Big five personality factors, hardiness, and social judgment as predictors of leader performance

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Abstract

Purpose – The purpose of this paper is to evaluate the influence of psychological hardiness, social judgment, and "Big Five" personality dimensions on leader performance in US military academy cadets at West Point.

Design/methodology/approach – Army cadets were studied in two different organizational contexts, i.e. summer field training and during academic semesters. Leader performance was measured with leadership grades (supervisor ratings) aggregated over four years at West Point.

Findings – After controlling for general intellectual abilities, hierarchical regression results showed leader performance in the summer field training environment is predicted by Big Five extroversion, and hardiness, and a trend for social judgment. During the academic period context, leader performance is predicted by mental abilities, Big Five conscientiousness, and hardiness, with a trend for social judgment.

Research limitations/implications – Results confirm the importance of psychological hardiness, extroversion, and conscientiousness as factors influencing leader effectiveness, and suggest that social judgment aspects of emotional intelligence can also be important. These results also show that different Big Five personality factors may influence leadership in different organizational contexts.

Practical implications – The study identifies personality factors related to leader performance in different types of work environments or contexts. Results can be used to improve leader selection and development programs.

Originality/value – This is the first study to examine the influence of psychological hardiness together with Big Five personality factors on leader performance. It identifies hardiness as an important predictor of leadership, while also showing that organizational context makes a difference for what Big Five personality factors influence leader performance: extroversion appears to be more influential in highly social and active work environments, whereas conscientiousness has greater salience in academic and business settings.

Keywords Personality measurement, Emotional intelligence, Leadership

Paper type Research paper

The selection and development of effective leaders is a matter of great consequence for organizations. For this reason, research into the personal characteristics tied to good leadership is of real practical significance. Until fairly recently, the abundance of

research on personal qualities and leadership has focused on mainly on cognitive abilities, to the exclusion of personality variables (Phillips and Hunt, 1992; Jacobs and Jaques, 1989; Mumford *et al.*, 1993). In the post-Second World War era, interest in personality and leadership diminished following arguments by Stodgill (1948) and others that personality traits do not predict leadership very well (Hollander and Julian, 1969; House, 1988). But many of the studies they reviewed relied on weak personality measures (Lau, 1998). But as Bass (1990) has pointed out, when better instruments are used results generally support the importance of personality traits (Bass, 1990). Regardless, the search for personality variables that distinguish good leaders from bad was never given up altogether (Burns, 1978; Bass, 1998; House and Howell, 1992). This is partly because cognitive variables have left much unexplained about effective leadership.

Big Five personality factors (Five Factor Model) and leadership

In recent years, the "Five Factor Model" of personality (neuroticism, extroversion, openness, agreeableness, and conscientiousness) has emerged as a unifying framework for understanding the complete domain of normal personality (Digman, 1990; McCrae, 1992), and more research is appearing that explores the influence of these five general personality dimensions on job performance and leadership (e.g. Barrick and Mount, 1991; McCormack and Mellor, 2002; Rubenzer *et al.*, 2000). Several meta-analytic studies have attempted to summarize the effects of Big Five personality dimensions on leadership, across multiple studies and groups (Judge and Bono, 2000; Judge *et al.*, 2002). Results of a comprehensive analysis by Judge *et al.* (2002) suggest that the Big Five dimensions of extroversion and conscientiousness show the most consistent effects on leadership, while effects of openness, neuroticism, and agreeableness vary more with the study setting and context. Mean corrected correlations of Big Five factors with leader performance have ranged from 0.31 (extroversion) to 0.08 (agreeableness) (Judge *et al.*, 2002). Additional inconsistencies with the Big Five emerge in cross-cultural studies. For example, in a sample of Chinese business school students, although neuroticism was linked to leadership in the expected direction, extroversion was negatively related to transformational leadership style (Shao and Webber, 2006). On the other hand, Leung and Bozionelos (2004) report that Chinese students associate effective leadership with the Big Five qualities of extroversion, conscientiousness, and emotional stability (low neuroticism), and to a somewhat lesser degree with agreeableness and openness.

Despite the clear advance that this line of work represents in identifying effects of personality characteristics on leadership and job performance, the Big Five personality dimensions may not fully represent all of the personality-based differences that can impact on leadership and job performance. For example, Block (1995) has criticized the Five Factor approach as being too global to be of much use in understanding actual behavior. Hough (1992) makes a similar argument, claiming the Big Five factors are too broad to adequately predict important life outcomes or criteria. Judge *et al.* (2002) treat this as a "levels of analysis" problem, and attempt to address it in part by evaluating the 30 underlying, more specific Big Five facets as predictors of leadership. Results were somewhat mixed, but they did show that leadership was more strongly predicted by facets of extroversion (sociability and dominance) and conscientiousness (achievement and dependability) than by the more general dimensions.

The question of whether the Five Factor model is fully adequate for describing personality goes beyond the levels-of-analysis issue raised by Judge *et al.* (2002) and even earlier by Mount and Barrick (1995). It is possible that some important personality characteristics are not captured at all by the Big Five, no matter how finely the five major factors get broken down. Two dimensions that do not seem to be covered within the Big Five are psychological hardiness, and social judgment.

Hardiness and leadership

Hardiness was first described by Kobasa (1979) as a personality style or pattern associated with continued good health and performance under stress. Hardy persons have a high sense of life and work commitment, a greater feeling of control over what happens to them, and are more open to change and challenges in life. They tend to interpret stressful and difficult experiences as normal features of an existence which is overall interesting and worthwhile. Research studies with a variety of occupational groups have found that hardiness functions as a significant moderator or buffer in the stress-health relation (Contrada and Type, 1989; Kobasa *et al.*, 1982; Maddi and Kobasa, 1984; Roth *et al.*, 1989; Wiebe, 1991). In military groups, hardiness is associated with fewer physical and mental health symptoms in combat-exposed Gulf War soldiers (Bartone, 1999), casualty assistance workers (Bartone *et al.*, 1989), peacekeeping soldiers (Bartone, 1996), and Israeli soldiers in stressful combat training (Florian *et al.*, 1995). Hardiness has also been associated with continued good performance under stress, including for example in Israeli officer candidates (Westman, 1990), Norwegian Navy cadets (Bartone *et al.*, 2002), and British police officers (Barton *et al.*, 2004). A recent study by Eid *et al.* (2008) found that hardiness was related to transformational leadership style as well as leader performance in Norwegian Navy cadets.

Some reports have suggested that hardiness is confounded with neuroticism, and that high hardiness may be just low neuroticism. This argument was partly based on the fact that early hardiness scales had only negative (low hardiness) items (Funk and Houston, 1987). Later measures of hardiness have corrected this problem (Bartone, 1989, 1995). In the present study, the question of whether hardiness is confounded or redundant with Big Five dimensions such as neuroticism is addressed empirically, by simultaneously evaluating the contributions of Big Five dimensions and personality hardiness in predicting leader performance.

Social judgment and leadership

Another trait-like variable that may not be covered by the Big Five model, and which may have an important influence on leadership is "emotional intelligence" (Salovey and Mayer, 1990; Goleman, 1995; Prati *et al.*, 2003). According to Goleman (1995), emotional intelligence involves an awareness of one's own emotions as well as the ability to control them, social awareness of others and their emotions, and the capacity to understand and manage relationships and social networks. While some (e.g. Antonakis, 2004) have questioned whether the emotional intelligence construct really adds anything new to the understanding of leadership, it seems reasonable that if emotional intelligence raises social awareness and understanding, it could be a useful attribute for leaders. Similar to emotional intelligence, Mumford and colleagues identified what they termed "social judgment" as an important ability for

effective leadership (Mumford *et al.*, 2000). Social judgment (or as some call it, "social intelligence"; Yukl, 2006) involves the ability to analyze organizational and social relationships, qualities that are also included in definitions of emotional intelligence (Goleman, 1995). According to Mumford *et al.* (1993), social judgment also confers an ability to make good decisions in ambiguous conditions, which is often the case for leaders. Thus, social judgment was included in the present investigation as a trait-like, individual difference variable that could influence leader performance over-and-above the influence of mental abilities, hardiness and the Big Five personality factors.

