
Article:
Rikoon, Samuel, Brenneman, Meghan, Kim, Lisa orcid.org/0000-0001-9724-2396 et al. (4 more authors) (2016) Facets of conscientiousness and their differential relationships with cognitive ability factors. Journal of Research in Personality. pp. 22-34. ISSN 0092-6566

https://doi.org/10.1016/j.jrp.2016.01.002

Facets of Conscientiousness and their Differential Relationships with Cognitive Ability Factors

Samuel H. Rikoon & Meghan Brenneman

Educational Testing Service

Lisa E. Kim

University of Sydney

Lale Khorramdel

Educational Testing Service

Carolyn MacCann

University of Sydney

Jeremy Burrus

Richard D. Roberts

Professional Examination Service

To be published as:

Rikoon, S. H., Brenneman, M., Kim, L. E., Khorramdel, L., MacCann, C., Burrus, J., & Roberts, R. D. (2016). Facets of Conscientiousness and their Differential Relationships with Cognitive Ability Factors. Journal of Research in Personality. doi:10.1016/j.jrp.2016.01.002

Acknowledgements

We would like to thank Elizabeth Coppola for her assistance in copyediting and preparing the final draft of this article. This research was supported in part by U.S. Army Research Institute (ARI) Contract W91WAW-07-C-0025 to the Educational Testing Service (ETS). All statements expressed in this article are the authors' and do not reflect the official opinions or policies of the U.S. government, ARI, ETS, or Professional Examination Service. Correspondence concerning this article should be addressed to the first author at srikoon@ets.org.

Abstract

This study examined relationships between conscientiousness facets and both broad factors of cognitive ability and collegiate GPA. Students responded to 117 Conscientiousness items and 15 cognitive tests demarcating fluid intelligence, crystallized intelligence, quantitative reasoning, visual processing, and broad retrieval ability. Confirmatory factor analysis replicated the eight-factor model found in MacCann, Duckworth, and Roberts (2009). Conscientiousness facet correlations with Cognitive Ability and GPA revealed that Cautiousness exhibited the highest correlation with Cognitive Ability, while Industriousness showed the strongest relationship with GPA. Procrastination Refrainment was the only facet negatively related to Cognitive Ability. Implications of these results are discussed in light of previous research and the potentially moderating effect of high- versus low-stakes testing on the relationship between conscientiousness and cognitive ability.

Keywords: academic success, conscientiousness, facet-structure, intelligence, cognitive ability, personality, Intelligence Compensation Theory

Facets of Conscientiousness and their Differential Relationships with Cognitive Ability Factors

There is an established literature showing that cognitive ability (intelligence) and Conscientiousness represent two of the strongest psycho-educational predictors of performance both at school and on the job (e.g., Barrick & Mount, 1991; Poropat, 2009; Schmidt & Hunter, 1998). However, there is only limited research examining the relationship between cognitive ability and Conscientiousness, and none (to our knowledge) considering lower-order constructs found in both cognitive ability and personality models. A complete investigation of the relative roles of Conscientiousness and cognitive abilities in predicting performance should examine how the facets of Conscientiousness are associated with the broad second-stratum factors of cognitive ability. This is the goal of the current study, which examines the associations of the eight-facet Conscientiousness model of MacCann, Duckworth, and Roberts (2009) with five second-stratum cognitive abilities from Cattell-Horn-Carroll (CHC) theory of cognitive abilities (McGrew, 2009).

The Elements of Conscientiousness

Conscientiousness emerged as a distinct factor in early research based on the lexical hypothesis, which states that important differences between people are encoded in single-word trait terms such that factor analysis of trait adjectives will uncover personality structures (e.g., Goldberg, 1990). While researchers agree that Conscientiousness is one of five or six broad domains of personality, there is considerable divergence of opinion on how many distinct facets it comprises. Different models variously propose that Conscientiousness consists of anywhere from two to eight facets (e.g., Costa & McCrae, 1992; DeYoung, Quilty, & Peterson, 2007; Lee & Ashton, 2004; MacCann et al., 2009; Peabody & de Raad, 2002; Roberts, Chernyshenko, Stark, & Goldberg, 2005; Saucier & Ostendorf, 1999). This precise delineation of facets is

important because different facets of Conscientiousness show differential relationships to other variables, including valued life outcomes such as job performance and academic achievement (e.g., Judge, Rodell, Klinger, Simon, & Crawford, 2013; Luciano, Wainwright, Wright, & Martin, 2006; MacCann et al., 2009). Whether a link between Conscientiousness and outcomes is found may thus depend on which facets of Conscientiousness are considered. Moreover, different facets of Conscientiousness may show differential relationships with cognitive ability, broadly defined. For example, Luciano et al. (2006) found that the Dutifulness and Competence facets of the NEO-PI-R were significantly associated with cognitive ability, whereas the other four were not. The degree of association the facets share with cognitive ability is also important, as this affects the interpretation of the conscientiousness/outcome relationships, particularly for outcomes such as job performance and academic achievement that are known to relate to cognitive ability. That is, some facets of Conscientiousness may show incremental prediction over cognitive ability, whereas others may not.

The Elements of Cognitive Ability

The most widely accepted psychological theory of cognitive ability is CHC theory (e.g., Roberts & Lipnevich, 2011). This model is derived from the commonalities among Carroll's (1993) three-stratum model and the Theory of Fluid and Crystallized Intelligence (Gf/Gc theory). Carroll's (1993) model was derived from re-analysis of nearly 500 data sets, and proposed three levels of abstraction at which cognitive ability should be considered. Stratum I consists of primary mental abilities (PMAs), which are very specific. For example, general sequential reasoning, inductive reasoning, reading comprehension, and spelling ability are PMAs. Stratum II consists of broader groupings of ability. For example, fluid intelligence (Gf; fluid reasoning) encompasses the PMAs of general sequential reasoning and inductive reasoning (as well as other

PMAs), and crystallized intelligence (Gc; acculturated knowledge) encompasses the PMAs of reading comprehension and spelling ability (as well as other PMAs).

Carroll (1993) proposed eight of these second-stratum factors. Stratum III consists of general intelligence (g), which encompasses all eight of the second-stratum factors. In its most recent conceptualization, CHC theory consists of ten Stratum II cognitive ability factors, with a further six to seven factors that are still tentatively defined (e.g., McGrew, 2009; MacCann, Joseph, Newman, & Roberts, 2014). Both exploratory and confirmatory factor methodologies also support this structural model (e.g., Roberts, Goff, Anjoul, Kyllonen, Pallier, & Stankov, 2000). In this study, we will focus on five of these broad factors: crystallized ability (Gc), fluid ability (Gf), quantitative reasoning (Gq), retrieval ability (Gr), and visual-spatial ability (Gv).

The Relationship between Conscientiousness and Cognitive Ability

Recent work has predominantly found either no relationship or a negative relationship between cognitive ability and Conscientiousness. Table 1 summarizes 14 such papers examining the relationship between conscientiousness and cognitive ability published since 1997. These include two meta-analyses (Ackerman & Heggestad, 1997; von Stumm, Hell, & Chamorro-Premuzic, 2011). In order to quantitatively summarize the overall relationship found in the literature between Conscientiousness and cognitive ability, we aggregated the previously reported correlation coefficients displayed in Table 1 using the Hunter and Schmidt (2004) random-effects method.[1] Two trends were apparent. First, the mean sample-weighted correlation between cognitive ability and Conscientiousness was very small and negative (-.07) with 95% credibility interval lower and upper bounds of -0.14 and -0.01, respectively. A chi-square test of homogeneity indicated there was considerable variation in effect sizes overall, $\chi^2(13) = 161.17$, p

[1] To avoid redundancy, this calculation omits results from the two prior meta-analyses Ackerman & Heggestad, 1997; von Stumm, Hell, & Chamorro-Premuzic, 2011).

