items loaded together on a single factor, all Risk-Taker items loaded together on a single factor, and so on), thus confirming that the analysis produced the correct factor structure. Researchers made minor adjustments where items did not load on the expected

factors. In sum, the conceptual talent model created by the researchers closely matched the results of the principal component analysis (PCA), indicating that the correct conclusions regarding the underlying factor structure for those items have been attained by the PCA.

All factors except Delegator have five or more strongly loading items (0.40 or better), indicating a solid factor. Researchers examined internal consistency for each of the themes using Cronbach’s alpha. The alphas were moderate: all above 0.50 except Delegator ($\alpha=0.32$). No substantial increases in alpha for any of the themes could have been achieved by eliminating more items. Individual themes are not intended as independent predictors of entrepreneurial success. The primary use of individual theme measurement is for developmental purposes.

Next, researchers created composite scores for each of the 10 talent themes based on the mean of the items that had their primary loadings on each factor. Higher scores on the theme indicated greater likelihood of success in meeting a specific need of the role.

The talent themes of entrepreneurship represent what an entrepreneur needs to do to be successful in starting or growing a business. While the themes are comprehensive, they are not intended as predictors of entrepreneurial success individually. Continuing research will focus on strengthening each of the themes through revision (rewriting) items with lower primary loadings and possibly adding new items. In addition, confirmatory factor analysis, as well as other latent variable modeling techniques, will also be used to further refine the thematic structure.

Table 6: Reliability and Descriptive Statistics for Talent Theme Scores

Talent Themes	Number of Items	α	Mean	SD
Confidence	9	0.74	65.22	11.69
Risk-Taker	12	0.67	50.85	11.48
Creative Thinker	9	0.67	63.58	14.41
Promoter	8	0.60	56.27	16.91
Business Focus	6	0.50	51.80	20.03
Knowledge-Seeker	6	0.47	66.49	14.52
Independent	10	0.60	54.49	14.29
Determination	14	0.69	69.57	13.57
Delegator	4	0.32	24.53	24.11
Relationship-Builder	12	0.69	57.79	15.82

Note:

α = Cronbach's alpha

SD = standard deviation

Test-Retest Reliability

Test-retest reliability indicates the stability of assessment outcomes over time and across occasions. Although Gallup could not collect such evidence with the current study, researchers' analyses on similar assessments generally show a high degree of test-retest reliability. A Gallup study on Web-based assessments involving different samples and assessments reported a sample-size-weighted average test-retest reliability of 0.81 (Harter, 2003). It should also be pointed out that the EP10 Index measures talent constructs that have high trait composition. Thus, they are expected to be relatively stable over the course of one's lifespan.

Concurrent Criterion-Related Validity Evidence

Criterion-related validity evidence indicates the extent to which assessment outcomes are predictive of individual performance in specified activities. Gallup gathers criterion-related validity evidence by examining the relationships between its assessment outcomes and measures that adequately reflect performance in the role. Researchers can use both concurrent and predictive designs to gather such evidence.

Gallup collects concurrent criterion-related validity evidence from assessment development studies, such as the one described in this report. In these studies, researchers collect outcomes on assessment and performance data from existing entrepreneurs at approximately the same time. Concurrent studies allow for demonstrations of desirable relationships between assessment outcomes and performance in the role. Such relationships further support the role-relatedness and business relevance of the assessment outcomes.

Properties of Performance Measure

In criterion-related validity analysis, the quality of performance measures researchers use as criteria is vital. The appropriateness and quality of performance measures may be evaluated with respect to the extent that they:

- are aligned with the key demands of the role
- have crucial implications to business outcomes
- reflect the definitions of various performance levels
- have clear definition and calculation/process/rubric
- can be attributable to the individual being measured
- are resistant to biasing factors in the measurement process
- are reliable across measurement occasions
- produce reasonable variance to effectively separate various performance levels
- are accessible and can be obtained with reasonable data collection time/efforts

The key criterion measure used in the analysis was a composite of nine questions that capture the entrepreneur’s current profit and sales performance (Q04-Q09), future expectations (Q01) and job creation potential (Q02 and Q03). Gallup researchers used self-reported profit and sales performance to capture performance because collecting objective metrics from a large sample of entrepreneurs was not practical. To provide a more stable measure of the various business outcomes, researchers formed a composite with unit-weighted z scores of constituent variables (Ackerman & Cianciolo, 2000). The group designations — study, middle, contrast — were based on the tri-tiles of the composite score.

- Q01. In the next five years, I expect profit to be a) very high, b) moderate to good, c) poor to fair.
- Q02. Has the number of employees in your most recent business a) increased, b) decreased, or c) remained about the same since you started your business?
- Q03. I expect to create a minimum of _____ additional jobs in the next five years.
- Q04. How did your most recent business perform relative to profit goals for 2008?
- Q05. How did your most recent business perform relative to profit goals for 2007?
- Q06. How did your most recent business perform relative to profit goals for 2006?
- Q07. How did your most recent business perform relative to sales goals for 2008?
- Q08. How did your most recent business perform relative to sales goals for 2007?
- Q09. How did your most recent business perform relative to sales goals for 2006?

The composite score has values between -1.41 and 2.00. Correlation between the grouping variable and the performance composite score is 0.89 and statistically significant at 0.01 level. This indicates that those designated in the study group had better performance in the role than those in the middle group, and those in the middle had better performance than those in the contrast group. These strong relationships support the use of the performance-grouping variable as a holistic and key measure of entrepreneurial performance for evaluating the criterion-related validity of the EP10.

