Journal of Applied Psychology
2011, Vol. 96, No. 1, 113–133

0021-9010/10/$12.00 DOI: 10.1037/a0021016

Too Much of a Good Thing: Curvilinear Relationships Between Personality Traits and Job Performance

Huy Le
TUI University

In-Sue Oh
Virginia Commonwealth University

Steven B. Robbins
ACT Inc.

Remus Ilies
Michigan State University

Ed Holland
Iowa Department of Administrative Services

Paul Westrick
University of Iowa

The relationships between personality traits and performance are often assumed to be linear. This assumption has been challenged conceptually and empirically, but results to date have been inconclusive. In the current study, we took a theory-driven approach in systematically addressing this issue. Results based on two different samples generally supported our expectations of the curvilinear relationships between personality traits, including Conscientiousness and Emotional Stability, and job performance dimensions, including task performance, organizational citizenship behavior, and counterproductive work behaviors. We also hypothesized and found that job complexity moderated the curvilinear personality–performance relationships such that the inflection points after which the relationships disappear were lower for low-complexity jobs than they were for high-complexity jobs. This finding suggests that high levels of the two personality traits examined are more beneficial for performance in high- than low-complexity jobs. We conclude by discussing the implications of these findings for the use of personality in personnel selection.

Keywords: personality, curvilinear relationship, performance, selection, faking

Since Guion and Gottier's (1965) pessimistic review, advances in personality and organizational research have provided an unambiguous answer to the question of whether employee personality influences behaviors on the job (Barrick & Mount, 1991; Salgado, 1997, 2002; Tett, Jackson, & Rothstein, 1991; for second-order meta-analyses, see Barrick, Mount, & Judge, 2001; Schmidt, Shaffer, & Oh, 2008). Empirical evidence suggests that employee dispositional characteristics affect job-related behaviors and the outcomes that organizations value (Barrick & Mount, 2005; R. Hogan, 2005). Accordingly, researchers have focused on gaining a better understanding of the nature of this relationship and of the mechanisms that underlie it (Barrick et al., 2001). Although significant progress has been made toward this end (Ones, Viswesvaran, & Dilchert, 2005), many questions remain to be answered, as reflected in a recent debate on the status of research on personality in personnel selection (Morgeson et al., 2007; Ones, Viswesvaran, Dilchert, & Judge, 2007; Tett & Christiansen, 2007).

One issue in the debate was raised by Ones et al. (2007), who suggested that the relationships between some personality traits and job performance may not be linear, as generally assumed in the literature. Because the linearity assumption of predictor–criterion relationships underlies the common practice of top-down selection in employment selection and is the basis of utility analysis (Boudreau, 1991; Coward & Sackett, 1990; Schmidt & Hunter, 1998), violation of this assumption may have important consequences in personnel selection research and practice. In fact, there have been earlier calls for research on the curvilinear relationship between personality and performance. Murphy (1996; Murphy & Dzieweczynski, 2005) questioned the implicit assumption of linearity of the personality–job performance relationship and speculated that some personality traits (in particular Conscientiousness) are likely to be curvilinearly related to job performance. In their influential meta-analysis, Barrick and Mount (1991) also speculated that the relatively low correlations between some personality factors, espe-

This article was published Online First October 11, 2010.

Huy Le, College of Business Administration, TUI University, California; In-Sue Oh, Department of Management, Virginia Commonwealth University, Virginia; Steven B. Robbins, ACT Inc., Iowa City, Iowa; Remus Ilies, Department of Management, Michigan State University, Michigan; Ed Holland, Iowa Department of Administrative Services, Des Moines, Iowa; Paul Westrick, University of Iowa, Iowa.

An earlier version of this paper was presented at the annual meeting of the Society of Industrial and Organizational Psychology, New York City, New York, April 2007. The integrity-based test discussed in Study 1 was developed with the assistance of Huy Le, Remus Ilies, and Ed Holland. The Talent Assessment discussed in Study 2 is owned by ACT, which has a financial interest, and was developed with the assistance of In-Sue Oh and Steven B. Robbins.

Correspondence concerning this article should be addressed to Huy Le, TUI University, 5665 Plaza Drive, Cypress, CA 90630. E-mail: huyanhle@gmail.com

cially Emotional Stability, and job performance were due to the relationships being nonlinear.

Despite the plausibility of the issue and its potentially important implications in theory and practice, few studies have empirically investigated the curvilinear relationship between personality and job performance. Results from the few available studies are often inconclusive. Day and Silverman (1989) found curvilinear relationships between impulse expression and several dimensions of job performance. Examining the relationship between Conscientiousness and job performance, Robie and Ryan (1999) failed to detect any curvilinear effect in their five samples. However, LaHuis, Martin, and Avis (2005) found the hypothesized quadratic effects in both samples included in their study.

Several other studies also found the curvilinear effects between personality and a performance-related criterion (Benson & Campbell, 2007; Cucina & Vasilopoulos, 2005; Robbins, Allen, Casillas, Peterson, & Le, 2006; Vasilopoulos, Cucina, Dyomina, Morewitz, & Reilly, 2006; Vasilopoulos, Cucina, & Hunter, 2007). Although these studies are informative, they did not directly examine job performance as a criterion (i.e., training performance in Vasilopoulos et al., 2007; college GPA in Cucina & Vasilopoulos, 2005, and Robbins et al., 2006) or they included compound traits of personality (i.e., derailing and dark-side personality composites in Benson & Campbell, 2007). Arguably, to ensure conceptual clarity and generalization of findings, studies should examine relationships between personality and job performance under appropriate levels of specificity and on the basis of widely accepted frameworks of the constructs (Barrick & Mount, 2005; Hurtz & Donovan, 2000). For personality, it is commonly agreed, the five-factor model of personality (FFM) provides an adequate general framework for understanding the effects of personality on work behaviors (e.g., Barrick & Mount, 1991, 2005; Hurtz & Donovan, 2000). For job performance, current theory and research have generally converged on the belief that the performance domain should be extended to include task performance, organizational citizenship behavior, and counterproductive work behavior (Rotundo & Sackett, 2002; Sackett, 2002; Viswesvaran & Ones, 2000). Accordingly, it is important to investigate the curvilinear relationships between personality conceptualized under the FFM and all three performance dimensions.

Given the elusiveness of the curvilinear effect of personality on job performance in past research (LaHuis et al., 2005; Robie & Ryan, 1999), it is also necessary to better understand the conditions that potentially qualify the curvilinear effect. That is, we need to examine potential moderators of the curvilinear effect. Verifying the nature of the effect has both theoretical and practical implications, which can shed light on the process through which personality influences people's behaviors on the job and provide guidance for personnel selection practices. To date, few, if any, research projects have systematically investigated this important issue.

The current study fills the void in the literature by examining the curvilinear effects of two important personality factors in the FFM framework, Conscientiousness and Emotional Stability, on all important dimensions of job performance: task performance, organizational citizenship behavior, and counterproductive work behavior. We search for the answers to the elusiveness of these curvilinear effects by investigating the potential moderating effect of job complexity. As suggested in past research (LaHuis et al., 2005) and discussed here, there are theoretical reasons to expect the curvilinear relationships between personality and dimensions of job performance to vary depending on levels of job complexity.

Conscientiousness and Job Performance

Conscientiousness refers to the extent to which persons are dependable, persistent, organized, and goal directed (Barrick & Mount, 2005; Costa & McCrae, 1992). Past research has consistently found that Conscientiousness is positively related to job performance and that this relationship is generalizable across settings and types of jobs (Barrick & Mount, 1991; Barrick et al., 2001; Hurtz & Donovan, 2000; Schmidt et al., 2008; Tett et al., 1991). As discussed, it has been argued that Conscientiousness may not be linearly related to job performance, despite the universal use of the Pearson product–moment correlation to index the relationship.

Nonlinear Relationship Between Conscientiousness and Task Performance

Compared to those who are low in Conscientiousness, highly conscientious persons tend to be more motivated to perform well on the job (Judge & Ilies, 2002) and therefore are likely to achieve better performance through careful planning, goal setting, and persistence (Barrick & Mount, 1991; Barrick, Mount, & Strauss, 1993; Gellatly, 1996; Hurtz & Donovan, 2000; Robie & Ryan, 1999). However, after a certain point, high Conscientiousness may no longer be helpful to task performance because excessively conscientious persons can be considered rigid, inflexible, and compulsive perfectionists. Such persons may pay too much attention to small details and overlook more important goals required on the job (Mount, Oh, & Burns, 2008; Tett, 1998). Highly conscientious people are likely to be more prone to self-deception and rigidity, which may inhibit learning new skills and knowledge, leading to lower performance (LePine, Colquitt, & Erez, 2000; Martocchio & Judge, 1997). Moscoso and Salgado (2004) argued that extreme levels of Conscientiousness may not be beneficial to job performance, "because the maladaptive tendencies of Conscientiousness (compulsive style) produce an interference with the practices considered as signs of a good quality job" (p. 360). As such, although the relationship between Conscientiousness and task performance is positive at lower levels of Conscientiousness, it may become weaker and eventually disappear at higher levels of the construct. Beyond this threshold, higher Conscientiousness may no longer be related to task performance. Accordingly, we hypothesize that

> *Hypothesis 1:* Conscientiousness and task performance are curvilinearly related such that the relationship is initially positive but becomes weaker as Conscientiousness increases; the relationship disappears when Conscientiousness increases further.

Conceivably, the levels of Conscientiousness at which the relationship disappears (i.e., the inflection point) are likely to depend on the characteristics of the job. Kanfer and Ackerman's (1989) model of ability–motivation interactions for attention effort suggests a framework that can be used to understand the potential

effect of job characteristics, in particular job complexity, on the nature of the relationships between Conscientiousness and task performance. Conscientiousness has been shown to influence job performance via motivational processes of goal setting (Barrick et al., 1993) or self-regulation (Kanfer & Heggestad, 1997). These proximal motivational processes in turn determine one's motivation (allocation policy), which distributes an individual's attention resources to task-related behaviors, nontask behaviors, and self-regulation (Kanfer & Ackerman, 1989). From the model, it can be inferred that three factors potentially influencing individual task performance are (a) the ability of a person (determining the amount of available attention resources), (b) the complexity level of a task (determining the attention resources required to perform the task), and (c) the motivation of a person based on his or her Conscientiousness (determining the proportion of resources allocated to task-related behaviors). As such, for a certain task, increases in the attention resources allocated to task-related behaviors (as the level of Conscientiousness increases) will initially result in proportional increases in task performance. However, when the allocated resources reach the maximum level required by the task (defined by the level of complexity of the task), further increases in attention resources no longer lead to higher task performance. Accordingly, the optimal level of Conscientiousness for a certain task is likely to be determined by the complexity of the task.

It is our contention that, because a job typically involves multiple tasks (Pearlman, 1980), the curvilinear relationship between Conscientiousness and job performance, which can be considered as the aggregate of performance in these tasks, is moderated by the overall complexity level of the tasks involved. The overall level of complexity of all the tasks included in a job constitutes the complexity of the job (Gottfredson, 1997). Job complexity is defined as a characteristic of the job "where high complexity infers a lack of routine repetitive work in favor of work involving high intellectual demands and/or frequent changes in task-related requirements—often involving the synthesis or interpretation of complex data" (Oswald, Campbell, McCloy, Rivkin, & Lewis, 1999, p. 3).

We believe that low-complexity jobs require relatively lower levels of Conscientiousness than do higher complexity jobs for maximum level of performance. For example, most jobs of low complexity involve tasks requiring both speed and accuracy, but the deliberate, cautious, dutiful nature of conscientious people (when more than optimal) leads them to waste time and thus decreases speed of work at the expense of accuracy, leading to overall low performance (Mount et al., 2008); thus, only moderately high levels of Conscientiousness are desirable. However, many jobs of high complexity often require not speed but accuracy (e.g., accountant, financial analyst) and creativity (scientist, engineer), which are obtained through very high levels of persistence and dutifulness associated with high levels of Conscientiousness. As such, fairly high levels of Conscientiousness are desirable for high-complexity jobs, though extremely high levels of Conscientiousness, such as in obsessive–compulsiveness disorder, are not desirable (Costa & Widiger, 2002; R. Hogan & Hogan, 2001). Based upon this reasoning, it is hypothesized that

> *Hypothesis 2:* The level of Conscientiousness at which its relationship with task performance disappears (i.e., the inflection point) is determined by job complexity such that the inflection point for more complex jobs occurs at higher levels of Conscientiousness than the inflection point for less complex jobs.

The hypothesized moderating effect of job complexity on the curvilinear relationship between Conscientiousness and task performance discussed above is closely related to the effect of job autonomy discussed in LaHuis et al. (2005). As mentioned earlier, these researchers found significant quadratic effects between Conscientiousness and job performance in their sample of incumbents for clerical jobs. Contrasting their finding with earlier results from Robie and Ryan (1999), who hypothesized but could not detect the curvilinear effect, LaHuis et al. suggested that the level of autonomy moderated the effect. Their sample included clerical jobs with relatively low job autonomy; these jobs allowed less freedom for employees to maximize their performance than did those in Robie and Ryan's study. Job autonomy, which prescribes the extent to which employees can determine their own behaviors on the job, is highly related to job complexity, the job characteristic examined in the current study (Cain & Treiman, 1981). Our decision to focus on job complexity instead of job autonomy in the current study was based upon several considerations. First, job complexity has been found to be the most important and robust moderator of the relationship between general mental ability and job performance (Hunter, 1983; Hunter, Schmidt, & Le, 2006). Examining the moderating effect of job complexity for personality would allow us to compare current results to these established findings. Second, job complexity provides a general and helpful framework to explain how the curvilinear relationships between personality traits and dimensions of job performance may vary in different types of jobs. Finally, most job analysis frameworks (e.g., O*NET) consider job complexity an important characteristic of the jobs and provide some classifications for this characteristic. This would conceivably facilitate future research and applications of the findings.