<.05. These results were consistent with previous meta-analyses containing the correlation between cognitive ability and conscientiousness, where similar findings were reported by way of the relationship between cognitive ability and conscientiousness appearing small in magnitude (ρ = -.05 to .08; Ackerman & Heggestad, 1997; von Stumm et al., 2011). Second, although cognitive ability is often differentiated into group factors (e.g., fluid and crystallized intelligence), Conscientiousness is rarely investigated at the level of its lower-order facets. Such an investigation would provide a more nuanced view of the overall association between cognitive ability and Conscientiousness, potentially disentangling the source of the negative and low-magnitude correlations. Rephrased, a near-zero relationship could indicate that all Conscientiousness facets are unrelated to cognitive ability, but could also be reflective of (for example) half of the facets demonstrating a positive relationship, while the other half demonstrated a negative relationship. Examining personality effects at only the domain level can mask facet-level effects if these are in opposing directions (e.g., Ziegler, Danay, Scholmerich, & Buhner, 2010). Similarly, conceptualizing cognitive ability only at its broadest general level (as general ability, or g) does not account for the different relationships that different cognitive abilities demonstrate with personality (e.g., Ackerman & Heggestad, 1997).

The Current Study

A comprehensive examination of the associations of Conscientiousness facets with cognitive abilities appears to have not been previously undertaken. This is the primary aim of the current paper — to examine whether relationships between Conscientiousness and Cognitive Ability differ across the facets of Conscientiousness or the group factors of Cognitive Ability. We use the eight-facet Conscientiousness scale of MacCann, Duckworth, and Roberts (2009), created through structural analyses of a comprehensive sampling of Conscientiousness items

from the International Personality Item Pool (IPIP; Goldberg et al., 2006). The eight facets identified included Industriousness, Perfectionism, Tidiness, Procrastination Refrainment, Control, Caution, Task Planning, and Perseverance.

We had two supplementary objectives in this work beyond examining associations between facets of both Conscientiousness and Cognitive Ability. First, we tested the fit of the eight-factor structure of Conscientiousness identified by MacCann et al. (2009) in a larger, older, and less range-restricted (in terms of both age and socioeconomic status) sample than that used to develop the model originally. In order to provide discriminant validity evidence for the eight-factor structure in the current sample, we also considered associations between the eight Conscientiousness facets and the other four major domains of personality (Agreeableness, Extraversion, Neuroticism, and Openness). Second, we considered the differential prediction of academic achievement by the different Conscientiousness facets. A recent comprehensive meta-analysis of the relationship between personality factors and job performance demonstrated that different facets of Conscientiousness were differentially predictive of job performance (Judge et al., 2013). Specifically, the Achievement Striving facets showed a corrected correlation more than double that of the Order facet (.23 versus .11). Researchers predicting academic achievement using facets of Conscientiousness have reported similarly variant findings. Paunonen and Ashton (1991) found that GPA correlated at .26 with Achievement Striving but -.02 with Order. MacCann et al. (2009) found that the relationship of academic honors with Conscientiousness was more than six times stronger for the Industriousness facet than for Tidiness (ordering of one's possessions, conceptually similar to Order). We expected this type of finding would be replicated in the current study when considering relationships between facets of Conscientiousness and university grades.

Summary of Hypotheses

The current study entailed four hypotheses. First, the eight-factor structure of Conscientiousness would generalize from the high school sample used in MacCann et al. (2009) to the more diverse college sample employed in the current study in terms of exhibiting close fit to the data. Second, associations between Conscientiousness and general Cognitive Ability would differ across Conscientiousness facets. Third, associations between Conscientiousness and Cognitive Ability would differ across different group factors of Cognitive Ability. Fourth, the facets of Conscientiousness would show differential levels of association with college GPA, where the strongest relationship was expected between Industriousness and GPA and the weakest expected between Tidiness and GPA.

Method

Participants

The sample was composed of 722 students (59% female) currently attending either a two-year college or four-year university in the United States. Participants ranged in age from 17 to 59 ($M = 21.62$, $SD = 5.95$). Approximately 64% of the students were Caucasian, 16% African American, 10% Hispanic, and 4% Asian. Four percent identified nonspecifically as multiracial. Fourteen institutions were involved in the study, located across all major geographic regions of the country (Northeast, Midwest, South, & West). Among two-year college students, 49% were in their first year, and 46% were in their second year or beyond. Among four-year university students, 26% were in their first year, 23% were in their second year, 24% were in their third year, and 27% were in their fourth year or beyond. Although research concerning different aspects of this dataset have been reported in previous publications (MacCann, Fogarty, &

Roberts, 2012; MacCann, Fogarty, Zeidner, & Roberts, 2011; MacCann et al., 2014; MacCann & Roberts, 2013), none have addressed the research questions posed in the current study.

Measures

Conscientiousness. Students in the current study responded to essentially the same set of computer-administered Conscientiousness items (113 of the original 117) selected from the IPIP (Goldberg et al., 2006) as did those who participated in the original study (MacCann et al., 2009). Students rated each item on a 5-point rating scale ranging from "Not at all like me" to "Very much like me." Since our objective was to test the replication of a previously-found latent structure underlying a subset of these items, the current study targeted the 66 items overlapping with those incorporated in the confirmatory analyses reported by MacCann et al. (2009).

Cognitive ability. Responses to a battery of fifteen cognitive ability tests were gathered to assess the following five dimensions of cognitive ability: 1) Crystallized Ability (Gc); 2) Fluid Ability (Gf), 3) Quantitative Reasoning (Gq); 4) Retrieval Ability (Glr), and 5) Visual-Spatial Ability (Gv). Table 2 provides a detailed description of each subtest, as well as the broad cognitive ability that each subtest defines. All of the cognitive ability tests were timed, and presented in either multiple-choice or constructed-response formats (where the test-taker was not given any response options but had to generate an answer from scratch). If respondents did not complete a particular test within the confines of the time limit, they were taken directly to the next test and the remaining unanswered responses were scored as incorrect.

Academic achievement. Grade point average (GPA) on a 4.0 scale was self-reported by 85% (n = 426) of students in the sample enrolled in a four-year university. GPA was not reported by students from two-year colleges.

Procedure

Data collection. A link to a computerized assessment battery including all instruments described above was emailed to all participants, who were free to complete the items at a time of their choosing. All test items, instructions, and administration protocols were approved by an institutional review board and content fairness review process. All data was collected from participants over a one month period. Participants were paid a small cash incentive for their participation.

Confirmatory analysis. Exploratory factor analysis was not conducted here given our goal of replicating a previously determined measurement structure for the major facets of Conscientiousness (MacCann et al., 2009). Confirmatory factor analysis (CFA) was conducted using LISREL 8.8 (Jöreskog, & Sörbom, 2006), employing diagonally weighted least squares estimation using polychoric correlations and asymptotic covariances as input. The structural model tested in the current study is identical to the originally confirmed facet structure but for the omission of two (3%) of the 68 original items due to those items ("I do unexpected things," and "I remain calm under pressure") not having been collected from the current sample. Close fit to the data was considered to be indicated by values of the Comparative Fit Index (CFI) $\geq .95$, Root Mean Squared Error of Approximation (RMSEA) $< .06$, and an upper 90% confidence limit for RMSEA $< .06$ (Hu & Bentler, 1999).

In the interest of determining whether the eight identified facets of Conscientiousness accounted for substantial proportions of item response variance over and above general Conscientiousness, we also estimated a bifactor model inclusive of all eight facets and a general factor (Brunner, Nagy, & Wilhem, 2012; Chen, Hayes, Carver, Laurenceau, & Zhang, 2012). In this model, each item was specified to load on both the general factor and its parent facet, with

all latent factors specified as orthogonal to one another to assess their independent contribution toward accounting for item-level variance.