Table 7: Performance Composite Score

	Number of Items	<i>a</i>	Mean	SD	SEM
Performance Composite Score	9	0.83	-0.015	0.644	0.265

Note:

a = Cronbach’s alpha

SD = standard deviation

SEM = standard error of measurement

Concurrent Criterion-Related Validity Coefficients

Table 8 shows the *observed* correlation between the EP10 and the composite performance variable in the fold-back sample. The observed correlation of talents to entrepreneurial success is of similar magnitude as meta-analytic observed correlations reported in Rauch and Frese (2005), where *r* was 0.231.

Table 8: Relationship Between the EP10 Index Score and Performance

	<i>r</i> *	95% Confidence Interval	
		Lower Bound	Upper Bound
EP10 Index (n=905)	0.26	0.19	0.32

* Correlation between EP10 Index Score and Composite Performance Score is significant at .01 level (two-tailed)

Table 9 shows the observed correlations between the talents and the composite performance variable.

Table 9: Relationship Between Theme Scores and Performance

Talent Themes (n=905)	<i>r</i> *	95% Confidence Interval	
		Lower Bound	Upper Bound
Confidence	0.161	0.09	0.22
Risk-Taker	0.241	0.17	0.30
Creative Thinker	0.116	0.05	0.18
Promoter	0.137	0.07	0.20
Business Focus	0.199	0.13	0.26
Knowledge-Seeker	0.130	0.06	0.19
Independent	0.172	0.10	0.23
Determination	0.203	0.13	0.26
Delegator	0.103	0.03	0.16
Relationship-Builder	0.164	0.09	0.22

* Correlation between Theme Scores and Composite Performance Score is significant at 0.01 level (two-tailed)

Regression Analysis: Relationship Between Talent and Business Performance

Next, the researchers conducted hierarchical regression analysis to understand the unique contribution of talent in explaining entrepreneurial performance, beyond the size of the company (measured as a dichotomous variable <10 employees=0, 10+ employees=1), previous entrepreneurial experience (measured by the number of businesses started) and standard demographic variables such as age and gender.

Table 10 summarizes the results from the hierarchical regression analysis. This approach is appropriate to test whether each new variable or block of variables adds to the prediction produced by the previously entered variables.

The first block of predictors entered in the regression model consisted of age and gender, while the entrepreneurial experience was entered in the second block. The size of the company was entered in the third block, and finally, the Total Index Score was entered in the fourth block. The analysis indicates that each block of variables adds substantially to the explanatory power of the model. Age significantly predicts performance ($B=-0.009$, $t(894)=-4.718$, $p<0.01$), but gender is not significantly related to entrepreneurial performance ($B=0.059$, $t(894)=1.348$, $p=0.178$). However, together they explain 2.8% of the variance in entrepreneurial performance ($r=0.028$, $p<0.01$). The addition of entrepreneurial experience in Model 2 raises the percentage of explained variance from 2.8% to 4.2% ($r=0.042$, $p<0.01$). Experience significantly predicts performance ($B=0.070$, $t(893)=3.626$, $p<0.01$). In Model 3, size significantly raises explained variance from 4.2% to 7.1% ($r=0.071$, $p<0.01$) and is a significant predictor of performance ($B=0.405$, $t(892)=5.261$, $p<0.01$). In Model 4, talent further raises explained variance from 7.1% to 12.2% ($r=0.122$, $p<0.01$) and is a significant predictor of performance ($B=0.016$, $t(891)=7.160$, $p<0.01$).

Table 10: Regression Analysis

	B	Std. Error	Beta	t	Sig.
(Constant)	0.467	0.113		4.144	0.00
Age	-0.009	0.002	-0.157	-4.718	0.00
Gender	0.059	0.043	0.045	1.348	0.17
Experience	0.070	0.019	0.121	3.626	0.00
Size	0.405	0.077	0.173	5.261	0.00
Talent	0.016	0.002	0.235	7.160	0.00

Overall, talent explains about 5% of the variance in entrepreneurial performance after controlling for age, gender, size of the company and previous entrepreneurial experience. This shows that the relationship between talent and performance is substantial.

To understand the practical meaning of the effects detected here, researchers conducted utility analysis. Business impact analysis, or utility analysis, is a means of demonstrating the practical value of the talent-performance linkage in terms of critical business outcomes (Schmidt & Rauschenberger, 1986; Juskiewicz & Harter, 2003). Table 11 indicates that 32% those with high talent (based on reference scores; see explanation below) have an average expectation of very high profitability in the next five years, compared with only 6% of those with low talent. Similarly, 40% of high potentials indicate increased hiring, compared with only 23% of low potentials. And 30% of high potentials expect to create jobs in the next five years, compared with only 12% of those with low talent.

Table 11: Utility of Talent

Talent Level	Percentage Who Expect Profit to Be Very High in the Next Five Years	Percentage Who Have Increased the Number of Employees Since the Start of the Business	Percentage Who Expect to Create 5% or More Additional Jobs in the Next Five Years
High Potential	32%	40%	30%
Conditional	21%	30%	27%
Low Potential	6%	23%	12%

Convergence With Previously Validated Assessments

In developing Web-based assessments, Gallup has also studied the convergence of this mode of assessment to traditional structured interviews. In a recent study, Gallup found a high degree of convergence between the two methodologies, with a weighted convergent validity coefficient of 0.62 (Harter & Yang, 2003). Convergence between the Web mode and the structured interview is important given that Gallup's structured interviews have a longstanding history of predictive validity across various criterion types (Schmidt & Rader, 1999; Harter, Hayes & Schmidt, 2004). The high level of convergent validity, coupled with predictive and concurrent criterion-related validity evidence, provides considerable evidence to justify the use of the Web mode of entrepreneurial talent assessment.

