The Validity of Conscientiousness for Predicting Job Performance: A meta-analytic test of two hypotheses

Jonathan A. Shaffer* and Bennett E. Postlethwaite**

*Department of Management, Marketing, and General Business, West Texas A&M University, WTAMU Box 60809, Canyon, TX 79016, USA. jshaffer@wtamu.edu
**Business Administration Division, Seaver College, Pepperdine University, 24255 Pacific Coast Highway, Malibu, CA 90263, USA

This study examined two hypotheses regarding the moderating effects of job characteristics on the validity of personality. Using meta-analytic techniques, the authors explored the extent to which the structural characteristics and cognitive ability requirements of jobs influence the role of conscientiousness in predicting performance. The results suggest that conscientiousness is a stronger predictor of performance in jobs that are highly routinized, and a weaker predictor of performance in jobs with high levels of cognitive ability requirements. Implications for theory and future research are discussed.

1. Introduction

Meta-analytic work indicates that personality traits are valid predictors of job performance (Barrick & Mount, 1991). The data from which this conclusion is drawn are generally believed to be extremely robust, and the notion that conscientiousness – a trait subsumed in the Big Five model of personality – is a valid predictor of performance across all jobs has become well established in the realm of practice (Rynes, Colbert, & Brown, 2002) as well as academics (Barrick, Mount, & Judge, 2001). In spite of this, debate about the validity of personality continues, with some researchers questioning the extent to which personality scales are useful for predicting performance (Morgeson et al., 2007) and others maintaining the importance of assessing personality during the hiring process (Ones, Dilchert, Viswesvaran, & Judge, 2007).

In examining the validity of personality traits more closely, researchers have gone past estimating simple correlations between personality and performance, turning instead to the search for moderators of the relationship between personality and job performance (e.g., Barrick, Parks, & Mount, 2005; Colbert & Witt, 2009; Witt & Ferris, 2003). One moderator of the relationship between conscientiousness and job performance that has received considerable attention in the literature is the nature of jobs themselves. Specifically, researchers have proposed that the effects of conscientiousness on job performance will be attenuated when jobs are highly structured (Wright & Mischel, 1987). Said another way, personality is hypothesized to be a better predictor of performance in jobs that give employees high levels of freedom and autonomy. The basis for this proposal is found in person-situation interaction theory (Mischel, 1973), which predicts that personality traits can be strong influences on behaviors unless a given situation exerts an even stronger influence on behaviors. The idea that personality is a weaker predictor of performance in highly structured jobs is well established in the literature (Barrick, Mitchell, & Stewart, 2003; Hough & Dilchert, 2010); however, surprisingly few studies provide empirical support for this notion.

A second theory suggests that the cognitive ability requirements of jobs moderate the relationship between personality and job performance. The theory of cognitive buffering, which has gone largely unexplored in the literature, suggests that individual differences in cognitive ability allow some individuals more control over the expression of their personality tendencies, thereby limiting the relationship between their personality traits and external criteria (Bjorklund & Harnishfeger, 1995). According to this theory, individuals high in cognitive ability have more mental resources available with which to

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'buffer' any natural personality tendencies that would lead to behaviors that are undesired in a given context. Said another way, this theory predicts that the influence of personality traits on behavior is weaker for individuals high in cognitive ability than it is for those low in cognitive ability. In terms of job performance, given that jobs that require higher levels of cognitive ability are, on average, staffed by individuals with higher levels of cognitive ability (Wilk, Desmarais, & Sackett, 1995; Wilk & Sackett, 1996), the theory of cognitive buffering would suggest that the relationship between personality and job performance will decrease as the cognitive ability requirements of jobs increase.

In response to the continued debate over the validity of personality, the purpose of this study was to meta-analytically investigate two hypotheses regarding the extent to which job characteristics moderate the validity of personality for predicting job performance. In doing so, we focus specifically on the validity of conscientiousness. We focus on conscientiousness in our research for several reasons. First, and as mentioned previously, conscientiousness has been shown to be a valid predictor of performance in virtually all jobs. Second, the incremental validity of other personality traits above and beyond that of conscientiousness is limited (Schmidt, Shaffer, & Oh, 2008), suggesting that the relevance of conscientiousness in the context of performance prediction is high relative to that of other traits. Finally, because conscientiousness is generally associated with behaviors that are highly salient to job performance – time management, organization, and self-discipline (e.g., McCrae & Costa, 1987) – it is the personality trait that is most relevant to person-situation interaction theory and the process of cognitive buffering in a work context. In the remainder of this article, we first explicate the theoretical and empirical work associated with person-situation interaction theory and cognitive buffering theory. We then hypothesize that the validity of conscientiousness will be lower for jobs that are highly routinized and lower for jobs high in cognitive ability requirements. Finally, we present meta-analytic tests of our hypotheses and discuss the theoretical and practical implications of our results.

2. Theoretical background

Person-situation interaction theory (Mischel, 1973) hypothesizes that the relationship between personality and behavior is moderated by situational factors, which can be categorized on a continuum ranging from highly strong to highly weak. A strong situation is one that exerts considerable pressure on individuals to display behaviors that are judged to be congruent with behavioral expectations for that situation; a weak situation is one in which individuals are not constrained to behave in a prescribed way and are instead free to exhibit whatever behaviors they see fit. The theory contends that strong situations can reduce or even eliminate the association between personality traits and behaviors because in strong situations 'the person is restricted in the range of behaviors that she or he may be willing and able to exhibit' (Barrick & Mount, 1993, p. 112). From a statistical standpoint, two variables cannot be correlated if there is no variance in either one of the variables. Strong situations have the effect of decreasing the variance in behaviors that are displayed in such situations, thereby reducing the correlation between personality traits and behaviors. In contrast, person-situation interaction theory suggests that when situation strength is adequately low, it is more likely that personality traits and behaviors will correlate.

In a work setting, job autonomy often has been considered the equivalent of situational strength. Thus, empirical tests of person-situation theory that have been conducted in organizational contexts have examined job autonomy as the moderator of the relationship between personality and job performance. Interestingly, few studies have tested the moderating effects of job autonomy on the association between conscientiousness and job performance, and those that have report mixed results. Barrick and Mount (1993) found that the correlation between conscientiousness and job performance was weaker when employee autonomy was low and was stronger when autonomy was high. Similarly, Ng, Ang, and Chan (2008) found that the relationship between conscientiousness and leadership effectiveness was stronger when job autonomy was high. However, Slimak (1996) found a significant interaction between conscientiousness and job autonomy that operated in precisely the *opposite* direction. That is, conscientiousness was a stronger predictor of performance for jobs low in autonomy than for jobs high in autonomy. Finally, Beaty, Cleveland, and Murphy (2001) did not detect an interaction between conscientiousness and job autonomy.

More recently, Tett and Guterman (2000) proposed trait activation theory, which expanded the scope of person-situation interaction theory to include not only situational job demands but also situation specific cues that encourage the expression of a given personality trait. For an example of a weak situation with trait-relevant cues, consider an introverted employee going through a normal workday in an office setting. In this situation an introverted employee may limit their interaction with coworkers, which would be a natural expression of their true personality tendencies. However, the same employee may behave in a more extraverted manner when golfing with clients. In the latter case, the situation may be strong enough that it not only exerts pressure on the employee to entertain their clients, but also presents fewer behavioral cues that are relevant to

introversion. In a laboratory study, Tett and Guterman (2000) found that the correlation between traits and behavioral intentions was higher when the situation provided cues that were relevant to those traits. Lievens, Chasteen, Day, and Christiansen (2006) reexamined 30 studies of multitrait-multimethod assessment center ratings and found that the convergence among ratings was highest for assessment center dimensions that offered subjects opportunities to express particular personality traits on a consistent basis. Colbert and Witt (2009) showed that conscientiousness was more strongly correlated with the job performance of employees that believed their supervisors set goals and provided them with clearly defined roles, responsibilities, and priorities – situational cues that are related to conscientiousness on a conceptual level (McCrae & Costa, 1987) – lending further support to the idea that the relationship between personality and job performance is moderated by the structural characteristics of jobs.