To the extent feasible given our dataset, it was also important to consider at least one alternative structure for Conscientiousness hypothesized in the extant literature. The six-facet structure implemented in the NEO-PI-R (Costa & McCrae, 1992) seemed ideal for such an exploratory comparison to our eight-facet model given the conceptual similarity between the two and the former's widespread adoption in the field (e.g., De Fruyt, De Bolle, McCrae, Terracciano, & Costa; 2009; McCrae, 2002). Four of the facets in the NEO-PI-R conceptualization could be considered to have close correspondence with four of the facets in our model. More specifically, the NEO-PI-R facets Competence, Achievement Striving, Dutifulness, and Deliberation were taken to be analogous to our Industriousness, Perfectionism, Control, and Cautiousness facets, respectively. The remaining two NEO-PI-R facets, Order and Self-Discipline, were taken to represent constructs each split into two more domain-specific components in our eight-facet model. In our estimated six-facet representation of the NEO-PI-R model, Order included items originally specified to load on our model's Tidiness (i.e. ordering possessions) and Task Planning (i.e. ordering time or tasks) factors, while Self-Discipline included items originally specified to load on our Procrastination Refrainment (i.e. discipline in starting) and Perseverance (i.e. discipline in continuing) factors.

Reliability, scoring, and relationships with concurrent measures. Internal consistency was calculated for each facet by way of Cronbach's alpha (α), with minimal criteria for interpretation set at $\alpha > .70$. Each factor in the current sample was scored by a sum total of its constituent item responses which was then standardized to a T score distribution ($M = 50$, $SD = 10$) to ease interpretation. Pearson product-moment correlations were calculated both between

factor scores (Table 4) and to evaluate relationships between the facets of Conscientiousness with GPA and cognitive abilities (Table 5).

Incremental validity. Given a natural interest in studies of this type in examining the unique contribution of the focal variables relative to others in predicting student outcomes, we conducted analyses of incremental validity to supplement the work described above. Hierarchical regressions were estimated to assess the unique ability of Conscientiousness facets to predict collegiate GPA above and beyond general cognitive ability. First, eight models were run (one for each facet of Conscientiousness) entering general cognitive ability as a predictor in the first step, a single facet of conscientiousness in a second step, and the interaction between general cognitive ability and the given facet of Conscientiousness in a third step. The third step represented a test of whether the relationship between the Conscientiousness facet under investigation and collegiate GPA varied significantly dependent on student cognitive ability level. Second, a hierarchical regression was estimated containing with general Cognitive Ability entered in the first step and general Conscientiousness in the second step. Third, a similar model was run containing general cognitive ability in the first step and all Conscientiousness facets in a second step. The final two analyses allowed us to compare the incremental R^2 between models where facets were entered individually versus using the broad Conscientiousness score.

Results

Confirmatory Factor Analysis

An eight-factor correlated-traits model (Satorra-Bentler χ^2 = 7,022, df = 2,051) incorporating all 66 items exhibited acceptably close fit to the data (CFI = .952, RMSEA = .058 with 90% CI = .057-.059). As in the previous study (MacCann et al., 2009), for comparison a one-factor model was also estimated hypothesizing a single overarching Conscientiousness

factor (Satorra-Bentler χ^2 = 13,998, df = 2,079). This model failed to exhibit acceptable fit based both on the above fit indices (CFI = .884, RMSEA = .089 with 90% CI = .088-.091) and the AIC for the one-factor model (14,262) nearly doubling that of the eight-factor model (7,342). Table 3 presents standardized factor loadings for the two models described above. Six items (9%) in the current sample failed to load saliently (i.e., standardized loading < .30), three of which had been hypothesized to load on Perfectionism. These were retained in the scoring of each factor for two reasons. First, removing them would have had a practically negligible impact on reliability estimates. Second, one goal of the current study was to maintain as much consistency as possible between constructs in the current study versus the previous work reported by MacCann et al. (2009).

A bifactor model (Satorra-Bentler χ^2 = 6,454, df = 2,013) fit the data acceptably well (CFI = .957, RMSEA = .055 with 90% CI = .054-.057) and demonstrated clearly improved fit over the one-factor model (which fit the data poorly). This suggested that the extraction of facets accounted for significant variance over and above the general factor. We averaged the squared standardized item loadings within each factor of the bifactor model as an indication of the proportion of item variance explained by each facet versus the general Conscientiousness factor. This process revealed that each facet explained between 10% (Industriousness) and 22% (Control) of its constituent items' variance on average above and beyond the general factor, which accounted for approximately 24% of response variance on average across all items.

An alternative six-facet structure (Satorra-Bentler χ^2 = 9637, df = 2,064; CFI = .926, RMSEA = .071 with 90% CI = .070-.073) conceptually aligned with the NEO-PI-R (combining Tidiness and Task Planning to form a single Order factor, and combining Procrastination Refrainment and Perseverance to form a single Self-Discipline factor) showed a worse fit to the

data than our targeted eight-facet model. This indicated that the eight-facet specification provided significant explanatory power above and beyond the six-facet model. It is crucial to emphasize that this six-facet comparison model could not represent a true test of the NEO-PI-R conceptualization since our item pool was specifically selected to represent the eight-factor model currently under investigation (MacCann et al., 2009). That is, while it was possible to conduct an exploratory exercise specifying a six-facet alternative to our eight-facet model approximating the structure of Conscientiousness assessed by the NEO-PI-R, the fact that our eight-facet model evidenced a closer fit to the data should not be taken as evidence against the NEO-PI-R structure given item-level differences between that instrument and ours.

Conscientiousness facets and the Big Five personality domains

Table 4 presents reliability estimates for each facet of Conscientiousness, all reaching acceptable levels with a range from .74 to .85. Correlations between facets are also shown, with all but one (i.e., that between Control and Perfectionism; $r = -.02$, $p = .64$) exhibiting statistically significant, moderately strong association between dimensions. Significant factor correlations ranged from .21 (between perseverance and perfectionism) to .68 (between Task Planning and Industriousness), with $M = .45$ ($SD = .12$).

Relationships between Conscientiousness facets and broad measures of the Big Five personality factors ranged from -.65 (between Perseverance and Neuroticism) to .81 (between Industriousness and broad Conscientiousness), with their absolute values having $M = .44$ ($SD = .23$). Generally, broad Conscientiousness related most strongly to its major facets ($M = .71$) than did other broad measures of the Big Five, with Extraversion showing the weakest association on average ($M = .21$) across all of its significant facet relationships. All facets of Conscientiousness demonstrated statistically significant associations with at least two of the four broad personality

factors apart from Conscientiousness itself, with each of these four constructs significantly related to a minimum of five facets.

Conscientiousness facets and collegiate GPA. To test the hypothesis that the Industriousness facet had the strongest relationship (and Tidiness the weakest relationship) with GPA compared to other facets, we compared these relationships using Steiger's z test for dependent correlations (Lee & Preacher, 2013; Steiger, 1980) applied to the subsample of 426 students with valid collegiate GPA data. As reported in Table 5, in addition to having the largest estimated value the correlation between Industriousness and collegiate GPA ($r = .28$, $p < .01$) was significantly different from the correlations between five of the other seven facets of Conscientiousness and GPA ($|z| = 2.14$ to 4.00, all $p < .05$). The two exceptions were Control ($z = 0.84$, $p > .05$) and Procrastination refrainment ($z = 1.70$, $p > .05$). The correlation between Tidiness and GPA ($r = .08$, $p > .05$) was significantly different from the relationships between four of the other seven facets of Conscientiousness and GPA ($|z| = 2.11$ to 4.00, all $p < .05$). The three exceptions were Perfectionism ($z = -1.45$, $p > .05$), Cautiousness ($z = -1.12$, $p > .05$), and Task Planning ($z = -1.65$, $p > .05$). We also tested whether the correlation between General Conscientiousness and GPA ($r = .26$, $p < .05$) was significantly different from those between the facets of Conscientiousness and GPA. Indeed, this was true for six of the eight facets ($|z| = 2.00$ to 7.48, $p < .05$), the two exceptions being Industriousness ($z = -0.91$, $p > .05$), and Cautiousness ($z = -1.69$, $p > .05$). These results were taken to indicate that the relationship between domain-level Conscientiousness and collegiate GPA varied substantially at the facet level.