Reference Scores

After researchers finalized the EP10, they set reference scores to differentiate those who have a higher likelihood of success in the entrepreneurial role from others who may need supporting strategies to create or grow sustainable businesses. *Success* in the entrepreneurial role is defined as the creation of a sustainable business with high growth potential.

Researchers derived reference scores based on analysis with the concurrent validation sample and evaluated the scores in terms of their relationships with a job performance measure. That is, researchers set reference scores so that those recommended have a higher probability of success than those not recommended.

Table 12 shows the resulting reference scores, the corresponding classifications and average performance scores.

Table 12: Average Performance by Reference Scores

Classification	Reference Scores	Average Performance Score
High Potential	75 and above	0.34
Conditional	65-74	0.17
Low Potential	0-64	-0.09

High Potential: The individual consistently exhibits behaviors that will allow him or her to meet most of the demands of the role effectively. He or she exhibits behaviors that show unique abilities and natural talents for the role.

Conditional: The individual will be able to meet a reasonable number of demands at a high level. However, more deliberate attention to the requirements of the demands is needed to predict consistent success in the role.

Low Potential: Being in the role of an entrepreneur will present challenges for this individual. The actions required to meet the demands might not come naturally to him or her and often require extra effort and support from others.

Analysis of Adverse Impact Concerning Demographic Variables

Sound instrument development methodology and ongoing validation studies provide the foundation for addressing issues pertaining to the fairness, bias and potential adverse impact concerning using Gallup talent-based selection assessments. Specifically:

- Instrument development research based on a sound methodology provides evidence on the relevance of the content of an assessment to the targeted roles, the psychometric properties of assessment outcomes and concurrent criterion-related validity.
- Ongoing validation studies provide evidence regarding predictive validity and utility of the assessment outcomes, as well as further evidence about these outcomes' psychometric properties.

Additionally, Gallup assesses fairness, bias and potential adverse impact issues in both concurrent instrument development studies and in ongoing validation research.

Researchers can assess bias with various methods, from observing and testing differences in bivariate correlations to sophisticated statistical modeling. In this study, Gallup researchers first compared score distributions among the demographic groups. Table 13 shows these score distributions. Note that researchers did not break out the analysis for race by specific nonwhite race groups because of small sample sizes.¹ Using all cases with valid Theme Index Scores, the effect sizes (standardized mean differences, as measured by Cohen's *d*) were 0.16 for race (with all nonwhite group scoring higher than white), -0.22 for gender (with men scoring higher) and 0.09 for age (with those aged 40 and older scoring higher). These effect sizes may be considered practically small (Cohen, 1988).

Table 13: EP10 Index Score by Demographic Categories

Demographic Group	n	Mean	SD	<i>d_s</i>
Race				
White (not Hispanic or Latino)	825	57.88	9.57	
All nonwhite	70	59.41	10.07	0.16
Gender				
Male	539	58.88	9.81	
Female	366	56.77	9.11	-0.22
Age				
Younger than 40	92	57.35	8.38	
40 and older	759	58.21	9.74	0.09

¹ Gallup's reporting standards require a minimum of 100 cases for reporting passing rates and impact ratios associated with a demographic group. The current sample included 13 Black, 22 American Indian or Alaskan Native, seven Asian (not Hispanic or Latino), three Pacific Islander (not Hispanic or Latino), and 25 Two or More Races.

Analysis of Potential Disparate Impact

Initial estimates of potential disparate impact across demographic groups may be made based on the existing reference scores and using the research sample. Table 14 shows the estimated passing rates (percentage of individuals scored in the “conditional recommend” or the “recommend” range) by demographic group, as well as the associated impact ratio (the ratio of the passing rate of a protected group to the passing rate of an unprotected group). Gallup did not report results for detailed nonwhite groups because of small sample sizes. Numerically, the impact ratio estimates for race and age categories were greater than 0.80, but 0.73 for gender. Furthermore, the 95% confidence intervals of the estimated impact ratios for race and age groups were also above 0.80. This indicates a high degree of confidence that the impact ratio would be within the requirement of the four-fifth rule for race and age groups. In summary, these results showed no indication of any substantial disparate impact across race and age groups. However, researchers will continue to monitor adverse impact for gender groups.

Table 14: Estimated Passing Rates and Impact Ratio by Demographics

Demographic Group	Total	Estimated Passing Rate	Estimated Impact Ratio	95% Confidence Interval of Impact Ratio	
				Lower Bound	Upper Bound
Race					
White (not Hispanic or Latino)	825	25.0%			
All nonwhite	70	37.1%	1.49	1.12	1.95
Gender					
Male	539	29.1%			
Female	366	21.3%	0.73	0.60	0.89
Age					
Younger than 40	92	21.7%			
40 and older	759	26.7%	1.23	0.87	1.72

Caveats to the Bias and Adverse Impact Analyses

Together, the results from the analyses of score distributions and of estimated disparate impact suggest that there is no evidence of adverse impact for race and age groups from using the EP10 and the reference scores. However, these analyses are bound by the nature and size of the available data.

First, analyses reported in this paper used participants from the instrument development study. These samples may not represent other entrepreneurs in terms of potential performance in the role, demographics and EP10 Index Score distribution. Thus, researchers will conduct ongoing adverse impact analysis with other participants who take the assessment.

PART II: COLLECTING FURTHER VALIDITY EVIDENCE

Gallup researchers developed the EP10 assessment based on what was learned from the company’s long history of developing selection instruments. Part I highlighted instrument development and assessment validation. Part II explains Gallup’s continuing efforts to validate the EP10 assessment using diverse samples. The validity evidence outlined in this part further supports the assessment’s use.