Hypothesis 1: The validity of conscientiousness is moderated by the structural characteristics of jobs, such that the validity of conscientiousness increases as job structure and routinization decreases.

A second theory, the theory of cognitive buffering, suggests that the validity of conscientiousness is moderated by the cognitive ability requirements of jobs such that conscientiousness is a stronger predictor of performance in jobs that have lower cognitive ability requirements. Psychologists have theorized that a process called *cognitive buffering* may allow individuals to temporarily suppress their natural instincts and reactions in order to consider all possible responses to a given stimulus and the potential consequences of those actions (Bjorklund & Harnishfeger, 1995). Said another way, the theory of cognitive buffering states that the relationship between an individual's natural tendency to behave in a given manner and the actual behaviors that the individual ultimately exhibits may be weakened by the extent to which individuals make a mindful effort to create a disconnection between such tendencies and behaviors. Because the inhibition of trait-driven behavioral expression has been modeled as a complex, cognitive process, individual differences in cognitive ability have been targeted as the main mechanism through which cognitive buffering is realized. In this model, the relationship between behavioral tendencies and actual behaviors is weaker for those high in cognitive ability than it is for those low in cognitive ability because individuals high in cognitive ability are more able to deliberately limit the impact of certain personality tendencies on their job performance. For example, an individual who is low in conscientiousness may purposely decide to maintain an organized workspace and develop a scheduled work routine – behaviors that are not typically associated with individuals low in conscientiousness – in order to achieve a high level of job performance. It is important to note that cognitive buffering generally applies only to undesired personality traits. That is, a highly conscientious employee probably has few, if any, reasons to inhibit their natural tendency to be conscientious at work. Instead, the theory suggests that because conscientious behaviors are associated with higher job performance, those individuals high in cognitive ability and low in conscientiousness will choose to express behaviors associated with conscientiousness regardless of their natural personality tendencies.

Support for the theory of cognitive buffering has been found in experimental work (Brewin & Beaton, 2002; Brewin & Smart, 2005; Conway, Kane, & Engle, 2003; Gernsbacher & Faust, 1991; Rosen & Engle, 1998) and clinical studies (Breslau, Lucia, & Alvarado, 2006; Macklin et al., 1998; McNally & Shin, 1995). More recent work has also examined cognitive buffering in organizational contexts. Perkins and Corr (2005) first tested the theory in a sample of financial sector managers in which they measured general mental ability (GMA) and trait anxiety. The authors found that managers with the best performance were those high in both trait anxiety and GMA, while those high in trait anxiety and low in GMA had the worst performance. Perkins and Corr (2006) performed a second test in two independent samples of British Naval and Army officers. In these samples, the authors found that the performance of officers high in GMA was unaffected by their self-reported level of neuroticism, while those officers high in neuroticism and low in GMA had the worst performance. The results reported by Perkins and Corr suggest that even when an individual has high levels of an undesirable personality trait, if they also possess the cognitive ability necessary to effectively control or redirect their natural impulses, they may be able to perform their job at acceptable, and even exceptional, levels. Finally, Postlethwaite, Robbins, Rickerson, and McKinniss (2009) found that individuals with high levels of cognitive ability tended to work safely regardless of whether they were high or low in conscientiousness. In contrast, conscientiousness predicted safety behaviors for those low in cognitive ability.

As it relates to conscientiousness, we believe that the process of cognitive buffering may manifest in two ways. First, cognitive buffering may be a self-protective process by which individuals high in cognitive ability are more able to (a) predict and assess the outcomes associated with their behaviors and (b) restrain themselves from exhibiting behaviors that are detrimental to their job performance (Dilchert, Ones, Davis, & Rostow, 2007). Thus, a highly intelligent individual low in conscientiousness may be more likely to recognize the impact that a lack of punctuality may have on their job performance and to make subsequent efforts to meet given deadlines. Second, cognitive buffering may also be a proactive process by which individuals identify behaviors

that promote job performance and focus on exhibiting such behaviors. For example, researchers consider many of the behaviors associated with conscientiousness – such as effectively managing time, staying organized, and practicing self-discipline (McCrae & Costa, 1987) – to be the visible manifestations of specific skill sets that can be learned (Green & Skinner, 2005; Pepper & Henry, 1985; Van Eerde, 2003). The potential for individuals to learn these behaviors is important given that one way that cognitive ability influences job performance in through its relationship with the ability to learn job relevant knowledge and skills (Hunter, 1986). Individuals who are low in conscientiousness may purposely attempt to obtain time management skills and develop a scheduled work routine in order to achieve a high level of job performance. Those with higher levels of cognitive ability will learn such skills more quickly and may be more likely (due to their ability to recall their training more easily) to apply these skills on the job.

Whether it is an inhibitory or proactive process, the theory of cognitive buffering would predict that conscientiousness should be a weaker predictor of performance for individuals high in cognitive ability because individuals high in cognitive ability and low in conscientiousness should be more able to deliberately limit the impact of conscientiousness on their job performance. Because incumbents of jobs that have high cognitive ability requirements tend to have higher levels of actual cognitive ability (McCormick, DeNisi, & Shaw, 1979; McCormick, Jeanneret, & Mecham, 1972; Wilk et al., 1995; Wilk & Sackett, 1996; Wonderlic, 2002), the cognitive buffering process should be most salient to jobs that have high cognitive ability requirements. Based on the arguments presented above, we hypothesize:

Hypothesis 2: The validity of conscientiousness for predicting job performance is moderated by the cognitive ability requirements of jobs such that the validity of conscientiousness decreases as the cognitive ability requirements of the job increase.

3. Method

3.1. Literature search

We conducted an extensive search for both published and unpublished papers to include in this meta-analysis. First, we searched electronic databases such as PsycINFO, PsycARTICLES, EBSCO, Web of Science, and ProQuest Dissertations and Theses. Our search included, but was not limited to, the following keywords: *personality, Big Five, conscientiousness*, and *job performance*. We also conducted an electronic search of the following journals for the time period from 1977 to 2010: *Journal of Applied Psychology, Personnel Psychology, Psychological Bulletin, International Journal of Selection and Assessment, Human Performance, Organizational Behavior and Human Decision Processes, Journal of Vocational Behavior, Journal of Organizational Behavior, Journal of Occupational Psychology, Journal of Occupational and Organizational Psychology, Journal of Management*, and *Academy of Management Journal*. Third, we reviewed the conference programs of both the Society for Industrial and Organizational Psychology and the Academy of Management meetings and requested related articles from their authors. Fourth, we requested unpublished studies through the Academy of Management mailing list servers. Finally, we contacted several test publishers to request additional unpublished data.

3.2. Inclusion criteria

After acquiring all promising studies, we examined the abstracts and evaluated the results of each study to determine its relevance for our study purposes. We used several decision rules in order to determine if the study should be included in the present analysis. First, the study had to be empirical in nature. Second, the study needed to include a Big Five measure of conscientiousness and a measure of overall job performance. Third, the study had to report sample sizes and correlations, or enough information that the reported statistics (univariate *F*-values, *t*-values, chi-square values, differences scores, or means and standard deviations) could be converted into usable effect sizes. Fourth, the study must have reported data based on an independent sample. We found several studies which reported results that seemed to be based on the same data set. In such cases, we included only the study with the largest sample size. Finally, the study had to have included enough information to allow for the occupation of the study sample to be matched to an O*NET occupation. Studies that included participants from multiple occupations were excluded unless we determined that the majority of the sample could be matched to an O*NET occupation. Only studies involving a single occupation were included. Following these criteria, we identified a total of 53 studies from which we obtained 75 usable effect sizes.

3.3. Description of variables

3.3.1. Conscientiousness

Only global Big Five measures of conscientiousness were included (Hurtz & Donovan, 2000). We included studies that measured individual facets of conscientiousness only when enough information was reported to allow us to aggregate multiple facets to the trait level.