Research approach
The present study makes use of data collected in a longitudinal study of leader development conducted at the US Military Academy, West Point, known as BOLDS – Baseline Officer Leader Development Study (Milan *et al.*, 2002). Previous work identified conscientiousness and social judgment as predictors of leader performance during the academic periods of junior and senior years (Bartone *et al.*, 2002). For the present average leadership grades over the entire four-year period provide a more comprehensive criterion indicator of leader performance. After controlling for mental abilities, the contribution of social judgment to leader performance is separately assessed, and then personality hardiness and the Big Five dimensions are evaluated simultaneously to determine their unique, non-redundant contributions to leader performance. Considering that different factors might influence leader performance under different organizational demand conditions, these relations are tested under two quite different environmental contexts:

(1) summer field training periods, when cadets perform as leaders in a series of challenging group tasks; and

(2) during the academic semesters, when leader activities have more to do with managing schedules to meet pressing academic requirements while at the same time maintaining the basic military and physical skills.

The following hypotheses will be tested:

H1. Social judgment is positively related to leader performance.

Social judgment includes perceptiveness and understanding of people and relationships. Since leadership often involves organizing and motivating individuals to work together toward common goals, social judgment should provide an advantage to leaders in many situations. Social judgment also includes a facility for making sound assessments in uncertain or ambiguous conditions, which should also be an asset for leaders (Mumford *et al.*, 1993).

H2. Neuroticism is negatively related to leader performance.

Persons high in neuroticism, which includes anxiety, impulsiveness, hostility, depression, and low self-confidence, would be expected to avoid leadership roles as much as possible, and perform poorly when required to act as leaders. They lack the social skills needed to interact effectively with others, and are not likely to be chosen as role-models.

H3. Extroversion is positively related to leader performance.

Extroversion, which includes warmth, gregariousness, assertiveness, and positive outlook (Costa and McCrae, 1992), is expected to be a positive influence on leader effectiveness. Sociability and dominance or assertiveness should be valuable and appreciated assets for leaders in organizations like the military, where group tasks are common and social interaction is frequent.

H4. Openness is positively related to leader performance.

According to Costa and McCrae (1992), openness includes a willingness to try new activities and approaches, and also intellectual curiosity and openness to new ideas. These tendencies should encourage learning and adaptability, qualities that should be valuable for leaders. Also, the person high in openness would in principle be more open to feedback, and generally more attuned to activities and relationships within the organization. Leaders who are high in openness would likely be more approachable by subordinates, and more likely to have a good "situation awareness" or understanding of the surrounding situation.

H5. Agreeableness is positively related to leader performance.

The high agreeable person is trusting, honest and concerned for the welfare of others. In a leader, these are qualities that would be appreciated by peers and subordinates alike. High agreeableness should be especially useful in the context of military leadership, where caring for subordinates and giving "selfless service" are highly valued.

H6. Conscientiousness is positively related to leader performance.

Conscientiousness includes the facets of competence, order, and dutifulness. The leader who is technically skilled and knowledgeable (competent) should be more confident and capable, the kind of person others are willing to follow. Conscientiousness also involves being well organized and dedicated to the mission, also qualities that would be highly valued in a leader. The conscientious person is goal-oriented (achievement striving), focused and persistent (self-disciplined), more likely to follow-through and complete tasks. He/she would thus be better able to organize and delegate work to accomplish goals, also valuable skills for a leader.

H7. Hardiness is positively related to leader performance.

Hardiness involves an abiding sense that life is interesting and meaningful (commitment), that one can influence events and the future (control), and that novel situations that test one's abilities are fun (challenge). These would theoretically be valuable qualities for a leader. The high-hardy leader should be one who is actively engaged in the work as well as the people doing the work (commitment), and is confident and planful in pursuing tasks and goals (control). Finally, the leader who is high in hardiness is not deterred by obstacles and setbacks, but instead interprets these as challenges to overcome and to learn from.

Method
Data for the present study were taken from a larger study of leader development conducted at the US Military Academy, West Point (BOLDS – Baseline Officer Leader

Development Study; Tremble, 1997; Milan *et al.*, 2002). One class cohort of US Military Academy – West Point students was studied over time from freshman to senior year (four years). A variety of measures were collected on this group over time, from entry through graduation (Tremble, 1997; Evans, 1997). Some of the data for this study were drawn from official academy records, for example leader performance grades. Other data come from instruments administered over the four-year period of study. Further details on measures and timing of data collection are presented below.

Sample
The sample for the present study comes from a single class cohort at the US Military Academy with complete data on the measures of interest. For the multivariate analyses, $n = 296$ subjects with valid data were included. Mean age for this group is 22.6 years (at the senior year), with 87 percent male and 13 percent female. This matches the age and sex distribution for the total class ($n = 883$ at graduation)[1].

Measures
Leader performance
Military development (MD) grades provided the leader performance measures for this study. MD grades are assigned to cadets at the end of each academic semester and summer training period by three to four key supervisors (United States Corps of Cadets, 1995). Fifty percent of the MD grade is allocated by the cadet's Tactical Officer – a supervisor, usually an Army Captain or Major. The remaining 50 percent of the MD grade comes from cadet supervisors. In most cases, there are three cadet supervisors providing ratings. The grade assigned by the direct supervisor (for example, squad leader) is weighted at 30 percent of the total MD grade, and two more senior cadet supervisors (for example, platoon leader, company commander) each provide 10 percent of the MD grade. Thus, the MD grade represents a weighted average of several supervisors' ratings on military performance and leadership. In making their performance evaluations, supervisors are instructed to consider 12 behavioral domains in relation to the cadet's leader performance:

(1) duty motivation;
(2) military bearing;
(3) teamwork;
(4) influencing others;
(5) consideration for others;
(6) professional ethics;
(7) planning and organizing;
(8) delegating;
(9) supervising;
(10) developing subordinates;
(11) decision making; and
(12) oral and written communication (United States Corps of Cadets, 1995).

An earlier study by Schwager and Evans (1996) verified the construct validity of these dimensions.

Final Military Development (MD) grades are stored on a numeric scale ranging from 1 to 4, corresponding with letter grades of D to A. Thus, high scores reflect better performance. For the present study, leader performance during summer field training periods (June and July) was measured using the average of all MD grades received across the first three years of summer training[2]. Similarly, leader performance during the academic cycle (August through May) was measured using the average of all MD grades received for academic periods from freshman through senior years. Finally, a combined total leader performance indicator includes both summer and academic period MD grades. Summer MD grades were complete with no missing data for all $n = 883$ graduates. The n for the academic cycle MD grade composite was slightly reduced ($n = 849$) due to late submission of grades on $n = 34$ cadets in the final semester prior to graduation.

Predictors of leader performance. The following variables were included as predictors of leader performance:

- *Sex*, included here as a control variable. If there is any influence of sex on leader performance, we want to control for this influence first before evaluating the primary variables of interest. Sex was coded as $1 = $ men and $2 = $ women.

- *College Entrance Equivalency Rating* (CEER) represents scores on standard college entrance examinations, the SAT (Scholastic Aptitude Test) or the ACT, converted to an equivalent scale. The CEER score was taken from official academy admissions files. This provides a reasonable proxy measure of general mental ability, which is considered to be reasonably stable over time. Mental ability or intelligence has often been associated with leadership performance (Stodgill, 1948; Yukl, 2006). It is also included here as a control variable, permitting a more rigorous test of the effects of personality and social judgment variables on leader performance.