Conscientiousness and Organizational Citizenship Behavior and Counterproductive Behavior

As the job performance domain has been expanded beyond task performance to capture other performance dimensions of value to organizations, such as organizational citizenship behavior and counterproductive work behavior (Borman & Motowidlo, 1993; Campbell, McCloy, Oppler, & Sager, 1993; Rotundo & Sackett, 2002), more emphasis has been placed on the role of personality. Organizational citizenship behavior (OCB) is generally considered to be a set of behaviors that are not directly task related but contribute to the goals of the organization by improving its social and psychological environments (Rotundo & Sackett, 2002). Counterproductive work behavior (CWB), on the other hand, is defined as a set of behaviors that potentially harm the well-being of the organization (Rotundo & Sackett, 2002). Although these two performance dimensions can be seen as opposite ends of a continuum reflecting employees' nontask behaviors that affect the organization's well-being, empirical research has generally shown that they are actually distinct (Dalal, 2005).

Past research has consistently found that Conscientiousness is positively related to OCB and negatively related to CWB (Berry, Ones, & Sackett, 2007; Ilies, Fulmer, Spitzmuller, & Johnson,

2009). Highly conscientious persons are likely to perform extrarole behaviors benefiting the organization and to avoid deviant behaviors detrimental to the organization. In the current study, because overall job performance is influenced by OCB, CWB, and task performance (Rotundo & Sackett, 2002) and given our theorizing with regard of the relationships of Conscientiousness and task performance, we also examine nonlinear relationships between Conscientiousness and both OCB and CWB. However, because there is no conceptual model of voluntary work behavior (OCB and CWB) that clearly suggests such curvilinear relationships, we examine them on only an exploratory basis.

Emotional Stability and Job Performance

Nonlinear Relationship Between Emotional Stability and Task Performance

Emotional Stability indicates the extent to which people are calm, steady under pressure, and less likely to experience negative emotional states, including anxiety, depression, and anger (Costa & McCrae, 1992). This personality factor can be considered to reflect the personal disposition that enables people to effectively control their negative emotions (Kanfer & Heggestad, 1997). As observed by Kanfer and Ackerman (1989) and Kuhl and Koch (1984), emotional control helps people overcome distracting emotions that can take away attention resources they need to perform a job task. Accordingly, we expected that Emotional Stability would be positively related to task performance.

Nevertheless, it may be overly simplistic to assume that there is a strict, linear relationship between Emotional Stability and job performance. As we note earlier, researchers have long suspected that the relationship is actually curvilinear, which may potentially explain the relatively low validity of Emotional Stability in predicting job performance (Barrick & Mount, 1991; Ones et al., 2007). Barrick and Mount (1991, p. 20) suggested the possibility that "there may not be a linear relation between Emotional Stability and job performance beyond the 'critically unstable' range. That is, as long as an individual possesses 'enough' Emotional Stability, the predictive value of any differences are minimized."

An inverted-*U* relationship, widely associated with the Yerkes–Dodson law (Yerkes & Dodson, 1908), has been observed in a variety of research areas over the past century (Eysenck, 1989; Hancock & Ganey, 2003; Teigen, 1994), notably with research examining the effects of emotionality, anxiety, tension, and stress upon performance. A typical finding is that at the extremes of low and high levels of emotionality, performance is lower, but as emotion level deviates from the extremes toward the mean, performance gradually increases. In explaining this relationship, Easterbrook (1959) suggested that emotion level tends to narrow the range of cue utilization. As the level of emotion rises, performance first improves, because it helps people concentrate on relevant task cues and exclude irrelevant ones, but only up to a point. Beyond that point, further increases in emotion may become detrimental because relevant cues can be excluded due to the obsessive focus on accuracy. By the same token, Nettle (2006) argued that the anxiety aspect of Neuroticism (the converse of Emotional Stability) is not always detrimental to task performance; the moderate level of anxiety can be in fact facilitating, due to its anticipatory ability.

Here again Kanfer and Ackerman's (1989) model of ability–motivation interactions for attention resource can further explain the curvilinear relationship between Emotional Stability and task performance. As noted earlier, the model suggests that self-regulation, which is a proximal motivation process, influences task performance by determining the attention resource one devotes to the task. An optimal level of attention resource is needed for successfully performing a task; excessive attention resource beyond that level will be wasted, so the relationship between self-regulation and task performance is nonlinear. Self-regulation is determined by motivation skills, which include motivation control and emotion control (Kanfer & Heggestad, 1997; see also Robbins, Oh, Le, & Button, 2009). Emotional Stability influences emotion control (Kanfer & Heggestad, 1997), so in general it is positively related to task performance. Up to a point, however, higher levels of Emotional Stability may no longer be helpful, as the effect on task performance via the self-regulation process and attention resource becomes saturated. As such, Emotional Stability is likely to be curvilinearly related to task performance.

Taken together, these lines of reasoning suggest that Emotional Stability, which is one of the important determinants of negative emotion (stress, anxiety) and emotional level (Easterbrook, 1959; Kanfer & Heggestad, 1997), is likely to be curvilinearly related to task performance (i.e., there is an optimal midrange level of Emotional Stability for maximum performance). Accordingly, we propose the following hypothesis:

> *Hypothesis 3:* Emotional Stability and task performance are curvilinearly related such that the relationship is initially positive but becomes weaker as Emotional Stability increases; the relationship disappears when Emotional Stability increases further.

Much like the relationship between Conscientiousness and task performance, we suspect, the relationship between Emotional Stability and task performance may be influenced by job complexity. Past research has indeed shown that the optimal level of emotionality or anxiety depends on characteristics of a task. As noted earlier, Easterbrook (1959) found that tasks involving a wide range of peripheral cues require lower emotion level. Thus, the optimal emotion level for tasks requiring more information processing may be lower than that for tasks demanding less information. As such, Easterbrook's theory seems to suggest that task complexity influences the curvilinear relationship between emotion and task performance. Because Emotional Stability influences emotion control (Kanfer & Heggestad, 1997), it is reasonable to expect that the curvilinear relationship between Emotional Stability and task performance is influenced by the complexity of a task.

Similar reasoning regarding the moderating effect of task complexity can be presented for the Emotional Stability–task performance relationship. In particular, the optimal level of attention for a task is determined by the complexity level of the task. In other words, the curvilinear effect of Emotional Stability on task performance via its regulating effect on attention resource devoted to the task is likely to be moderated by task complexity. As job complexity reflects the overall complexity level of all the tasks included in a job, we expected that the optimal point (threshold) at which higher levels of Emotional Stability are no longer beneficial

to task performance would vary depending on levels of job complexity. Accordingly, it is hypothesized that

> *Hypothesis 4:* The level of Emotional Stability at which its relationship with task performance disappears (i.e., inflection point) is determined by job complexity such that the inflection point for more complex jobs occurs at higher levels of Emotional Stability than the inflection point for less complex jobs.

Nonlinear Relationship Between Emotional Stability and OCB

Past research generally found a weak, positive link between Emotional Stability and OCB. A meta-analysis by Organ and Ryan (1995) found moderately negative relationships between negative affectivity (generally considered the opposite of Emotional Stability) and altruism as well as generalized compliance, which are the two dimensions of OCB. As such, empirical evidence appears to show that higher levels of Emotional Stability are generally associated with higher levels of OCB.

Research on emotional exhaustion, which is "a type of strain that results from workplace stressors" (Cropanzano, Rupp, & Byrne, 2003, p. 160), suggests an explanation for this effect. Emotional Stability was found to be an important dispositional determinant of emotional exhaustion (Michielsen, Croon, Willemsen, DeVries, & Van Heck, 2007). In turn, emotional exhaustion is negatively related to OCB because a "burned-out" individual may feel unfairly treated by his or her employing organization and is therefore unlikely to engage in behaviors benefiting the organization (Cropanzano et al., 2003).

A related explanation for the effect of Emotional Stability on OCB also involves its effect on stress. Neurotic (i.e., emotionally unstable) individuals are more susceptible to stressors at work (Conard & Matthews, 2008; Gallagher, 1990), and stressed people, due to the depletion of emotional resources, are less likely to help others and engage in other organization-benefiting behaviors. Additionally, neurotic individuals may be more likely to be involved in complaints and grievances that create negative work environments. George (1990) found that individual members' negative affectivity (a strong correlate of Neuroticism) led to the negative tone of a team, which was negatively related to team prosocial behaviors. As such, Emotional Stability may be positively related to OCB to the extent it helps counter the stressors in work environments (cf. Yang & Diefendorff, 2009).

However, the effect of Emotional Stability on OCB may not be consistently positive. Up to a certain point, increases in Emotional Stability allow individuals to better cope with workplace stressors, thereby increasing OCB. Beyond that point, the buffering effect of Emotional Stability on stress may become redundant, so the positive relationship between Emotional Stability and OCB disappears. Consistent with this expectation, Eisenberg, Fabes, Guthrie, and Reiser (2000) found a quadratic effect of emotion regulation (a facet of Emotional Stability) on social functioning among schoolchildren. Eisenberg et al. explained that emotional regulation enhances social competence (as reflected by teachers' ratings of children prosocial behaviors) but only up to a point. Beyond that point, the relationship becomes negative, because "people characterized by extreme overcontrol (because of either very high involuntary behavioral inhibition or voluntary control) probably are not as socially competent as individuals who are moderately high in control" (Eisenberg et al., 2000, p. 143). Accordingly, we believe that there might be a curvilinear relationship between Emotional Stability and OCB among adults in the workplace.

> *Hypothesis 5:* Emotional Stability and OCB are curvilinearly related such that the relationship is initially positive but becomes weaker as Emotional Stability increases; the relationship disappears when Emotional Stability increases further.

As with the relationship between Emotional Stability and task performance discussed earlier (Hypothesis 4), we expected that the relationship between Emotional Stability and OCB would be influenced by job complexity. Higher complexity jobs are likely to have more stressors due to broad and often not clearly defined responsibilities inherent in the jobs (as compared to lower complexity jobs; Grebner et al., 2003), and a higher level of Emotional Stability may be required to buffer the negative effect of these stressors on OCB (Schmidt et al., 2008). As such, the threshold at which the Emotional Stability–OCB relationship disappears is expected to be higher for high-complexity than lower complexity jobs. On the basis of this rationale, we advance the following hypothesis:

> *Hypothesis 6:* The level of Emotional Stability at which its relationship with OCB disappears (i.e., the inflection point) is determined by job complexity such that the inflection point of more complex jobs occurs at higher levels of Emotional Stability than the inflection point for less complex jobs.

Nonlinear Relationship Between Emotional Stability and CWBs

There are many empirical studies examining the relationships between Emotional Stability and CWB in the organizational literature. These studies seem to be consistent in their findings about the (linear) negative effect of Emotional Stability on CWB. Meta-analytic results (Berry et al., 2007) have confirmed that Emotional Stability is negatively related to both types of CWB: (a) deviant behavior directed toward others in the workplace and (b) deviant behavior directed toward the organization.

The effect of Emotional Stability on CWB can be explained by the finding that job stressors are likely to invoke antiorganizational behaviors via negative emotions (Fox, Spector, & Miles, 2001). Emotional Stability may help "buffer" the effect of job stressors on negative emotions (Yang & Diefendorff, 2009), so emotionally stable individuals are less likely to be emotionally exhausted and thus less likely to commit counterproductive behaviors against the organizations. As in the case with OCB, it can be seen that the level of stressors inherent in a job determines the optimal level of Emotional Stability. Higher levels of Emotional Stability may not be helpful in reducing CWB. As such, the relationship between Emotional Stability and CWB is likely to be nonlinear. Furthermore, depending on the nature of a job, the level of Emotional Stability needed to buffer the effect of these stressors may vary. As noted earlier, high-complexity jobs may be characterized as having more stressors (Grebner et al., 2003). Accordingly, the asymptotic

level of Emotional Stability required to cope with these stressors is likely higher for jobs of high complexity than for jobs of low complexity. On the basis of this reasoning, we suggest the following hypotheses about the relationships between Emotional Stability and CWB as moderated by job complexity:

> *Hypothesis 7:* Emotional Stability and counterproductive behavior are curvilinearly related such that the relationship is initially negative but becomes less negative as Emotional Stability increases; the relationship disappears as Emotional Stability increases further.
>
> *Hypothesis 8:* The level of Emotional Stability at which its relationship with counterproductive behavior disappears (i.e., the inflection point) is determined by job complexity such that the inflection point for more complex jobs is likely to occur at higher levels of Emotional Stability than the inflection point for less complex jobs.

In the following sections, we describe two studies conducted to examine the hypotheses about the curvilinear relationships between personality and job performance dimensions proposed above.

Study 1

Method

Sample. Data for Study 1 came from a concurrent validation study for a personnel selection test battery developed for a large public organization in the Midwest. Participants were employees of the organization, and their jobs ranged from low levels of complexity (e.g., receptionists, typists, drivers, custodians) to relatively high levels of complexity (e.g., computer programmers, accountants, training specialists, engineers). Participation in the study was voluntary; employees were informed that the study was for research and their responses would be anonymous. Participants responded to a questionnaire of 300 test items on a 6-point Likert scale ranging from *Strongly Disagree* to *Strongly Agree.* Ratings from the employees' direct supervisors were also collected and later matched with responses from the participants. Our sample included 602 responses with matched supervisors' ratings. Participants included 337 women (56%) and 265 men (44%) and had an average age of 46.33 years ($SD = 9.95$).

Measures. The questionnaire used in the current study was modeled after both overt and covert (personality-based) integrity tests (Ones, Viwesvaran, & Schmidt, 1993; Sackett & Wanek, 1996). To capture the constructs underlying covert integrity tests (Ones, 1993), researchers developed items to reflect three dimensions of the Big Five: Conscientiousness, Emotional Stability, and Agreeableness.[1] In the current study, we used 14 questionnaire items to measure Conscientiousness and 11 questionnaire items to measure Emotional Stability. Example items are "Others describe me as a highly dependable and reliable person" (Conscientiousness) and "It is easy for me to remain calm in most situations" (Emotional Stability). The scales had acceptable internal consistency, with coefficient alpha estimated at .81 for Conscientiousness and for Emotional Stability.

