

**Nonlinear Relationships of Narrow Personality and  
Narrow Leadership Criterion Constructs**

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## Abstract

Despite consensus on the criterion-related validity of personality assessments, researchers disagree on the shape of the personality-performance relationship. Furthermore, misalignment of theory and measurement can harm organizational performance. We explored the shape of the personality-performance relationship using narrow facets of Extraversion and Openness and specific dimensions of leadership performance. Our findings suggest significant non-linear and linear relationships emerge between various personality-criterion combinations, which carry implications for both the research and practice of personality assessments.

### *Nonlinear Relationships of Narrow Personality and Narrow Leadership Criterion Constructs*

Modeling the wrong shape of personality-performance relationship (i.e., linear or non-linear) can decrease the validity and utility of personality assessments (Converse & Oswald, 2014; Oswald & Hough, 2010). Organizations will likely see decrements in performance if statistical models are not aligned with theory (Converse & Oswald, 2014). However, personality research is fraught with mixed findings regarding the nature and direction of relationship with performance. Studies support both linear (e.g., Barrick & Mount, 1991; Schmidt & Hunter, 1998) and non-linear (e.g., curvilinear, asymptotic, quadratic) hypotheses (Carter et al., 2014; Converse & Oswald, 2014; Le et al., 2011; Robie & Ryan, 2005). Research needs to detail the true shape of personality-performance relationships for organizations to effectively utilize personality assessments to inform personnel decisions (Carter et al., 2014; Converse & Oswald, 2014).

Inconsistent findings may result from misalignment of statistical measurement and theoretical nature of the personality-performance relationship (i.e., linear models imposed on theoretical non-linear relationships). The conceptual and theoretical mismatch of specificity between the personality-criterion constructs may also account for conflicting findings. Most previous studies measure broad personality constructs like Conscientiousness (e.g., LaHuis, Martin, & Avis, 2005; Le et al., 2011; Robie & Ryan, 1999) or Emotional Stability (e.g., Le et al., 2011).

However, this approach has been criticized as being too wide-ranging such that broad constructs obscure relationships with criteria; future research should use narrow traits (Judge, et al., 2002; Oswald & Hough, 2010). Narrow performance dimensions should also be used to ensure conceptual match with narrow predictors (e.g., Benson & Campbell, 2007; Oswald & Hough, 2010). The purpose of this study is to expand theoretical and empirical understanding of the shape of personality-performance relationships by focusing on narrow personality with correspondingly narrow performance criteria and constructs overlooked in the literature.

### **Relationship between Personality and Leadership Performance**

Leadership is arguably one of the most important components of successful organizations (Benson & Campbell, 2007; Hogan, Curphy, & Hogan, 1994). Leaders develop competitive strategies and build effective teams that can execute strategic plans to drive business (Hogan & Hogan, 2001). As such, researchers have long sought to understand personality characteristics that predict leadership performance (e.g., Barrick & Mount, 1991; Kirchner & Dunette, 1958;

Stogdill, 1948). However, literature provides mixed findings on relations between personality and leadership criteria (Judge, et al., 2002; Pierce & Aguinis, 2013).

Leadership literature, with the exception of a few studies (e.g., Ames & Flynn, 2007; Benson & Campbell, 2007), fails to discuss, much less evaluate, effects of extreme personality (Pierce & Aguinis, 2013). Though personality has traditionally been theorized and shown to have a moderate, linear relationship with performance (Barrick & Mount, 1991; Bauer et al., 2006), the nature of the relationship may be curvilinear (Benson & Campbell, 2007). Studies evaluating the shape of the relationship use the big five traits in order to enable comparison and integration across studies (Judge, et al., 2002) and we too will follow this practice.

We specifically focused on Extraversion and Openness to Experience (hereafter “Openness”) in the present study, because they are theoretically related to dimensions of leadership performance (i.e., interpersonal relations, development of vision and strategy) and have been empirically validated as two of the best predictors of leadership performance (Judge et al., 2002).