- *Social judgment*. The "Organizational Scenarios" test was used to measure social judgment (Tremble *et al.*, 1997). This measure is based on the problem-solving model of Mumford and Connelly (1991) and Mumford *et al.* (1993), who describe leadership as largely involving "discretionary social problem solving in ill-defined domains" (p. 25). In this framework, the ability to exercise good judgment in regard to self, social and organizational relations is seen as essential to effective leadership. In the Organizational Scenarios test, respondents answer three open-ended questions regarding two written organizational scenarios, providing their own problem definitions and proposed solutions. Responses are scored on a 1 (not at all) to 6 (to a very large extent) scale for the following dimensions: self-objectivity (knowing one's strengths and weaknesses and able to work with or around them); self-reflectivity (introspective, intuitive, good understanding of self based on past experience; learns from experience and past mistakes); sensitivity to fit (knows what will work and what will not in a given situation, driven more by affect than knowledge); systems perception (good understanding of others in social systems, sensitive to social needs, goals, demands at multiple levels in social systems); good judgment under uncertain conditions (ability to make good decisions under ambiguous conditions, and take appropriate action); systems commitment (recognition of one's and others' roles in broader social systems, pursues socially constructive goals); and overall wisdom.

The Organizational Scenarios test was administered to the entire class
($n = 1,143$) during the first summer following matriculation. The response rate
was 100 percent, since the instrument was administered as part of a scheduled
class activity. However, some written responses were either illegible, or too brief to
be scored, resulting in usable data for $n = 1,064$ or 93 percent. Inter-rater
reliability on this instrument is reported at 0.74 to 0.75 (Tremble *et al.*, 1997;
Zaccaro *et al.*, 2000). Cronbach's α computed across the seven dimensions in the
present sample is 0.88, indicating good consistency across the sub-scales. Scores
on the seven sub-scales were averaged to generate a total social judgment score.

- *Big Five personality factors*. Evans (1997) developed empirically based analog
  measures corresponding to the "Big Five" personality dimensions as measured
  by the NEO Personality Instrument (Costa and McCrae, 1992). To accomplish
  this, the NEO-PI was administered to an earlier West Point class (class of 1996),
  and optimized, cross-validated regression equations identified sets of items from
  the standard admissions battery that best predicted NEO-PI Big Five scores.
  These items came primarily from the Astin Student Information Form (SIF;
  Astin *et al.*, 1990) and the West Point "Class Characteristics Inventory", a
  standard set of questions on values and preferences administered to all entering
  students. The resulting 47-item analog instrument yields scores on the Big Five
  dimensions of neuroticism, extroversion, openness, conscientiousness, and
  agreeableness. Scores correlate highly with actual NEO-PI scores, ranging from
  0.67 (neuroticism) to 0.52 (agreeableness), and show appropriate convergent and
  discriminant validity. More detailed information on the West Point analog
  NEO-PI is available in reports by Evans (1997), Milan (2002), and Milan *et al.*
  (2002). Missing data on some of the component items resulted in somewhat
  reduced values of n for the analog NEO-PI scales, ranging from $n = 768$ on
  conscientiousness to $n = 901$ on agreeableness.

- *Hardiness*. To measure hardiness, this study used a 15-item scale that improves
  over earlier instruments, including both positively and negatively keyed items,
  and covering the three important hardiness facets of commitment, control and
  challenge (Bartone *et al.*, 1989; Bartone, 1995). The hardiness scale was
  administered to this cohort by an email survey during their senior year. All
  $n = 859$ original members of this class for whom e-mail addresses were available
  were sent the hardiness survey. Of these, $n = 430$ responded with usable
  surveys, for a response rate of 50 percent. Cronbach's α coefficient for the total
  measure is 0.70 in the present sample. The three-week test-retest reliability
  coefficient for this measure is reported at 0.78 (Bartone, 2007).

Statistics
Descriptive statistics and inter-correlations were computed for all study variables.
Correlations were computed using pairwise deletion of missing data in order to make
maximum use of available information, since there were different amounts of missing
data for different variables. Separate hierarchical regression models were computed for
average leader performance scores (MD grades) from the two different organizational
contexts of interest (i.e. summer training period and academic period). The first level in
the regression model entered Sex in order to control for possible influence of sex on
leader performance in either context. Next, college entrance exam scores (CEER) were

entered in order to control for the influence of general intellectual abilities. At step 3 social judgment scores were entered, since social judgment or intelligence appears to involve both intellectual and personality features. In the fourth step, all of the Big Five personality factors were entered with a stepwise selection procedure in order to identify any Big Five factors influencing leader performance. Finally, hardiness was entered in a separate step to test for any unique influence of hardiness on leader performance after the effects of all other predictor variables have been removed.

Results

Table I presents the means, standard deviations, and inter-correlations for all study variables. The variable Sex (higher scores = women) is correlated significantly with Big Five neuroticism ($r = 0.09$[**]), openness ($r = 0.21$[***]) and agreeableness ($r = 0.19$[***]), and academic-period leader grades ($r = 0.09$[**]). This means that the women in this group are somewhat higher in neuroticism, openness and agreeableness, and also earn slightly higher leader performance grades than men, but only during the academic cycle. Higher CEER scores, reflecting general mental abilities, are associated with lower Neuroticism ($r = -0.10$[***]), less extroversion ($r = -0.11$[**]), and slightly more agreeableness ($r = 0.07$[*]) and conscientiousness ($r = 0.08$[*]). CEER – mental abilities – also correlates with social judgment ($r = 0.14$[***]) and better leader performance in the academic period ($r = 0.16$[***]), but not during the summer periods. Hardiness is not correlated with Sex or CEER – general mental abilities.

The pattern of intercorrelations among the Big Five measures used in this study closely resembles that reported by Costa and McCrae (1992) for adults with the NEO-PI-R measure. For example, in the present sample neuroticism is highly (negatively) correlated with conscientiousness ($r = -0.67$[***]), and moderately with agreeableness ($r = -0.23$[***]); Costa and McCrae report these same correlations at $r = -0.53$ and $r = -0.25$ (both $p < 0.001$). Similarly, conscientiousness correlates $r = 0.29$[***] with agreeableness in the present sample, compared to $r = 0.24$ ($p < 0.001$) for Costa and McCrae (1992). This very similar pattern of Big Five scale inter-correlations lends further support to the validity of the analog NEO Big Five scales developed by Evans (1997) and used here. The correlation of Extroversion with Openness in the present sample is somewhat lower ($r = 0.19$[***]) than what Costa and McCrae report ($r = 0.40$), and extroversion with conscientiousness somewhat higher ($r = 0.50$[***] compared to $r = 0.27$, $p < 0.001$). These modest differences regarding extroversion could be a function of age, since our sample is younger (college age) than the adult normative sample used by Costa and McCrae for the purpose of showing NEO-PI-R scale intercorrelations.

Hardiness shows some modest correlations with Big Five factors of conscientiousness ($r = 0.18$[**]), extroversion ($r = 0.11$[**]), and neuroticism ($r = -0.25$[***]). Social judgment also shows modest but significant positive correlations with openness (0.09[**]) and agreeableness (0.11[**]). As regards the relation between personality and leadership performance, hardiness, extroversion, neuroticism and conscientiousness all correlate positively with military development grades for the summer periods, as does social judgment. The same pattern holds for military development grades during the academic periods, but now with agreeableness also correlating with leader performance.