Researchers know that talent predicts performance in the entrepreneurial role through the empirical studies showing positive correlations across three samples that go beyond the pilot sample. These correlational data are sufficient to show the pervasive predictive validity of entrepreneurial talent to business performance.

The observed correlation of talent to entrepreneurial success is of similar magnitude as meta-analytic observed correlations reported in Rauch and Frese (2005), where r was 0.231. The observed correlations between the predictor (EP10 score) and the criterion variable (the performance metric) in Table 15 are underestimates of the true relationship between entrepreneurial talent and performance. If corrected for criterion variable reliability or range restriction, it is likely to be higher than estimates.

Table 15: Validity of Talent Predicting Business Performance

	Sample Size	Criterion-Related Validity	Version of EP ¹⁰ Assessment
Pilot sample	905 U.S. entrepreneurs	0.26	Version 1: Pilot Assessment With 113 Items (89 Scored)
U.S. high school students	3,119 high school students	0.21	Version 2: High School Version 121 Items (93 Scored)
Nationally representative sample of entrepreneurs in U.S.	2,697 entrepreneurs	0.25	Version 3: Final Assessment With 133 Items (122 Scored)
Mexico City high school students	7,203 high school students	0.20	Version 3: Final Assessment With 133 Items (122 Scored)

The EP10 is grounded in cross-cultural research through early qualitative research based on a sample of German entrepreneurs and subsequent samples in Mexico and the U.S. Moreover, the validity coefficients in Table 15 show that the correlations between entrepreneurial talent and business outcomes do not vary substantially across these studies. It appears that the conclusions researchers reached from U.S. samples are not specific to American culture, but they are generalizable across other cultures. Gallup will continue to study cross-cultural issues by conducting comprehensive meta-analysis when gathering data from different countries. The following sections explain each study in Table 15 in detail.

U.S. HIGH SCHOOL SAMPLE

In May 2013, Gallup researchers tested the EP10 instrument in nine high schools and two entrepreneurship-focus programs for high school students across the state of Nebraska to validate the assessment in a student population. A comprehensive review of the items led to revisions of the assessment. Some of the changes involved removing items that seemed unnecessary and irrelevant to the student population. Based on a review of positive youth development literature, researchers added new items that were more suitable to students’ experiential level and stage of life. For instance, researchers replaced items related to delegation and managerial experience with items focused on team participation. The revised instrument consisted of 121 items, of which 93 were scored. There are 82 items common between Version 1 (pilot) and Version 2 (high school) of the assessment.

Findings

Table 16 shows the high school sample broken out by race, gender and grade. All students completed the assessment in U.S. English.

Table 16: Demographics From High School Sample

Variable	In Sample
Total students	3,119
Race	
White (not Hispanic or Latino)	2,098
All nonwhite (not Hispanic or Latino)	679
Black (not Hispanic or Latino)	261
Hispanic or Latino	0
Native American (not Hispanic or Latino)	30
Asian (not Hispanic or Latino)	89
Pacific Islander (not Hispanic or Latino)	18
Other	281
Missing race information	342
Gender	
Male	1,878
Female	1,183
Missing gender information	58
Grade	
9 th	1,080
10 th	771
11 th	775
12 th	451
Missing grade information	42

The key criterion measure used in the analysis was a composite of three questions that capture the student’s intent to start a business and his or her formulation of a business idea and a business plan. All items are on a Yes/No scale.

Q01. Are you planning to start your own business in the near future?

Q02. Do you have a business idea you want to try out?

Q03. Do you have a business plan?

Studies indicate that intent is a powerful driver of action (Hurst & Pugsley, 2011); therefore, students with an intent to start a business in the near future are more likely to start a venture than those who do not have an intent to do so. However, just having intent is not a sufficient condition to start a business. An individual’s desire to start a venture, if backed by some action, is even more predictive of success. Gallup researchers used “business idea” and “business plan” as proxy for action that would increase the likelihood of starting a business. The composite was formed with unit-weighted z scores of the three measures and is a more holistic and stable measure of entrepreneurial outcomes for evaluating the EP10’s criterion-related validity. The validity of talent predicting “plan to start a business” is 0.16, but that increases to 0.21 when combining the three items into a composite performance indicator.

The composite score has values between -0.74 and 1.71.

Table 17: Performance Composite Score for High School Sample

	Number of Items	<i>a</i>	Mean	SD	SEM
Performance Composite Score	3	0.66	-0.001	0.773	0.450

Note:

a = Cronbach’s alpha

SD = standard deviation

SEM = standard error of measurement

Concurrent Criterion-Related Validity Coefficients

Table 18 shows the *observed* correlation between the EP10 and the composite performance variable in the high school sample. The observed correlation of talents to entrepreneurial intent is of similar magnitude as the observed correlations in the fold-back sample, where *r* was 0.26. This correlation represents the lower-bound estimate of the true relationship between entrepreneurial talent and performance. Once corrected for measurement error and range restriction, the average correlation would be higher than estimated here.

Table 18: Correlation Between EP10 Index Score and Performance for High School Sample

	r^*	95% Confidence Interval	
		Lower Bound	Upper Bound
EP10 Index (n=3,119)	0.21*	0.17	0.24

* Correlation between EP10 Index Score and Composite Performance Score is significant at 0.01 level (two-tailed)

Table 19 shows the observed correlations between the talents and the composite performance variable.