Extraversion enables leaders to excel in social interactions (Benson & Campbell, 2007; Judge et al., 2002), whereas Openness is critical to creativity, which empowers leaders to develop competitive strategy and compelling vision for the organization (Bono & Judge, 2004).

However, these constructs also have a “dark side” that hinders performance (Judge et al., 2009). Individuals extremely high in Extraversion can be perceived as self-serving or a threat to stability (Judge et al., 2009). Likewise, individuals high in Openness may appear unfocused and unusual. As a result, we specifically examined Extraversion, Openness, and their relationship with leadership performance to explore non-linear personality-performance relationship.

### **Using Narrow Personality-Performance Constructs**

Findings using big five traits may be inconsistent because they may be too broad to advance understanding and prediction of behavior (Oswald & Hough, 2010). The use of personality facets can advance theory, model building, and validity (Oswald & Hough, 2010). As such, we chose to explore facets of Extraversion and Openness and specific leadership criteria that conceptually align with these narrow facets, relationship management and strategic task performance, respectively.

**Extraversion.** Extraversion is characterized as individuals’ tendency to be social, assertive, and energetic (Costa & McCrae, 1988; 1992). Extraverted individuals are often seen as more leader-like because of their ability to manage relationships and influence others through sociability and ambition to accomplish organizational goals (Judge et al., 2009; Hogan et al., 1994; R. Hogan, 1994; Yukl, 2013). Extraversion predicts leader-member exchange, turnover, and leadership emergence (Bauer et al., 2006; Judge et al., 2009). Despite numerous positive findings of Extraversion and leadership performance relations, studies also reveal negative relations (Judge et al., 2002; Judge et al., 2009). To address mixed findings, we explored narrow facets of Extraversion (i.e., Ambition, Sociability; Hogan & Holland, 2003), and relationship management performance a narrow dimension of leader performance. Sociability concerns impulsivity and need for social interactions, whereas Ambition concerns desire for status, power, recognition and achievements Hogan and Hogan (2007). By using narrow facets and performance dimensions,

we expect uncover a more accurate depiction of the shape of relationship between Extraversion and relationship management performance.

**Ambition**, a component of extraversion, is likely to have a non-linear relationship with relationship management, such that both low and high levels are detrimental. High Ambition individuals are highly competitive, take initiative, and aim for career advancement (Hogan & Holland, 2003). For leaders, ambition is important for managing relationships because individuals lacking ambition may appear as if they are not taking enough action due to their extra cautious, risk-averse, and or lack of initiative (Hogan & Hogan, 2001). High levels of ambition can also be perceived as aggressive; individuals who are extremely bold and aggressive may be perceived as if they are trying to get ahead, even if it means stepping over teammates (Judge et al., 2009). Those with extreme levels of ambition may also overestimate abilities or make risky decisions in haste and be perceived as on to test the limits or be manipulative (Hogan & Hogan, 2001). Moreover, leaders extremely high in ambition may be perceived as socially dominant, taking control of conversations and putting pressure on others (Judge et al., 2009).

**Sociability**. Both low and high levels of sociability likely lead to poor relationship management, whereas those with moderate levels are successful. Sociability is characterized by individuals who are outgoing, have a need for social interaction, and dislike working alone (Hogan & Holland, 2003). Leaders with low Sociability may be perceived as aloof or uncommunicative, therefore have challenge building teams. They may also have a difficult time generating follower enthusiasm towards achieving goals (Bono & Judge, 2004). Individuals with high-levels of sociability may demonstrate poor relationship management skills as well. If they are overly outgoing and constantly seek social interaction it may distract others or they may be perceived as unfocused on task work. Individuals extremely high in sociability may focus too much time on teamwork and be perceived as low in autonomy or unable to handle tasks on their own.

*Hypothesis 1a:* A non-linear relationship, in the form of an inverted U exists between Ambition and relationship management performance.

*Hypothesis 1b:* A non-linear relationship, in the form of an inverted U exists between sociability and relationship management performance.