These correlational findings were followed-up with hierarchical multiple regression analyses predicting leadership performance separately for the different contexts of

	Mean	SD	Sex (n = 1,143)	CEER (n = 1,142)	Neuroticism (n = 879)	Extroversion (n = 850)	Openness (n = 880)	Agreeableness (n = 901)	Conscientiousness (n = 768)	Hardiness (n = 430)	Social judgement (n = 1,064)	Summer MD grades (n = 883)	Academic MD grades (n = 849)
Sex	1.13	0.34	1.0										
CEER	607.2	51.5	NS	1.0									
Neuroticism	91.6	14.5	0.09**	−0.10**	1.0								
Extroversion	119.6	11.1	NS	−0.11**	−0.40***	1.0							
Openness	110.7	12.5	0.21***	NS	0.07*	0.19***	1.0						
Agreeableness	107.1	8.7	0.19***	0.07*	−0.25***	0.09***	0.10**	1.0					
Conscientiousness	1161	13.3	NS	0.08*	−0.67***	0.50***	NS	0.29***	1.0				
Hardiness	30.8	4.6	NS	NS	−0.25***	0.11*	NS	NS	0.18**	1.0			
Social judgement	2.8	0.30	0.06*	0.14***	NS	NS	0.09**	0.11**	NS	NS	1.0		
Summer MD grades	2.8	0.43	NS	NS	−0.12**	0.18***	NS	NS	0.15***	0.17***	0.10**	1.0	
Academic MD grades	2.9	0.40	0.09**	0.16***	−0.07*	0.10**	NS	0.12**	0.15***	0.16***	0.14***	0.56***	1.0

Notes: Pairwise deletion of missing data; values of *n* for the correlations vary due to more missing data on some variables than others. The lowest *n* is for the hardiness with conscientiousness correlation (n = 297); the highest *n* is for the sex with CEER correlation (n = 1,142). $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$

summer and academic periods. In the first regression model, predicting cumulative military development grades for the summer training periods only, Sex was entered in the first step, followed by CEER (college entrance exam scores) in step 2 and social judgment in step 3. The Big 5 personality factors were entered in step 4 with a stepwise elimination procedure. Hardiness was entered separately in the final step. Results are displayed in Table II. Neither Sex nor CEER were significant predictors of leader performance in the summer training periods. Social judgment shows a small effect, but not significant ($p < 0.10$). Of the Big Five, only extroversion entered as a significant predictor. Finally, hardiness enters as a significant independent predictor of leader performance during the summer field training periods. The increase in R^2 (variance accounted for) is marginally significant with the addition of Social judgment to the model. The subsequent addition of Big Five Extroversion and then hardiness also results in significant increases in variance accounted for (R^2).

Table III shows results from the hierarchical regression model predicting cumulative military development grades for the academic semester context. In this model, Sex again is not a significant predictor of leader performance. College entrance exam scores (CEER) is a significant predictor of leader performance ($p < 0.02$), with a significant increase also in R^2. Social judgment is marginally significant ($p < 0.08$). In step 4 where the Big Five personality dimensions are entered with a stepwise selection method, only conscientiousness ($p < 0.05$) is a significant predictor. Finally, hardiness is a significant addition to the model in the final step, also with a significant increase in the R^2 variance accounted for in leader performance in the academic context.

Discussion

This study has examined the power of several personality variables to predict rated leader performance of US Military Academy cadets over an extended period of time (four years) and in two different contexts:

(1) summer training periods, which emphasize successful completion of group tasks in a field environment; and

(2) academic periods, which emphasize organizing time and schedules and balancing competing requirements within a complex social network.

The potential effects of sex (gender) and general mental abilities on leadership performance were also examined. Based on the correlational data, women cadets perform slightly better than men as leaders during the academic periods, but not in the summer training context. However, this effect does not hold in the multivariate regression analyses. Our results also show that women tend to be higher than men in Big Five openness, agreeableness, and neuroticism. These differences are consistent with multiple studies showing higher levels of neuroticism and agreeableness in women (Chapman *et al.*, 2007; Costa *et al.*, 2001; McCrae, 2002). Results in the literature are mixed on openness, with men higher in some cultures and women higher in others (Schmidt *et al.*, 2008). It is possible that higher levels of openness among women in the present sample reflect a self-selection bias, wherein young women who are more open (to ideas, feelings, activities, etc.) are also more inclined to attend a military academy like West Point where the physical and military training demands and traditional military culture can pose greater challenges for women.

Step	Predictor	Standardized β	t	Significance of β, $p <$	R	ΔR^2	Significance of ΔR^2
1	Sex	−0.039	−0.68	NS	0.03	0.001	NS
2	CEER	−0.027	−0.48	NS	0.03	0.001	NS
3	Social judgment	0.094	1.64	0.10	0.11	0.012	
4	Big Five personality factors extroversion	0.152	2.64	0.01**	0.20	.028	0.01**
5	Hardiness	0.152	2.65	0.01**	0.25	0.022	0.01**

Notes: Standardized β, t values and significance levels displayed are based on the final model 5 results. Model 1 (sex only) overall $F_{(295, 1)} = 0.17$, NS. Model 2 (sex, CEER), overall $F_{(294, 2)} = 0.18$, NS. Model 3 (sex, CEER, social judgment), overall $F_{(293, 3)} = 1.31$, NS. Model 4 (sex, CEER, social judgment, extroversion; Big Five factors entered by stepwise method), overall $F_{(292, 4)} = 3.17$, $p < 0.01$. Model 5 (sex, CEER, social judgment, extroversion, hardiness), overall $F_{(291, 5)} = 3.99$, $p < 0.01$. Regression based on pairwise deletion of missing data

Table II.
Hierarchical regression
model predicting
cumulative leader
performance: summer
training period context

Step	Predictor	Standardized β	t	Significance of β, $p <$	R	ΔR^2	Significance of ΔR^2
1	Sex	0.07	1.19	NS	0.09	0.008	NS
2	CEER	0.13	2.36	0.02	0.18	0.034	0.01
3	Social judgment	0.10	1.75	0.08	0.21	0.046	0.06
4	Big Five personality factors conscientious	0.11	1.95	0.05	0.25	0.064	0.02
5	Hardiness	0.12	2.09	0.04	0.28	0.077	0.04

Notes: Standardized β, t values and significance levels displayed are based on the final model 5 results. Model 1 (sex only), overall $F_{(295, 1)} = 2.31$, NS. Model 2 (sex, CEER), overall $F_{(294, 2)} = 5.18$, $p < 0.01$. Model 3 (sex, CEER, social judgment), overall $F_{(293, 3)} = 4.71$, $p < 0.01$. Model 4 (sex, CEER, social judgment, conscientiousness; Big Five factors entered by stepwise method), overall $F_{(292, 4)} = 4.96$, $p < 0.001$. Model 5 (sex, CEER, social judgment, extroversion, hardiness), overall $F_{(291, 5)} = 4.89$, $p < 0.001$. Regression based on pairwise deletion of missing data

Table III.
Hierarchical regression
model predicting
cumulative leader
performance: academic
periods

While mental abilities factors have usually been treated as distinct from personality factors (Chamorro-Premuzic and Furnham, 2006), there is recent evidence that the two are more closely related than previously thought (Ackerman and Heggestad, 1997). In the present sample, mental abilities as measured by college entrance exam scores shows some negative relation to Big Five neuroticism and extroversion, and (positive) to agreeableness and conscientiousness, but no relation to hardiness. Mental abilities are also positively associated with social judgment and with leader performance in the academic period context, but not during the summer training periods. This suggests that mental abilities or intelligence provides a leadership advantage in some, more academically oriented environments, but not others.

The relations of Big Five personality dimensions to personality hardiness are of special interest, given arguments that the Big Five framework provides a comprehensive taxonomy for normal personality (Goldberg, 1990; Barrick and Mount, 1991), and also in light of criticisms that hardiness is not conceptually or empirically distinct from neuroticism (Funk, 1992; Funk and Houston, 1987). In the present study, hardiness is only moderately correlated with neuroticism ($r = -0.25^{***}$), supporting the conceptual distinctiveness of hardiness from neuroticism. In fact, three of the Big Five factors, extroversion, conscientiousness and agreeableness, correlate to the same or greater degree with neuroticism. Other studies report similar and even stronger relations of extroversion and conscientiousness with neuroticism (McCormack and Mellor, 2002). It seems clear that hardiness is capturing something that is distinct from the big five dimensions, although there is some expected correlation with neuroticism, extroversion and conscientiousness.