Table 19: Relationships Between Theme Scores and Performance for High School Sample

Talent Themes (n=3119)	r^*	95% Confidence Interval	
		Lower Bound	Upper Bound
Confidence	0.097	0.062	0.132
Risk-Taker	0.294	0.260	0.328
Creative Thinker	0.207	0.173	0.241
Promoter	0.077	0.042	0.112
Business Focus	0.045	0.009	0.080
Knowledge-Seeker	0.101	0.066	0.136
Independent	0.093	0.058	0.128
Determination	0.121	0.086	0.156
Delegator	0.013 (ns)	-0.022	0.048
Relationship-Builder	0.116	0.081	0.151

* Correlation between Theme Scores and Composite Performance Score is significant at 0.01 level (two-tailed), except for Delegator

Regression Analysis: Talent Predicts Intent to Start a Business Among High School Students

Next, researchers conducted hierarchical regression analysis to understand the unique contribution of talent in explaining entrepreneurial intent among high school students. Ecological perspective in entrepreneurship research points to the effect of parental business ownership on the likelihood of a child’s choice to be an entrepreneur (Sorenson, 2007). Reasons cited include exposure to a business environment through prior work experience in a family member’s business (Aldrich & Kim, 2007), acquired knowledge about industry-specific information from parents (Sorenson, 2007) and transfer of social and financial capital from parents to children (Sorenson, 2007). In this analysis, researchers controlled for ecological factors (measured by “Have either of your parents or guardians ever started a business?”) to isolate the effect of talent on the likelihood to start a business. In addition, researchers also controlled for standard demographic variables such as race and gender.

Table 20 summarizes the results from the hierarchical regression analysis.

The first block of predictors entered in the regression model consisted of race and gender, while the parental business ownership was entered in the second block. Finally, the Total Index Score was entered in the third block. The analysis indicates that each block of variables adds substantially to the explanatory power of the model. Gender (B=0.066, t(2769)=2.203, p<0.01) and race (B=0.166, t(2769)=7.605, p<0.01) significantly predict performance. Gender and race explain 2.1% of variance in entrepreneurial outcomes (r=.021, p<0.01). The addition of parental business ownership in Model 2 raises the percentage of explained variance from 2.1% to 4.1% (r=0.041, p<0.01). Ecological factors significantly predict performance (B=0.229, t(2768)=7.528, p<0.01). In Model 3, talent further raises explained variance from 4.1% to 7.8% (r=0.077, p<0.01) and is a significant predictor of performance (B=0.015, t(2767)=10.584, p<0.01).

Table 20: Regression Analysis, High School Sample

	B	Std. Error	Beta	t	Sig.
(Constant)	-0.272	0.040		-6.806	0.00
Race	0.166	0.022	0.144	7.605	0.00
Gender	0.066	0.030	0.042	2.203	0.02
Parents own business	0.229	0.030	0.141	7.528	0.00
Talent	0.015	0.001	0.196	10.584	0.00

Overall, talent explains about 4% of the variance in entrepreneurial performance after controlling for race, gender and ecological factors. This shows that the relationship between talent and performance is substantial.

To understand the practical meaning of the effects detected here, researchers conducted utility analysis.

Table 21: Utility of Talent for High School Sample

Talent Level	Percentage Who Expect to Start a Business	Percentage Who Have a Business Idea	Percentage Who Have a Business Plan
High Potential	52%	57%	44%
Conditional	40%	52%	31%
Low Potential	28%	38%	18%

Table 21 indicates that 52% those with high talent (based on reference scores) expect to start a business in the near future, compared with 28% of those with low talent. Similarly, 57% of high potentials indicate having a business idea, compared with 38% of low potentials. And 44% of high potentials have a business plan, compared with 18% of those with low talent.

**NATIONALLY
REPRESENTATIVE
SAMPLE OF
ENTREPRENEURS
IN THE U.S.**

Gallup researchers used the findings from the Nebraska high school study to create the final version of the EP10 assessment (Version 3) that reliably measures talent for those aged 14 and older. Version 3 of the assessment consists of 133 items, of which 122 are scored. Version 3 has 53 items in common with Version 1 (pilot assessment) and 58 items in common with Version 2 (high school version). Researchers validated the new assessment using a nationally representative sample of entrepreneurs in the U.S.

Findings

Table 22 shows the national sample broken out by race, gender and age for entrepreneurs and non-entrepreneurs.

Table 22: Demographics From the National Sample of Entrepreneurs

Variable	Entrepreneurs
Total	2,697
Race	
White (not Hispanic or Latino)	2,356
All nonwhite (not Hispanic or Latino)	322
Black (not Hispanic or Latino)	129
Hispanic or Latino	143
Asian (not Hispanic or Latino)	42
Other	8
Missing race information	19
Gender	
Male	1,625
Female	1,072
Missing gender information	0
Age	
Younger than 40	343
40 and older	2,354
Missing age information	0

For the entrepreneur sample, the key criterion measure used in the analysis was a composite of four questions that capture the entrepreneur’s intent to grow the business. Researchers formed the composite with unit-weighted z scores of variables:

- Q01. In the next 12 months, by what percentage do you expect to increase the number of employees?
- Q02. How did your business perform relative to sales goals for the last 12 months?
- Q03. How did your business perform relative to profit goals for the last 12 months?
- Q04. Thinking ahead to the next five years, which of the following best describes your revenue goals for your business?

The composite score has values between -2.07 and 1.83.