**Openness to Experience**. Openness, characterized as the tendency to be creative, imaginative, intellectually curious, and having flexible attitudes (Costa & McCrae, 1988; 1992) is related positively to leadership performance (Judge et al., 2002). This is likely due to inspirational and visionary skills of those high in openness (Bono & Judge, 2004). However, extreme levels of Openness can damage leadership performance. When individuals spend too much time acquiring new knowledge, they may not allocate enough energy on executing strategic visions and achieving goals. Hogan and Hogan (2007) found two distinctive facets underlying Openness: Inquisitive and learning Approach. Inquisitive concerns interest in culture and ideas, whereas Learning Approach concerns interests in acquiring new knowledge. Because both facets are empirically and theoretically linked to Openness (Bono & Judge, 2004; Hogan & Holland, 2003), we examined them to explore the relationship between Openness and strategic leadership performance.

**Learning approach** is a facet of openness that defines individuals who are achievement-oriented and work to stay up-to-date on career knowledge (Hogan & Holland, 2003). Individuals low in learning approach may have difficulty demonstrating legitimate power due to lack of expertise (French & Raven, 1959; Yukl, 2013). Leaders are expected to be knowledgeable of various organizational functions (e.g., marketing, research and development, finance, accounting) in order to make informed decisions making, learning a critical task (Yukl, 2013). Leaders extremely high on Learning Approach may be perceived as incompetent as they may spend too much time keeping current with new knowledge and may neglect other responsibilities such as developing strategic plans with said information. Leaders who are overly high may be paralyzed to make decisions without a sense of mastery, which is an ineffective approach considering the rapid changing nature of the global business environment (Busenitz & Barney, 1997; Gigerenzer & Gaissmaier, 2011).

**Inquisitive** is characterized by individuals who are highly imaginative, curious, and creative. Inquisitive leaders are quick-witted, visionary, and less attune to details (Hogan & Holland, 2003). They like to challenge status quo on critical issues and visualize a captivating future for the organization (Judge, et al., 2009). Conversely, leaders who are not inquisitive may be too detail-oriented and miss the big picture of organizations goals, which is detrimental to organizational performance (Yukl, 2013). Leaders who are too imaginative or creative may be perceived as thinking in unusual or weird ways (Hogan & Hogan, 2001). Their ideas and visions may seem too far-fetched, creating challenge in garnering follower support. Highly inquisitive leaders may lack attention to detail leading to grandiose ideas that are impractical to execute.

*Hypothesis 2a:* A non-linear relationship, in the form of an inverted U, exists between Learning Approach and strategic task performance (e.g., strategic planning, managing performance).

*Hypothesis 2b:* A non-linear relationship, in the form of an inverted U, exists between Inquisitive and strategic task performance.

## Methods

Our sample included 1,252 Australian leaders from various industries. Participants completed the HPI and a 360-degree assessment as part of a leadership development program. Table 1 shows the demographic distribution of this sample.

## Measures

We used the Hogan Personality Inventory (HPI; Hogan & Hogan, 2007) to measure personality. The HPI is Five-Factor Model (FFM) personality measure designed for use in business settings within a normal population. The assessment demonstrates construct validity through correlations with other FFM tools (Hogan & Hogan, 2007). The HPI has been validated in over 320 criterion-related validation studies to predict occupational performance across a range of jobs and industries (Hogan Assessment Systems, 2013). Internal consistency reliabilities of the HPI range from .57 to .83. Test-retest reliabilities range from .69 to .87. The HPI incorporates the FFM with an internal factor structure supporting seven scales (Hogan & Hogan, 2007), which allows us to

capture narrow constructs underlying Extraversion and Openness. See Table 2 for scales definitions, and loadings on the five factors.

To evaluate leadership competence in relationship management and strategic task performance, we used the Hogan 360 measure (Peter Berry Consultancy, 2009). This tool measures four leadership domains: Self Management, Relationship Management, Business Skills, and Strategic Skills (See Table 3 for definitions). The target leader, direct reports, peers, managers, and others (e.g., clients) rated the target leader's performance using the same items. For the purpose of this study we used manager ratings to reflect a realistic performance review. The Relationship Management domain fits our need to measure leadership competency in managing relationships, whereas the Strategic Skills domain concerns strategic task performance.