In the multivariate analyses, of the Big Five personality factors only extroversion and conscientiousness predict leader performance, and results vary by context. Extroversion is a significant independent predictor of leader performance during the summer training periods, when cadets are actively engaged in field maneuvers and challenging group tasks (Table II). This is an environment in which social interactions are frequent, where good social skills and an outgoing and assertive style of interacting could confer an advantage for leaders. Judge *et al.* (2002) also identified extroversion as a consistent predictor of leadership across multiple studies, although this effect was strongest in college student samples, and somewhat less in older, business and government/military samples. Our results are also consistent with those of Thomas *et al.* (2001), who reported that extroversion was associated with better leader performance for ROTC cadets in summer training camp. The present findings, in which extroversion predicts leadership during the summer periods but not during the academic year, show it is important to consider the work-environment context in future studies of personality and leadership.

Of the Big Five, conscientiousness also was a significant predictor of leadership performance during the academic year (Table III). Conscientiousness has been related to job performance in multiple samples and contexts (Barrick and Mount, 1991), and has also shown fairly consistent relations with leadership (Judge *et al.*, 2002; McCormack and Mellor, 2002). It is not surprising that conscientiousness also predicts leadership performance in a military setting like West Point, where competence, dutifulness, discipline and achievement striving all are highly valued, and likely to facilitate the kind of successful group organization and task completion associated with effective leadership. Neuroticism and agreeableness showed small but significant

correlations with leadership performance in the predicted directions, but these effects did not hold up in the regression analyses.

There was no evidence for a relation between openness and leadership performance in this study. Perhaps openness and the kinds of creative and unorthodox approaches that openness implies are valuable for leaders in uncertain and ambiguous conditions, but not so helpful within a fairly regulated environment with well-defined rules and standards of performance. The potential contribution of Big Five openness to effective leadership needs further study in other groups and circumstances.

Mental abilities as measured by college entrance exam scores predicts leader performance during the academic periods, but not during the summer field periods. This finding again shows that context matters when considering individual factors associated with leadership performance. During the school year cycle at West Point, the academic demands on all cadets are substantial. To succeed as leaders in this phase of the program, cadets must effectively manage their own academic requirements so as not to risk academic probation or be seen as poor role models. They must also complete their academic work in a timely way so as to have sufficient time remaining to organize and pursue other leadership responsibilities during the academic semester. This explanation is further reinforced by the emergence of conscientiousness in the same regression model as a predictor of leadership effectiveness during the academic periods. In contrast, neither conscientiousness nor college entrance exam scores are related to leadership performance during the summer periods, when academic demands are minimal and group field tasks represent the primary activity.

Social judgment is marginally significant as a predictor of leadership during the academic phase. Similar to conscientiousness, this indicates that social judgment matters especially for leadership during the academic cycle, when multiple demands are placed on leaders who must carefully balance time devoted to academic requirements with their leadership responsibilities. More so than in summer field training, leadership during the academic cycle requires careful planning and balanced judgment so as to achieve unit goals in a context of multiple demands on unit members, including academic, athletic and club activities. Those high in social judgment are likely better able to understand complex social systems and relationships, including multiple roles and demands (Mumford *et al.*, 1993), and so should be more effective in deciding how to allocate their time to meet competing requirements. Subordinates are also experiencing more demands on their time during the academic cycle, and the astute leader would need to recognize and adjust to this more complex environment. Social judgment also shows a trend toward significance in predicting leader performance during the summer training periods, suggesting the general value for leaders of social intelligence and understanding social relationships across multiple contexts. Based on these results, the social judgment aspects of "emotional intelligence" in particular merit further investigation as potentially valuable qualities for leaders.

Hardiness emerges in this study as the strongest personality predictor of leader performance, and the only personality factor predicting leader performance across the two different contexts. For this college age group, hardiness together with extroversion that best predicts cumulative leader performance during the summer field training periods. Persons high in hardiness have a strong sense of commitment to themselves, others, and the activities they are engaged in. They are also more inclined to believe they can control and influence events around them. Such a person is likely to be more

competent in the range of skills called for in the field training environment, and also to project confidence and control, all valuable qualities for a leader. The sense of challenge that characterizes persons high in hardiness would likewise contribute to an attitude that difficult tasks and obstacles are manageable, fun challenges to address and overcome. This is also a valuable tendency for someone leading a group of people in shared, difficult tasks. In the context of summer field training then, hardiness together with the social and outgoing qualities of extroversion represent valuable leadership characteristics.

Hardiness is also a significant predictor of leadership performance during the academic periods, together with Big Five conscientiousness. In the somewhat more routinized though complex environment of the academic semester, the qualities of conscientiousness, not extroversion, appear as more important for leader success. Hardiness is found to be a more general predictor of leadership performance, across both summer and academic contexts. The hardiness features of commitment, control and challenge thus appear to have more broad application for leadership success in different situational contexts. Results overall provide an interesting profile of the generally effective leader as competent and committed, confident in his/her ability to manage events and influence outcomes, and conscientious, persistent and savvy in the face of complex and changing conditions. This leader also has good insight into social relationships and how people interface with social systems and organizations (social judgment).

This study offers a possible explanation for discrepant findings in the literature regarding the relation of extroversion to leadership performance. While extroversion is the Big Five factor most commonly associated with leadership performance (Judge *et al.*, 2002), many studies have not found this link. Some studies even find a negative association of extroversion with leadership. For example, McCormack and Mellor (2002) report that extroversion was a negative predictor of leadership performance in Australian Army officers. Their sample was older, with over half at the rank of Major or above (typically, age $30+$). Also, leader effectiveness was measured with supervisor ratings, whereas the bulk of studies examined by Judge *et al.* (2002) included younger, student samples, and in many cases leadership ratings were made by subordinates not supervisors. In these younger groups, the work of the leader is probably more similar to that of cadet leaders in the present study during the summer training periods. Here, the leader must convince group members to work together to accomplish some specified team task. In this context, being outgoing, sociable and action-oriented (extroverted) is a leadership advantage.

But in the more complex environment of the academic cycle, a more deliberative and planful leadership approach is likely to be more effective. This context may also align better with the complex leader environments found in large organizations, and systems of interacting organizations, as well as modern complex military operations. In these more complex environments, some features of extroversion such as assertiveness and the tendency to take quick action could turn out to be a liability for leaders. A further consideration is that subordinate ratings of leader effectiveness may be more influenced by the sociability and likeability of the leader, as opposed to effectiveness. This would tend to inflate the association between extroversion and leader performance in many studies, such as those examined by Judge *et al.* (2002). Future research in this area should pay close attention to both the situational context in which

leadership is being evaluated, as well as to how (and by whom) leadership performance is assessed.

Limitations and future directions
Some limitations of this study should be noted. Military academy cadets in some ways are a specialized population, and may not be representative of the general population of college students in the USA. However, while the special qualities of the military academy may limit generalizability somewhat, these same qualities make military academy cadets a valuable group in which to study leader performance. Leadership development and training is an important part of the overall program at the US Military Academy, and all cadets are encouraged to develop and practice their leadership skills. Cadets are also evaluated on their performance as leaders by multiple external supervisors, and these evaluations are conducted regularly over their four-year tenure at the academy. So in these respects the military academy provides an excellent natural laboratory in which to study leadership. The more important question regarding generalizability concerns the extent to which the present findings might apply to other groups and organizational contexts where leadership is important, such as military officers, corporate managers and executives, educators, and government agencies. This is a question that can only be answered with additional research.