Conscientiousness facets and Cognitive Ability

Examining associations between facets of Conscientiousness and Cognitive Ability, Tidiness and Task Planning displayed zero and only one (respectively) significant relationship

with the six cognitive domains assessed, while all other facets of Conscientiousness showed significant (though typically weak in magnitude) associations with both general Cognitive Ability and at least two of its specific domains. A slight negative relationship was observed between scores on Procrastination Refrainment and Cognitive Ability, with those more likely to procrastinate (i.e., lower refrainment scores) also more likely (in all but one domain) to score higher on the cognitive measures. Significant correlations between the facets of Conscientiousness and specific cognitive ability factors ranged from -.13 (between Procrastination Refrainment and Fluid Ability) to .22 (between Cautiousness and Crystallized Intelligence), with absolute values (indicative of relationship strength irrespective of direction) across all relationships demonstrating M = .12 (SD = .03). The reader is referred to Appendix A for a comprehensive correlation matrix inclusive of all variables employed in the current study.

Incremental validity

Table 6 presents hierarchical regression analyses predicting collegiate GPA using both facets of Conscientiousness and General Cognitive Ability. As can be seen reviewing the second step of these models, each Conscientiousness facet was significantly predictive of collegiate GPA above and beyond General Cognitive Ability. Also notable was that General Conscientiousness was as strongly predictive of GPA as General Cognitive Ability. Furthermore, when all Conscientiousness facets were entered in Step 2, this predicted collegiate GPA above and beyond General Cognitive Ability and accounted for a greater proportion of variance in GPA ($\Delta R^2 = .12$), than when General Conscientiousness was entered as a single score ($\Delta R^2 = .06$).

To test whether the association between Conscientiousness facets and collegiate GPA changed depending on a student's level of cognitive ability, an interaction between each of the Conscientiousness facets and General Cognitive Ability was computed and entered as the third

step in our hierarchical regression models. As shown in Table 6, the interaction term was statistically significant for only two of the eight facets (Tidiness and Task Planning). Across both the remaining six facets and General Conscientiousness, we found no evidence to support the notion that the relationship between Conscientiousness levels and collegiate GPA varies substantially between students demonstrating lower versus higher cognitive ability. One way to interpret this finding is that we did not find support in our data for the theory that students of lower cognitive ability may be compensating for any cognitive deficit (in comparison to their higher ability peers) via the exhibition of higher levels of either General Conscientiousness or a majority of its facets.

Discussion

To the best of our knowledge, the current study represents the first extensive investigation into the relationship between the facets of Conscientiousness and second-order (i.e., Stratum II) factors of cognitive ability. Three of our four hypotheses were supported. First, MacCann et al.'s (2009) eight-factor structure of Conscientiousness demonstrated close fit to the data in this collegiate sample, suggesting that this model is appropriate for characterizing Conscientiousness beyond the high school years (to which their original study was limited). Second, associations between Conscientiousness and Cognitive Ability differed across facets of Conscientiousness. Two facets (Cautiousness and Perfectionism) showed non-trivial associations across all aspects of Cognitive Ability. In contrast, Tidiness was unrelated to Cognitive Ability and Procrastination Refrainment showed a consistently negative (though not always statistically significant) relationship with all group factors of Cognitive Ability (i.e., procrastinators demonstrated higher levels of cognitive ability on average). Third and contrary to our hypothesis, relationships between Conscientiousness and Cognitive Ability were similar across all five group

factors of ability. Although Gf and Gc tended to exhibit the strongest relationships to Conscientiousness and its facets (and Gr the weakest), these associations were modest in magnitude across the five factors of Cognitive Ability with none exhibiting an absolute value > .22. Fourth, as predicted the facets of Conscientiousness showed differential prediction of collegiate GPA, with the strongest (but still modest in magnitude) demonstrated by Industriousness and weakest by Tidiness. Of particular note was that General Conscientiousness predicted collegiate GPA in this sample as strongly as did General Cognitive Ability.

Perseverance as a Compound Facet

Although fit statistics supported the eight-factor model of Conscientiousness, the strong negative correlation between Perseverance and Neuroticism suggests that Perseverance may not be wholly located within the Conscientiousness factor space. Roberts et al. (2005) refer to such facets as "interstitial constructs" and Salgado et al. (2014) refer to them as "compound facets". While compound facets may describe conceptually distinct and pragmatically useful constructs, their use in some research areas may be problematic. For example, there has been ongoing debate as to whether broad domains versus facets of personality provide better prediction of criteria (e.g., Ones & Viswesvaran, 1996; Paunonen, Rothstein, & Jackson, 1999; Salgado et al., 2014). Because compound facets effectively "double dip" from multiple broader domains, they may be more predictive than those broad domains due to their greater bandwidth rather than their greater specificity (as this debate often assumes). One technique for examining whether a facet is more strongly predictive of an outcome than a broad domain is to examine such relationships using facet scores which have been partialled of their relationships with the related broad domain (Salgado et al., 2014). This technique would not be valid for compound facets, however, as it assumes any remaining variance is specific to the facet in question (vs. other domains). In terms

of the eight-factor model of Conscientiousness, our results suggest caution in using Perseverance in an examination of the facets-versus-domains debate due to its apparent relationship to both Conscientiousness and Neuroticism.

Procrastination, Cautiousness, and Perfectionism Associated with Higher Cognitive Ability

Of the eight Conscientiousness facets, only Procrastination Refrainment was negatively related to cognitive ability whereas the strongest relationships were observed for Perfectionism and Cautiousness. The common feature of these three characteristics (procrastination, perfectionism and caution) is timing or hurriedness. One possible interpretation of our results is that people with greater cognitive ability tend to be less hurried in their general approach to life's activities. This interpretation implies both positive aspects (e.g., the cautiousness involved in checking details, delaying acting, and continuing with tasks until their product is "perfect") and negative ones (e.g., the tendency to procrastinate).

While the above explanation is speculative, cognitive ability has been shown to relate to inhibitory processes (e.g., Dempster, 1991; Loo & Wener, 1971). This suggests a slower internal pace among more intelligent people that more easily allows for interruptions or the incorporation of new information while completing a task. This is not to imply that more intelligent people are physically slower in their tasks, as in fact they appear to be faster at most tasks (e.g., Carroll, 1993; Jensen, 1987; Roberts & Stankov, 1999). Rather, we are suggesting that one way in which those demonstrating higher levels of cognitive ability may differ from those exhibiting lower levels of cognitive ability is a behavioral tendency to pace their work or other tasks at less than their maximum potential ability. Such an option may not be available to those more limited in their intellectual capacity as they may need to employ their full capacity when tasked. That is, higher levels of cognitive ability may tend to facilitate the development of certain behavioral

tendencies explicative of the relationships observed in the current study (e.g., demonstrating caution, or not considering a task or assignment complete until it is "perfect").

A further example of the relationship between cognitive ability and personality development is Intelligence Compensation Theory (ICT), or the idea that "Conscientiousness acts as a coping strategy for relatively less intelligent people" (Wood & Englert, 2009). In our study, the negative relationships observed between Procrastination Refrainment and Cognitive Ability factors were the only ones among the eight facets of Conscientiousness that might support this theory. That is, our results could be considered to add specificity to ICT by suggesting that people of lower cognitive ability may compensate or enhance their overall performance on tasks by beginning their work earlier. The significant positive relationship between Procrastination Refrainment and collegiate GPA suggests that this mechanism may indeed be successful. It is also important to note that the unique behavior of procrastination refrainment among the facets of Conscientiousness seems to occur only with cognitive ability. The general pattern of correlations of Procrastination Refrainment with other personality dimensions is consistent with other facets of Conscientiousness. This helps to rule out ICT as an explanation for the negative relationship observed with Cognitive Ability (i.e., Procrastination Refrainment did behave aberrantly in relation to other constructs). We conducted a further test of ICT in our analyses of incremental validity (Table 6) via the inclusion of interaction terms for each facet of Conscientiousness. Interestingly, the only two significant interactions involved Tidiness and Task Planning. That is, the positive relationship observed between general Cognitive Ability and collegiate GPA was stronger among students who were more organized than their peers in managing their possessions and tasks. Considering the other six facets of Conscientiousness, our findings raise questions about the arguments underlying ICT. Further

research would be required to test the theory more thoroughly, for example including the a priori specification of which facets of Conscientiousness ICT should be expected to impact.