Direct supervisors of the participants provided ratings of job performance dimensions. The rating scales were constructed based on a pilot study surveying 165 managers of the organization about desirable and undesirable employee job behaviors. Items were developed based on analysis of the frequencies of the behaviors reported in the pilot study. The final rating scale used in the validation study includes three subscales: CWB (14 items), OCB (12 items), and task performance (6 items). For each item, supervisors were provided with a number of representative behaviors and asked to rate how frequently participants could be observed to exhibit such behaviors at work on a rating scale from 1 (*Never*) to 6 (*Always*). For example, the "Helping Coworkers" item of the OCB subscale includes behaviors such as "Assists other employees with their work when they have been absent," "Supports coworkers with personal problems," and "Takes times to listen to coworkers' problems and worries." It was made clear to supervisors and participants that data were collected for research purposes only. These scales were found to have good internal consistency (coefficient $\alpha = .86$, .95, and .92 for CWB, OCB, and task performance, respectively).

For job complexity, Cain and Treiman (1981) provided one of the earliest systematic measures on which subsequent operationalizations of the construct have often been based. in factor-analyzing 44 job dimensions provided in the *Dictionary of Occupational Titles* (*DOT*), the researchers found six factors, with *substantive complexity* being the first factor in the sample of 1,172 *DOT* occupations. Cain and Treiman noted that this factor reflects the substantive complexity of work, which can be interpreted as measuring the complexity of routines entailed in occupations. Since then, other researchers have used some variations of job dimension ratings from the *DOT.* For example, Hunter (1983) derived a measure of job complexity based on the Data dimension of the *DOT.* Sturman, Cheramie, and Cashen (2005) also used the *DOT*'s Data dimension to measure job complexity.

In the current study, the participating organization used a special system of job classification that cannot be readily linked to the *DOT* jobs. Therefore, we cannot use the *DOT*-based measure of job complexity. Instead, from the information provided by the organization, two of us independently coded participants' jobs based on the extent to which the jobs (a) included nonroutine and complex information processing tasks and (b) required extensive training and/ or preparation. Jobs were coded into two categories: low complexity and high complexity. Complexity was operationalized as a binary variable in the current study.[2] Interrater agreement was 92%. Out of 602 participants, 279 (46.3%) held low-complexity jobs and 323 (53.7%) held high-complexity jobs.

Data analysis. Hierarchical polynomial regression analysis was used in testing the hypotheses. Analyses were conducted separately for each combination of Conscientiousness and Emotional Stability and each performance dimension. To avoid the problem of multicolinearity, we used standardized values of the independent variables (described below) in all the regression models (Aiken & West, 1991).

---

[1] Apart from these dimensions, the inventory includes items written to capture other dimensions often found in overt integrity tests, such as Acceptance of Authority, Rule Orientation, and Theft Prevalence.

[2] We attempted to code job complexity on an ordinal scale, but that proved difficult because relatively limited information was available about the jobs. Binary coding provided more reliable result and thus was used in the study.

In Step 1, job complexity was treated as a control variable and entered into a regression model predicting a job performance dimension (task performance, OCB, or CWB). In Step 2, the relevant personality factor (Conscientiousness or Emotional Stability) was included. In Step 3, we entered the quadratic term of the personality factor (square of the personality score) to represent the hypothesized curvilinear effect (cf. Cucina & Vasilopoulos, 2005). A statistically significant effect of the quadratic term found in this step would provide support for Hypothesis 1, 3, 5, or 7. A negative quadratic term would suggest an inverted-*U*-shaped relationship, supporting Hypotheses 1, 3, and 5, whereas a positive quadratic term would provide support for Hypothesis 7.

Hypotheses 2, 4, 6, and 8, suggesting that the inflection point at which the effect of personality on job performance disappears depends on levels of job complexity, were examined only if the corresponding quadratic effects were found in Step 3 described above. These hypotheses were tested in Step 4, which includes interaction effects between (a) job complexity and the personality factor and (b) job complexity and the quadratic term of the personality factor. For a polynomial regression model

$$Y = B_0 + B_1X + B_2X^2 + \varepsilon, \quad (1)$$

the inflection point occurs at the following value of the predictor X (Weisberg, 2005):

$$X_{\text{inflection}} = -B_1/2B_2. \quad (2)$$

As such, the inflection point depends on the values of B_1, the regression coefficient of the personality factor, and B_2, the regression coefficient of the quadratic term of the personality factor. The model in Step 4 mentioned above can be presented as

$$Y = B_0 + B_1X + B_2X^2 + B_3Z + B_4ZX + B_5ZX^2 + \varepsilon, \quad (3)$$

with X being the personality factor and Z being job complexity. Equation 3 can be rearranged as follows:

$$Y = B_0 + B_3Z + (B_1 + B_4Z)X + (B_2 + B_5Z)X^2 + \varepsilon. \quad (4)$$

Calling $B_0^* = B_0 + B_3Z$, $B_1^* = B_1 + B_4Z$, and

$$B_2^* = B_2 + B_5Z, \quad (5)$$

we can then rewrite Equation 4 above in the same format as in Equation 1:

$$Y = B_0^* + B_1^*X + B_2^*X^2 + \varepsilon. \quad (6)$$

Accordingly, the inflection point for the model in Equation 6 is

$$X_{Inflection} = -B_1^*/2B_2^*. \quad (7)$$

From Equations 5 and 7, it can be seen that the inflection point depends on B_1^* and B_2^*, which are functions of Z when B_4 and B_5 are different from zero. As such, Hypothesis 2, 4, 6, or 8 would be supported when the either B_4 or B_5 (or both) is statistically significant. In other words, the statistical significance of any interaction term in Equation 3 would indicate that the inflection point at which the effect of personality factor on job performance disappears depends on job complexity, as hypothesized.

We also conducted the same analyses as described above for the relationships between Conscientiousness and OCB and between Conscientiousness and CWB, although no hypothesis is made about these relationships. These analyses are thus exploratory in nature.

Results

Table 1 presents the correlations between the variables examined in Study 1. Both Conscientiousness and Emotional Stability are statistically significantly correlated to all three performance dimensions. The personality variables are also positively related with job complexity.

The relatively high correlations between the two personality variables (.62) shown in Table 1 may raise concern about their validity, especially given that they were newly developed measures. The three job performance dimensions are also highly correlated, although they are within the range often found in past research (Viswesvaran, Schmidt, & Ones, 2005). The high correlations suggest that they may largely reflect the general job performance factor, apart from the "halo" effect (Viswesvaran et al., 2005). To examine this potential problem, we conducted additional analysis examining the discriminant validity of these measures. Using confirmatory factor analysis, we specified hierarchically nested models with five factors (Conscientiousness and Emotional Stability factors underlie the personality items; task performance, OCB, and CWB factors underlie the performance-rating items), two factors (one personality factor underlies all the personality items and one performance factor underlies all the performance rating items), and one factor (underlying all the personality and

Table 1
Descriptive Statistics and Correlations Between Variables in Study 1

Variable	*M*	*SD*	1	2	3	4	5	6
1. Job complexity	0.54	0.50	—					
2. Conscientiousness	3.06	0.50	.13*	*.81*				
3. Emotional Stability	4.46	0.64	.14*	.62*	*.81*			
4. Task performance	24.92	3.99	.07	.18*	.21*	*.92*		
5. OCB	50.96	11.75	.03	.24*	.24*	.80*	*.95*	
6. CWB	18.16	5.17	−.02	−.23*	−.25*	−.63*	−.62*	*.86*

Note. $N = 569–602$. Coefficient alphas are shown in italics on the diagonal. Job complexity: Low complexity = 0, high complexity = 1. OCB = organizational citizenship behavior; CWB = counterproductive work behavior.
* $p < .05$.

performance-rating items). The fit indices of the five-factor model, $\chi^2(1439) = 4{,}007.12$, $p < .01$; root mean square error of approximation (RMSEA) = .056, standardized root mean square residual (SRMR) = .065, comparative fit interval (CFI) = .861, are significantly better than those of the two-factor model, $\chi^2(1448) = 5{,}958.52$, $p < .01$; RMSEA = .082, SRMR = .066, CFI = .746, and the one-factor model, $\chi^2(1449) = 6{,}216.31$, $p < .01$; RMSEA = .095, SRMR = .105, CFI = .672. This result provides certain support for the discriminant validity of the measures.

Conscientiousness and job performance. Table 2 shows results of analyses examining the relationships between Conscientiousness and dimensions of job performance. As can be seen, the quadratic effect of Conscientiousness in Step 3 for the regression model predicting task performance was statistically significant ($\beta = -.12$, $p < .05$), supporting Hypothesis 1. Although not hypothesized, statistically significant effects were found for the quadratic terms in models predicting OCB and CWB ($\beta = -.10$ for OCB, $\beta = .14$ for CWB), suggesting the relationships between Conscientiousness and these two job performance dimensions were also nonlinear. The signs of the quadratic effects were negative for task performance and OCB, indicating that the relationships resemble an inverted-*U* shape. This means that an increase in Conscientiousness will initially lead to better performance on these job performance dimensions, but the relationships will become weaker and eventually disappear when Conscientiousness increases past a certain point. For CWB, the sign was positive, indicating a *U*-shaped relationship. Conscientiousness is negatively related with CWB at first, but the relationship diminishes as the level of Conscientiousness increases.

Hypothesis 2 regarding the moderating effect of job complexity was also supported. As shown in Table 2, the interaction effect between Conscientiousness and job complexity in Step 4 of the model predicting task performance was statistically significant ($\beta = .11$, $p < .05$). This means that the threshold at which the positive relationship between Conscientiousness and task performance disappears depends on the complexity level of a job. To better understand this effect, we compared the curvilinear relationship in low-complexity jobs to that in high-complexity jobs. This was achieved by replacing the values of job complexity (-1.00 *SD* or 1.00 *SD*) in the model relating Conscientiousness and task performance in Step 4 (see Table 2). That is, we used the regression coefficients for the model reported in Table 2 to construct two separate polynomial regression models reflecting the relationships between Conscientiousness (in standardized scores) and task performance for low-complexity jobs and high-complexity jobs. Table 3 (the top two rows) presents the regression coefficients for the two models and the corresponding inflection points. As can be seen, the inflection point for low-complexity jobs (0.23 *SD* above the mean of Conscientiousness) is much lower than that for high-complexity jobs (2.33 *SD* above the mean). This result provides full support for Hypothesis 2. Figure 1 illustrates the difference between these effects in low- and high-complexity jobs.

Emotional Stability and job performance. Table 4 presents results of analyses examining the relationships between Emotional Stability and the three job performance dimensions hypothesized under Hypotheses 3–8. As shown, the quadratic terms of Emotional Stability were statistically significant in all three regression models predicting job performance dimensions. The quadratic terms were negative in Step 3 of the models predicting task performance ($\beta = -.11$, $p < .05$) and OCB ($\beta = -.11$, $p < .05$), supporting the hypothesized inverted-*U* relationships between Emotional Stability and these job performance dimensions (Hypotheses 3 and 5). Hypothesis 7 was also supported by the significantly positive effect of the quadratic term in Step 3 of the model predicting CWB ($\beta = .15$, $p < .05$).

As shown in Table 4, the interaction effects between the quadratic term of Emotional Stability and job complexity were also statistically significant in Step 4 of the models predicting task

Table 2
Examining the Relationships Between Conscientiousness and Performance Dimensions as Moderated by Job Complexity (Study 1)

	Job performance dimension criterion								
	Task performance			OCB			CWB		
Predictor	*B*	β	R^2 (ΔR^2)	*B*	β	R^2 (ΔR^2)	*B*	β	R^2 (ΔR^2)
Step 1									
Job complexity	0.27	.07	.004 (.004)	0.32	.03	.001 (.001)	−0.10	−.02	.000 (.000)
Step 2									
Job complexity	0.18	.04	.033* (.028*)	−0.06	−.01	.059* (.058*)	0.06	.01	.053* (.053*)
Conscientiousness	0.67*	.17*		2.86*	.24*		−1.20*	−.23*	
Step 3									
Job complexity	0.17	.04	.046* (.014*)	−0.08	−.01	.069* (.010*)	0.70	.01	.074* (.021*)
Conscientiousness	0.69*	.17*		2.89*	.25*		−1.22*	−.24*	
Conscientiousness—quadratic effect	−0.32*	−.12*		−0.84*	−.10*		0.52*	.14*	
Step 4									
Job complexity	0.03	.01	.060* (.013*)	−0.41	−.04	.076* (.007)	0.18	.04	.078* (.004)
Conscientiousness	0.65*	.17*		2.79*	.24*		−1.18*	−.23*	
Conscientiousness—quadratic effect	−0.37*	−.14*		−0.92*	−.11*		0.55*	.15*	
Complexity × Conscientiousness	0.42*	.11*		0.83	.07		−0.29	−.06	
Complexity × Conscientiousness—quadratic effect	0.14	.06		0.36	.05		−0.12	−.04	

Note. $N = 568–601$. OCB = organizational citizenship behavior; CWB = counterproductive work behavior.
* $p < .05$.

Table 3
Moderating Effects of Job Complexity on the Relationships Between Personality and Job Performance (Study 1 and Study 2)

Personality–performance	Regression coefficients (B)			
	Intercept (B_0)	Linear (B_1)	Quadratic (B_2)	$Z_{\text{inflection}} = -B_1/2B_2$
Study 1				
Conscientiousness–task performance				
Low-complexity jobs (−1.00 *SD*)	25.21	0.23	−0.51	0.23
High-complexity jobs (1.00 *SD*)	25.27	1.07	−0.23	2.33
Emotional Stability–task performance				
Low-complexity jobs (−1.00 *SD*)	25.36	0.33	−0.78	0.21
High-complexity jobs (1.00 *SD*)	25.22	0.97	−0.16	3.03
Emotional Stability–OCB				
Low-complexity jobs (−1.00 *SD*)	53.00	1.86	−2.48	0.38
High-complexity jobs (1.00 *SD*)	51.34	2.86	−0.36	3.97
Study 2				
Emotional Stability–OCB				
Low-complexity jobs (−1.00 *SD*)	0.04	−0.02	−0.10	−0.10
High-complexity jobs (1.00 *SD*)	0.10	0.14	−0.04	1.75

Note. $Z_{\text{inflection}}$ = standardized score on the personality scale corresponding to the inflection point of the curve reflecting the relation between personality and performance. That is, the relation between personality and job performance starts changing direction (or reaching asymptotic point) at this score. OCB = organizational citizenship behavior.
* $p < .05$.

performance ($\beta = .13$, $p < .05$) and OCB ($\beta = .15$, $p < .05$), indicating that Hypotheses 4 and 6 were supported. None of the interaction terms in Step 4 of the model predicting CWB were statistically significant, so Hypothesis 8 was not supported.