Because data for the present study were drawn from a larger longitudinal study conducted over four years at West Point, not all measures were administered at the same time, and there are different amounts of missing data for different variables. In part, missing data results from the fact that some cadets dropped out of the academy at some point during the four-year program. In the case of the class of 1998 examined here, of the $n = 1,143$ students who started the program, only $n = 883$ (77 percent) graduated four years later. Since sex and CEER scores were taken from admissions files, there was little or no missing data on these measures. The "Organizational Scenarios" (social judgment) measure was administered during the first summer and scored soon thereafter, resulting in fairly complete data ($n = 1,064$). The analog NEO-PI (Big Five Personality Factor) measure was based on data collected during the first cadet summer, so most of the entering class had completed the source instruments. However, if a single component item was skipped on the original survey, this resulted in a missing scale score for the analog NEO-PI measure, reducing the n somewhat. This reduced the values of n somewhat for Big Five personality factor scores, from $n = 768$ (conscientiousness) to $n = 901$ (agreeableness). These numbers are still quite sufficient to support analyses reported here.

The hardiness measure was administered toward the end of the four-year period (fall of senior year). Response rate was high (50 percent) for a voluntary survey, and resulted in a sufficiently large number of cadets with complete hardiness data $n = 430$). However, it is still possible that respondents were biased in some way compared to non-respondents, as could happen for example if those higher in hardiness were also more likely to respond to the survey. To check this possibility, a non-response analysis was done comparing hardiness survey respondents ($n = 430$) with non-respondents in this cohort ($n = 712$). No differences were found between the groups on sex, CEER, or social judgment scores.

Another potential limitation relates to the timing of administration of the hardiness scale. Hardiness was measured in the fall semester of senior year, and then related

retrospectively to leader performance over the previous four years. Logically, it would be better to measure predictor variables prior in time to outcome variables of interest. But since hardiness is thought to be a trait-like variable that remains fairly stable over time and across situations (Maddi, 2006), this is not a serious concern. Here it is reasonable to infer that cadets who were high in hardiness as seniors were also high throughout their college years. Lending further support to the stability of hardiness over time, test-retest coefficients are reported at $r = 0.78$ over three-weeks (Bartone, 2007) and $r = 0.62$ over ten-months (Eid *et al.*, 2008). Also, if hardiness did change much over time, this would tend to diminish rather than increase correlations with measures collected one, two or three years earlier. Nevertheless, the possibility exists for hardiness to change, especially in an intense developmental environment (Zach *et al.*, 2007). It would be best in futures studies such as this to assess hardiness at multiple time points, especially since there now exists a short, valid and reliable tool for measuring hardiness (Bartone, 2007; Bartone *et al.*, 2008).

The measure of social judgment used in this study is open-ended, and time consuming to score. Considering the recent growth of interest in "emotional intelligence" along with the publication of multiple instruments for assessing emotional intelligence and its presumed components, it may be possible to measure the social judgment construct with more simplified self-report methods, at least to the extent that emotional intelligence includes recognition of emotions in others (Bar-On, 2000; Mayer *et al.*, 2000). Still, substituting simpler emotional intelligence measures for the scenario-based measure of social judgment used here could result in a weakened measure of the construct. A more promising and theoretically relevant direction may be in the work on "social intelligence" (Barnes and Sternberg, 1989). In this domain, the Tromsø Social Intelligence Scale, with subscales for "social information processing", "social skills", and "social awareness", would appear to be an excellent candidate for assessing social judgment in a more straightforward manner (Silvera *et al.*, 2001).

Future directions in personality and leadership research

Future research on personality and leadership should seek to clarify the role of hardiness, extroversion and conscientiousness in leader development and performance across a broader range of situational contexts. In this study, Big Five extroversion was related to leader effectiveness only in the summer training period, and not during the longer and more diversified academic cycles. This is most likely due to different situational demands, not group differences, since it was the same individuals who were assessed throughout the study as they performed under different leadership conditions. Conscientiousness predicts leader performance only during the academic cycle. Of all the predictor variables considered, personality hardiness displays the most robust associations with leadership performance, predicting effective leadership both during summer training periods and academic cycles, over the combined four-year experience.

These results also lend support to recent arguments for the "intelligent personality", a more integrated approach to understanding intellectual abilities and personality factors as they may contribute to performance in a variety of contexts (Chamorro-Premuzic and Furnham, 2006). Social judgment as conceptualized and measured here clearly involves an intelligence component, albeit intelligence applied to the world of social relationships. The significant correlation of social judgment with a

traditional mental abilities measure, i.e. college entrance exam scores, supports this view. The emergence of hardiness and conscientiousness together with social judgment as significant predictors of overall leadership performance in this study suggests a profile of the "intelligent personality" that is especially effective for leaders in a hierarchically structured and demanding organizational environment. At the same time, the somewhat different predictors identified for summer training periods versus the academic cycle confirm the important influence of situational context. Rather than a single "intelligent personality" with some uniform set of personality and abilities factors of general value, it may be more realistic to consider the possibility multiple "different, situationally determined intelligent personalities" (Chamorro-Premuzic and Furnham, 2006, p. 261). In the present study, intellectual abilities (together with personality factors) have a greater influence on leadership in the context of the academic year, but are less important during summer field training periods.

A related area for future work concerns the possible influence of personality and abilities factors on "transformational" leadership style, a style of leadership that has been associated with a variety of positive outcomes (Bass, 1998). A recent meta-analysis by Bono and Judge (2004) found Big Five extroversion to show the strongest correlation with transformational leadership across multiple studies. This is somewhat at variance with the more narrow effects of extroversion seen in the present study. However, we examined the direct effects of Big Five factors on rated leadership performance, not on transformational leadership style as did Bono and Judge (2004). Also, Bono and Judge (2004) relied upon peer and subordinate ratings of leadership style, which may be more influenced by extrovert qualities such as warmth, sociability and assertiveness. In contrast, in the present study ratings of leadership performance were made by supervisors (including cadet supervisors), and focused explicitly on a range of relevant leadership behaviors (Schwager and Evans, 1996). For the remaining Big Five factors, Bono and Judge (2004) found significant but low correlations with transformational leadership, leading them to conclude that although "the Big Five can be a useful framework for cumulating research results, it appears that more narrow or specific traits may be relevant in predicting and understanding transformational and transactional leadership" (p. 908). A recent study of Norwegian Navy cadets found that hardiness was associated with both transformational leadership style and with rated leadership performance (Eid *et al.*, 2008). The present findings point to personality hardiness and social judgment/social intelligence as factors that contribute to leader performance, and may also be related to transformational leadership. Along with the Big Five personality factors, these dimensions merit further active investigation as predictors of leader effectiveness across a range of occupational groups and situational contexts.

Notes

1. Entering class size in summer of 1994 was $n = 1,143$. A total of $n = 260$ cadets dropped-out over the entire four-year period, representing an attrition rate of 23 percent.

2. The first summer for West Point cadets (known colloquially as "beast barracks") occurs just before the start of freshman year; summer two is prior to sophomore year; and summer three is before the junior year. In the fourth and final summer before the senior year, cadets are engaged in internships and other special assignments and generally do not receive MD grades.

References

Ackerman, P.L. and Heggestad, E. (1997), "Intelligence, personality and interests: evidence for overlapping traits", *Psychological Bulletin*, Vol. 121, pp. 219-45.

Antonakis, J. (2004), "On why 'emotional intelligence' will not predict leadership effectiveness beyond IQ or the 'big five': an extension and rejoinder", *Organizational Analysis*, Vol. 12, pp. 171-82.

Astin, A.W., Korn, W.S. and Berz, E.R. (1990), *The American Freshman: National Norms for Fall 1990*, Higher Education Research Institute, UCLA, Los Angeles, CA.