3.3.2. Performance outcomes

We included only studies that reported supervisory ratings of job performance. Studies that reported only one facet of job performance (i.e., task performance, organ-

izational citizenship behaviors, or counterproductive work behaviors) were excluded from our analyses. Some studies reported several effect sizes for job performance. When this occurred, we employed three main decision rules to determine which coefficient to retain. First, we prioritized measures of supervisory ratings of overall job performance if such ratings were available. Second, when measures of multiple job performance facets were provided (e.g., supervisor ratings of task performance and interpersonal performance were reported separately), we computed a composite correlation for overall job performance whenever possible (see equation 10.11 in Hunter & Schmidt, 2004 for details related to computing composite correlations). Third, in the few cases in which multiple job performance criteria were reported but it was not possible to compute a composite correlation, we averaged the correlations for the individual performance measures to obtain an effect size for overall job performance. Studies that included only objective measures of performance (such as objective sales data) were excluded.

3.3.3. Job characteristics

In order to code the moderator variables included in our analyses, we used the Occupational Information Network (O*NET) database that is maintained by the U.S. Department of Labor. The O*NET database is an extensive database of job analyses that is constantly updated and revised. Each job analysis is created from data provided by job incumbents and occupational analysts and is based on a content model that addresses six categories of information: worker characteristics (abilities, interests, values), worker requirements (skills, knowledge, education), experience requirements (job experience, training, licensing), occupational requirements (general and specific work activities, work context), workforce characteristics (labor market data, occupational outlook projections), and occupation-specific information (required tasks, tools, and technology) (Peterson et al., 2001).

First, we operationalized the structural characteristics of jobs based on the data contained in O*NET under the 'work values' category. In O*NET, work values are defined as characteristics of jobs that are important to the job satisfaction of incumbents. We examined the 'independence' dimension from this category. Jobs that score highly on this dimension are jobs that '. . . allow employees to work on their own and make decisions.' This dimension consists of three facets: Autonomy ('workers on this job plan their work with little supervision'), creativity ('workers on this job try out their own ideas'), and responsibility ('workers on this job make decisions on their own').

Second, we operationalized the structural characteristics of jobs based on the data contained in O*NET under the 'structural job characteristics' category. We examined two dimensions from this category. Routinization of work reflects the extent to workers on a job perform routine or challenging work and consists of four facets: Degree of automation, importance of being exact or accurate, importance of repeating the same tasks, and the degree of structure associated with a job.

Finally, we operationalized the structural characteristics of jobs based on the data contained in O*NET under the 'criticality of position' category. Criticality of position reflects the 'amount of impact the worker has on final products and their outcomes.' We felt that this category was important because it provided an additional index of the extent to which employees have decision-making authority in their jobs. The category consists of four facets: Consequence of error, freedom to make decisions, frequency of decision making, and the potential impact of those decisions.

We coded the cognitive ability requirements of each job by summing the scores from the 21 cognitive ability categories listed in O*NET (Dierdorff & Morgeson, 2009). The 21 categories are each associated with one of seven higher-order cognitive ability factors: Verbal ability, quantitative ability, reasoning, memory, perceptual speed, spatial ability, and attentiveness. Coefficient alpha for this scale in the current study was .92.

It is important to note that in order to be included in our moderator analyses, a study had to include enough information about its sample to allow us to accurately compute a moderator for the sample. Not all studies included such information. Specifically, some studies reported results based on samples that contained subjects from a variety of different jobs. If we could not identify a specific job for a given study, we excluded it from our analyses. Complete details related to the coding of the individuals studies included in our analyses can be found in Appendix A.

3.4. Meta-analytic procedure and artifact corrections

In testing the moderating effects of cognitive ability requirements on the validity of conscientiousness at the overall level, we used weighted least squares (WLS) regression as recommended by Steel and Kammeyer-Mueller (2002). For each regression equation, the cognitive ability requirement score was entered as the independent variable and the validity estimate reported from each study was entered as the dependent variable. Researchers also recommend that meta-analysts report effect sizes and confidence intervals (Kirk, 1996; Rozeboom, 1960; Schmidt, 1996). Therefore, in addition to the moderator tests that we performed, we computed estimates of the validity of conscientiousness at various levels of cognitive ability demand. To accomplish this, we used the methods de-

veloped by Hunter and Schmidt (2004). These methods compute the sample-weighted mean of the observed correlations and observed standard deviations from the original studies, and then correct for statistical artifacts, including range restriction and criterion unreliability. To compute validity estimates, we created three levels of each moderator – high, medium, and low. In order to assign studies to the appropriate level, we computed the mean and standard deviation for each moderator based on the information provided in our database. Studies were then assigned to one of the three categories based on whether the job included in that study was above, within, or below one standard deviation from the mean score for each moderator.

Because it is extremely unlikely that the individuals in our sample were selected solely top-down based on personality scores, corrections for direct range restriction were not appropriate for use this study. Instead, we used the procedures for correcting for indirect range restriction (Hunter & Schmidt, 2004). For these corrections, we used the range restriction estimate of .93 for conscientiousness reported by Zimmerman (2008), and a criterion reliability estimate of .52 as reported by Viswesvaran, Ones, and Schmidt (1996). Although we did not correct for unreliability in the predictor variable, the reliability of the predictor is used in making corrections for indirect range restriction. We computed a reliability estimate of .82 for conscientiousness and used this estimate for all of our analyses.

4. Results

Table 1 provides estimates of the operational validity of conscientiousness at three levels of independence. The results show that the validity of conscientiousness decreases as independence increases from low ($\rho = .34$) and medium ($\rho = .20$) to high ($\rho = .17$). Table 2 provides estimates of the validity of conscientiousness at three levels of routinization and criticality. These results suggest that the validity of conscientiousness is lower in jobs with a high ($\rho = .17$) or low ($\rho = .18$) degree of routinization and higher in jobs with an average level of routinization ($\rho = .23$), though the confidence intervals for these estimates overlap to some extent.. Finally, the results indicate that the validity of conscientiousness decreased as the criticality of jobs increased from low ($\rho = .28$) and medium ($\rho = .26$) to high ($\rho = .09$). Overall, these results do not support Hypothesis 1.

Hypothesis 2 predicted that the validity of conscientiousness for predicting job performance would be moderated by the cognitive ability requirements of jobs such that the validity of conscientiousness would decrease as the cognitive ability requirements of the job increased. Table 3 contains validity estimates for conscientiousness in jobs with low, medium, and high levels of cognitive ability requirements. The results indicate that the validity of conscientiousness decreases as the cognitive ability requirements of jobs increases from low ($\rho = .29$) and medium ($\rho = .25$) to high ($\rho = .09$), with no overlap in the confidence intervals for these estimates. These results suggest support for Hypothesis 2.

We confirmed these results using WLS regression. The results for these analyses are shown in Table 4. A negative regression coefficient indicates that the validity of conscientiousness decreased as the level of the moderator variable increased. Conversely, a positive coefficient indicates that the validity of conscientiousness increased as the level of the moderator increased. Hypothesis 1 predicted that the validity of conscien-

Table 1. Validity estimates for conscientiousness as moderated by work values

Analysis	*k*	*N*	Mean correlations				95% CI	
			r	*SDr*	ρ	*SD*ρ	Lower	Upper
Independence								
High	16	2,155	.11	.06	.17	.09	.13	.21
Medium	47	8,395	.13	.07	.20	.11	.17	.23
Low	12	1,781	.22	.06	.34	.09	.29	.39
Autonomy								
High	16	2,155	.11	.06	.17	.09	.13	.21
Medium	45	7,831	.14	.08	.22	.12	.18	.26
Low	14	2,345	.18	.07	.28	.11	.22	.34
Creativity								
High	11	1,392	.13	.03	.20	.05	.17	.23
Medium	48	8,539	.13	.08	.20	.12	.17	.23
Low	16	2,400	.20	.07	.31	.11	.26	.36
Responsibility								
High	16	2,428	.09	.09	.14	.14	.07	.21
Medium	50	8,386	.14	.06	.22	.09	.20	.24
Low	9	1,517	.22	.00	.34	.00	.34	.34

Note: *k* = number of studies; *N* = total sample size; *r* = estimated mean observed (uncorrected) validity; *SDr* = estimated standard deviation of the mean observed (uncorrected) validity; ρ = estimated mean operational validity based on correction for indirect range restriction; *SD*ρ = estimated standard deviation of the operational validity correct for indirect range restriction; CI = confidence interval.