Table 3 provides further details about the moderating effect of job complexity on the curvilinear relationships between Emotional Stability and task performance (Hypothesis 4) and between Emotional Stability and OCB (Hypothesis 6). The third and fourth rows in Table 3 show the polynomial regression models predicting task performance separately for low-complexity jobs (−1.00 *SD*) and high-complexity jobs (1.00 *SD*). Consistent with the prediction made in Hypothesis 4, the inflection point for low-complexity jobs was estimated to occur at a low level of Emotional Stability (i.e., at 0.21 *SD* above the mean) whereas it was much higher (3.03 *SD* above the mean) for high-complexity jobs. These findings are illustrated in Figure 2.

The fifth and sixth rows of data in Table 3 show the moderating effect of job complexity on the curvilinear relationship between

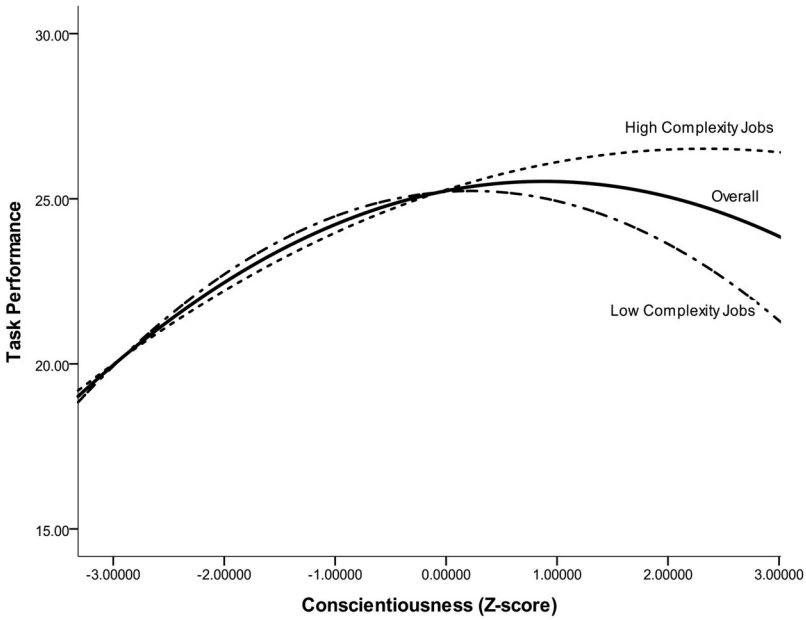

Figure 1. Relationships between Conscientiousness and task performance (Study 1).

Table 4
Examining the Relationships Between Emotional Stability and Performance Dimensions as Moderated by Job Complexity (Study 1)

	Job performance dimension criterion								
	Task performance			OCB			CWB		
Predictor	*B*	β	R^2 (ΔR^2)	*B*	β	R^2 (ΔR^2)	*B*	β	R^2 (ΔR^2)
Step 1									
Job complexity	0.27	.07	.005 (.005)	0.35	.03	.001 (.001)	−0.10	−.02	.000 (.000)
Step 2									
Job complexity	0.15	.04	.044* (.039*)	−0.05	−.00	.058* (.058*)	0.09	.02	.065* (.065*)
Emotional Stability	0.80*	.20*		2.85*	.24*		−1.33*	−.26*	
Step 3									
Job complexity	0.20	.05	.056* (.012*)	0.10	.01	.071* (.013*)	0.00	.00	.087* (.022*)
Emotional Stability	0.77*	.19*		2.65*	.23*		−1.22*	−.24*	
Emotional Stability, quadratic effect	−0.33*	−.11*		−0.98*	−.11*		0.56*	.15*	
Step 4									
Job complexity	−0.07	−.02	.068* (.012*)	−0.83	−.07	.083* (.012*)	0.20	.04	.089* (.003)
Emotional Stability	0.65*	.16*		2.36*	.20*		−1.16*	−.22*	
Emotional Stability, quadratic effect	−0.47*	−.16*		−1.42*	−.17*		0.65*	.17*	
Complexity × Emotional Stability	0.32	.08		0.50	.04		−0.10	−.02	
Complexity × Emotional Stability, quadratic effect	0.31*	.13*		1.06*	.15*		−0.22	−.07	

Note. $N = 569–602$. OCB = organizational citizenship behavior; CWB = counterproductive work behavior.
* $p < .05$.

Emotional Stability and OCB predicted in Hypothesis 6. As can be seen, the inflection point occurs at a much lower level of Emotional Stability for low-complexity jobs (0.38 *SD* above the mean) than for high-complexity jobs (3.97 *SD* above the mean). Figure 3 presents the findings pertaining to Hypothesis 6.

Discussion

We found support for all the hypothesized nonlinear relationships between personality (Conscientiousness and Emotional Stability) and job performance dimensions. Conscientiousness is curvilinearly related to task performance, and Emotional Stability is curvilinearly related to all three performance dimensions (task performance, OCB, and CWB). Although this was not hypothesized, curvilinear relationships were also found between Conscientiousness and OCB and CWB. For the Conscientiousness–OCB relationship, it is possible that persons who are very high in Conscientiousness are considered rigid and inflexible. These persons may tend to stick to the rules and responsibilities formally

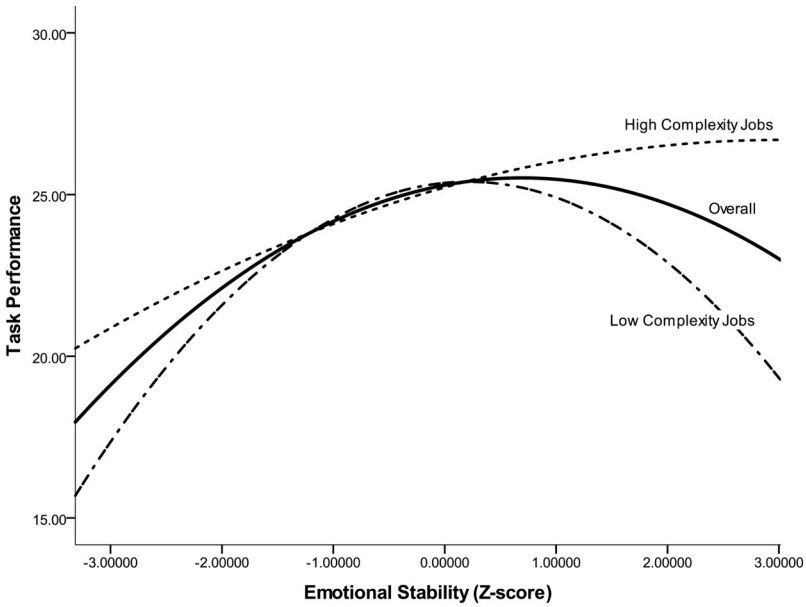

Figure 2. Relationships between Emotional Stability and task performance (Study 1).

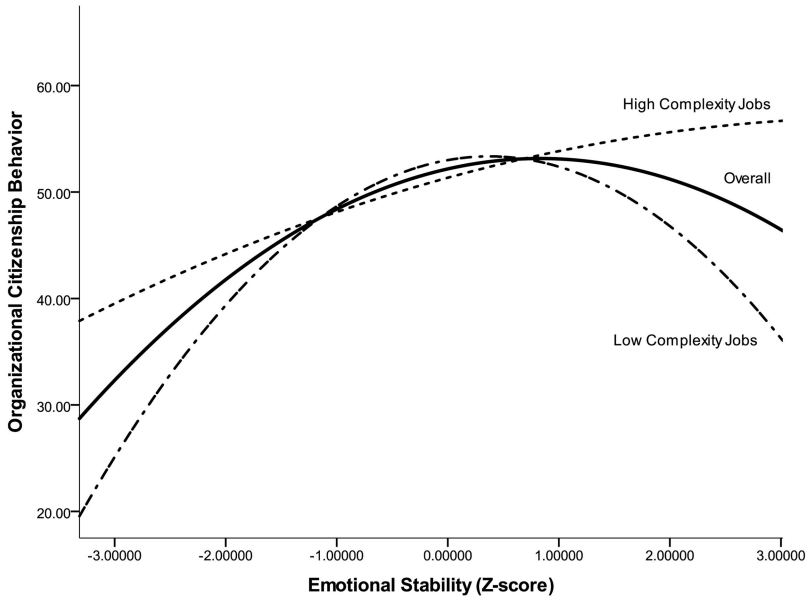

Figure 3. Relationships between Emotional Stability and organizational citizenship behavior (Study 1).

defined for their job roles. Thus they are less likely to be involved in extrarole behaviors, even though such behaviors may be of value to the organization.

An alternative explanation for the unexpected findings, especially for those related to CWB, is that the observed nonlinear relationships may actually be methodological artifacts due to the skewness in the distributions of the criterion variables (Coward & Sackett, 1990). Skewness may result from raters' leniency, which reflects the tendency for raters to give indiscriminately high ratings (or low ratings for CWB). The resulting skewed distribution may create the ceiling effects (or floor effects for CWB) leading to the observed nonlinear relationship between the predictors (personality) and the criterion (job performance ratings). In the current data, this seems to be the problem for the CWB dimension, as its skewness is moderately high, at 1.56. For the other two job performance dimensions, the values are much lower: −.30 for OCB and −.58 for task performance. In general, distributions having levels of skewness with absolute value lower than 1.00 are considered slightly nonnormal (Lei & Lomax, 2005), so skewness is unlikely to be the answer to the observed curvilinear effects of personality on these two job performance dimensions. Furthermore, additional analysis revealed that correlations between the personality predictors and the three job performance dimensions after their respective inflection points change directions from positive to negative. This indicates that these relationships are indeed curvilinear, unlike the ceiling effects that would be created by skewness.[3]

More important, current results support the hypothesized moderating effects of job complexity on the curvilinear relationships between personality and job performance dimensions. Further, it is unlikely that methodological artifacts can be the explanation for these findings, which are theoretically expected. The fact that the level of complexity of a job influences the shape of the relationships between personality and job performance sheds light on conflicting findings in past research about the nature of these relationships (e.g., LaHuis et al., 2005; Robie & Ryan, 1999). Studies including samples from low-complexity jobs (e.g., LaHuis et al., 2005) were likely to find the nonlinear relationship, whereas those based on jobs with high levels of complexity (e.g., Robie & Ryan, 1999) were unlikely to detect the significant quadratic effects because of low statistical power due to the relatively higher thresholds inherent in these jobs. As suggested in Table 3 and Figures 1–3, high thresholds can mask the curvilinear effect and create an impression that the relationships are actually linear. The figures also reveal that, for low-complexity jobs, higher levels of personality (beyond the inflection point) become detrimental to job performance. That is, the relationships between personality and job performance dimensions change directions after the inflection whereas the hypotheses suggest only asymptotic relationships. This unexpected finding may have practical implications in developing new personnel selection systems, as discussed later.

All in all, the current findings provide important information regarding (a) the functional links between personality and job performance and (b) how such links are influenced by job characteristics. Nevertheless, data from the current study were obtained from a single organization, so the extent to which these findings can be generalized to other organizations is not clear. In addition, as discussed earlier, measures of Conscientiousness and Emotional Stability used in the current study were newly developed and correlated rather highly (.62). It should be noted, however, that this correlation falls within the range found in past research (e.g., Mount, Barrick, Scullen, & Rounds, 2005), and additional analyses (described earlier) suggested that the measures could be discriminated empirically. These considerations somewhat alleviate the concern about the validity of these measures.

[3] Details of this additional analysis are available from the authors upon request.

A similar issue was observed in the ratings of job performance dimensions. As noted, the correlations among these dimensions are rather high (.62 to .80 in absolute value; see Table 1), although additional analyses found evidence supporting their discriminant validity. In addition to these high correlations, the finding that personality factors are similarly related to the job dimensions appears to support the argument that there is a general job performance factor (Viswesvaran et al., 2005). Despite the well-established theoretical underpinnings for the dimensionality of job performance, empirical evidence is often more equivocal (Viswesvaran et al., 2005). In fact, past research results have often failed to support the differential effects by job performance dimensions (Viswesvaran, Schmidt, & Ones, 2002). It is possible either that the supervisors in the current study could not reliably distinguish these performance dimensions or that the nature of the jobs involved made the distinction difficult.[4]

To better investigate these issues, we conducted a second study to replicate the findings from Study 1. Data from multiple organizations and different measures of personality and performance ratings were used in Study 2.

Study 2

Method

Sample. Data from Study 2 are part of concurrent validation studies for the Talent Assessment (ACT, 2008), a personality-based measure developed by ACT for use in employment decisions. Participants included employees from 25 organizations spanning different industries (e.g., health care, manufacturing, construction, testing, construction services) and educational institutions (high schools and community colleges). The organizations, ranging from small businesses to branches of multinational companies, are located throughout the United States. Participants responded to the Talent Assessment, which is described in detail in the Measures section. Ratings from supervisors for the participants were also collected. Responses from 956 employees could be matched with their supervisor ratings. This was the sample for the current study.

Of the 956 participants, 322 were male (33.7%) and 634 were female (66.3%). The average age was 40.18 years ($SD = 14.53$). Most participants were non-Hispanic White (85.1%), with small numbers of Black (6%), Hispanic (3%), and other (6%). They held a wide range of occupations, including production, food preparation and service, installation and maintenance, office and administrative support, health care education, training, library, education, and management. Average tenure in the current occupations was 3.43 years ($SD = 1.63$).

Measures. The Talent Assessment was developed by ACT based on the Big Five personality framework (ACT, 2008). It includes 12 subscales with a total of 165 Likert items. Responses are made on a scale from 1 (*Strongly Disagree*) to 6 (*Strongly Agree*). The subscales have high internal consistency (coefficient αs = .81–.89; ACT, 2008).

Conscientiousness is measured by summing three subscales: Carefulness ("the tendency to think and plan carefully before acting or speaking"; 14 items), Discipline ("the tendency to be responsible, dependable, and follow through with tasks without becoming distracted or bored"; 13 items), and Order ("the tendency to be neat and well-organized"; 13 items). Emotional Stability is measured by the Stability subscale ("the tendency to maintain composure and rationality in situations of actual or perceived stress"; 13 items). The resulting scales show good convergent validity (ACT, 2008): Conscientiousness and Emotional Stability are correlated at .80 and .75 respectively with the corresponding scales of an established measure of Big Five personality, the Big Five Inventory (John & Srivastava, 1999). In the current sample, reliability estimates of these scales were very high (.90 for Conscientiousness and .86 for Emotional Stability).