Bar-On, R. (2000), "Emotional and social intelligence: insights from the Emotional Quotient Inventory (EQ-i)", in Bar-On, R. and Parker, J.D.A. (Eds), *Handbook of Emotional Intelligence*, Jossey-Bass, San Francisco, CA.

Barnes, M.L. and Sternberg, R.J. (1989), "Social intelligence and decoding of nonverbal cues", *Intelligence*, Vol. 13, pp. 263-87.

Barrick, M.R. and Mount, M.K. (1991), "The Big Five personality dimensions and job performance: a meta-analysis", *Personnel Psychology*, Vol. 44, pp. 1-26.

Barton, J., Vrij, A. and Bull, R. (2004), "Shift patterns and hardiness: police use of lethal force during simulated incidents", *Journal of Police and Criminal Psychology*, Vol. 19, pp. 82-9.

Bartone, P.T. (1989), "Predictors of stress-related illness in city bus drivers", *Journal of Occupational Medicine*, Vol. 3, pp. 657-63.

Bartone, P.T. (1995), "A short hardiness scale", paper presented at the Annual Convention of the American Psychological Society, New York, NY, July.

Bartone, P.T. (1996), *Stress and Hardiness in US Peacekeeping Soldiers*, American Psychological Association, Toronto, August.

Bartone, P.T. (1999), "Hardiness protects against war-related stress in Army reserve forces", *Consulting Psychology Journal*, Vol. 51, pp. 72-82.

Bartone, P.T. (2007), "Test-retest reliability of the Dispositional Resilience Scale-15, a brief hardiness scale", *Psychological Reports*, Vol. 101, pp. 943-4.

Bartone, P.T., Snook, S.A. and Tremble, T.R. (2002), "Cognitive and personality predictors of leader performance in West Point cadets", *Military Psychology*, Vol. 14, pp. 321-8.

Bartone, P.T., Roland, R.R., Picano, J.J. and Williams, T.J. (2008), "Psychological hardiness predicts success in US Army Special Forces candidates", *International Journal of Selection and Assessment*, Vol. 16, pp. 78-81.

Bartone, P.T., Ursano, R.J., Wright, K.W. and Ingraham, L.H. (1989), "The impact of a military air disaster on the health of assistance workers: a prospective study", *Journal of Nervous and Mental Disease*, Vol. 177, pp. 317-28.

Bass, B.M. (1990), *Bass and Stogdill's Handbook of Leadership*, The Free Press, New York, NY.

Bass, B.M. (1998), *Transformational Leadership*, Lawrence Erlbaum Associates, Mahwah, NJ.

Block, J. (1995), "A contrarian view of the five-factor approach to personality description", *Psychological Bulletin*, Vol. 117, pp. 187-215.

Bono, J.E. and Judge, T.A. (2004), "Personality and transformational and transactional leadership: a meta-analysis", *Journal of Applied Psychology*, Vol. 89, pp. 901-10.

Burns, J.M. (1978), *Leadership*, Harper & Row, New York, NY.

Chamorro-Premuzic, T. and Furnham, A. (2006), "Intellectual competence and the intelligent personality: a third way in differential psychology", *Review of General Psychology*, Vol. 10, pp. 251-67.

Chapman, B.P., Duberstein, P.R., Sörensen, S. and Lyness, J.M. (2007), "Gender differences in Five Factor Model personality traits in an elderly cohort: extension of robust and surprising findings to an older generation", *Personality and Individual Differences*, Vol. 43, pp. 1594-603.

Contrada, R.J. and Type, A. (1989), "Type A behavior, personality hardiness, and cardiovascular responses to stress", *Journal of Personality and Social Psychology*, Vol. 57, pp. 895-903.

Costa, P.T. Jr and McCrae, R.R. (1992), *The Revised NEO Personality Inventory (NEO PI-R) and NEO Five-Factor Inventory (NEO-FFI) Professional Manual*, Psychological Assessment Resources, Inc., Odessa, FL.

Costa, P.T., Terracciano, A. and McCrae, R.R. (2001), "Gender differences in personality traits across cultures: robust and surprising findings", *Journal of Personality and Social Psychology*, Vol. 81, pp. 322-31.

Digman, J.M. (1990), "Personality structure: emergence of the five-factor model", *Annual Review of Psychology*, Vol. 41, pp. 417-40.

Eid, J., Johnsen, B.J., Bartone, P.T. and Nissestad, O.A. (2008), "Growing transformational leaders: exploring the role of personality hardiness", *Leadership & Organization Development Journal*, Vol. 29, pp. 4-23.

Evans, K.L. (1997), "Estimating personality constructs from archival data", ARI Technical Report 1063, US Army Research Institute for the Behavioral and Social Sciences, Alexandria, VA.

Florian, V., Mikulincer, M. and Taubman, O. (1995), "Does hardiness contribute to mental health during a stressful real life situation? The role of appraisal and coping", *Journal of Personality and Social Psychology*, Vol. 68, pp. 687-95.

Funk, S.C. (1992), "Hardiness: a review of theory and research", *Health Psychology*, Vol. 11, pp. 335-45.

Funk, S.C. and Houston, B.K. (1987), "A critical analysis of the hardiness scale's validity and utility", *Journal of Personality and Social Psychology*, Vol. 53, pp. 572-8.

Goldberg, L.R. (1990), "An alternative 'description of personality': the Big-Five factor structure", *Journal of Personality and Social Psychology*, Vol. 59, pp. 1216-29.

Goleman, D. (1995), *Emotional Intelligence*, Bantam Books, New York, NY.

Hollander, E.P. and Julian, J.W. (1969), "Contemporary trends in the analysis of leadership process", *Psychological Bulletin*, Vol. 71, pp. 387-97.

Hough, L. (1992), "The 'Big Five' personality variables – construct confusion: description versus prediction", *Human Performance*, Vol. 5, pp. 139-55.

House, R.J. (1988), "Leadership research: some forgotten, ignored, or overlooked findings", in Hunt, J.G., Baliga, B.R., Dachler, H.P. and Schriesheim, C.A. (Eds), *Emerging Leadership Vistas*, Lexington Books, Lexington, MA, pp. 245-60.

House, R.J. and Howell, J.M. (1992), "Personality and charismatic leadership", *The Leadership Quarterly*, Vol. 3, pp. 81-108.

Jacobs, T.O. and Jaques, E. (1989), *Executive Leadership*, US Army Research Institute, Alexandria, VA.

Judge, T.A. and Bono, J.E. (2000), "Five-factor model of personality and transformational leadership", *Journal of Applied Psychology*, Vol. 85, pp. 751-65.

Judge, T.A., Bono, J.E., Ilies, R. and Gerhardt, M.W. (2002), "Personality and leadership: a qualitative and quantitative review", *Journal of Applied Psychology*, Vol. 87, pp. 765-80.

Kobasa, S.C. (1979), "Stressful life events, personality, and health: an inquiry into hardiness", *Journal of Personality and Social Psychology*, Vol. 37, pp. 1-11.

Kobasa, S.C., Maddi, S.R. and Kahn, S. (1982), "Hardiness and health: a prospective study", *Journal of Personality and Social Psychology*, Vol. 42, pp. 168-77.

Lau, A. (1998), "Military leadership", in Cronin, C. (Ed.), *Military Psychology: An Introduction*, Pearson Education, New York, NY, pp. 49-69.

Leung, S.L. and Bozionelos, N. (2004), "Five-factor model traits and the prototypical image of the effective leader in the Confucian culture", *Employee Relations*, Vol. 26, pp. 62-71.

McCormack, L. and Mellor, D. (2002), "The role of personality in leadership: an application of the Five-Factor Model in the Australian military", *Military Psychology*, Vol. 14, pp. 179-97.