## Analyses

We conducted four separate hierarchical polynomial regression analyses (one for each standardized facet) to test the hypotheses, which allowed comparison of nonlinear quadratic and linear models. Determining model fit requires an evaluation of explanatory power (Ghiselli, Campbell, and Zedeck, 1981). To attain parsimony, linear analyses should be most appropriate if the polynomial regression analysis does not provide incremental statistical value. In Step 1, we entered the relevant facet predicting its corresponding performance dimension. In Step 2 we entered the quadratic term (squared value of each facet score). A significant  $\Delta R^2$  would indicate the non-linear shape best describes relationship personality-performance relationship. If results reveal a negative relationship between the quadratic term and the dependent variable, it would suggest an inverted U shape.

## Results

Table 4 presents descriptive statistics of study variables and inter-correlations. Table 5 shows the results of the hierarchical polynomial regression analyses. Both Ambition ( $\beta=.19, p<.05$ ) and Sociability ( $\beta=.12, p<.05$ ) had significant quadratic terms, presenting support for hypothesis 1. However, results were in the opposite direction as expected. Both low and high levels of sociability and ambition were related to higher relationship management while moderate levels indicated poor relationship management performance. Although Ambition significantly predicted relationship management in the linear model ( $\beta=.12, p<.05$ ), there was also a significant change from the linear to the nonlinear model ( $\Delta R^2=.14, p<.05$ ) suggesting that a nonlinear model may best describe the relationship between Extraversion facets and relationship management.

Hypothesis 2 was not supported. Neither the Learning Approach ( $\beta=.03, p=.50$ ) nor the Inquisitive ( $\beta=-.03, p=.50$ ) quadratic terms significantly predicted strategic task performance. There was no significant change in  $R^2$  for either quadratic model. The linear Learning Approach model ( $F(1, 1250)=1.93, p=.17$ ) was not significant and thus not identified as a predictor of strategic task performance. The linear Inquisitive model was significant ( $F(1, 751)=5.29, p=.02$ ) suggesting inquisitive predicts strategic task performance in a linear fashion.

Although it was not hypothesized, hierarchical polynomial regressions were run for all personality facets predicting overall 360 performance for exploratory purposes. No model was

significant (See Table 5). The non-significance of the model using a broad leadership performance measurement provides evidence that the specificity of predictor-criterion must match to truly understand the relationship. This is highlighted by the fact that significant effects were found when narrow performance constructs were used.

## Discussion

It is essential to model theory when evaluating the personality-performance relationship as not doing so can affect validity (Converse & Oswald, 2014; Oswald & Hough, 2010). This includes both the shape of the relationship (i.e., linear, nonlinear) and the conceptual and specificity match between predictor-criterion. Mischaracterization of personality measurement could have damaging results for organization is used for personnel decisions (Converse & Oswald, 2014; Oswald & Hough, 2010). Both linear (e.g., Barrick & Mount, 1991; Judge, et al., 2002; Schmidt & Hunter, 1998) and non-linear (e.g., curvilinear, asymptotic, quadratic) relations (Carter et al., 2014; Converse & Oswald, 2014; Robie & Ryan, 2005; Le et al., 2011) have been supported. Inconsistent findings may result from imposing linear models are on theoretically non-linear relationships as well as the use of overly broad constructs (Oswald & Hough, 2010; Pierce & Aguinis, 2013). This study contributed to theoretical and empirical understanding of the shape of personality-performance relationship using conceptually matched narrow constructs.

We found mixed results regarding the shape of the relationship between personality and leadership performance. Sociability and Ambition were linearly related to relationship management performance, though not in the expected direction. Both low and high levels of Sociability and Ambition predicted high scores in relationship management. Although these results contradict previous findings on the positive relationship between Extraversion and relationship management, they are consistent with the interpretation guideline of Hogan tools, which suggest positive implications for both high and low scores on each personality scale (Hogan, Hogan, & Warrenfeltz, 2007). Based on rich criterion-related validity evidence, the test publishers conclude that extreme scores on each dimension of the HPI carry both positive and negative implications. For example, individuals at the lower end of the Ambition score distribution can be perceived as cooperative team players. Therefore, they are as likely to receive positive ratings on relationship management as charismatic individuals who score high on Ambition. Similarly, organizational leaders who are non-sociable tend to be good listeners, which is a critical skill for relationship building.