As noted earlier, supervisors provided ratings for participants' job performance. Rating scales used by the supervisors were developed by ACT to capture the three basic performance dimensions (Dalal, 2005; Rotundo & Sackett, 2002; Sackett, 2002; Viswesvaran & Ones, 2000): task performance (7 items), OCB (4 items), and CWB (7 items). Ratings for these performance dimensions were obtained by averaging the standardized items belonging to each dimension. ACT researchers found that, from a development sample of 1,690 supervisors, the rating scales appropriately reflected the hypothesized performance constructs and had acceptable internal consistencies (coefficient αs = .94, .87, and .78 for task performance, OCB, and CWB, respectively; ACT, 2008). Evidence of discriminant validity of the job dimension ratings was also provided by ACT researchers via confirmatory factor analysis (ACT, 2008). In the current sample, the scales were also internally consistent, with coefficient alphas estimated to be .93 for task performance, .94 for OCB, and .74 for CWB.

Participating organizations provided O*NET's job codes for all participants in the sample, so we used this information to operationalize job complexity in the current study. Job complexity was determined based on ratings of preparation requirements for each occupation provided by O*NET (http://online.onetcenter.org). O*NET classifies all jobs into five "job zones" based on levels of experience, education, and training required to do the work. As shown in Table 5, job zones range from 1 (little or no preparation needed) to 5 (extensive preparation needed). These job zones were derived from the *DOT* SVP (specific vocational preparation) dimension (Oswald et al., 1999), which is the most important component of the *DOT*'s substantive complexity score (correlation between SVP and substantive complexity was estimated to be .93; correlation between SVP and the *DOT* Data dimension, another index of job complexity often used in past research, was .92; Roos & Treiman, 1980).Thus, our operationalization of job complexity in the current study was similar to that in past research examining the construct (Hunter, 1983; Sturman et al., 2005). Using these O*NET job codes, we linked the participants' jobs to the O*NET's job zones. The sample included all five job zones ($M = 2.71$, $SD = 1.06$).

Analysis. Because the sample in this study included individuals from multiple organizations, data within the organizations may not be independent, which violates one of the basic assumptions in regression analysis. In particular, ratings of job performance within an organization may be more similar than ratings across organizations. This nonindependence may result in increased Type II error rates in statistical tests based on ordinary

[4] The current organization, being a large and special public organization, includes jobs for which behaviors typically considered extrarole behaviors (OCB) are part of the formal job requirements.

Table 5
*Descriptions of O*NET's Job Zones*

Job zone	Overall experience	Job training	Typical education	Examples
Job Zone 1: Little or no preparation needed	No previous work-related skill, knowledge, or experience is needed	A few days to a few months	High school diploma or GED	Taxi drivers, cashiers, waiters/waitresses
Job Zone 2: Some preparation needed	Some previous work-related skill, knowledge, or experience is helpful but often not needed	A few months to one year	High school diploma and some vocational training	Sheet metal workers, forest firefighters, customer service representatives
Job Zone 3: Medium preparation needed	Previous work-related skill, knowledge, or experience is required	One to two years	Vocational training, an associate's degree; some may require a bachelor's degree	Electricians, legal secretaries, interviewers, insurance sales agents
Job Zone 4: Considerable preparation needed	A minimum of two to four years of work-related skill, knowledge, or experience is needed	Several years	A four-year bachelor's degree	Accountants, human resource managers, computer programmers, teachers
Job Zone 5: Extensive preparation needed	Extensive skill, knowledge, and experience are needed	Most assume that the person will already have the required skills, knowledge, and work-related experience	A graduate degree	Lawyers, physicists, surgeons, psychologists

Note. Source: http://online.onetcenter.org/help/online/zones

least squares (Bliese & Hanges, 2004).[5] To address this potential problem, we followed Bliese and Hanges' recommendation and controlled for the between-organizations variation using the random intercept mixed-effect model. In particular, a categorical variable representing organization membership was treated as a random factor in the current analysis. The hypotheses were tested hierarchically. In the initial step (Step 0), we examined a model with a job performance dimension (task performance, OCB, or CWB) as the dependent variable and the random factor representing organization membership as the only independent variable (the unconditional means model; Bliese & Hanges, 2004; Raudenbush & Bryk, 2002). The parameters estimated in this step, including the between-organizations variance (τ_{00}) and within-organization residual error variance (σ^2), were used to calculate the intraclass correlation (ICC), which provides an index quantifying the nonindependence of the data (Equation 7; Bliese & Hanges, 2004).

Next, we examined more hierarchically inclusive models, which are similar to those in Steps 1–4 described in Study 1, to test the hypotheses. Job complexity, personality (both the linear and quadratic effects), and their interactions were treated as fixed effects in these models.[6] As in Study 1, Hypotheses 2, 4, 6, and 8 were tested in Step 4 of the models, including the interaction effects between (a) personality and job complexity and (b) the quadratic term of personality and job complexity (Equation 3). As noted earlier, these latter hypotheses were examined only if the corresponding curvilinear effects presented in Hypotheses 1, 3, 5, and 7 were found. As in Study 1, we conducted the same analysis for the Conscientiousness–OCB and Conscientiousness–CWB relationships, even though no hypothesis was made for these relationships. The analyses were conducted with the linear mixed model analysis option in SPSS 17.0.

Results

Table 6 presents the correlation matrix of the variables in Study 2. As can be seen, at the zero-order correlation level, Conscientiousness was statistically significantly correlated with all three performance dimensions. Emotional Stability, however, was significantly correlated only with OCB. These correlations are similar to the values often found in past research (e.g., Berry et al., 2007; Hurtz & Donovan, 2000; Organ & Ryan, 1995).[7]

Conscientiousness and job performance. Table 7 shows results of analyses for Conscientiousness. As can be seen, for task performance, the ICC of .059 indicates that only 5.9% of the

[5] We thank the action editor for his suggestion of this analysis method to address the problem of data nonindependence.

[6] These steps are referred to as Steps 1 to 4, just like those in Study 1. All the fixed effects included in the models in these steps are the same as the effects included in the corresponding steps in Study 1, except that the models in Study 2 further include the random effect of organizations (see Tables 7 and 8 for data).

[7] Correlations between job performance dimension ratings range from .39 (in absolute value) to .68, which are notably lower than those observed in Study 1 (and generally lower than the values often observed in the literature; Viswesvaran et al., 2005). This is probably because the data from the current study came from multiple organizations. It can be inferred from Bliese and Hanges (2004) that differences in between-organization variances (reflected in differences in the ICC estimates, as discussed in the Method section) may attenuate the observed correlation between variables. As shown in the following section, the estimated ICC for CWB ratings (.267) in the current study is much different from those for task performance (.059) and OCB (.077), which may explain the relatively low observed correlations between CWB and the other two job performance dimensions.

Table 6
Descriptive Statistics and Correlations Among Variables in Study 2

Variable	*M*	*SD*	1	2	3	4	5	6
1. Job complexity	2.71	1.06	—					
2. Conscientiousness	188.62	22.73	−.01	*.90*				
3. Emotional Stability	53.14	10.96	.08*	.29*	*.86*			
4. Task performance	0.04	0.83	.11*	.12*	.05	*.93*		
5. OCB	0.08	0.89	.07*	.10*	.08*	.68*	*.94*	
6. CWB	−0.02	0.68	−.01	−.10*	−.04	−.39*	−.48*	*.74*

Note. $N = 925–956$. Coefficient alphas are shown in italics on the diagonal. OCB = organizational citizenship behavior; CWB = counterproductive work behavior.
* $p < .05$.

variance of ratings of task performance in the data is due to difference among organizations. The ICCs for OCB and CWB were .077 and .267, respectively.

For all the models predicting the three performance dimensions, the linear effects of Conscientiousness in Step 3 were moderate and statistically significant, but none of the quadratic effects were statistically significant. Further, no interaction effect in Step 4 was statistically significant. Taken together, Hypotheses 1 and 2 were not supported.[8]

Emotional Stability and job performance. Analysis results for Emotional Stability are shown in Table 8. Note that the ICCs for the models in Table 8 are exactly the same as those in Table 7 because these statistics involve only the random factor of organization. For task performance, the quadratic effect was not statistically significant in either Step 3 or Step 4. As such, neither Hypothesis 3 nor Hypothesis 4 was supported. However, in Step 4, the interaction effect between Emotional Stability and job complexity was statistically significant ($\beta = .07$, $p < .05$). This result suggests that the (linear) relationship between Emotional Stability and task performance was moderated by job complexity.

For OCB, as shown in Table 8, the quadratic effect of Emotional Stability was statistically significant in Step 3. The sign of the quadratic effect ($\beta = -.09$, $p < .05$) indicates that the relationship between Emotional Stability and OCB follows the hypothesized inverted-*U* shape. Thus, Hypothesis 5 was supported. In Step 4, the interaction effect between Emotional Stability and job complexity was also statistically significant ($\beta = .08$, $p < .05$), providing evidence supporting Hypothesis 6. To better understand the moderating effect of job complexity on the curvilinear relationship between Emotional Stability and OCB, we further compared the relationship in low-complexity jobs (i.e., job complexity level of 1 *SD* below the mean) to that in high-complexity jobs (i.e., job complexity level of 1 *SD* above the mean). The bottom rows of Table 3 show the coefficients of the regression equations and the corresponding inflection points of Emotional Stability (in standardized value) for these jobs. As can be seen, the inflection point for low-complexity jobs (−0.10) is lower than that for high-complexity jobs (1.75), as specified in Hypothesis 6. Figure 4 illustrates these moderated curvilinear effects.

For CWB, Table 8 shows that the quadratic effect of Emotional Stability was statistically significant in Step 3 ($\beta = .07$, $p < .05$). Thus, Hypothesis 7 was supported. The moderating effects of job complexity examined in Step 4, however, were not statistically significant. Hypothesis 8 was therefore not supported.

Discussion

In Study 2, empirical support was found for the curvilinear relationship between Emotional Stability and OCB (Hypothesis 5). As hypothesized, that curvilinear effect was further found to be moderated by job complexity, such that lower complexity jobs have a lower threshold at which the positive relationship between Emotional Stability and OCB disappears (Hypothesis 6). These findings are consistent with earlier results from Study 1.

As in Study 1, Study 2 results further support the hypothesized curvilinear relationship between Emotional Stability and CWB (Hypothesis 7). However, we could not find support for other hypothesized curvilinear relationships between personality and task performance (Hypotheses 1 and 3) or for the hypothesized moderating effects of job complexity (Hypotheses 2, 4, and 8) in the current study. As discussed earlier, the two studies are different in several aspects that might potentially be the reasons for the different findings. Different personality measures and performance ratings were used in the two studies. Samples in the studies were also different. The current sample included participants from many different organizations. We used the random intercept model in Study 2, which accounts for the between-organizations variance, as described in the Method section. Nevertheless, there could be some substantive differences between the samples used in the two studies which cannot be statistically accounted for. Most plausibly, however, the different findings may simply be due to the less than perfect power in the current study (i.e., Type II error). Further studies examining the issue based on different samples and measures are certainly needed to resolve the differences and triangulate the current findings.

[8] Recent research suggests that facets of Conscientiousness may have differential effects on job performance dimensions (Dudley, Orvis, Lebiecki, & Cortina, 2006). Accordingly, it is possible that the facets are curvilinearly related to job performance dimensions even though the overall Conscientiousness is not. To investigate this possibility, we conducted additional analysis with the three Conscientiousness facets included in the current study: Discipline, Carefulness, and Order. For each of these facets, we examined hierarchical models for the three job performance dimension as done with the overall Conscientiousness. Results for the Conscientiousness facets are generally consistent with those of the overall Conscientiousness. Details of these additional analyses are available from the authors upon request.

Table 7
The Relationships Between Conscientiousness and Performance Dimensions as Moderated by Job Complexity (Study 2)

	Job performance dimension criterion								
	Task performance[a]			OCB[b]			CWB[c]		
Predictor	*B*	β	R^2 (ΔR^2)	*B*	β	R^2 (ΔR^2)	*B*	β	R^2 (ΔR^2)
Step 0: Organization	$\tau_{00} = 0.042$; $\sigma^2 = 0.670^*$			$\tau_{00} = 0.062^*$; $\sigma^2 = 0.743^*$			$\tau_{00} = 0.147^*$; $\sigma^2 = 0.405^*$		
Step 1: Organization	$\tau_{00} = 0.038$; $\sigma^2 = 0.663^*$			$\tau_{00} = 0.068^*$; $\sigma^2 = 0.740^*$			$\tau_{00} = 0.147^*$; $\sigma^2 = 0.404^*$		
Job complexity	0.07*	.09*	.010* (.010*)	0.04	.05	.005 (.005)	0.01	.01	.000 (.001)
Step 2: Organization	$\tau_{00} = 0.038$; $\sigma^2 = 0.652^*$			$\tau_{00} = 0.066^*$; $\sigma^2 = 0.734^*$			$\tau_{00} = 0.143^*$; $\sigma^2 = 0.402^*$		
Job complexity	0.08*	.09*	.025* (.016*)	0.04	.05	.013* (.009*)	0.01	.01	.005* (.005*)
Conscientiousness	0.10*	.12*		0.09*	.10*		−0.05*	−.08*	
Step 3: Organization	$\tau_{00} = 0.037$; $\sigma^2 = 0.653^*$			$\tau_{00} = 0.067^*$; $\sigma^2 = 0.734^*$			$\tau_{00} = 0.143^*$; $\sigma^2 = 0.402^*$		
Job complexity	0.08*	.09*	.025* (.000)	0.04	.05	.013* (.000)	0.01	.01	.005* (.000)
Conscientiousness	0.11*	.13*		0.08*	.09*		−0.05*	−.08*	
Conscientiousness, quadratic effect	0.01	.02		−0.02	−.03		−0.00	−.00	
Step 4: Organization	$\tau_{00} = 0.040$; $\sigma^2 = 0.653^*$			$\tau_{00} = 0.064^*$; $\sigma^2 = 0.734^*$			$\tau_{00} = 0.142^*$; $\sigma^2 = 0.403^*$		
Job complexity	0.07*	.09*	.025* (.000)	0.02	.02	.013* (.000)	−0.01	−.01	.005* (.000)
Conscientiousness	0.11*	.13*		0.08*	.09*		−0.05*	−.08*	
Conscientiousness, quadratic effect	0.01	.02		−0.02	−.03		−0.00	−.00	
Complexity × Conscientiousness	−0.02	−.03		0.01	.01		0.01	.01	
Complexity × Conscientiousness, quadratic effect	−0.00	−.00		0.02	.05		0.01	.04	

Note. $N = 925$. τ_{00} = variance of the random factor (organizations). σ^2 = within-organization residual variance. R^2 is estimated as the proportion of the reduction in within-organization residual variance σ^2 compared to the model in Step 0 (cf. Hofmann et al., 2000): $R^2 = (\sigma_0^2 - \sigma^2)/\sigma_0^2$, with σ_0^2 being the within-organization residual variance estimated in Step 0. OCB = organizational citizenship behavior; CWB = counterproductive work behavior; ICC = intraclass correlation.
[a] ICC = .059. [b] ICC = .077. [c] ICC = .267.
* $p < .05$.