Table 2. Validity estimates for conscientiousness as moderated by structural job characteristics

Analysis	*k*	*N*	Mean correlations				95% CI	
			r	*SDr*	ρ	*SD*ρ	Lower	Upper
Routinization of work								
High	11	1,728	.11	.00	.17	.00	.17	.17
Medium	49	8,231	.15	.09	.23	.14	.19	.27
Low	15	2,372	.12	.04	.18	.06	.15	.21
Degree of automation								
High	19	2,618	.15	.03	.23	.05	.21	.25
Medium	39	6,332	.12	.09	.18	.14	.14	.22
Low	17	3,381	.19	.04	.29	.06	.26	.32
Importance of being exact								
High	15	2,361	.10	.12	.15	.18	.06	.24
Medium	47	7,778	.14	.05	.22	.08	.20	.24
Low	13	2,192	.19	.05	.29	.08	.25	.33
Importance of repetition								
High	23	3,514	.12	.05	.18	.08	.15	.21
Medium	41	7,200	.15	.08	.23	.12	.19	.27
Low	11	1,617	.13	.10	.20	.15	.11	.29
Structured work								
High	16	2,755	.12	.06	.18	.09	.14	.22
Medium	46	7,915	.16	.07	.25	.11	.22	.28
Low	13	1,661	.08	.05	.12	.08	.08	.16
Criticality of position								
High	15	3,109	.06	.07	.09	.11	.03	.15
Medium	47	7,722	.17	.04	.26	.06	.24	.28
Low	13	1,500	.18	.09	.28	.14	.20	.36
Consequence of error								
High	17	3,221	.07	.08	.11	.12	.05	.17
Medium	57	9,093	.17	.06	.26	.09	.24	.28
Low	1	17	.24	–	.37	–	–	–
Freedom to make decisions								
High	19	3,623	.10	.11	.15	.17	.07	.23
Medium	39	6,576	.15	.05	.23	.08	.20	.26
Low	17	2,132	.18	.02	.28	.03	.27	.29
Frequency of decision making								
High	10	2,154	.06	.10	.09	.15	.00	.18
Medium	49	8,314	.15	.05	.23	.08	.21	.25
Low	16	1,863	.19	.05	.29	.08	.25	.33
Impact of decisions								
High	15	2,494	.04	.07	.06	.11	.00	.12
Medium	49	8,508	.17	.05	.26	.08	.24	.28
Low	11	1,329	.15	.05	.23	.08	.18	.28

Note: *k* = number of studies; *N* = total sample size; *r* = estimated mean observed (uncorrected) validity; *SDr* = estimated standard deviation of the mean observed (uncorrected) validity; ρ = estimated mean operational validity based on correction for indirect range restriction; *SD*ρ = estimated standard deviation of the operational validity correct for indirect range restriction; CI = confidence interval.

Table 3. Validity estimates for conscientiousness as moderated by cognitive ability requirements

	k	*N*	Mean correlations				95% CI	
			r	*SDr*	ρ	*SD*ρ	Lower	Upper
Cognitive ability requirements								
High	13	2,307	.06	.08	.09	.12	.02	.16
Medium	51	8,408	.16	.06	.25	.09	.23	.27
Low	11	1,616	.19	.04	.29	.06	.25	.33

Note: *k* = number of studies; *N* = total sample size; *r* = estimated mean observed (uncorrected) validity; *SDr* = estimated standard deviation of the mean observed (uncorrected) validity; ρ = estimated mean operational validity based on correction for indirect range restriction; *SD*ρ = estimated standard deviation of the operational validity correct for indirect range restriction; CI = confidence interval.

tiousness would increase as the autonomy and routinization of jobs decreased. Thus, a statistically significant, positive coefficient is necessary to show support for Hypothesis 1. The results indicate that the relationship between conscientiousness and job performance is moderated by the amount of independence that workers have on the job, but the direction of the effects were the opposite of those predicted in Hypothesis 1 ($\beta = -.20$, $p = .087$). The validity of conscientiousness was not moderated by the extent to which jobs were routinized ($\beta = -.11$, *ns*). Finally, we found that validity of conscientiousness was moderated by the criticality of the position. However, the direction of the effects were opposite that of our prediction ($\beta = -.42$, $p \leq .01$) and do not support Hypothesis 1.

A statistically significant, negative coefficient is necessary to show support for Hypothesis 2. As shown in Table 1, the results indicate that the validity of conscientiousness for predicting job performance decreased as the cognitive ability requirements of jobs increased ($\beta = -.43$, $p \leq .01$). These results suggest support for Hypothesis 2.

Table 4. Weighted least squares tests of the moderating effects of job characteristics on the validity of conscientiousness for predicting overall job performance

Variable	β
Cognitive ability requirements	−.43**
Verbal ability	−.38**
Reasoning ability	−.38**
Quantitative ability	.06
Memory	−.27*
Perceptual ability	−.34**
Spatial ability	−.09
Attentiveness	−.39**
Independence	−.20†
Autonomy	−.09
Creativity	−.19
Responsibility	−.30**
Routinization of work	−.11
Degree of automation	.01
Importance of being exact or accurate	−.29**
Importance of repetition	−.12
Structured work	−.00
Criticality of position	−.42**
Consequence of error	−.35**
Freedom to make decisions	−.20†
Frequency of decision making	−.38**
Impact of decisions	−.39**

Note: $k = 75$, $N = 12{,}331$; β = Standardized WLS regression coefficient. A negative (positive) β indicates that the validity of conscientiousness decreases (increases) as the moderator variable increases.
† = $p \leq .10$. * = $p \leq .05$. ** = $p \leq .01$.

5. Discussion

This study meta-analytically examined whether structural jobs characteristics – such as autonomy and the routinization of jobs – and the cognitive ability requirements of jobs moderated the validity of conscientiousness for predicting job performance. We first examined the hypothesis that the validity of conscientiousness would decrease as jobs became more structured. Our results did not support this hypothesis. In fact, the results of this study may suggest the opposite. That is, the validity of conscientiousness was not lower for jobs that were highly routinized. We also tested the hypothesis that conscientiousness would be a weaker predictor of performance in jobs with high cognitive ability requirements. Our results supported this hypothesis, suggesting that the validity of conscientiousness decreases as the cognitive ability requirements of jobs increase.

These findings have several important theoretical implications. Our results support the theory of cognitive buffering and raise interesting questions about the relative influence of cognitive ability and conscientiousness on job performance. Recent research has reported that the relative validity of conscientiousness as compared to that of cognitive ability is less than previously believed (Schmidt et al., 2008). However, the current study indicates that conscientiousness is a more valid predictor of performance in jobs that require low levels of cognitive ability than it is in jobs that require high levels of cognitive ability. Keeping in mind that the validity of cognitive ability increases as jobs increase in their cognitive ability requirements (Hunter & Hunter, 1984), our results suggest that the validity of conscientiousness relative to that of cognitive ability increases as the cognitive ability requirements of jobs decrease. Cognitive ability is theorized to influence job performance through its impact on the acquisition of job knowledge and the problem solving process (Hunter, 1986). Our results may suggest that cognitive ability further influences job performance through its suppression of the influence of personality traits on job performance.

It is also possible that person-situation interaction theories have failed to take into account important performance-related factors that affect the extent to which personality impacts job performance. One plausible explanation for our findings, and one that has heretofore been unexplored in the literature, is the possibility that there are systematic differences in the way that job performance is measured across jobs with different levels of cognitive ability requirements. In the case of conscientiousness, it may be the case that job performance is measured in such a way that makes conscientiousness more relevant to performance in jobs with low cognitive ability requirements. The performance of front-line production workers, restaurant servers, or bus drivers, for example, is not generally rated according to the quality of their complex problem solving ability, their ability to manage their own schedules, or their high level interpersonal skills – all of which are related to cognitive ability (Gottfredson, 1997). Instead, evaluations of line workers may be more dependent on whether they arrive to work in a timely manner, attend diligently to their workstation, and maintain good personal hygiene – behaviors that are highly related to conscientiousness on a conceptual level (McCrae & Costa, 1987). Currently, analyses of job performance ratings tend to focus on the accuracy of ratings, the extent to which measurement error affects those ratings (Scullen, Mount, & Goff, 2000) and the constructs assessed by subordinate, peer, and supervisor ratings (Viswesvaran, Schmidt, & Ones, 2005) but have not examined potential differences in the actual content of the ratings across various job types. This could be an important question for future research to address.