Table 23: Performance Composite Score for the National Sample of Entrepreneurs

	Number of Items	<i>a</i>	Mean	SD	SEM
Performance Composite Score	4	0.54	-0.008	0.687	0.465

Note:

a = Cronbach's alpha

SD = standard deviation

SEM = standard error of measurement

Concurrent Criterion-Related Validity Coefficients

Table 24 shows the *observed* correlation between the EP10 and the composite performance variable in the entrepreneur sample. The observed correlation of talents to entrepreneurial intent is of similar magnitude as the observed correlations in the fold-back sample, where *r* was 0.26. This correlation represents the lower-bound estimate of the true relationship between entrepreneurial talent and performance. Once corrected for measurement error and range restriction, the average correlation would be higher than estimated here.

Table 24: Relationship Between EP10 Index Score and Performance for National Sample of Entrepreneurs

	<i>r</i> *	95% Confidence Interval	
		Lower Bound	Upper Bound
EP10 Index (n=2,697)	0.25*	0.21	0.28

* Correlation between EP10 Index Score and Composite Performance Score is significant at 0.01 level (two-tailed)

Table 25 shows the observed correlations between the talents and the composite performance variable.

Table 25: Relationship Between Themes Scores and Performance for National Sample of Entrepreneurs

Talent Themes (n=2,697)	<i>r</i> *	95% Confidence Interval	
		Lower Bound	Upper Bound
Confidence	0.168	0.131	0.205
Risk-Taker	0.226	0.189	0.263
Creative Thinker	0.110	0.073	0.148
Promoter	0.188	0.151	0.225
Business Focus	0.232	0.195	0.268
Knowledge-Seeker	0.189	0.152	0.226
Independent	0.121	0.084	0.158
Determination	0.182	0.145	0.219
Delegator	0.101	0.063	0.138
Relationship-Builder	0.200	0.163	0.237

* Correlation between Theme Scores and Composite Performance
Score is significant at 0.01 level (two-tailed)

Regression Analysis: Talent Predicts Performance Among U.S. Sample of Entrepreneurs

Next, researchers conducted hierarchical regression analysis to understand the unique contribution of talent in explaining entrepreneurial performance, beyond the size of the company, age of the company and standard demographic variables such as an entrepreneur's age and gender.

The entrepreneur's age is on an interval scale with values ranging from 19 to 66 years, and an average entrepreneur age of 48 years. Gender is a dichotomous variable where male=1 and female=0. The size of the company is polytomous so that the regression specification requires three dummy variables: one to nine employees, 10 or more employees, and non-employer firms. The non-employer category is the reference group. All respondents who are members of a particular category are assigned a code of 1; respondents not in that particular category receive a code of 0. Finally, the age of the company is measured as a dichotomous variable where zero to five years age=0; six years and older age=1.

Table 26 summarizes the results from the hierarchical regression analysis. This approach is appropriate to test whether each new variable or block of variables adds to the prediction produced by the previously entered variables.

The first block of predictors entered in the regression model consisted of the entrepreneur's age and gender, while dummy variables for business age and business size were entered in the second block. Finally, the Total Index Score was entered in the third block.

The analysis indicates that each block of variables adds substantially to the explanatory power of the model. Age ($B=-0.012$, $t(1542)=-8.426$, $p<0.01$) significantly predicts performance. Younger entrepreneurs have higher performance. Gender ($B=0.063$, $t(1542)=1.786$, $p=0.074$) is not a significant predictor, but together they explain about 5% of variance in entrepreneurial outcomes ($r=0.046$, $p<0.01$). The addition of business age and size in Model 2 raises the percentage of explained variance from 5% to 14.3% ($r=0.144$, $p<0.01$). Each factor significantly predicts performance. As expected, younger businesses (zero to five years old) have higher business performance than the more established businesses ($B=-0.178$, $t(1539)=-4.865$, $p<0.01$). Businesses with fewer than 10 employees are performing better than the reference group (non-employers) ($B=0.303$, $t(1539)=8.634$, $p<0.01$). Similarly, businesses with more than 10 employees have better business outcomes than the reference group, non-employers ($B=0.720$, $t(1539)=12.195$, $p<0.01$). In Model 3, talent further raises explained variance from 14.4% to 18% ($r=0.180$, $p<0.01$) and is a significant predictor of performance ($B=0.013$, $t(1538)=8.208$, $p<0.01$).

Table 26: Regression Analysis for National Sample of Entrepreneurs

	B	Std. Error	Beta	t	Sig.
(Constant)	0.581	0.072		7.218	0.00
Age	-0.012	0.001	-0.210	-8.426	0.00
Gender	0.063	0.035	0.044	1.786	0.07
Business Age	-0.178	0.037	-0.129	-4.865	0.00
Business Size Zero to Nine Employees	0.303	0.035	0.219	8.634	0.00
Business Size 10+ Employees	0.720	0.059	0.310	12.195	0.00
Talent	0.013	0.002	0.195	8.208	0.00

Overall, talent explains about 4% of the variance in entrepreneurial performance after controlling for the entrepreneur’s age and gender and the firm’s age and size. This shows that the relationship between talent and performance is substantial.

To understand the practical meaning of the effects detected, researchers conducted utility analysis.

Table 27: Utility of Talent for National Sample of Entrepreneurs

Talent Level	Percentage Who Expect to Increase Hiring	Percentage Who Exceeded Sales Goals	Percentage Who Exceeded Profit Goals	Percentage Who Expect to Grow Significantly
High Potential	29%	45%	40%	44%
Conditional	21%	22%	19%	35%
Low Potential	7%	13%	11%	19%

Table 27 indicates that 29% those with high talent (based on reference scores) expect to hire in the near future, compared with 7% of those with low talent. Similarly, 45% of high potentials indicate exceeding sales goals, compared with 13% of low potentials. And 40% of high potentials exceeded profit, compared with 11% of those with low talent. Of those with high talent, 44% expect to grow significantly in the next five years, compared with 19% of those with low talent.