General Discussion and Conclusion

Although the linearity of the ability–job performance relationship has long been established (Coward & Sackett, 1990; Hawk, 1970), less is known about the functional form of the relationships between personality and job performance. Researchers have implicitly assumed that the relationships are also linear, as evidenced by universal use of Pearson correlation in empirical research studies. In a recent review Burch and Anderson (2008) lamented the current status of research in the issue: "[For] too long, uncritical assumptions over linear relationships have dominated the I/O personality psychology literature, but these initial studies are highly suggestive of other, more complex patterns of relation between personality traits and behavior on the job" (p. 288). We attempted to take a new, theory-driven approach to address the problem in the current two studies. On the basis of past research and relevant theories, we divided job performance criteria into relevant dimensions (OCB, CWB, and task performance) and systematically examined the curvilinear relationships between personality and each of these dimensions. We also hypothesized and tested the moderating effect of job complexity on the curvilinear personality–performance relationships.

Analysis results, though not in complete agreement across the two studies, generally supported the hypotheses. The hypothesized curvilinear effects of Emotional Stability on OCB and CWB (Hypotheses 5 and 7) were supported in both studies. Further, evidence was found supporting the hypothesized moderating effect of job complexity for the Emotional Stability and OCB relationship (Hypothesis 6). Support for hypotheses related to task performance (Conscientiousness–task performance and Emotional Stability–task performance, Hypotheses 1–4), however, was found only in Study 1 and not in Study 2. As noted earlier, there are differences between the studies which may underlie these different findings. Taken together, however, it appears that although conclusions about the curvilinear effects of personality on task performance may be tentative at this point and should be replicated in future studies, there is convincing evidence concerning (a) the curvilinear effects of Emotional Stability on two of the job performance dimensions (OCB and CWB) and (b) the moderating effect of job complexity on the Emotional Stability–OCB relationship.

Critics may still argue that the validity of personality measures remains low, and we must admit that the incremental validity gained by adding the quadratic effect was less than we had hoped to see. However, any increase in the predictive validity of personality measures is a benefit, especially when there are no additional costs associated with the increased validity. The same measure is used, but the information obtained from the measure is more informative; from a utility perspective, an increase in efficiency can reduce expenses and increase savings or profits over time (Schmidt & Hunter, 1998). The most important contribution made by this study may be theoretical, however, as discussed below.

Theoretical Implications

Findings that personality (Emotional Stability and Conscientiousness, especially the former) is curvilinearly related to job performance dimensions allow a better understanding of the mechanism through which personality influences the behavioral outcomes of interest to the organizations. As discussed earlier, per-

Table 8
The Relationships Between Emotional Stability and Performance Dimensions as Moderated by Job Complexity (Study 2)

Predictor	Job performance dimension criterion								
	Task performance[a]			OCB[b]			CWB[c]		
	B	β	R^2 (ΔR^2)	*B*	β	R^2 (ΔR^2)	*B*	β	R^2 (ΔR^2)
Step 0: Organization	τ_{00} = 0.042; σ^2 = 0.670*			τ_{00} = 0.062*; σ^2 = 0.743*			τ_{00} = 0.147*; σ^2 = 0.405*		
Step 1: Organization	τ_{00} = 0.033; σ^2 = 0.663*			τ_{00} = 0.069*; σ^2 = 0.740*			τ_{00} = 0.147*; σ^2 = 0.405*		
Job complexity	0.07*	.09*	.010* (.010*)	0.04	.05	.004 (.004)	0.01	.01	.000 (.000)
Step 2: Organization	τ_{00} = 0.035; σ^2 = 0.661*			τ_{00} = 0.072*; σ^2 = 0.736*			τ_{00} = 0.147*; σ^2 = 0.405*		
Job complexity	0.07*	.09*	.012* (.002)	0.04	.04	.010* (.007*)	0.01	.01	.000 (.000)
Emotional Stability	0.04	.05		0.07*	.08*		−0.01	−.02	
Step 3: Organization	τ_{00} = 0.035; σ^2 = 0.661*			τ_{00} = 0.069*; σ^2 = 0.731*			τ_{00} = 0.149*; σ^2 = 0.404*		
Job complexity	0.07*	.08*	.012* (.000)	0.04	.05	.017* (.007*)	0.01	.01	.002 (.002)
Emotional Stability	0.04	.05		0.06*	.07*		−0.01	−.01	
Emotional Stability, quadratic effect	−0.02	−.03		−0.06*	−.09*		0.04*	.07*	
Step 4: Organization	τ_{00} = 0.029; σ^2 = 0.661*			τ_{00} = 0.063*; σ^2 = 0.728*			τ_{00} = 0.151*; σ^2 = 0.403*		
Job complexity	0.07	.08	.012* (.000)	0.02	.02	.021* (.004*)	−0.02	−.03	.004 (.002)
Emotional Stability	0.04	.05		0.06*	.07*		−0.01	−.02	
Emotional Stability, quadratic effect	−0.02	−.03		−0.07*	−.10*		0.04*	.07*	
Complexity × Emotional Stability	0.06*	.07*		0.07*	.08*		−0.02	−.02	
Complexity × Emotional Stability, quadratic effect	0.01	.02		0.02	.05		0.03	.07	

Note. N = 925. τ_{00} = variance of the random factor (organizations). σ^2 = within-organization residual variance. R^2 is estimated as the proportion of the reduction in within-organization residual variance σ^2 compared to the model in Step 0 (cf. Hofmann et al., 2000): $R^2 = (\sigma_0^2 - \sigma^2)/\sigma_0^2$, with σ_0^2 being the within-organization residual variance estimated in Step 0. OCB = organizational citizenship behavior; CWB = counterproductive work behavior; ICC = intraclass correlation.
[a] ICC = .059. [b] ICC = .077. [c] ICC = .267.
* $p < .05$.

sonality affects job behaviors via the motivational and emotional control mechanisms (Kanfer & Heggestad, 1997). Such effects, however, are not consistent throughout all levels of personality, at least not for these two factors. At lower levels of these personality factors, increases in the factors are associated with increases in the behavioral outcomes. Such positive relationships gradually decrease as the personality factors further increase because of the diminishing effects of the motivational/emotional control mediators on the job performance outcomes. Beyond a certain level (inflection point or threshold), further increases in the personality factors will not result in higher levels of job performance. Instead, current studies found that for low-complexity jobs, increase of

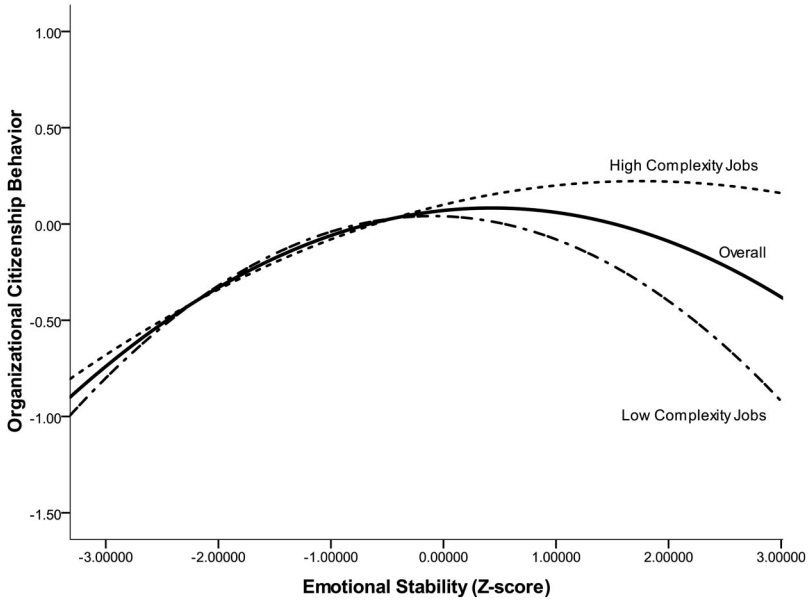

Figure 4. Relationships between Emotional Stability and organizational citizenship behavior (Study 2).

personality beyond the threshold may lead to reduced performance. It is possible that the overabundant motivational and emotional resources become disruptive. This resultant curvilinear effect of personality seems to support the argument that extreme levels of personality can be indicative of pathological tendency (R. Hogan & Hogan, 2001; Judge & LePine, 2007; Moscoso & Salgado, 2004). In fact, research in the clinical domain has long recognized that extreme scores on normal personality traits can signal maladaptive tendencies (Costa & Widiger, 2002); that is, some generally desirable traits positively associated with better job performance may be required but only up to a point.

The fact that job complexity influences how personality is related to job performance supports the general notion that behaviors are the product both of people's characteristics and of situations (Endler & Magnusson, 1976; Mischel & Shoda, 2008). Higher complexity jobs are found to be associated with higher thresholds, suggesting that high levels of personality traits may be more helpful in predicting performance in these jobs. This is similar to the well-established finding that general mental ability is most highly correlated with job performance in high-complexity jobs (Hunter, 1983; Hunter et al., 2006). Taken together, it seems that variation in performance for jobs with high cognitive demand is more determined by individual differences in personality and abilities than is variation for jobs with less cognitive demand. This finding may have implications of the relative importance of selection tools for different types of jobs.

It should be noted here that the finding that job complexity moderates the relationships between personality (especially Conscientiousness) and job performance is not inconsistent with earlier meta-analytic results, which have established that the validity of Conscientiousness is generalizable across different jobs and situations (Barrick & Mount, 1991; Hurtz & Donovan, 2000; Salgado, 1997). In all meta-analyses examining the issues, statistical and methodological artifacts were typically found to account for only a part of the observed variance of validities across studies, leaving the possibility that the remaining variance could be due to some substantive moderators. Our study suggests that one of these moderators can be job complexity. We found that the linear component of the relationship between Conscientiousness and job performance remains positive even for jobs with relatively low levels of complexity; this finding is consistent with earlier meta-analytic results.

Practical Implications

Current findings may help reconcile the recent debate about the usefulness of personality in personnel selection (Morgeson et al., 2007; Ones et al., 2007; Tett & Christiansen, 2007). As noted earlier, many applied researchers, being disappointed at the seemingly low validity of personality in predicting job performance, have suggested that "self-report personality tests should probably not be used for personnel selection" (Morgeson et al., 2007, p. 720). To a certain extent, current findings can help address this concern. Knowledge about the curvilinear relationship between personality and job performance can conceivably be used to improve personnel selection practices, thereby enhancing the utility of personality measures. For example, when using personality measures in personnel selection, it may not be optimal to select job applicants top-down, as commonly done with ability measures. Instead, selection based on cutoff points should be more appropriate, given that personality is not consistently positively related to job performance after a certain point (Coward & Sackett, 1990). For low-complexity jobs, organizations may want to further exclude job applicants with very high scores on personality measures because of the negative correlation between personality and job performance after the threshold (see Figures 1–4). The cutoff point should be adjusted for job complexity levels. All in all, it seems appropriate that personality tests may be used in the early stage of selection based upon a double cutoff strategy (setting both lower and upper limits) to screen out applicants. Arguably, such a selection system can help improve the utility of personality tests in personnel selection, beyond what generally believed to be associated with their frequently observed low validities.

The new selection system mentioned above may have an additional benefit, as it can address the problem of faking. This is an acknowledged weakness of personality measures, as low validity can result when faked test results are used for personnel selection purposes (Morgeson et al., 2007). Critics of the use of self-report measures of personality in personnel selection have argued that top-down selection would result in selecting people who intentionally inflate their scores. However, attempts to detect and eliminate these (particularly extreme) "fakers" by measuring social desirability in their responses may exclude applicants who really are high on the personality factors (Ones, Viswesvaran, & Reiss, 1996). Eliminating applicants who truly are high on the personality construct is not desirable under the top-down selection system. As noted above, the new selection system involves eliminating applicants with extremely high scores, no matter if the high scores are due to being high in the personality construct or to faking. As such, faking may be a less serious problem with the new selection system. Conceivably, screening out the extreme scorers (they either are faking or are truly high on the personality trait) will result in an increase in the (linear) relationship between personality and job performance. Thus, by attending to the issue of curvilinearity, we can potentially improve the validity of personality measures in predicting job performance.

Applying the new selection system discussed above necessitates determining appropriate cutoff scores for the personality measures. The upper end cutoff score should ideally be determined relative to the threshold where predicted job performance drops below an acceptable level. This is not an easy task (Berry & Sackett, 2009), but findings about the moderating effects of job complexity can provide some helpful guidance. In particular, jobs with low levels of complexity may require both low and high cutoff scores on the personality measure, with ideal candidates being selected from the middle of the distribution, whereas jobs with relatively higher complexity may require a single and relatively higher cutoff. Naturally, it remains to be determined which level of personality should be considered low or high. More research investigating the issue across different types of jobs is needed before the suggested new selection system can be adopted by organizations.