In the case of conscientiousness, specifically, it may be the case that job performance is measured in such a way that makes conscientiousness more relevant to performance in highly structured jobs. The performance of line workers, for example, is not generally rated according to the quality of their decision-making ability or their ability to manage their own schedules while still achieving organizational goals. Instead, evaluations of line workers may be more dependent on whether they ar-

rive to work in a timely manner, attend diligently to their workstation, and maintain good personal hygiene – behaviors that are highly related to conscientiousness on a conceptual level (McCrae & Costa, 1987). Current analyses of job performance ratings tend to focus on the accuracy of ratings, the extent to which measurement error affects those ratings (Scullen et al., 2000), and the constructs assessed by subordinate, peer, and supervisor ratings (Viswesvaran et al., 2005). However, these analyses have not examined potential differences in the actual content of the ratings across various job types. This could be an important question for future research to address.

Finally, although there have been relatively few field studies that have examined person-situation theory and its relation to job performance, it is worth noting that our results contrast with the results found in previous research. We believe that are key differences between our study and previous studies that may account for these differences. Specifically, previous research has used self-rated perceptions of job characteristics (Barrick & Mount, 1993; Colbert & Witt, 2009; Gellatly & Irving, 2001) as the moderator of interest when examining the relationship between personality and performance. In contrast, our study uses objectively rated measures of job characteristics that are held constant across all of the studies in our analysis. It may be the case that when perceptions of autonomy are high, individuals feel freer to express their natural personality tendencies, thus increasing the relationship between personality and job performance. The results of the current study may suggest that perceptions of autonomy and expert or multisource ratings of autonomy are two very different constructs, and that the roles of these constructs in the relationship between personality and performance differ to some extent.

From a practical perspective, our results suggest that, in some cases, measures of conscientiousness may be a more useful predictor of performance than previously believed and should continue to be used as a selection tool – especially for jobs that are lower in cognitive ability requirements. For jobs high in cognitive ability requirements, however, such measures seem to have low validity. Because the utility (that is, the economic value) of any selection tool is a function of its validity, our results also suggest that the economic benefit of using measures of conscientiousness as a selection tool for jobs low in cognitive ability requirements may be higher than previous research has estimated (Schmidt & Hunter, 1998; Schmidt et al., 2008). We note that the operational validity of conscientiousness reported in the current study for jobs low in cognitive ability requirements ($\rho = .29$, $SD\rho = .06$) is similar to the operational validity of general mental ability that has been reported for low complexity jobs in previous research ($\rho = .39$, $SD\rho = .06$; Hunter, Schmidt, & Le, 2006). In addition, personality measures have been shown to create little, if any, adverse impact during the selection process; tests of cognitive ability create a considerable amount of adverse impact (Sackett, Schmitt, Ellingson, & Kabin, 2001).

5.1. Limitations and directions for future research

This study is not without limitations. First, to the extent that the jobs in our study do not constitute a representative sample of jobs, the generalizability of our results may be diminished. To address this concern, we compared our database to the O*NET database and found minimal differences between the two databases. On average, the means and standard deviations obtained from each dataset for the moderators of interest were highly similar, as were the correlations between the moderators (see Appendix B). Similarly, to the extent that our databases are not representative of the available validity evidence for conscientiousness may be an issue. To examine this issue, we computed the operational validity of conscientiousness across all of the studies included in our dataset and compared it to the validities that have been reported in previous studies. As shown in Appendix C, our results are very similar, and in some cases virtually identical, to the results of other meta-analyses of the validity of conscientiousness. Thus, while it is possible that our database is unique in some way, we do not believe this to be the case.

Second, although the theory of cognitive buffering applies to interactions between individual levels of cognitive ability and conscientiousness, our meta-analysis tested the theory across jobs using the average level of cognitive ability requirements for the jobs represented in the studies in our dataset. Therefore, it could be argued that our study does not provide a direct test of the cognitive buffering hypothesis. We believe that this concern is ameliorated somewhat given the abundance of evidence showing that jobs that are higher in cognitive ability requirements generally are performed by job incumbents that are higher in cognitive ability (McCormick et al., 1979; McCormick et al., 1972; Wilk et al., 1995; Wilk & Sackett, 1996; Wonderlic, 2002). In addition, similar methodology has been used in prior meta-analytic tests of moderators of the validity of conscientiousness (Meyer, Dalal, & Bonaccio, 2009).

Finally, it is worth noting that if the extent to which conscientiousness is restricted differs across moderator categories, the validity estimates that we report are biased in some way. For example, if conscientiousness scores are more restricted in jobs that require high levels of cognitive ability, then the validity estimate for such jobs would be biased in a downward direction. We examined the extent to which range restriction estimates for conscientiousness differed across moderator categories and found that range restriction estimates for

conscientiousness tended to increase as the cognitive ability requirements of a job decreased. If we had used these range restriction estimates in our analyses, the validity estimates reported for jobs of high, medium, and low cognitive ability requirements, for example, would have been .10, .25, and .41, respectively. That is, the moderating effects shown in our results would have been even more pronounced for many, if not all of the moderators that we examined. However, because these range restriction estimates were based on very few studies we did not use them in our analyses.

There are several fruitful avenues of research that relate to this study. First, we have only examined the moderating effects of job characteristics on a single personality trait. Future research should examine these effects in regards to additional traits, such as extraversion, agreeableness, and emotional stability. It would be interesting to see whether the same conclusions drawn from this study would be drawn from studies that include other personality traits. In addition, the theory of cognitive buffering should be tested more directly than it was tested in this study. As reviewed above, few studies have examined the theory of cognitive buffering in a work-related context. Finally, research should determine whether other job characteristics moderate the relationship between personality and job performance, such as the extent to which jobs require conflict management skills or negotiation skills. For example, one might hypothesize that emotional stability is a more valid predictor of performance in jobs that require a high level of conflict management or negotiation skills. Alternatively, agreeableness might be more valid in jobs that require employees to teach or train others. Such hypotheses are intuitively appealing, and could be empirically tested using meta-analytic procedures in combination with the job characteristics data contained in O*NET. In light of the continuing debate surrounding the validity of personality (Morgeson et al., 2007; Ones et al., 2007; Tett & Christiansen, 2007), a continued search for moderators of the validity of personality is appropriate.