This study contributes to both theory and practice on the personality-performance link. Theoretically, our mixed findings further support the claim (e.g., Oswald & Hough, 2010) that researchers should evaluate personality-criterion relationships at the narrow level to truly describe and explain the nature and direction of the relationship. It is not likely that personality and performance is best depicted by linear relationships or by nonlinear relationships. Rather, researchers should expect both linear and nonlinear hypotheses when using narrow constructs; the shape of the relationship depends on the personality construct and the theoretical relationship with each specific criterion. Mixed findings are possible when broad constructs are used due to the multidimensional nature of these constructs. From an application perspective, when using personality measures for prediction purposes, practitioners should evaluate the linearity of the

personality-performance relationship at a low level rather than at a broad level in order to statistically model relationships that inform effective personnel decisions.

### **Limitations**

Researchers should take into consideration several limitations when interpreting the result of this study. This study provides evidence for only four facets of which there are many, many more in the literature. This study was not able to incorporate moderators, which also likely influence findings (Le et al., 2011). Future research should take care to detail the nature of relationships and include moderators in order to determine whether the linear assumption is appropriate. The current sample also consisted mostly of males from Building & Construction and General Administration industry (see Table 1). A more culturally, demographically, and occupationally diverse sample may further validate the generalizability of the current findings.



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Table 1

*Demographics Distribution of the Managers and Executives Sample*

	Number of Cases	Percent of Final Sample
Gender		
Male	986	78.8
Female	213	17.0
Not Indicated	53	4.2
Age		
20 – 35	310	24.9
36 – 45	456	36.5
46 – 55	290	23.2
56+	92	7.5
Not Indicated	104	8.3
Sector		
Private	368	29.4
Public	167	13.3
Not Indicated	717	57.3
Industry		
Accounting	77	6.2
Agriculture Forestry and Fishing		
Support Services	50	4.0
Aviation	12	1.0
Banking & Financial Services	1	0.1
Building & Construction	371	29.6
Business Consulting & Services	1	0.1
Community Care & Support Services	1	0.1
Engineering	5	0.4
Government Administration	218	17.4
Healthcare & Medical	6	0.5
Human Resources & Recruitment	1	0.1
IT & Telecommunications	39	3.1
Logistics Transport & Supply	34	2.7
Mining, Oil & Gas	3	0.2
Other	4	0.3
Real Estate & Property	90	7.2
Sales & Marketing	2	0.2
Sports & Leisure	20	1.6

Table 2

*HPI Scales, Definitions, and FFM Loadings*

FFM Loading	HPI Scale	Definition
Neuroticism	Adjustment	The Adjustment scale reflects the degree to which a person is calm and even-tempered or conversely, moody and volatile. High scorers seem confident, resilient, and optimistic. Low scorers seem tense, irritable, and negative.
Extraversion	Ambition	The Ambition scale evaluates the degree to which a person seems leaderlike, seeks status, and values achievement. High scorers seem competitive and eager to advance. Low scorers seem unassertive and less interested in advancement.
	Sociability	The Sociability scale assesses the degree to which a person appears talkative and socially self-confident. High scorers seem outgoing, colorful, and impulsive, and they dislike working by themselves. Low scorers seem reserved and quiet; they avoid calling attention to themselves and do not mind working alone.
Agreeableness	Interpersonal Sensitivity	The Interpersonal Sensitivity scale reflects social skill, tact, and perceptiveness. High scorers seem friendly, warm, and popular. Low scorers seem independent, frank, and direct.
Conscientiousness	Prudence	The Prudence scale concerns self-control and conscientiousness. High scorers seem organized, dependable, and thorough; they follow rules and are easy to supervise. Low scorers seem impulsive and flexible. They tend to resist rules and close supervision; however, they may be creative and spontaneous.
Openness to Experience	Inquisitive	The Inquisitive scale reflects the degree to which a person seems curious, adventurous, and imaginative. High scorers tend to be quick-witted and visionary, but they may be easily bored and not pay attention to details. Low scorers tend to be practical, focused, and able to concentrate for long periods.
	Learning Approach	The Learning Approach scale reflects the degree to which a person enjoys academic activities and values education as an end in itself. High scorers tend to enjoy reading and studying. Low scorers are less interested in formal education and more interested in hands-on learning on the job.