Divergence of Current Findings from Previous Research

Our results are inconsistent with much of the previous evidence presented in Table 1, which showed that several extant studies have reported negative relationships between Conscientiousness and Cognitive Ability. We posit two possible reasons for this. The first is related to the stakes of the testing. Four of the five studies reporting statistically significant negative relationships greater than 0.10 administered conscientiousness and cognitive ability tests as part of high-stakes job applications (the other did not report on testing stakes). These results suggest that the severity of stakes in a given setting may moderate the relationship between Conscientiousness and Cognitive Ability. The relationship may be negative when the stakes are higher but positive when they are lower. This result would be consistent with a mechanism where Conscientiousness affected Cognitive Ability test scores in low-stakes but not high-stakes settings – a case where everyone exerts maximum effort on tests of cognitive ability when the stakes are high, but only conscientious people exert maximum effort when the stakes are low.

A second possible reason for the divergence of our findings from those of extant research is the type of instrumentation deployed. Many of the studies shown in Table 1 utilized relatively brief personality assessments, which may tend to emphasize one or a subset of the facets from each of the more broadly construed "Big 5" personality factors. When instruments such as these are deployed, they should of course be expected to relate to other phenomena in line with their selective content. As such if they tended to be more representative of one or more facets of Conscientiousness, any relationships observed with other measures should reflect or accentuate

expectations for those facets versus overall Conscientiousness (see the diversity of associations displayed in Table 5). This is a long-recognized issue with forms designed as brief measures of more broadly conceived constructs (Smith, McCarthy, & Anderson, 2000), and thus the divergence of our findings from previous research may be taken in part as a cautionary tale about the importance of incorporating truly comprehensive assessments of Conscientiousness (or the limitations inherent to including only selected facets).

Future Research

It should be noted that although this study has replicated and found support for an eight-factor model of Conscientiousness (MacCann et al., 2009) in the current sample, this model remains only one of several in the extant literature (for a review see Kim, Poropat, & MacCann, 2015). While there may in fact exist a "true" underlying, unobserved structure of general Conscientiousness, any empirically-derived structural model of the construct will in part be a function of the instrumentation used to assess it. Furthermore, since our sample was comprised of college students there may have been issues of selection resulting in a higher mean level of Conscientiousness versus the general population. Future research should seek to compare different instrumentation and models of Conscientiousness within both similar and more diverse samples (ideally representative of large geographic areas or occupational fields) to move the field toward consensus on these issues.

As mentioned above, the field would benefit from a rigorous investigation into whether or not the level of stakes inherent to a testing condition demonstrates a significant impact on the relationships between facets of Conscientiousness and cognitive ability. Contextual stakes are of course only one possible explanation for the patterns found in our review of prior research, and

future experimental studies will be valuable in determining whether they are truly impactful in this area.

The current study further suggests at least two more methodological areas for future research. The first would involve comprehensively modeling the relationships studied herein at the level of latent constructs rather than factor scores. Estimating such a comprehensive model using categorical item-level data would present its own challenges given the large number of assessment items involved and sample size thus required to stably estimate models containing so many free parameters. However, a study able to meet those challenges, wherein associations reported would account for both measurement error and covariances between latent constructs, would provide a more distilled (and thus more clearly interpretable) impression of the relationships of interest here. A second line of methodologically oriented future research should seek to examine whether the eight-factor model of Conscientiousness, now demonstrated in both collegiate and high school samples, exhibits structural invariance across demographic (e.g., gender, ethnicity) or other (e.g., low vs. high cognitive ability) subgroups of interest. Measurement and/or predictive invariance studies along these lines would lend further support to the interpretation of interfactor relationships across such samples as a whole.

References

Ackerman, P. L., & Heggestad, E. D. (1997). Intelligence, personality, and interests: Evidence for overlapping traits. Psychological Bulletin, 121, 219-245.

Amhauer, P., Brocke, B., Liepmann, D., & Beauducel, A. (2001). Intelligenz-Strucktur-Test 2000 R [Test of intelligence structure 2000 R] (2nd ed.). Göttingen, Germany: Hogrefe.

Barrick, M. R., & Mount, M. K. (1991). The Big Five personality dimensions and job performance: A meta-analysis. Personnel Psychology, 44, 1–26.

Beauducel, A., Liepmann, D., Felfe, J., & Nettelnstroth, W. (2007). The impact of different measurement models for fluid and crystallized intelligence on the correlation with personality traits. European Journal of Psychological Assessment, 23, 71-78.

Bennett, G. K., Seashore, H. G., Wesman, A. G. (1997). Differential Aptitude Test. San Antonio, TX: The Psychological Corporation.

Blinkhorn, S. F. (1985). Graduate and managerial assessment manual and user guide. Dorchester, UK: Psychometric Research and Development Ltd.

Bratko, D., Butkovic, A., Vukasovic, T., Chamorro-Premuzic, T., von Stumm, S. (2012). Cognitive ability, self-assessed intelligence and personality: Common genetic but independent environmental aetiologies. Intelligence, 40, 91–99.

Brunner, M., Nagy, G., & Wilhelm, O. (2012). A tutorial on hierarchically structured constructs. Journal of Personality, 80(4), 796-846.

Budd, R. (1991). OPP technical manual. Letchworth, UK: Psytech International Ltd.

Budd, R. (1992). 15FQ technical manual. Letchworth, UK: Psychtech International Ltd.

Budd, R. (1993a). General, critical, and graduate test battery: The technical manual. Letchworth, UK: Psychtech International Ltd.

Budd, R. (1993b). Manual for the technical test battery. Letchworth, UK: Psychtech International Ltd.

Carroll, J. B. (1993). Human cognitive abilities: A survey of factor-analytic studies. New York, NY: Cambridge University Press.

Cattell, R. B., Cattell, A. K., & Cattell, H. E. P. (1993). 16 PF Fifth Edition. Champaign, IL: Institute for Personality and Ability Testing.

Chen, F. F., Hayes, A., Carver, C. S., Laurenceau, J. P., & Zhang, Z. (2012). Modeling general and specific variance in multifaceted constructs: A comparison of the bifactor model to other approaches. Journal of Personality, 80(1), 219-251.

Ciarrochi, J., Heaven, P. C., & Skinner, T. (2012). Cognitive ability and health-related behaviors during adolescence: A prospective study across five years. Intelligence, 40(4), 317-324.

Costa, P. T., & McCrae, R. R. (1989). The NEO-PI/NEO-FFI manual supplement. Odessa, FL: Psychological Assessment Resources.

Costa, P. T., & McCrae, R. R. (1992). NEO-PI-R Professional Manual. Odessa, FL: Psychological Assessment Resources.

Costa, P. T., & McCrae, R. R. (2005). *Priručnik: Revidirani* NEO *inventar ličnosti* (NEO-PI- R) I NEO petofaktorski inventar (NEO-FFI) (Manual for NEO-PI-R and NEO-FFI). Jastrebarsko, Croatia: Naklada Slap.

De Fruyt, F., De Bolle, M., McCrae, R. R., Terracciano, A., & Costa, P. T. (2009). Assessing the universal structure of personality in early adolescence: The NEO-PI-R and NEO-PI-3 in 24 cultures. Assessment, 16(3), 301-311.

Dempster, F. N. (1991). Inhibitory processes: A neglected dimension of intelligence. Intelligence, 15, 157-173.

DeYoung, C. G., Quilty, L. C., & Peterson, J. B. (2007). Between facets and domains: 10 aspects of the Big Five. Journal of Personality and Social Psychology, 93, 880-896.

Djapo, N., Kolenovic-Djapo, J., Djokic, R., & Fako, I. (2011). Relationship between Cattell's 16PF and fluid and crystallized intelligence Personality and Individual Differences, 51, 63–67.

Ekstrom, R. B., French, J. W., Harman, H. H., & Derman, D. (1976). Manual for kit of factor-referenced cognitive tests. Princeton, NJ: Educational Testing Service.

Goldberg, L R. (1999). A broad-bandwidth, public domain, personality inventory measuring the lower-level facets of several five-factor personality models. In I. Merviedle, I. Deary, F. De Fruyt, & F. Ostendorf (Eds.), Personality psychology in Europe. Tillberg, the Netherlands: Tillburg University Press.