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Appendix A

Summary of meta-analytic database

Reference	SOC code	*n*	*r*	C	V	R	Q	M	P	S	A	I	Au	Cr	Re	Ct	Cq	Fd	Fq	Im	Rt	Dg	Ix	Ir	St
Abraham and Morrison (2003)	33–9032.00	55	.14	39	51	43	6	28	44	24	42	37	44	19	47	3.8	3.0	4.4	3.7	4.1	3.2	2.3	4.2	4.2	3.9
Avis (2001)	43–9061.00	173	.09	43	66	42	55	19	36	13	46	37	41	31	38	3.3	2.1	3.8	3.4	3.6	3.2	2.3	4.4	4.3	4.3
Bacha (2003)	41–2031.00	150	.29	45	66	49	40	38	34	19	46	48	53	44	47	3.5	2.1	4.1	3.9	3.8	2.8	1.8	4.1	3.1	4.0
Barrick and Mount (1996)	53–3032.00	139	.27	48	51	48	38	28	45	57	57	41	56	28	39	3.8	3.3	4.2	3.7	3.9	2.9	2.2	3.9	3.1	3.8
Barrick and Mount (1996)	53–3032.00	147	.26	48	51	48	38	28	45	57	57	41	56	28	39	3.8	3.3	4.2	3.7	3.9	2.9	2.2	3.9	3.1	3.8
Barrick, Stewart, and Piotrowski (2002)	41–9041.00	164	.26	31	63	35	16	19	7	2	39	38	47	38	28	3.2	2.9	3.5	3.3	3.3	3.3	3.1	3.8	3.6	3.4
Brown, Mowen, Donavan, and Licata (2002)	35–3021.00	249	.18	35	52	36	41	28	15	19	41	14	19	6	16	3.4	2.3	3.7	3.7	3.8	2.7	1.7	3.8	3.1	3.8
Burke and Witt (2002)	43–9061.00	114	.23	43	66	42	55	19	36	13	46	37	41	31	38	3.3	2.1	3.8	3.4	3.6	3.2	2.3	4.4	4.3	4.3
Chan and Schmitt (2002)	43–6014.00	160	.08	46	79	53	19	38	30	13	50	29	34	19	34	3.2	2.2	4.1	3.4	3.3	3.3	2.9	4.3	4.2	4.4
Conte and Gintoft (2005)	41–2031.00	174	.05	45	66	49	40	38	34	19	46	48	53	44	47	3.5	2.1	4.1	3.9	3.8	2.8	1.8	4.1	3.1	4.0
Conte and Jacobs (2003)	53–4041.00	181	.19	51	59	49	41	35	56	50	58	59	53	56	69	4.0	4.3	3.5	4.3	3.9	3.6	2.7	4.5	3.8	2.7
Cook (2005)	41–1011.00	250	.23	47	57	52	52	38	41	27	43	79	78	72	88	3.8	2.5	4.4	4.4	4.0	2.7	1.9	3.8	3.2	4.2
Cutchin (1998)	25–2031.00	126	.12	56	74	67	41	44	48	22	52	78	75	78	81	3.3	2.1	4.4	3.3	3.3	2.6	1.8	3.9	2.9	4.3
DeGroot and Kluemper (2007)	41–2031.00	154	.14	46	66	49	40	38	34	19	46	48	53	44	47	3.5	2.1	4.1	3.9	3.8	2.8	1.8	4.1	3.1	4.0
Dierdorff (2002)	33–3021.03	158	.06	60	72	70	43	44	58	43	54	59	53	56	69	4.1	3.8	4.1	4.0	4.6	3.3	2.2	4.8	4.0	3.6
Donavan (1999)	35–3031.00	212	.10	37	58	39	40	41	11	16	46	25	28	13	34	3.1	2.1	3.2	3.6	3.5	2.9	2.3	3.8	3.0	3.4
Fallon, Avis, Kudisch, and Gornet (2000)	41–2031.00	317	.23	45	66	49	40	38	34	19	46	48	53	44	47	3.5	2.1	4.1	3.9	3.8	2.8	1.8	4.1	3.1	4.0
Fine (2006)	43–5021.00	321	.32	47	59	49	35	31	41	46	46	18	28	13	13	3.8	2.9	4.4	4.1	3.8	2.8	1.7	4.6	2.4	3.8
Gill and Hodgkinson (2007)	41–2031.00	223	.24	45	66	49	40	38	34	19	46	48	53	44	47	3.5	2.1	4.1	3.9	3.8	2.8	1.8	4.1	3.1	4.0
Gill and Hodgkinson (2007)	41–4012.00	168	.01	45	74	52	24	22	30	18	41	66	78	56	63	3.7	2.3	4.4	4.2	3.8	2.6	2.1	3.9	2.8	4.4
Hayes, Roehm, and Castellano (1994)	51–4072.00	130	.29	42	47	45	28	25	48	30	44	23	27	15	28	3.1	2.4	3.6	3.3	3.2	3.0	2.9	3.3	3.4	3.6
Hunthausen, Truxillo, Bauer, and Hammer (2003)	43–1011.00	102	.10	56	74	64	47	47	48	24	55	74	80	67	74	3.8	2.8	4.4	4.1	3.9	3.1	2.7	4.3	3.9	4.4
Jacobs, Conte, Day, Silva, and Harris (1996)	53–3021.00	574	.00	53	64	51	36	28	48	57	77	31	34	22	38	4.4	3.9	4.5	4.7	4.7	3.3	2.0	4.4	4.2	3.1
Johnson, Rowatt, and Petrini (2011)	31–1011.00	269	.11	46	60	51	24	31	45	35	46	32	44	25	28	3.6	3.3	3.8	3.9	3.4	3.0	2.3	3.8	3.0	3.3
Judge, LePine, and Rich (2006)	33–9092.00	131	.11	41	54	50	8	31	44	18	46	43	47	31	50	3.4	3.7	3.8	3.4	2.9	2.4	1.1	3.4	2.4	3.3
Kraus (2002)	25–2021.00	94	−.01	57	74	68	44	44	45	22	55	78	75	78	81	3.6	2.1	4.2	4.1	4.0	2.5	1.3	4.1	2.7	3.9
Lao (2001)	33–3051.00	395	−.10	56	65	60	28	41	61	43	65	52	41	50	66	4.5	4.0	4.7	4.7	4.5	3.2	2.3	4.7	3.8	4.0
Lee (2000)	17–2121.01	315	.11	61	72	68	66	41	49	50	47	79	81	81	75	4.2	3.1	4.7	4.4	4.4	2.6	2.0	4.3	3.1	4.8
Lee, Stettler, and Antonakis (2011)	13–2011.02	460	.09	56	71	63	65	44	52	19	42	52	59	34	63	3.4	2.3	3.9	3.6	3.6	3.3	3.2	4.0	3.7	3.8
	29–1111.00	142	.07	58	72	66	47	44	56	27	57	48	44	47	53	4.2	3.8	4.2	4.4	4.3	3.1	2.1	4.8	3.5	4.0
Licata et al. (2003)	35–3031.00	278	.22	37	58	39	40	41	11	16	46	25	28	13	34	3.1	2.1	3.2	3.6	3.5	2.9	2.3	3.8	3.0	3.4
Lounsbury, Gibson, and Hambrick (2004)	51-9197.00	105	.17	38	47	43	21	22	37	30	39	23	25	13	31	3.2	2.2	2.8	4.3	3.6	3.8	3.2	4.5	4.3	2.9
Lounsbury et al. (2004)	13-2072.00	105	.13	43	72	50	50	22	24	2	32	51	63	25	66	4.2	2.5	4.6	4.8	4.7	3.2	3.1	4.3	3.9	4.3
Lounsbury et al. (2004)	17-3026.00	188	.19	54	64	63	55	31	47	30	54	47	47	44	50	3.9	2.9	4.3	4.2	4.1	3.0	2.8	4.1	3.1	4.1
Loveland, Gibson, Lounsbury, and Huffstetler (2005)	39–9011.00	145	.27	51	66	64	14	38	44	24	62	48	53	44	47	3.2	2.3	4.2	2.9	3.4	2.3	1.7	3.2	2.3	4.0
Lyons, Bayless, and Park (2001)	33–3012.00	381	.10	51	67	56	33	35	47	38	54	31	19	31	44	4.1	3.6	4.2	4.3	4.2	3.4	1.9	4.8	4.5	3.7
McManus and Kelly (1999)	41–3021.00	116	.02	52	77	56	49	35	43	18	47	64	69	47	75	3.9	2.3	4.7	4.3	4.3	3.1	3.1	4.7	3.0	4.5
Mount, Witt, and Barrick (2000)	43–9061.00	146	.27	43	66	42	55	19	36	13	46	37	41	31	38	3.3	2.1	3.8	3.4	3.6	3.2	2.3	4.4	4.3	4.3
Mount et al. (2000)	43–9061.00	222	.21	43	66	42	55	19	36	13	46	37	41	31	38	3.3	2.1	3.8	3.4	3.6	3.2	2.3	4.4	4.3	4.3
Mount, Oh, and Burns (2008)	43–5081.03	133	.23	36	51	42	32	13	24	22	32	25	34	13	28	3.6	2.2	4.2	4.2	3.9	2.8	1.5	4.2	3.1	3.8
Norris (2002)	29–1111.00	123	−.07	58	72	66	47	44	56	27	57	48	44	47	53	4.2	3.8	4.2	4.4	4.3	3.1	2.1	4.8	3.5	4.0
Ono, Sachau, Deal, Englert, and Taylor (2011)	33–3021.03	38	−.10	60	72	70	43	44	58	43	54	59	53	56	69	4.1	3.8	4.1	4.0	4.6	3.4	2.2	4.8	4.0	3.6
Postlethwaite, Robbins, Oh, and Casillas (2010)	29-2071.00	39	.17	42	58	47	30	38	37	14	41	35	41	25	38	3.3	2.5	3.8	3.4	3.5	3.2	2.5	4.4	4.2	4.2
Postlethwaite et al. (2010)	43-9061.00	31	.08	43	66	42	55	19	36	13	46	37	41	31	38	3.3	2.1	3.8	3.4	3.6	3.2	2.3	4.4	4.3	4.3
Postlethwaite et al. (2010)	29-2061.00	32	.18	53	70	59	46	35	47	22	53	32	28	38	31	4.5	4.2	4.2	4.9	4.6	3.2	2.0	4.8	4.1	4.2
Postlethwaite et al. (2010)	43-6011.00	17	.24	50	74	54	40	44	44	16	50	38	38	38	38	2.6	1.6	3.5	2.8	2.5	3.2	2.4	4.3	4.1	4.0
Postlethwaite et al. (2010)	29-1111.00	20	−.18	58	72	66	47	44	56	27	57	48	44	47	53	4.2	3.8	4.2	4.4	4.3	3.1	2.1	4.8	3.5	4.0
Postlethwaite et al. (2010)	35-3021.00	47	.23	35	52	36	41	28	15	19	41	14	19	6	16	3.4	2.3	3.7	3.7	3.8	2.7	1.7	3.8	3.1	3.8