Analysis of Adverse Impact With Respect to Demographic Variables

Additionally, Gallup assessed fairness and potential adverse impact issues in the national sample of entrepreneurs as part of the ongoing validation research.

In this study, researchers first compared score distributions among the demographic groups. Table 28 reports these score distributions. Researchers did not break out the analysis for race by specific nonwhite race groups because of small sample sizes² for some of the racial groups. Using all cases with valid EP10 scores, the effect sizes (standardized mean differences, as measured by Cohen’s *d*) were 0.26 for race (with all nonwhite groups scoring higher than white), -0.34 for gender (with men scoring higher) and -0.07 for age (with those aged younger than 40 scoring higher). These effect sizes may be considered practically small (Cohen, 1988).

² Gallup’s reporting standards require a minimum of 100 cases for reporting passing rates and impact ratios associated with a demographic group. In the current sample, there were 129 Black, 42 Asian (not Hispanic or Latino), 143 Hispanic and eight Other.

Table 28: EP10 Index Score Distributions by Demographics for National Sample of Entrepreneurs

Demographic Group	n	Mean	SD	d _s
Race				
White (not Hispanic or Latino)	2,356	57.45	10.15	
All nonwhite	322	60.09	10.19	0.26
Gender				
Male	1,625	59.39	10.23	
Female	1,072	55.97	9.88	-0.34
Age Group				
Younger than 40	343	58.58	9.51	
40 and older	2,354	57.86	10.47	-0.07

Analysis of Potential Disparate Impact

Researchers made initial estimates of potential disparate impact across demographic groups based on the existing reference scores and using the research sample (see Table 14). Continuing to monitor adverse impact for demographic groups, Table 29 shows the estimated passing rates (percentage of individuals scored in the “conditional recommend” or the “recommend” range) by demographic group, as well as the associated impact ratio (the ratio of the passing rate of a protected group to the passing rate of an unprotected group) for the national sample of entrepreneurs. Gallup did not report results for detailed nonwhite groups because of small sample sizes for some of the minority groups. Numerically, the impact ratio estimates for race and age categories were greater than 0.80, but 0.66 for gender. Furthermore, the 95% confidence intervals of the estimated impact ratios for race and age groups were also above 0.80. This indicates a high degree of confidence that the impact ratio would be within the requirement of the four-fifth rule for race and age groups. In summary, these results showed no indication of any substantial disparate impact across race and age groups. However, researchers will continue to monitor adverse impact for gender groups on an ongoing basis.

Table 29: Estimated Passing Rates and Impact Ratio for U.S. Sample of Entrepreneurs

Demographic Group	Total	Estimated Passing Rate	Estimated Impact Ratio	95% Confidence Interval of Impact Ratio	
				Lower Bound	Upper Bound
Race					
White (not Hispanic or Latino)	2,356	26.7%			
All nonwhite	322	34.5%	1.29	1.13	1.48
Gender					
Male	1,625	31.8%			
Female	1,072	21.1%	0.66	0.59	0.74
Age					
Younger than 40	343	29.4%			
40 and older	2,354	27.3%	0.93	0.80	1.07

**MEXICO CITY
HIGH SCHOOL
SAMPLE**

INADEM, Mexico’s federal agency responsible for encouraging and developing entrepreneurial activity in the country, partnered with FONDESOC, the state agency for small-business development in Mexico City, to offer an entrepreneurial development program to high school students in Mexico City. The main objective of the program was to identify and develop entrepreneurial talent among high school students in Mexico City. Eight different high school systems participated in the program, which involved talent identification and development of 7,203 students across the city. Researchers used Version 3 (final assessment) to measure talent among these high school students.

Findings

Table 30 shows the national sample broken out by gender for high school students.

Table 30: Demographics of the Mexico City High School Sample

Variable	Entrepreneurs
Total	7,203
Gender	
Male	3,250
Female	3,947
Missing gender information	6

For the Mexico City high school student sample, the key criterion measure used in the analysis is the intent to start a business because intent is a strong driver of action. The following item is on a Yes/No scale. Of the students measured, 81% plan to start a business, which is a relatively high number of students. Social desirability factors could be driving students to say “yes” to the item because they knew that they were invited to be part of a development program sponsored by the federal and state agencies.

Q01: Are you planning to start your own business in the near future?

Table 31: Performance Metric for the Mexico City High School Sample

Are you planning to start your own business in the near future?	
Yes	81%
No	19%

Concurrent Criterion-Related Validity Coefficients

Table 32 shows the *observed* correlation between the EP10 assessment and the performance variable in the Mexico City sample. The observed correlation of talents to entrepreneurial intent is of similar magnitude as the observed correlations in the fold-back sample, where *r* was 0.26. This correlation represents the lower-bound estimate of the true relationship between entrepreneurial talent and performance.

Table 32: Relationship Between EP10 Index Score and Performance in Mexico City High School Sample

	<i>r</i> *	95% Confidence Interval	
		Lower Bound	Upper Bound
EP10 Index (n=7,203)	0.20*	0.177	0.223

* Correlation between EP10 Index Score and Performance Score is significant at 0.01 level (two-tailed)

Table 33 shows the observed correlations between the talents and the performance variable.