Goldberg, L. R. (1990). An alternative" description of personality": The big-five factor structure. Journal of Personality and Social Psychology, 59, 1216-1229.

Goldberg, L. R., Johnson, J. A., Eber, H. W., Hogan, R., Ashton, M. C., Cloninger, C. R., & Gough, H. G. (2006). The International Personality Item Pool and the future of public-domain personality measures. Journal of Research in Personality, 40, 84-96.

Heaven, P. C. L., Ciarrochi, J., & Vialle, W. (2007). Conscientiousness and Eysenckian Psychoticism as predictors of school grades: A one-year longitudinal study. Personality and Individual Differences, 42, 535-546.

Hu, L., & Bentler, P. M. (1999). Critical cutoff for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. Structural Equation Modeling: A Multidisciplinary Journal, 6(1), 1-55.

Hunter, J. E., & Schmidt, F. L. (2004). Methods of meta-analysis: correcting error and bias in research findings (Vol. 2nd). Thousand Oaks, CA: Sage.

Jackson, D. N. (1998). Multidimensional aptitude battery II. Port Hurnon, MI: Sigma Assessment Systems, Inc.

Jensen, A. R. (1987). Individual differences in the Hick paradigm. In P. A. Vernon (Ed.), Speed of information-processing and intelligence. Northwood, NJ: Ablex.

Jöreskog, K.G. & Sörbom, D. (2006). LISREL 8.8 for Windows [Computer software]. Lincolnwood, IL: Scientific Software International, Inc.

Judge, T. A., Rodell, J. B., Klinger, R. L., Simon, L. S., & Crawford, E. R. (2013). Hierarchical representations of the Five-Factor Model of Personality in predicting job performance: Integrating three organizing frameworks with two theoretical perspectives. Journal of Applied Psychology, 98(6), 875-925.

Kim, L.E., Poropat, A., & MacCann, C. (in press). Conscientiousness: An examination of its nature, predictions, assessment and enhancement. To appear in: A. A. Lipnevich, F. Preckel, and R. D. Roberts (Eds.), Psychosocial skills and school systems in the twenty-first century: Theory, research, and applications. Springer.

Lee, K., & Ashton, M. C. (2004). Psychometric properties of the HEXACO Personality Inventory. Multivariate Behavioral Research, 39, 329-358.

Lee, I. A., & Preacher, K. J. (2013). Calculation for the test of the difference between two dependent correlations with one variable in common [Computer software]. Retrieved from http://quantpsy.org

Loo, C., & Wener, C. (1971). Activity level and motor inhibition: Their relationship to intelligence-test performance in normal children. Child Development, 42, 967-971.

Luciano, M., Wainwright, M. A., Wright, M. J., & Martin, N. G. (2006). The heritability of conscientiousness facets and their relationship to IQ and academic achievement. Personality and Individual Differences, 40, 1189-1199.

MacCann, C. (2013). Instructed faking of the HEXACO reduces facet reliability and involves more Gc than Gf. Personality and Individual Differences, 55, 828-833.

MacCann, C., & Roberts, R. D. (2013). Just as smart but not as successful: obese students obtain lower school grades but equivalent test scores to nonobese students. International Journal of Obesity, 37, 40-46.

MacCann, C., Duckworth, A.L., & Roberts, R.D. (2009). Empirical identification of the major facets of Conscientiousness. Learning and Individual Differences, 19, 451-458.

MacCann, C., Fogarty, G. & Roberts, R. D. (2012). Strategies for success in vocational education: Time management is more important for part-time than full-time students. Learning and Individual Differences, 22, 618-623.

MacCann, C., Fogarty, G. J., Zeidner, M., & Roberts, R. D. (2011). Coping mediates the relationship between emotional intelligence (EI) and academic achievement. Contemporary Educational Psychology, 36, 60-70.

MacCann, C., Joseph, D., Newman, D., & Roberts, R. D. (2014). Emotional intelligence is a second-stratum factor of intelligence: Evidence from hierarchical and bifactor models. Emotion, 42, 358-374.

McCrae, R. R. (2002). NEO-PI-R data from 36 cultures: Further intercultural comparisons. In R. R. McCrae & J. Allik (Eds.). The five-factor model of personality across cultures. (pp. 105-125). New York, NY: Springer.

McGrew, K. (2009). CHC theory and the human cognitive abilities project: Standing on the shoulders of the giants of psychometric intelligence research. Intelligence, 37, 1-1.

Moutafi, J., Furnham, A., & Crump, J. (2003). Demographic and personality predictors of intelligence: A study using the Neo Personality Inventory and the Myers-Briggs Type Indicator. European Journal of Personality, 17, 79-94.

Moutafi, J., Furnham, A., & Crump, J. (2006). What facets of openness and conscientiousness predict fluid intelligence score? Learning and Individual Differences, 16, 31–42.

Moutafi, J., Furnham, A., & Paltiel, L. (2004). Why is conscientiousness negatively correlated with intelligence? Personality and Individual Differences, 37, 1013-1022.

Ones, D. S., & Viswesvaran, C. (1996). Bandwidth–fidelity dilemma in personality measurement for personnel selection. Journal of Organizational Behavior, 17, 609-626.

Paunonen, S. V., & Ashton, M. C. (2001). Big five predictors of academic achievement. Journal of Research in Personality, 35, 78–90.

Paunonen, S. V., Rothstein, M. G., & Jackson, D. N. (1999). Narrow reasoning about the use of broad personality measures for personnel selection. Journal of Organizational Behavior, 20, 389-405.

Peabody, D., & De Raad, B. (2002). The substantive nature of psycholexical personality factors: A comparison across languages. Journal of Personality and Social Psychology, 83(4), 983-997.

Poropat, A. E. (2009). A meta-analysis of the five factor model of personality and academic performance. Psychological Bulletin, 135, 322-338.

Raven J. Advanced Progressive Matrices, Set II. London: H.K. Lewis; 1962.

Raven, J. C., Court, J. H., & Raven, J. (1994). *Manual for Raven's progressive matrices and* vocabulary scale. Oxford UK: Oxford Psychologies Press.

Raven, J., Raven, J. C., & Court, J. H. 1998. Manual for Raven's Progressive Matrices and Vocabulary Scales, Section 1: General overview. San Antonio, TX: Harcourt Assessment.

Roberts, B. W., Chernyshenko, O. S., Stark, S., & Goldberg, L. R. (2005). The structure of conscientiousness: An empirical investigation based on seven major personality questionnaires. Personnel Psychology, 58, 103-139.

Roberts, R. D., Goff, G. N., Anjoul, F., Kyllonen, P. C., Pallier, G., & Stankov, L. (2000). The Armed Services Vocational Aptitude Battery (ASVAB): Little More Than Acculturated Learning (Gc)!?. Learning and individual differences, 12(1), 81-103.

Roberts, R. D., & Lipnevich, A. A. (2011). From general intelligence to multiple intelligences: Meanings, models, and measures. In K. R. Harris, S. Graham, & T. Urdan (Eds.), APA educational psychology handbook, volume 2. (pp. 33-57). Washington, DC: APA.

Roberts, R. D., & Stankov, L. (1999). Individual differences in speed of mental processing and human cognitive abilities: Toward a taxonomic model. Learning and Individual Differences, 11(1), 1-120.

Salgado, J. F., Moscoso, S., Sanchez, J. I., Alonso, P., Choragwicka, B., & Berges, A. (2014). Validity of the five-factor model and their facets: The impact of performance measure and facet residualization on the bandwidth-fidelity dilemma. European Journal of Work and Organizational Psychology, 23(1), 3-30.

Salthouse, T.. A. (1993). Speed and knowledge as determinants of adult age differences in verbal tasks. Journal of Gerontology: Psychological Sciences, 48, 29–36.

Salthouse, T.A. (1993b). Influence of working memory on adult age differences in matrix reasoning. British Journal of Psychology. 84, 171–199.

Salthouse, T.A. (1993c). Speed mediation of adult age differences in cognition. Developmental Psychology, 29, 722–738.