Postlethwaite et al. (2010)	41-4011.00	24	−.18	51	76	55	44	50	39	19	41	65	73	57	65	3.6	2.1	4.6	3.6	4.3	2.6	2.3	4.1	2.7	4.6
Postlethwaite et al. (2010)	15-1021.00	66	.10	50	64	58	58	35	41	21	46	73	78	81	59	3.2	2.6	3.2	3.5	3.3	3.5	2.7	4.6	4.1	3.5
Postlethwaite et al. (2010)	15-1041.00	16	.51	52	74	57	38	38	45	22	50	68	75	69	59	3.7	2.6	4.4	4.0	3.6	3.1	2.8	4.5	3.6	4.5
Postlethwaite et al. (2010)	43-6014.00	27	−.26	46	79	53	19	38	30	13	50	29	34	19	34	3.2	2.2	4.1	3.4	3.3	3.3	2.9	4.3	4.2	4.4
Postlethwaite et al. (2010)	31-1012.00	95	.18	44	55	47	35	38	44	25	43	12	16	13	6	3.8	3.7	3.6	3.9	4.2	3.0	1.9	4.2	3.6	3.9
Postlethwaite et al. (2010)	43-4051.00	89	.10	46	71	52	37	38	37	13	43	40	42	33	45	3.5	2.5	3.6	4.2	3.9	3.5	2.8	4.2	4.4	3.5
Quick (2003)	33-3012.00	284	.06	51	67	56	33	35	47	38	54	31	19	31	44	4.1	3.6	4.2	4.3	4.2	3.4	1.9	4.8	4.5	3.7
Salgado and Rumbo (1997)	11–3031.02	125	.30	59	85	67	62	50	44	14	53	67	72	56	72	4.2	3.2	4.4	4.9	4.5	3.3	3.6	4.6	3.5	4.5
Salomon (2000)	39–6031.00	215	.16	50	66	55	35	22	52	22	56	29	38	19	31	4.5	4.0	4.7	4.8	4.4	2.7	2.3	3.8	3.0	4.2
Sharaf (2009)	31–9091.00	109	.22	43	60	50	28	25	37	21	46	25	31	22	22	3.4	2.8	3.5	3.7	3.7	3.0	2.0	4.4	3.6	4.0
Shen (2011)	41–2031.00	191	.08	46	66	49	40	38	34	19	46	48	53	44	47	3.5	2.1	4.1	3.9	3.8	2.8	1.8	4.1	3.1	4.0
Shen (2011)	41–2031.00	200	.14	46	66	49	40	38	34	19	46	48	53	44	47	3.5	2.1	4.1	3.9	3.8	2.8	1.8	4.1	3.1	4.0
Shen (2011)	41–2031.00	269	.20	46	66	49	40	38	34	19	46	48	53	44	47	3.5	2.1	4.1	3.9	3.8	2.8	1.8	4.1	3.1	4.0
Shen (2011)	41–2031.00	457	.19	46	66	49	40	38	34	19	46	48	53	44	47	3.5	2.1	4.1	3.9	3.8	2.8	1.8	4.1	3.1	4.0
Strauss, Barrick, and Connerly (2001)	41–4012.00	157	.15	45	74	52	24	22	30	18	41	66	78	56	63	3.7	2.3	4.4	4.2	3.8	2.6	2.1	3.9	2.8	4.4
Tews, Michel, and Lyons (2010)	35–3031.00	139	.20	37	58	39	40	41	11	16	46	25	28	13	34	3.1	2.1	3.2	3.6	3.5	2.9	2.3	3.8	3.0	3.4
Tichon (2005)	53–3032.00	39	.32	48	51	48	38	28	45	57	57	41	56	28	39	3.8	3.3	4.2	3.7	3.9	2.9	2.2	3.9	3.1	3.8
Timmerman (2004)	43–4051.00	203	.16	46	71	52	37	38	37	13	43	40	42	33	45	3.5	2.5	3.6	4.2	3.9	3.5	2.8	4.2	4.4	3.5
Tracey, Sturman, and Tews (2007)	35–3031.00	177	.34	37	58	39	40	41	11	16	46	25	28	13	34	3.1	2.1	3.2	3.6	3.5	2.9	2.3	3.8	3.0	3.4
Tracey, Sturman, and Tews (2007)	35–3031.00	64	−.11	37	58	39	40	41	11	16	46	25	28	13	34	3.1	2.1	3.2	3.6	3.5	2.9	2.3	3.8	3.0	3.4
Tull (1997)	41–4012.00	197	−.01	45	74	52	24	22	30	18	41	66	78	56	63	3.7	2.3	4.4	4.2	3.8	2.6	2.1	3.9	2.8	4.4
Vargas (2005)	21–1021.00	163	.05	56	84	65	33	44	48	13	53	68	78	59	66	4.0	3.2	4.1	4.3	4.4	2.7	2.2	4.2	2.9	4.4
Weekly and Ployhart (2005)	33–9032.00	271	.21	39	51	43	6	28	44	24	42	37	44	19	47	3.8	3.0	4.4	3.7	4.1	3.2	2.3	4.2	4.2	3.9
Weilbacher (2000)	11–9051.00	91	.12	51	76	55	44	50	39	19	41	65	73	57	65	3.6	2.1	4.6	3.6	4.3	2.6	2.3	4.1	2.7	4.6
Weilbacher (2000)	41–4011.00	145	.24	53	72	61	46	38	43	21	52	75	78	72	75	3.7	2.6	4.1	4.0	4.2	3.0	2.4	3.9	3.9	4.1
Williams (1999)	43–4181.00	94	.08	51	72	56	43	41	45	16	49	40	52	25	42	2.9	2.4	2.8	2.9	3.4	3.8	2.8	4.3	4.6	2.6
Witt (2002)	43–9061.00	144	.34	43	66	42	55	19	36	13	46	37	41	31	38	3.3	2.1	3.8	3.4	3.6	3.2	2.3	4.4	4.3	4.3
Witt (2002)	43–4051.00	195	.11	46	71	52	37	38	37	13	43	40	42	33	45	3.5	2.5	3.6	4.2	3.9	3.5	2.8	4.2	4.4	3.5
Witt, Andrews, and Carlson (2004)	43–4051.00	92	.19	47	71	52	37	38	37	13	43	40	42	33	45	3.5	2.5	3.6	4.2	3.9	3.5	2.8	4.2	4.4	3.5

Note: SOC code = Standard occupational classification code of study sample; n = Study sample size; r = Study observed correlation; C = Cognitive ability requirements; V = Verbal ability requirements; R = Reasoning ability requirements; Q = Quantitative ability requirements; M = Memorization ability requirements; P = Perceptual ability requirements; S = Spatial ability requirements; A = Attentiveness ability requirements; I = Higher order independence; Au = Autonomy; Cr = Creativity; Re = Responsibility; Ct = Criticality of position; Cq = Consequence of error; Fd = Freedom to make decisions; Fq = Frequency of making decisions; Im = Impact of decisions; Rt = Routinization of work; Dg = Degree of automation; Ix = Importance of being exact or accurate; Ir = Importance of repetition; St = Degree of structure of job.