McCrae, R.R. (1992), "The Five-Factor Model: issues and applications", *Journal of Personality*, Vol. 60 No. 2, special issue.

McCrae, R.R. (2002), "NEO-PI-R data from 36 cultures: further intercultural comparisons", in McCrae, R.R. and Allik, J. (Eds), *The Five-factor Model of Personality across Cultures*, Kluwer Academic/Plenum, New York, NY, pp. 105-25.

Maddi, S.R. (2006), "Hardiness: the courage to grow from stresses", *Journal of Positive Psychology*, Vol. 1, pp. 1-9.

Maddi, S.R. and Kobasa, S.C. (1984), *The Hardy Executive*, Dow Jones-Irwin, Homewood, IL.

Mayer, J., Salovey, P. and Caruso, D. (2000), "Emotional intelligence as *Zeitgeist*, as personality, and as a mental ability", in Bar-On, R. and Parker, J.D.A. (Eds), *The Handbook of Emotional Intelligence*, Jossey-Bass, New York, NY.

Milan, L.M. (2002), "Analog scales as temperament measures in the Baseline Officer Longitudinal Data Set (BOLDS)", ARI Technical Report No. 1126, US Army Research Institute for the Behavioral and Social Sciences, Alexandria, VA.

Milan, L.M., Bourne, D.R., Zazanis, M.M. and Bartone, P.T. (2002), "Measures collected on the USMA Class of 1998 as part of the Baseline Officer Longitudinal Data Set (BOLDS)", ARI Technical Report No. 1127, US Army Research Institute for the Behavioral and Social Sciences, Alexandria, VA.

Mount, M.K. and Barrick, M.R. (1995), "The Big Five personality dimensions: implications for research and practice in human resources management", *Research in Personnel and Human Resources Management*, Vol. 13, pp. 153-200.

Mumford, M.D. and Connelly, M.S. (1991), "Leaders as creators: leader performance and problem solving in ill-defined domains", *The Leadership Quarterly*, Vol. 2 No. 4, pp. 289-315.

Mumford, M.D., Marks, M.A., Connelly, M.S., Zaccaro, S.J. and Reiter-Palmon, R. (2000), "Development of leadership skills: experience and timing", *The Leadership Quarterly*, Vol. 11, pp. 87-114.

Mumford, M.D., Zaccaro, S.J., Harding, F.D., Fleishman, E.A. and Reiter-Palmon, R. (1993), "Cognitive and temperament predictors of executive ability: principles for developing leadership capacity", ARI Technical Report No. 977, US Army Research Institute for the Behavioral and Social Sciences, Alexandria, VA.

Phillips, R.L. and Hunt, J.G. (Eds) (1992), *Strategic Leadership: A Multiorganizational-Level Perspective*, Quorum Books, Westport, CT.

Prati, L.M., Douglas, C., Ferris, G.R., Ammeter, A.P. and Buckley, M.R. (2003), "Emotional intelligence, leadership effectiveness, and team outcomes", *International Journal of Organizational Analysis*, Vol. 11, pp. 21-30.

Roth, D.L., Wiebe, D.J., Fillingim, R.B. and Shay, K.A. (1989), "Life events, fitness, hardiness, and health: a simultaneous analysis of proposed stress-resistance effects", *Journal of Personality and Social Psychology*, Vol. 57, pp. 136-42.

Rubenzer, S.J., Faschingbauer, T.R. and Ones, D.S. (2000), "Assessing the US presidents using the Revised NEO Personality Inventory", *Assessment*, Vol. 7, pp. 403-20.

Salovey, P. and Mayer, J.D. (1990), "Emotional intelligence", *Imagination, Cognition and Personality*, Vol. 9, pp. 185-211.

Schmidt, D.P., Realo, A., Voracek, M. and Allik, J. (2008), "Why can't a man be more like a woman? Sex differences in Big Five personality traits across 55 cultures", *Journal of Personality and Social Psychology*, Vol. 94, pp. 168-82.

Schwager, E.H. and Evans, K.L. (1996), "An exploration of the construct validity of a leadership behavior rating system", ARI Technical Report No. 1041, US Army Research Institute for the Behavioral and Social Sciences, Alexandria, VA.

Shao, L. and Webber, S. (2006), "A cross-cultural test of the 'five-factor model' of personality and transformational leadership", *Journal of Business Research*, Vol. 59, pp. 936-44.

Silvera, D.H., Martinussen, M. and Dahl, T.I. (2001), "The Tromsø Social Intelligence Scale: a self-report measure of social intelligence", *Scandinavian Journal of Psychology*, Vol. 42, pp. 313-19.

Stodgill, R.M. (1948), "Personal factors associated with leadership: a survey of the literature", *Journal of Psychology*, Vol. 25, pp. 35-71.

Thomas, J.L., Dickson, M.W. and Bleise, P.D. (2001), "Values predicting leader performance in the US Army Reserve Officer Training Corps Assessment Center: evidence for a personality-mediated model", *The Leadership Quarterly*, Vol. 12, pp. 181-96.

Tremble, T.R. (1997), "Longitudinal research on leadership development: plans and status", unpublished manuscript, Department of Behavioral Sciences and Leadership, US Military Academy, West Point, New York, NY.

Tremble, T.R., Kane, T.D. and Stewart, S.R. (1997), "A note on organizational leadership as problem solving", ARI Research Note No. 97-03, US Army Research Institute for the Behavioral and Social Sciences, Alexandria, VA.

United States Corps of Cadets (1995), "Leadership evaluation and developmental ratings", USCC Regulation No. 623-1, US Military Academy, West Point, New York, NY.

Westman, M. (1990), "The relationship between stress and performance: the moderating effect of hardiness", *Human Performance*, Vol. 3, pp. 141-55.

Wiebe, D.J. (1991), "Hardiness and stress moderation: a test of proposed mechanisms", *Journal of Personality and Social Psychology*, Vol. 60, pp. 89-99.

Yukl, G. (2006), *Leadership in Organizations*, Prentice-Hall, Upper Saddle River, NJ.

Zaccaro, S.J., Mumford, M.D., Connelly, M.S., Marks, M.A. and Gilbert, J.A. (2000), "Assessment of leader problem-solving capabilities", *The Leadership Quarterly*, Vol. 11, pp. 37-64.

Zach, S., Raviv, S. and Inbar, R. (2007), "The benefits of a graduated training program for security officers on physical performance in stressful situations", *International Journal of Stress Management*, Vol. 14, pp. 350-69.

Further reading

Bartone, P.T. (1993), "Psychosocial predictors of soldier adjustment to combat stress", paper presented at the 3rd European Conference on Traumatic Stress, Bergen, June.

Bartone, P.T., Johnsen, B.H., Eid, J., Brun, W. and Laberg, J.C. (2002), "Factors influencing small unit cohesion in Norwegian Navy officer cadets", *Military Psychology*, Vol. 14, pp. 1-22.

Keen, E. (1970), *Three Faces of Being: Toward an Existential Clinical Psychology*, Appleton-Century-Croft, New York, NY.

Kobasa, S.C. and Maddi, S.R. (1977), "Existential personality theory", in Corsini, R. (Ed.), *Existential Personality Theories*, Peacock, Itasca, IL.

Maddi, S.R. (1967), "The existential neurosis", *Journal of Abnormal Psychology*, Vol. 72, pp. 311-25.

Ouellette, S.C. (1993), "Inquiries into hardiness", in Goldberger, L. and Breznitz, S. (Eds), *Handbook of Stress: Theoretical and Clinical Aspects*, 2nd ed., The Free Press, New York, NY, pp. 77-100.

Quirk, M.P. and Fandt, P.M. (2000), *The 2nd Language of Leadership*, Lawrence Erlbaum Associates, Mahwah, NJ.

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