One potential difficulty in establishing the cutoff scores is the concurrent research design used in most validation studies (as well as in the current two studies). Because the participants are current employees, they may respond in a way that is different from what job applicants typically do. This can be a problem, because we are obviously interested in generalizing the findings to the population of job applicants. In particular, compared to job incumbents,

applicants may be more motivated to respond in a socially desirable way, which can potentially (a) distort the factor structure of personality measures (Ellingson, Sackett, & Hough, 1999; Schmit & Ryan, 1993) and (b) inflate mean scores on the measures (Birkeland, Manson, Kisamore, Brannick, & Smith, 2006; Hough, 1998). Although recent research evidence seems to suggest that the former issue is more problematic in situations where participants were explicitly instructed to fake good rather than in real job application settings (Ellingson, Smith, & Sackett, 2001; J. Hogan, Barrett, & Hogan, 2007; Sackett & Lievens, 2008), the latter can pose certain difficulty in efforts to estimate the appropriate cutoff scores for the new selection system discussed earlier (Berry & Sackett, 2009). Cutoff scores derived from concurrent studies may not be applicable to job applicants. In view of the issue, use of predictive design with sample of job applicants may be advisable for accurately estimating the cutoff scores for personality measures.

A related concern is the potential problem due to range restriction in samples of job incumbents. Variations of the personality predictors in studies based on concurrent design may be restricted in range as compared to those in the job applicant population of interest. Recent research evidence (Ones & Viswesvaran, 2003; Schmidt et al., 2008), however, suggests that range restriction is not a serious problem for personality measures, somewhat alleviating this concern. Further, range restriction, if it exists, would likely result in lower power for tests detecting the quadratic effects in polynomial regression models, so findings in this study about the curvilinear relationships may be robust when generalized to the population of job applicants.

Limitations and Future Research

In Study 1 we found an unexpected significant nonlinear effect for Conscientiousness on CWB, which could not be replicated in Study 2. As discussed earlier, this result is probably due to methodological artifacts created by the skewed distribution of the CWB ratings. To further investigate this issue, we examined the correlations between Conscientiousness and CWB before and after the thresholds determined by the regression coefficients estimated in Table 2 (Equation 2). The correlation is negative before the threshold ($r = -.27$) but becomes positive after it ($r = .20$). This result suggests that the nonlinear effect of Conscientiousness on CWB found in Study 1 actually followed the reversed curvilinear shape, which is not consistent with the floor effects that would be expected due to skewness (the correlations after the threshold would not change direction based on the floor effect). As such, the finding about the curvilinear effect of Conscientiousness on CWB in Study 1 may not be due just to methodological artifacts. Future research should replicate this finding to verify and further explain the mechanism underlying the Conscientiousness–CWB relationship.

In both studies, supervisor ratings were used to operationalize the performance criteria. Although this is the common practice in personnel selection research (Viswesvaran et al., 2002, 2005), there is evidence that sole reliance on supervisor ratings of job performance as criterion-deficient measures may have masked some meaningful relationships (Oh & Berry, 2009). Studies using alternative measures of job performance (e.g., work sample, objective measures) are needed to replicate and extend current findings about the personality–job performance curvilinear relationships.

Conclusion

For a long time, researchers have implicitly assumed that the relationships between personality and performance are linear. This assumption has been challenged conceptually and empirically, but results to date have been inconclusive. The current research based on two independent samples provided credible evidence for the curvilinear relationships between personality, especially Emotional Stability, and job performance dimensions such that there is an optimal midrange level (threshold) of personality for maximum performance. We also hypothesized and found the moderating effect of job complexity on the curvilinear personality–performance relationships such that higher complexity jobs are associated with higher thresholds. The result suggests that high levels of the two most desirable personality traits may be more helpful in predicting performance in high-complexity rather than low-complexity jobs. Overall, current findings have important theoretical and practical implications. Theoretically, the findings help clarify the nature of the relationships between personality and job-related behaviors and show how such relationships are moderated by the job environments (i.e., job complexity). As such, this contributes to the broader understanding about the interplay of personality and situation in determining behaviors. Practically, the findings can help those designing selection systems that enhance the utility of personality in personnel selection practices. When personality measures are used in personnel selection, it may not be optimal to select job applicants top-down as commonly done with ability measures, given that personality is not consistently positively related to job performance beyond a certain point.

References

ACT, Inc. (2008). *Talent Assessment user and technical guide.* Iowa City, IA: Author. Retrieved from http://act.org/workkeys/assess/pdf/TalentUserGuide.pdf

Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions.* Newbury Park, CA: Sage.

Barrick, M. R., & Mount, M. K. (1991). The Big Five personality dimensions and job performance: A meta-analysis. *Personnel Psychology, 44,* 1–26. doi: 10.1111/j.1744-6570.1991.tb00688.x

Barrick, M. R., & Mount, M. K. (2005). Yes, personality matters: Moving on to more important matters. *Human Performance, 18,* 359–372. doi: 10.1207/s15327043hup1804_3

Barrick, M. R., Mount, M. K., & Judge, T. A. (2001). Personality and performance at the beginning of the new millennium: What do we know and where do we go next? *International Journal of Selection and Assessment, 9,* 9–30. doi: 10.1111/1468-2389.00160

Barrick, M. R., Mount, M. K., & Strauss, J. P. (1993). Conscientiousness and performance of sales representatives: Test of the mediating effects of goal setting. *Journal of Applied Psychology, 78,* 715–722. doi: 10.1037/0021-9010.78.5.715

Benson, M. J., & Campbell, J. P. (2007). To be, or not to be, linear: An expanded representation of personality and its relationship to leadership performance. *International Journal of Selection and Assessment, 15,* 232–249. doi: 10.1111/j.1468-2389.2007.00384.x

Berry, C. M., Ones, D. S., & Sackett, P. R. (2007). Interpersonal deviance, organizational deviance, and their common correlates: A review and meta-analysis. *Journal of Applied Psychology, 92,* 410–424. doi: 10.1037/0021-9010.92.2.410

Berry, C. M., & Sackett, P. R. (2009). Faking in personnel selection: Tradeoffs in performance versus fairness resulting from two cut-score strategies. *Personnel Psychology, 62,* 833–863. doi: 10.1111/j.1744-6570.2009.01159.x

Birkeland, S. A., Manson, T. M., Kisamore, J. L., Brannick, M. T., & Smith, M. A. (2006). A meta-analytic investigation of job applicant faking on personality measures. *International Journal of Selection and Assessment, 14,* 317–335.

Bliese, P. D., & Hanges, P. J. (2004). Being both too liberal and too conservative: The perils of treating grouped data as though they were independent. *Organizational Research Methods, 7,* 400–417. doi: 10.1177/1094428104268542

Borman, W. C., & Motowidlo, S. J. (1993). Expanding the criterion domain to include elements of contextual performance. In N. Schmitt, W. C. Borman, & Associates (Eds.), *Personnel selection in organizations* (pp. 71–98). San Francisco, CA: Jossey-Bass.

Boudreau, J. W. (1991). Utility analysis for decisions in human resource management. In M. D. Dunnette & L. M. Hough (Eds.), *Handbook of industrial and organizational psychology* (Vol. 2, pp. 621–745). Palo Alto, CA: Consulting Psychologists Press.

Burch, G. St. J, & Anderson, N. (2008). Personality as a predictor of work-related behavior and performance: Recent advances and directions for future research. In G. P. Hodgkinson & J. K. Ford (Eds.), *International review of industrial and organizational psychology* (Vol. 23, 261–305). Chichester, England: Wiley.

Cain, P. S., & Treiman, D. J. (1981). The *Dictionary of occupational titles* as a source of occupational data. *American Sociological Review, 46,* 253–278. doi: 10.2307/2095059

Campbell, J. P., McCloy, R. A., Oppler, S. H., & Sager, C. E. (1993). A theory of performance. In N. Schmitt, W. C. Borman, & Associates (Eds.), *Personnel selection in organizations* (pp. 35–70). San Francisco, CA: Jossey-Bass.

Conard, M., & Matthews, R. (2008). Modeling the stress process: Personality eclipses dysfunctional cognitions and workload in predicting stress. *Personality and Individual Differences, 44,* 171–181. doi: 10.1016/j.paid.2007.07.023

Costa, P. T., & McCrae, R. R. (1992). Four ways five factors are basic. *Personality and Individual Differences, 13,* 653–665. doi: 10.1016/0191-8869(92)90236-I

Costa, P. T., & Widiger, T. A. (Eds.). (2002). *Personality disorders and the five-factor model of personality* (2nd ed.). Washington, DC: American Psychological Association. doi: 10.1037/10423-000

Coward, W. M., & Sackett, P. R. (1990). Linearity of ability–performance relationships: A reconfirmation. *Journal of Applied Psychology, 75,* 297–300. doi: 10.1037/0021-9010.75.3.297

Cropanzano, R., Rupp, D. E., & Byrne, Z. S. (2003). The relationship of emotional exhaustion to work attitudes, job performance, and organizational citizenship behaviors. *Journal of Applied Psychology, 88,* 160–169. doi: 10.1037/0021-9010.88.1.160

Cucina, J. M., & Vasilopoulos, N. L. (2005). Nonlinear personality–performance relationships and the spurious moderating effects of traitedness. *Journal of Personality, 73,* 227–260. doi: 10.1111/j.1467-6494.2004.00309.x

Dalal, R. S. (2005). A meta-analysis of the relationship between organizational citizenship behavior and counterproductive work behavior. *Journal of Applied Psychology, 90,* 1241–1255. doi: 10.1037/0021-9010.90.6.1241

Day, D. V., & Silverman, S. B. (1989). Personality and job performance: Evidence of incremental validity. *Personnel Psychology, 42,* 25–36. doi: 10.1111/j.1744-6570.1989.tb01549.x

Dudley, N. M., Orvis, K. A., Lebiecki, J. E., & Cortina, J. M. (2006). A meta-analytic investigation of conscientiousness in the prediction of job performance: Examining the intercorrelations and the incremental validity of narrow traits. *Journal of Applied Psychology, 91,* 40–57. doi: 10.1037/0021-9010.91.1.40

Easterbrook, J. A. (1959). Emotion, cue utilization, and organization of behavior. *Psychological Review, 66,* 183–201. doi: 10.1037/h0047707

Eisenberg, N., Fabes, R. A., Guthrie, I. K., & Reiser, M. (2000). Dispositional emotionality and regulation: Their role in predicting quality of social functioning. *Journal of Personality and Social Psychology, 78,* 136–157. doi: 10.1037/0022-3514.78.1.136

Ellingson, J. E., Sackett, P. R., & Hough, L. M. (1999). Social desirability corrections in personality measurement: Issues of applicant comparison and construct validity. *Journal of Applied Psychology, 84,* 155–166. doi: 10.1037/0021-9010.84.2.155

Ellingson, J. E., Smith, D. B., & Sackett, P. R. (2001). Investigating the influence of social desirability on personality factor structure. *Journal of Applied Psychology, 86,* 122–133. doi: 10.1037/0021-9010.86.1.122

Endler, N. S., & Magnusson, D. (1976). Toward an interactional psychology of personality. *Psychological Bulletin, 83,* 956–974. doi: 10.1037/0033-2909.83.5.956

Eysenck, M. W. (1989). Anxiety and cognition: Theory and research. In T. Archer & L. G. Nilsson (Eds.), *Aversion, avoidance, and anxiety* (pp. 437–465). Hillsdale, NJ: Erlbaum.

Fox, S., Spector, P. E., & Miles, D. (2001). Counterproductive work behavior (CWB) in response to job stressors and organizational injustice: Some mediator and moderator tests for autonomy and emotions. *Journal of Vocational Behavior, 59,* 291–309. doi: 10.1006/jvbe.2001.1803

Gallagher, D. J. (1990). Extraversion, neuroticism, and appraisal of stressful academic events. *Personality and Individual Differences, 11,* 1053–1057. doi: 10.1016/0191-8869(90)90133-C

Gellatly, I. R. (1996). Conscientiousness and task performance: Test of a cognitive process model. *Journal of Applied Psychology, 81,* 474–482. doi: 10.1037/0021-9010.81.5.474

George, J. M. (1990). Personality, affect, and behaviors in groups. *Journal of Applied Psychology, 75,* 107–116. doi: 10.1037/0021-9010.75.2.107

Gottfredson, L. S. (1997). Why *g* matters: The complexity of everyday life. *Intelligence, 24,* 79–132. doi: 10.1016/S0160-2896(97)90014-3

Grebner, S., Semmer, K. K., Lo Faso, L., Gut, S., Kalin, W., & Elfering, A. (2003). Working conditions, well-being, and job-related attitudes among call centre agents. *European Journal of Work and Organizational Psychology, 12,* 341–365. doi: 10.1080/13594320344000192

Guion, R. M., & Gottier, R. F. (1965). Validity of personality measures in personnel selection. *Personnel Psychology, 18,* 135–164. doi: 10.1111/j.1744-6570.1965.tb00273.x

Hancock, P. A., & Ganey, H. C. (2003). From the inverted-U to the extended-U: The evolution of a law of psychology. *Journal of Human Performance in Extreme Environments, 7,* 5–14.

Hawk, J. (1970). Linearity of criterion–GATB aptitude relationships. *Measurement and Evaluation in Guidance, 2,* 249–251.

Hofmann, D. A., Griffin, M. A., & Gavin, M. B. (2000). The application of hierarchical linear modeling to organizational research. In K. J. Klein & S. W. J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations* (pp. 467–511). San Francisco, CA: Jossey-Bass.

Hogan, J., Barrett, P., & Hogan, R. (2007). Personality measurement, faking, and employment selection. *Journal of Applied Psychology, 92,* 1270–1285. doi: 10.1037/0021-9010.92.5.1270

Hogan, R. (2005). In defense of personality measurement: New wine for old whiners. *Human Performance, 18,* 331–341. doi: 10.1207/s15327043hup1804_1

Hogan, R., & Hogan, J. (2001). Assessing leadership: A view of the dark side. *International Journal of Selection and Assessment, 9,* 40–51. doi: 10.1111/1468-2389.00162

Hough, L. M. (1998). Effects of intentional distortion in personality measurement and evaluation of suggested palliatives. *Human Performance, 11,* 209–244. doi: 10.1207/s15327043hup1102&3_6

Hunter, J. E. (1983). *Test validation for 12,000 jobs: An application of job classification and validity generalization analysis to the General Aptitude Test Battery* (USES Test Research Report No. 45). Washington, DC: U.S. Employment Service, U.S. Department of Labor.