Salthouse, T.. A., & Babcock, R. I. (1991). Decomposing adult age differences in working memory. Developmental Psychology, 27, 763-776.

Salthouse, T. A., Fristoe, N. E., & Rhee, S. H. (1996). How localized are age-related effects on neuropsychological measures?. Neuropsychology, 10, 272-285.

Saucier, G., & Ostendorf, F. (1999). Hierarchical subcomponents of the Big Five personality factors: a cross-language replication. Journal of Personality and Social Psychology, 76, 613-627.

Schmidt, F. L., & Hunter, J. E. (1998). The validity and utility of selection methods in personnel psychology: Practical and theoretical implications of 85 years of research findings. Psychological Bulletin, 2, 262-274.

Smith, G. T., McCarthy, D. M., & Anderson, K. G. (2000). On the sins of short-form development. Psychological assessment, 12(1), 102-111.

Soubelet, A, & Salthouse, T. A. (2011). Personality-cognition relations across adulthood. Developmental Psychology, 47, 303-310.

Stankov, L. (1997). Gf-gc quickie test battery. Sydney, Australia: E-intelligence Testing Products.

Steiger, J. H. (1980). Tests for comparing elements of a correlation matrix. Psychological bulletin, 87, 245-251.

von Stumm, S., Hell, B., & Chamorro-Premuzic, T. (2011). The hungry mind: Intellectual curiosity is the third pillar of academic performance. Perspectives on Psychological Science, 6, 574–588.

Tarbuk, D. (1977). Test 4/MFBT-*Rjecˇnik (Subtest 4/MFBT-Vocabulary). Priruc˙nik za* psihologijsko testiranje s pomoc´u multifaktorske baterije testova (Manual for the psychological assessment with the Multifactor test battery: form P-1). Zagreb, Croatia.

Wechsler, D. (1981). WAIS-R manual: Wechsler Adult Intelligence Scale. San Antonio, TX: Psychological Corporation.

Wechsler, D. (1997a). WAIS-III administration and scoring manual. San Antonio, TX: Psychological Corporation.

Wechsler, D. (1997b). Wechsler Adult Intelligence Scale: Third Edition. San Antonio, TX: Psychological Corporation.

Wechsler, D. (1997c). Wechsler Memory Scale—Third Edition. San Antonio, TX: Psychological Corporation.

Wood, P., & Englert, P. (2009). Intelligence compensation theory: A critical examination of the negative relationship between conscientiousness and fluid and crystallised intelligence. The Australian and New Zealand Journal of Organisational Psychology, 2, 19-29.

Woodcock, R. W., Johnson, M. B., & Mather, N. (1990). Woodcock-Johnson Test of Cognitive Ability (Standard and Supplemental Batteries: Examiner's Manual). Allen, TX: DLM.

Wright, M. J., & Martin, N. G. (2004). Brisbane Adolescent Twin Study: Outline of study methods and research projects. Australian Journal of Psychology, 56, 65-78. Zachary, R.A. (1986). Shipley Institute of Living Scale – Revised. Los Angeles, CA: Western Psychological Services.

Ziegler, M., Danay, E., Scholmerich, F., & Buhner, M. (2010). Predicting academic success with the big 5 rated from different points of view: Self-rated, other rated and faked. European Journal of Personality, 24, 341–355.

Table 1

Recent Research on the Relationship of Conscientiousness and Cognitive Ability

Study	C Facet	C Measure	G Facet	G Measure	N	r
Ackerman & Heggestad (1997)	General C	Meta-analytically derived	General G (g) Gf Gc	Meta-analytically derived	4,850 1,485 401	.02 -.05 .08
Beauducel, Liepmann, Felfe, & Nettelnstroth (2007)	General C	NEO-FFI (Costa & McCrae, 1992)	Gf Gc	Intelligence Structure Test 2000 R (Amthauer, Brocke, Liepmann, and Beauducel, 2001)	789	.05 -.07
Bratko, Butkovic, Vukasovic, Chamorro-Premuzic, and von Stumm (2012)	General C	NEO-FFI (Costa & McCrae, 1989, 2005)	General G	General Aptitude Test Battery (Tarbuk, 1977)	339 twin pairs	-.10 monozygotic -.08 Dizygotic
Ciarrochi, Heaven, & Skinner, T. (2012)	General C	Author-derived 16-item scale aligned with IPIP (Heaven, Ciarrochi, & Vialle, 2007)	General G	State-based standardized assessment	420	.16**
Djapo, Kolenovic-Djapo, Djokic, & Fako (2011)	Rule-Consc. Self-Control	Sixteen Personality Factors Questionnaire (16PF) (Cattell, Cattell, & Cattell, 1993)	Gf Gf	Raven's Advanced Progressive Matrices (Raven, Raven, & Court, 1998)	105	-.24* -.21*
	Rule-Consc. Self-Control		Gc Gc	Mill Hill Vocabulary Scale (Raven, Court, & Raven, 1994)	105	-.25** -.16

Table 1 (continued)

Luciano , Wainwright, Wright, Martin (2006)	6 facets	NEO-PI-R (Form S; Wright & Martin, 2004)	Gc Gv	Multidimensional Aptitude Battery (Jackson, 1998)	538 individuals in twin pairs	-.06 to .27*
MacCann (2013)	General C and 4 facets of C	HEXACO (Lee & Ashton, 2004)	Gf, Gc	Multiple measures[2]	185	-.13 to .05
Moutafi, Furnham & Crump (2003)	General C	NEO-FFI (Costa & McCrae, 1992)	General G	Graduate and Managerial Assessment: Abstract (GMA:A; Blinkhorn, 1985)	900	-.14**
Moutafi, Furnham & Crump (2006)	General C	NEO-FFI (Costa & McCrae, 1992)	Gf	Graduate and Managerial Assessment: Abstract (GMA:A; Blinkhorn, 1985)	2,658	-.11***
Moutafi, Furnham & Paltiel (2004)	General C	Fifteen Factor Questionnaire (15FQ) (Budd, 1992)	Gf	The General Reasoning Test Battery (GRT1) (Budd, 1993)	201	-.26***
Soubelet and Salthouse (2011)	General C	IPIP Big 5 (Goldberg; 1999)	Gf Gc Memory Speed	Multiple measures[3] Multiple measures[4] Multiple measures[5] Multiple measures[6]	2,317	.03[a] .08[a] .00[a] .10[a]
von Stumm, Hell, & Chamorro-Premuzic (2011)	General C	Meta-analytically derived	General G	Meta-analytically derived	12 studies, N = 608 - 28,471	-.04
Wood & Englert (2009)	4 facets from 15FQ; 3 facets From OPP	15FQ (Budd, 1992), OPP (Budd, 1991)	Gf Gc	General Reasoning Test 2 (Budd, 1993)	2 studies, N = 546 & 1,083	-.17*** -.29***

Table 1 (continued)