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Appendix B

Means, standard deviations and correlations for all moderator variables

	M	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	*M*	*SD*
1. Cognitive ability requirements	2.36	.33		.72**	.94**	.69**	.73**	.74**	.20**	.66**	.64**	.62**	.57**	.65**	−.03	.04	.27**	.07	−.45**	.47**	.24**	.45**	.34**	.47**	2.42	.38
2. Verbal	3.28	.43	.61**		.75**	.40**	.51**	.18**	−.38**	.30**	.67**	.67**	.60**	.66**	−.06	.06	.20**	.09*	−.54**	.35**	−.01	.44**	.32**	.42**	3.15	.62
3. Reasoning	2.59	.44	.94**	.64**		.57**	.67**	.58**	.05	.51**	.75**	.72**	.71**	.74**	−.17**	−.06	.20**	−.05	−.52**	.43**	.14**	.50**	.30**	.45**	2.73	.45
4. Quantitative	1.93	.63	.39**	.30**	.23*		.49**	.50**	.04	.32**	.38**	.40**	.32**	.38**	.16**	.21**	.32**	.19**	−.29**	.17**	.04	.20**	.11**	.22**	1.87	.73
5. Memory	1.71	.45	.56**	.45**	.59**	.19		.52**	.08*	.50**	.46**	.43**	.43**	.45**	−.04	.02	.11**	.04	−.28**	.24**	.08*	.28**	.16**	.25**	1.69	.48
6. Perceptual ability	1.93	.58	.81**	.22	.73**	.12	.27*		.49**	.68**	.21**	.19**	.15**	.27**	.17**	.12**	.27**	.16**	−.10**	.37**	.40**	.18**	.24**	.30**	2.10	.51
7. Spatial ability	1.17	.63	.41**	−.34**	.26*	−.02	.05	.55**		.38**	−.14**	−.18**	−.12**	−.10**	−.07	−.12**	−.03	−.13**	.14**	.23**	.37**	.04	.10**	.12**	1.43	.62
8. Attentiveness	2.39	.36	.62**	.16	.48**	.06	.28*	.58**	.60**		.18**	.16**	.14**	.29**	.11**	.063	.20**	.14**	−.12**	.49**	.40**	.23**	.35**	.38**	2.32	.36
9. Independence	2.24	.85	.63**	.58**	.66**	.30**	.39**	.38**	.03	.14		.97**	.95**	.96**	−.36**	−.20**	.08*	−.20**	−.60**	.27**	−.08*	.55**	.17**	.32**	2.51	1.06
10. Autonomy	2.44	.89	.49**	.51**	.53**	.24*	.27*	.26*	−.02	.02	.95**		.87**	.91**	−.31**	−.15**	.11**	−.14**	−.62**	.27**	−.09*	.54**	.18**	.32**	2.02	1.22
11. Creativity	1.90	.95	.67**	.58**	.69**	.34**	.42**	.43**	.07	.22	.96**	.85**		.85**	−.41**	−.26**	.00	−.26**	−.53**	.16**	−.14**	.46**	.07*	.22**	2.16	1.19
12. Responsibility	2.36	.86	.65**	.55**	.67**	.28*	.44**	.42**	.06	.18	.94**	.84**	.86**		−.30**	−.16**	.12**	−.15**	−.59**	.36**	.00	.57**	.25**	.39**	2.67	1.06
13. Routine work	3.03	.32	.05	.05	−.01	.11	−.05	.19	−.00	.06	−.23	−.31**	−.20	−.12		.74**	.63**	.84**	.38**	.06	.24**	−.38**	.12**	.08*	2.88	.37
14. Degree of automation	2.27	.48	.07	.26*	−.06	.15	.04	−.03	−.21	−.10	.05	.08	−.05	.11	.67**		.28**	.51**	.09*	.05	.13**	−.16**	.10**	.04	2.20	.56
15. Importance of being exact	4.19	.35	.44**	.36**	.34**	.33**	.13	.42**	.16	.22	.08	−.08	.17	.14	.60**	.21		.54**	−.12**	.37**	.33**	.09*	.31**	.37**	4.16	.46
16. Importance of repetition	3.53	.62	−.02	.09	−.05	.11	−.15	.19	−.10	.04	−.21	−.31**	−.17	−.12	.89**	.48**	.57**		.06	.17**	.19**	−.14**	.22**	.21**	3.21	.66
17. Structured work	1.08	.44	−.25*	−.48**	−.25*	−.25*	−.02	−.07	.25*	.11	−.41**	−.44**	−.39**	−.32**	.44**	.06	−.10	.19		.44**	−.02	.80**	.33**	.41**	.96	.52
18. Criticality of position	3.61	.39	.56**	.18	.49**	.10	.08	.56**	.50**	.44**	.27*	.18	.27*	.34**	−.01	−.07	.43**	−.02	.20		.70**	.60**	.87**	.90**	3.70	.44
19. Consequence of error	2.67	.66	.44**	−.09	.38**	−.12	.07	.61**	.61**	.56**	−.01	−.12	.04	.05	.21	−.03	.35**	.12	−.23*	.79**		.11**	.41**	.45**	2.96	.70
20. Freedom to make decisions	4.00	.44	.49**	.34**	.45**	.02	.08	.40**	.27**	.25*	.48**	.47**	.42**	.48**	−.43**	−.21	.13	−.31**	.68**	.68**	.25*		.42**	.49**	4.16	.48
21. Frequency of decision making	3.89	.46	.38**	.20	.36**	.14	.07	.29*	.26*	.20	.22*	.14	.22	.30**	.07	.05	.39**	−.02	.09	.84**	.53**	.47**		.84**	3.86	.59
22. Impact of decisions	3.85	.42	.48**	.23*	.42**	.23*	.16	.38**	.34**	.28*	.25*	.17	.22	.34**	.04	−.01	.45**	.04	.21	.88**	.55**	.58**	.79**		3.83	.53

Note: Mean and standard deviations for the dataset used in the meta-analysis (O*NET) are shown on the left (right). Correlations for the dataset used in the meta-analysis (O*NET) are shown in the lower (upper) diagonal. In the current dataset, $n = 75$. For O*NET, $n = 747$.

*$= p \leq .05$.

**$= p \leq .01$.

Appendix C

Validity of conscientiousness for predicting supervisory ratings of overall job performance

	k	*N*	Mean correlations				95% CI	
			r	*SDr*	ρ	*SD*ρ	Lower	Upper
Current study	75	12,331	.14	.08	.22	.12	.19	.25
Barrick and Mount (1991)	92	12,893	.13	.07	.20	.11	.18	.22
Salgado (1997)	33	4,605	.09	.12	.14	.19	.08	.20
Hurtz and Donovan (2000)	45	8,083	.14	.13	.22	.20	.16	.28

Note: *k* = number of studies; *N* = total sample size; *r* = estimated mean observed (uncorrected) validity; *SDr* = estimated standard deviation of the mean observed (uncorrected) validity; ρ = estimated mean operational validity based on correction for indirect range restriction; *SD*ρ = estimated standard deviation of the operational validity correct for indirect range restriction; CI = confidence interval.