Table 33: Relationship Between Themes Scores and Performance in Mexico City High School Sample

Talent (n=7,203)	<i>r</i> *	95% Confidence Interval	
		Lower Bound	Upper Bound
Confidence	0.146	0.123	0.168
Risk-Taker	0.222	0.199	0.245
Creative Thinker	0.163	0.140	0.186
Promoter	0.093	0.070	0.116
Business Focus	0.116	0.093	0.138
Knowledge-Seeker	0.132	0.109	0.155
Independent	0.127	0.104	0.149
Determination	0.138	0.115	0.161
Delegator	0.036	0.013	0.059
Relationship-Builder	0.147	0.124	0.169

* Correlation between Theme Scores and Performance Score is significant at 0.01 level (two-tailed)

Regression Analysis: Talent Predicts Performance Among Mexico City High School Students

Next, the researchers conducted hierarchical logistic regression to understand the unique contribution of talent in explaining a high school student’s intent to start a business, after controlling for gender. Table 34 summarizes the results from the analysis.

In the first block, researchers entered gender. The Total Index Score was entered in the second block. The analysis indicates that each block of variables adds substantially to the explanatory power of the model. Gender ($\chi^2=10.92$, $df=1$, $n=6,675$, $p<0.01$) significantly predicts performance. Males are more likely to say that they intend to start a business in the near future. Gender explains 0.3% of variance in entrepreneurial outcome (Nagelkerke, $r=0.003$). In Model 2, researchers entered talent score to see if it would add to the predictive power of gender. It does, as indicated by the results of block 2 ($\chi^2=246.36$, $df=1$, $n=6,675$, $p<0.01$). Talent substantially raises explained variance from 0.3% to 6% (Nagelkerke, $r=0.061$) and is a significant predictor of performance.

Table 34: Regression Analysis for Mexico City High School Sample

	B	Wald χ^2	p	Odds Ratio
(Constant)	-1.568	64.363	0.000	0.208
Gender	0.164	6.271	0.012	1.178
Talent	0.056	228.320	0.000	1.058

Overall, talent explains about 6% of the variance in intent to start a business, after controlling for gender. This shows that the relationship between talent and performance is substantial.

To understand the practical meaning of the effects detected here, researchers conducted utility analysis.

Table 35: Utility of Talent for Mexico City High School Sample

Talent Level	Percentage Who Expect To Start a Business
High Potential	92%
Conditional	91%
Low Potential	79%

Table 35 indicates that 92% of those with high talent expect to start a business in the near future, compared with 79% of those with low talent.

CONCLUSION

The evidence presented in this part supports the hypothesis that entrepreneurial talent relates positively to business outcomes such as higher profitability, increased hiring and higher revenue. The studies outlined in this part also show that those with higher levels of entrepreneurial talent are more likely to say that they intend to grow their business. The preponderance of the validity evidence to date shows strong evidence of the utility of EP10 in driving business outcomes. Gallup continues to study the relationships between talent and business performance as data become available from clients and research partners.

PART III: ASSESSMENT DETAILS

ADMINISTRATION

Before implementing the EP10, users should address issues pertaining to the proper administration of the assessment such as reporting structure, software/hardware availability and accessibility, security and confidentiality. Focus discussions of these issues on providing a fair and secure assessment environment or all participants. In addition, focus discussions on establishing systems that allow for accurate and efficient delivery and access of assessment outcomes. Finally, Gallup must train and certify EP10 assessment users as part of the assurance of proper interpretation and use of the assessment.

FEEDBACK

After completing the EP10 assessment, the individual receives a customized report based on his or her scores in each of the 10 talents. The individual does not see his or her scores because the talents appear in order of intensity: Dominant, Contributing and Supporting. In programs designed to develop entrepreneurial talent, the customized report becomes the basis for coaching and mentoring by Gallup-trained coaches. Gallup designed the report to help individuals develop their entrepreneurial talents and manage areas of lesser talents.

The number of possible permutations of rank-ordered talents is large. There are 3,628,800 possible permutations (order-dependent), making it rare for two individuals to have the same rank order of talents. Taking into consideration talent intensity and rank order, the number of possible permutations exceeds 214 billion. This means that the probability of finding two individuals with same rank order *and* same intensity of talents is effectively zero.

PROPER USE OF ASSESSMENT OUTCOMES

Applications of the EP10 are consistent with the instrument development process, which relevant validity evidence supports. Gallup will not support or defend improper uses of the assessment.

Although the assessment includes items about a range of interrelated topics, Gallup created these items for facilitating decisions about entrepreneurial potential at the Index Total Score level only. The Talent-Based Index is designed so that higher-scoring individuals are potentially more likely to be successful in the entrepreneurial role than lower-scoring individuals. However, Gallup recommends using the assessment results to help individuals understand how they can best use their talents to drive business success. The issue is not so much of “how much more” talent one individual has over another, but how that individual can realize and best put to use his or her talents in the role. The assessment results should not be used to determine who should be an entrepreneur because compensatory actions — such as the formation of complementary partnerships, acquiring skills or knowledge, or putting systems in place to manage areas of less talent — can lead to business success.

An individual also receives a report with the 10 talents arranged in descending order based on the intensity score as part of the assessment outcomes. The theme report provides detailed information about an individual's talent profile. The talent themes and the EP10 Index Total Score are the best representation of a person's talents and can be used to devise proper strategies to help individuals maximize their talents. Proper use and interpretation of Total Index Scores and talent reports require training from an experienced Gallup consultant. Gallup will not support or defend improper uses of these reports.

Studies indicate that the interaction between specific traits and environmental factors predicts business success better than any one of these factors alone (Bandura, 1986; Barrick, Mitchell & Steward, 2003; Hatrup & Jackson, 1996). Hence, consider factors such as market conditions, role of government, social environment, access to information, access to credit, infrastructure and other relevant information when making informed judgments about an entrepreneur's potential.

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