Table 3

*Domains and Definitions of the Hogan 360 Model*

Leadership Domain	Sub-domain	Definition
Self-Management	Integrity	Serves as a role model for the organization’s values in relation to treating employees with respect and equity
	Resilience	Maintains emotional maturity even in stressful situations and spends time reflecting about personal improvement opportunities
Relationship Management	Communication	Has clarity and professionalism in communication style and message
	People Skills	Engages with others and is approachable and authentic
	Team Player	Actively builds team functionality and cohesion
	Customer	Is driven by internal and external customer needs to drive improvement
Business Skills	Capability	Has the requisite ability and experience to do one’s current job
	Efficiency	Prioritizes and manages time and effort for maximum benefit
	Results	Delivers on commitments and expectations to a high standard
	Engaging	Brings positive energy to the workplace
Strategic Skills	Accountability	Manages performance by providing consistent and constructive feedback
	Motivation	Creates a work environment that allows everyone to become engaged
	Strategy	Spend time thinking long term and shares vision with others
	Innovation	Suggests and supports ideas that improve processes and deliverables

Table 4

*Descriptive Statistics and Intercorrelations*

	<i>M</i>	<i>SD</i>	1.	2.	3.	4.	6.	7.	8.
1. Inquisitive	14.04	4.39							
2. Learning Approach	8.33	3.11	.32*						
3. Ambition	24.30	4.27	.26*	.21*					
4. Sociability	12.93	4.69	.28*	.18*	.42*				
6. Strategic Task Performance	5.92	0.83	.08*	.05	.20*	.09*			
7. Relationship Management	6.21	0.78	-.04	-.01	.06	.02	.24*		
8. Overall 360 Score	6.19	0.52	-.01	-.04	.06	.00	.52*	.77*	

Note. *N*= 681- 1252. \* Indicates significance at the  $p < .05$  level.

Table 5. Comparison of Linear and Non-Linear Relationships Between Personality-Leadership Performance

Predictor	Job Performance Dimensions											
	Relationship Management				Strategic Task Performance				Overall 360			
	B	$\beta$	$R^2$	$\Delta R^2$	B	$\beta$	$R^2$	$\Delta R^2$	B	$\beta$	$R^2$	$\Delta R^2$
Model 1												
Step 1												
Ambition	.10*	.12*	.013						.03	.06	.002	
Step 2												
Ambition	.19*	.25*	.032	.020*					.06	.11	.004	.003*
Ambition – Quadratic	.08*	.19*							.02	.08		
Model 2												
Step 1												
Sociability	.02	.03	.000						.00	.00	-.001	
Step 2												
Sociability	.03	.04	.011	.013*					.00	.00	-.001	.001
Sociability – Quadratic	.07*	.12*							.01	.03		
Model 3												
Step 1												
Learning Approach					.04	.05	.001		-.02	-.04	.001	
Step 2												
Learning Approach					.04	.05	.051	.001	-.01	-.03	.003	.003*
Learning Approach – Quadratic					.02	.03			.02	.06		
Model 4												
Step 1												
Inquisitive					.07*	.08*	.006		.00	-.01	-.001	
Step 2												
Inquisitive					.07*	.08*	.005	.001	.00	-.01	-.001	.000
Inquisitive - Quadratic					-.02	-.03			-.01	-.01		

Note.  $N = 1252$ . \* Indicates significance at the  $p < .05$  level.