Hunter, J. E., Schmidt, F. L., & Le, H. (2006). Implications of direct and indirect range restriction for meta-analysis methods and findings. *Journal of Applied Psychology, 91,* 594–612. doi: 10.1037/0021-9010.91.3.594

Hurtz, G. M., & Donovan, J. J. (2000). Personality and job performance: The Big Five revisited. *Journal of Applied Psychology, 85,* 869–879. doi: 10.1037/0021-9010.85.6.869

Ilies, R., Fulmer, I. S., Spitzmuller, M., & Johnson, M. D. (2009). Personality and citizenship behavior: The mediating role of job satisfaction. *Journal of Applied Psychology, 94,* 945–959. doi: 10.1037/a0013329

John, O. P., & Srivastava, S. (1999). The Big Five trait taxonomy: History, measurement, and theoretical perspectives. In L. A. Pervin & O. P. John (Eds.), *Handbook of personality* (2nd ed., pp. 102–138). New York, NY: Guilford Press.

Judge, T. A., & Ilies, R. (2002). Relationship of personality to performance motivation: A meta-analytic review. *Journal of Applied Psychology, 87,* 797–807. doi: 10.1037/0021-9010.87.4.797

Judge, T. A., & LePine, J. A. (2007). The bright and dark sides of personality: Implications for personnel selection and team configuration. In J. Langan-Fox, C. Cooper, & R. Klimoski (Eds.), *Research companion to the dysfunctional workplace: Management challenges and symptoms* (pp. 332–355). Cheltenham, England: Elgar.

Kanfer, R., & Ackerman, P. L. (1989). Motivation and cognitive abilities: An integrative/aptitude–treatment interaction approach to skill acquisition. *Journal of Applied Psychology, 74,* 657–690. doi: 10.1037/0021-9010.74.4.657

Kanfer, R., & Heggestad, E. D. (1997). Motivational traits and skills: A person-centered approach to work motivation. In L. L. Cummings & B. M. Staw (Eds.), *Research in organizational behavior* (Vol. 19, pp. 1–57). Greenwich, CT: JAI Press.

Kuhl, J., & Koch, B. (1984). Motivational determinants of motor performance: The hidden second task. *Psychological Research, 46,* 143–153. doi: 10.1007/BF00308599

LaHuis, D. M., Martin, N. R., & Avis, J. M. (2005). Investigating nonlinear conscientiousness–job performance relations for clerical employees. *Human Performance, 18,* 199–212. doi: 10.1207/s15327043hup1803_1

Lei, M., & Lomax, R. G. (2005). The effect of varying degrees of nonnormality in structural equation modeling. *Structural Equation Modeling, 12,* 1–27. doi: 10.1207/s15328007sem1201_1

LePine, J. A., Colquitt, J. A., & Erez, A. (2000). Adaptability to changing task contexts: Effects of general cognitive ability, conscientiousness, and openness to experience. *Personnel Psychology, 53,* 563–593. doi: 10.1111/j.1744-6570.2000.tb00214.x

Martocchio, J. J., & Judge, T. A. (1997). Relationship between conscientiousness and learning in employee training: Mediating influences of self-deception and self-efficacy. *Journal of Applied Psychology, 82,* 764–773. doi: 10.1037/0021-9010.82.5.764

Michielsen, H. J., Croon, M. A., Willemsen, T. M., De Vries, J., & Van Heck, G. L. (2007). Which constructs can predict emotional exhaustion in a working population? A study into its determinants. *Stress and Health, 23,* 121–130. doi: 10.1002/smi.1129

Mischel, W., & Shoda, Y. (2008). Toward a unified theory of personality: Integrating dispositions and processing dynamics within the cognitive–affective processing system. In O. P. John, R. W. Robins, & L. A. Pervin (Eds.), *Handbook of personality: Theory and research* (3rd ed., pp. 208–241). New York, NY: Guilford Press.

Morgeson, F. P., Campion, M. A., Dipboye, R. L., Hollenbeck, J. R., Murphy, K., & Schmitt, N. (2007). Reconsidering the use of personality tests in personnel selection contexts. *Personnel Psychology, 60,* 683–729. doi: 10.1111/j.1744-6570.2007.00089.x

Moscoso, S., & Salgado, J. F. (2004). "Dark Side" personality styles as predictors of task, contextual, and job performance. *International Journal of Selection and Assessment, 12,* 356–362. doi: 10.1111/j.0965-075X.2004.00290.x

Mount, M. K., Barrick, M. R., Scullen, S. M., & Rounds, J. (2005). Higher-order dimensions of the Big Five personality traits and the Big Six vocational interest types. *Personnel Psychology, 58,* 447–478. doi: 10.1111/j.1744-6570.2005.00468.x

Mount, M. K., Oh, I., & Burns, M. (2008). Incremental validity of perceptual speed and accuracy over general mental ability. *Personnel Psychology, 61,* 113–139. doi: 10.1111/j.1744-6570.2008.00107.x

Murphy, K. R. (1996). Individual differences and behavior in organizations: Much more than *g*. In K. Murphy (Ed.), *Individual differences and behavior in organizations* (pp. 3–30). San Francisco, CA: Jossey-Bass.

Murphy, K. R., & Dzieweczynski, J. L. (2005). Why don't measures of broad dimensions of personality perform better as predictors of job performance? *Human Performance, 18,* 343–357. doi: 10.1207/s15327043hup1804_2

Nettle, D. (2006). The evolution of personality variation in humans and other animals. *American Psychologist, 61,* 622–631. doi: 10.1037/0003-066X.61.6.622

Oh, I.-S., & Berry, C. M. (2009). The five-factor model of personality and managerial performance: Validity gains through the use of 360 degree performance ratings. *Journal of Applied Psychology, 94,* 1498–1513. doi: 10.1037/a0017221

Ones, D. S. (1993). *The construct of integrity tests* (Unpublished doctoral dissertation). University of Iowa.

Ones, D. S., & Viswesvaran, C. (2003). Job-specific applicant pools and national norms for personality scales: Implications for range-restriction corrections in validation research. *Journal of Applied Psychology, 88,* 570–577. doi: 10.1037/0021-9010.88.3.570

Ones, D. S., Viswesvaran, C., & Dilchert, S. (2005). Personality at work: Raising awareness and correcting misconceptions. *Human Performance, 18,* 389–404. doi: 10.1207/s15327043hup1804_5

Ones, D. S., Viswesvaran, C., Dilchert, S., & Judge, T. A. (2007). In support of personality assessment in organizational settings. *Personnel Psychology, 60,* 995–1027. doi: 10.1111/j.1744-6570.2007.00099.x

Ones, D. S., Viswesvaran, C., & Reiss, A. D. (1996). Role of social desirability in personality testing for personnel selection: The red herring. *Journal of Applied Psychology, 81,* 660–679. doi: 10.1037/0021-9010.81.6.660

Ones, D. S., Viswesvaran, C., & Schmidt, F. L. (1993). Comprehensive meta-analysis of integrity test validities: Findings and implications for personnel selection and theories of job performance. *Journal of Applied Psychology, 78,* 679–703. doi: 10.1037/0021-9010.78.4.679

Organ, D. W., & Ryan, K. (1995). A meta-analytic review of attitudinal and dispositional predictors of organizational citizenship behavior. *Personnel Psychology, 48,* 775–802. doi: 10.1111/j.1744-6570.1995.tb01781.x

Oswald, F., Campbell, J., McCloy, R., Rivkin, D., & Lewis, P. (1999). *Stratifying occupational units by specific vocational preparation.* Raleigh, NC: National Center for O*NET Development.

Pearlman, K. (1980). Job families: A review and discussion of their implication for personnel selection. *Psychological Bulletin, 87,* 1–28. doi: 10.1037/0033-2909.87.1.1

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models applications and data analysis methods.* Thousand Oaks, CA: Sage.

Robbins, S. B., Allen, J., Casillas, A., Peterson, C. H., & Le, H. (2006). Unraveling the differential effects of motivational and skills, social, and self-management measures from traditional predictors of college outcomes. *Journal of Educational Psychology, 98,* 598–616. doi: 10.1037/0022-0663.98.3.598

Robbins, S. B., Oh, I., Le, H., & Button, C. (2009). Intervention effects on college performance and retention as mediated by motivational, emo-

tional, and social control factors: Integrated meta-analytic path analyses. *Journal of Applied Psychology, 94,* 1163–1184. doi: 10.1037/a0015738

Robie, C., & Ryan, A. M. (1999). Effects of nonlinearity and heteroscedasticity on the validity of conscientiousness in predicting overall job performance. *International Journal of Selection and Assessment, 7,* 157–169. doi: 10.1111/1468-2389.00115

Roos, P. A., & Treiman, D. J. (1980). Worker functions and worker traits for the 1970 U.S. Census classification. In A. R. Miller, D. J. Treiman, P. S. Cain, & P. A. Roos (Eds.), *Work, job, and occupations: A critical review of the* Dictionary of occupational titles (pp. 336–389). Washington, DC: National Academy Press.

Rotundo, M., & Sackett, P. R. (2002). The relative importance of task, citizenship, and counterproductive performance to global ratings of job performance: A policy-capturing approach. *Journal of Applied Psychology, 87,* 66–80. doi: 10.1037/0021-9010.87.1.66

Sackett, P. R. (2002). The structure of counterproductive work behaviors: Dimensionality and relationships with facets of job performance. *International Journal of Selection and Assessment, 10,* 5–11. doi: 10.1111/1468-2389.00189

Sackett, P. R., & Lievens, F. (2008). Personnel selection. *Annual Review of Psychology, 59,* 419–450. doi: 10.1146/annurev.psych.59.103006.093716

Sackett, P. R., & Wanek, J. E. (1996). New development in the use of measures of honesty, integrity, conscientiousness, dependability, trustworthiness, and reliability for personnel selection. *Personnel Psychology, 49,* 787–829. doi: 10.1111/j.1744-6570.1996.tb02450.x

Salgado, J. F. (1997). The five-factor model of personality and job performance in the European Community. *Journal of Applied Psychology, 82,* 30–43. doi: 10.1037/0021-9010.82.1.30

Salgado, J. F. (2002). The Big Five personality dimensions and counterproductive behaviors. *International Journal of Selection and Assessment, 10,* 117–125. doi: 10.1111/1468-2389.00198

Schmidt, F., & Hunter, J. (1998). The validity and utility of selection methods in personnel psychology: Practical and theoretical implications of 85 years of research findings. *Psychological Bulletin, 124,* 262–274. doi: 10.1037/0033-2909.124.2.262

Schmidt, F. L., Shaffer, J. A., & Oh, I.-S. (2008). Increased accuracy of range restriction corrections: Implications for the role of personality and general mental ability in job and training performance. *Personnel Psychology, 61,* 827–868. doi: 10.1111/j.1744-6570.2008.00132.x

Schmit, M. J., & Ryan, A. M. (1993). The Big Five in personnel selection: Factor structure in applicant and nonapplicant populations. *Journal of Applied Psychology, 78,* 966–974. doi: 10.1037/0021-9010.78.6.966

Sturman, M. C., Cheramie, R. A., & Cashen, L. H. (2005). The impact of job complexity and performance measurement on the temporal consistency, stability, and test–retest reliability of employee job performance ratings. *Journal of Applied Psychology, 90,* 269–283. doi: 10.1037/0021-9010.90.2.269

Teigen, K. H. (1994). Yerkes–Dodson: A law for all seasons. *Theory & Psychology, 4,* 525–547. doi: 10.1177/0959354394044004

Tett, R. P. (1998). Is Conscientiousness always positively related to job performance? *The Industrial–Organizational Psychologist, 36,* 24–29.

Tett, R. P., & Christiansen, N. D. (2007). Personality tests at the crossroads: A response to Morgeson, Campion, Dipboye, Hollenbeck, Murphy, and Schmitt (2007). *Personnel Psychology, 60,* 967–993. doi: 10.1111/j.1744-6570.2007.00098.x

Tett, R. P., Jackson, D. N., & Rothstein, M. (1991). Personality measures as predictors of job performance: A meta-analytic review. *Personnel Psychology, 44,* 703–742.

Vasilopoulos, N. L., Cucina, J. M., Dyomina, N. V., Morewitz, C. L., & Reilly, R. R. (2006). Forced-choice personality tests: A measure of personality and cognitive ability? *Human Performance, 19,* 175–199. doi: 10.1207/s15327043hup1903_1

Vasilopoulos, N. L., Cucina, J. M., & Hunter, A. E. (2007). Personality and training proficiency: Issues of bandwidth-fidelity and curvilinearity. *Journal of Occupational and Organizational Psychology, 80,* 109–131. doi: 10.1348/096317906X102114

Viswesvaran, C., & Ones, D. S. (2000). Perspectives on models of job performance. *International Journal of Selection and Assessment, 8,* 216–226. doi: 10.1111/1468-2389.00151

Viswesvaran, C., Schmidt, F. L., & Ones, D. S. (2002). The moderating influence of job performance dimensions on convergence of supervisory and peer ratings of job performance: Unconfounding construct-level convergence and rating difficulty. *Journal of Applied Psychology, 87,* 345–354. doi: 10.1037/0021-9010.87.2.345

Viswesvaran, C., Schmidt, F. L., & Ones, D. S. (2005). Is there a general factor in ratings of job performance? A meta-analytic framework for disentangling substantive and error influences. *Journal of Applied Psychology, 90,* 108–131. doi: 10.1037/0021-9010.90.1.108

Weisberg, S. (2005). *Applied linear regression* (3rd ed.). New York, NY: Wiley. doi: 10.1002/0471704091

Yang, J., & Diefendorff, J. M. (2009). The relations of daily counterproductive workplace behavior with emotions, situational antecedents, and personality moderators: A diary study in Hong Kong. *Personnel Psychology, 62,* 259–295. doi: 10.1111/j.1744-6570.2009.01138.x

Yerkes, R. M., & Dodson, J. D. (1908). The relation of strengths of stimulus to rapidity of habit formation. *Journal of Comparative Neurology and Psychology, 18,* 459–482. doi: 10.1002/cne.920180503

Received January 10, 2010
Revision received July 7, 2010
Accepted July 15, 2010 ■