---

[1]New South Wales, Australia standardized assessment including both numerical (number, measurement, space, data, numeracy problem solving) and verbal (writing, reading, and language achievement) subtests combined to form a proxy for general intelligence (*g*).
[2]Letter Series (Gf) and Letter Counting (Gf) from the Gf/Gc Quickie Test Battery (Stankov, 1997). Syllogistic Reasoning (Gf) from the kit of factor-referenced cognitive tests (Ekstrom, French, Harman, & Derman, 1976). Analogies (Gc) from the Graduate Record examination. Vocabulary (Gc) from Ekstrom et al. (1976). General Knowledge (Gc) from an English translation of the Intelligenz-struktur-test (Amhauer, Brocke, Leipmann, & Beauducel, 2001).
[3]The cognitive tests were designed to assess fluid intelligence (Gf) with tests of reasoning and spatial visualization, crystallized intelligence (Gc) with tests of vocabulary, episodic memory with verbal memory tests, and perceptual speed with substitution and comparison tests. Tests of Gf included: Ravens Matrices (Raven, 1962); Shipley Abstraction (Zachary, 1986); Letter Sets (Ekstrom, French, Harman, Dermen, 1976); Spatial Relations (Bennett, Seashore & Wesman, 1997); Paper Folding (Ekstrom et al, 1976); Form Boards (Ekstrom et al, 1976).
[4]WAIS Vocabulary (Wechsler, 1997a); Picture Vocabulary (Woodcock, Johnson, & Mather 1990); Antonym Vocabulary (Salthouse, 1993a, 1993b, 1993c); Synonym Vocabulary (Salthouse, 1993a, 1993b, 1993c).
[5] Logical Memory (Wechsler, 1997c); Free Recall (Wechsler, 1997c); Paired Associates (Salthouse, Fristo, & Rhee, 1996).
[6]Digit Symbol (Wechsler, 1997b); Letter Comparison (Salthouse & Babcock, 1991); Pattern Comparison (Salthouse & Babcock, 1991); Digit Symbol test in WAIS-R (Wechsler, 1981); WAIS-III (Wechsler, 1997a).
[a]For three distinct age groups, Soubelet and Salthouse (2011) reported mulitple R^2 values for the relationship between Conscientiousness and each intelligence factor after controlling for the other four major personality factors. We calculated the square root of these values (i.e. multiple R) within each intelligence factor and report their respective averages across all age groups (weighted to account for differences in sample size across age groups). This was done to give an approximate indication of the partial correlation between conscientiousness and each intelligence factor.
Note. Consc. = Consciousness. $^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$.

Table 2

15 Subtests to Assess the Five Broad Cognitive Ability Dimensions

Assessment	Factor	Items	Format	Description
Analogies	Gc	30	Multiple choice	Each item presented a related pair of words in capital letters followed by five pairs of words in lowercase letters. The task for respondents was to select the lowercased pair that best expressed a relationship similar to that expressed in the capitalized pair.
Calendar Test	Gf	20	Multiple choice	A calendar was presented and respondents were required to answer items based on established rules specific to different calendar dates.
Cube Comparisons	Gv	42	Multiple choice	Each item presented two drawings of a cube, where each side of a cube had a different design, number, or letter represented. Respondents compared the cubes and indicated whether the drawings were of the same or different cubes.
Figure Classification	Gf	160	User response	A set of three geometrical figures was presented in groups of 2 or 3 that were alike with respect to a specific rule. Below the figures were 8 geometrical figures where the respondent assigned each of the 8 figures to one of the groups according to the established rule.
Hidden Patterns	Gv	200	User response	A geometric pattern was presented where a given configuration of a figure was embedded within the pattern. The task for respondents was to identify whether or not the given figure occurred within a pattern.
Letter Sets	Gf	15	Multiple choice	Each item presented five sets of four letters each; four of the sets of letters were alike. The task was for respondents to find the rule which related

Table 2 (continued)

				four of the sets and indicate which one of the sets did not fit the rule.
Mathematics Aptitude	Gq	15	Multiple choice	Mathematical word problems were presented which required algebraic concepts to be solved.
Necessary Mathematic Operations	Gq	15	Multiple choice	Mathematical word problems were presented and the task was for respondents to determine what numerical operations were required to solve the problems without actually carrying out the computations.
Opposites	Gr	8	User response	A target word was presented and respondents were asked to write up to six antonyms for each word.
Sentence Completion	Gc	30	Multiple choice	Each item presented an incomplete sentence and beneath this sentence, four words or phrases were listed. The task for respondents was to select the one word or phrase that best completed the sentence.
Subtraction and Multiplication	Gq	60	User response	Alternate items were presented where respondents were asked to either subtract 2-digit numbers from 2-digit numbers or multiply 2-digit numbers by single-digit numbers.
Surface Development	Gv	60	User response	This test required respondents to visualize how a piece of paper could be folded to form a kind of object. Drawings were presented of solid forms that were made with paper. Accompanying each drawing was a diagram showing how the paper might be cut and folded in order to create the solid form. One part of the diagram was marked with dotted lines or numbered edges to correspond to the same area in the drawing (marked by letters) and respondents were asked to indicate which lettered edges in the drawing corresponded to the numbered edges or dotted lines in the diagram.

Table 2 (continued)

Vocabulary	Gc	36	Multiple choice	This tests respondents' knowledge of word meanings. A target word was presented and four word choices were given where respondents were asked to indicate which word had the same meaning or nearly the same meaning as the target word.
Word Beginnings	Gr	2	User response	A set of letters was presented (e.g., "re") and respondents were asked to write as many words as possible that began with the given letter.
Word Endings	Gr	2	User response	A set of letters was presented (e.g., "ing") and respondents were asked to write as many words as possible that ended with the given letter.

Note. Crystallized Ability (Gc), Fluid Ability (Gf), Quantitative Reasoning (Gq), Retrieval Ability (Gr), and Visual-Spatial Ability (Gv). Subtests come from the Kit of Factor-Referenced Cognitive Tests (Ekstrom, French, Harman, & Dermen, 1976) or retired test items from various operational tests developed by the Educational Testing Service (ETS, Princeton).

Table 3

Standardized Factor Loadings From One-Factor and Eight-Factor CFA in the Current Sample, and Eight-Factor CFA Loadings as Reported in MacCann et al. (2009)

Item[a]	1-factor	8-factor	8-fac (MacCann)
Factor 1: Industriousness			
Q1: I accomplish a lot of work	**.67**	**.72**	**.84**
Q6: I am always prepared	**.69**	**.74**	**.83**
Q35: I do just enough work to get by (R)	**.58**	**.62**	**.84**
Q36: I do more than what's expected of me	**.61**	**.66**	**.75**
Q39: I do too little work (R)	**.62**	**.66**	**.76**
Q72: I make an effort	**.66**	**.71**	**.71**
Q87: I push myself very hard to succeed	**.71**	**.77**	**.87**
Q88: I put little time and effort into my work (R)	**.58**	**.62**	**.82**
Q114: I work hard	**.69**	**.75**	**.88**
Q115: I work too much	.26	.29	**.52**
Factor 2: Perfectionism			
Q28: I continue until everything is perfect	**.62**	**.79**	**.92**
Q29: I demand perfection in others	.08	.15	**.59**
Q30: I demand quality	**.36**	**.48**	**.74**
Q31: I detect mistakes	**.30**	**.41**	**.57**
Q53: I go straight for the goal	**.61**	**.77**	**.82**
Q106: I try to outdo others	.07	.17	**.37**

Table 3 (continued)

Q108: I want every detail taken care of	**.52**	**.66**	**.78**
Q110: I want to be in charge	.18	.29	**.47**
Q111: I want to be the very best	**.45**	**.58**	**.52**
Factor 3. Tidiness			
Q12: I am not bothered by disorder (R)	.25	**.34**	**.52**
Q13: I am not bothered by messy people (R)	.18	.26	**.51**
Q59: I leave a mess in my room (R)	**.41**	**.56**	**.80**
Q60: I leave my belongings around (R)	**.35**	**.48**	**.85**
Q63: I like to organize things	**.67**	**.86**	**.82**
Q67: I like to tidy up	**.47**	**.60**	**.68**
Q69: I love order and regularity	**.51**	**.64**	**.73**
Q71: I make a mess of things (R)	**.56**	**.72**	**.74**
Q79: I often forget to put things back in place (R)	**.42**	**.56**	**.69**
Factor 4. Procrastination Refrainment			
Q9: I am easily distracted (R)	**.45**	**.58**	**.73**
Q51: I get to work at once	**.52**	**.64**	**.81**
Q55: I have difficulty starting tasks (R)	**.56**	**.71**	**.73**
Q65: I like to take it easy (R)	.12	.18	**.38**
Q89: I put off unpleasant tasks (R)	**.41**	**.54**	**.67**
Q97: I start tasks right away	**.53**	**.66**	**.78**
Q112: I waste my time (R)	**.62**	**.78**	**.79**

Table 3 (continued)

Factor 5. Control			
Q2: I act impulsively when bothered (R)	**.33**	**.54**	**.50**
Q3: I act without planning (R)	**.53**	**.78**	**.84**
Q34: I do crazy things (R)	.20	**.35**	**.46**
Q40: I do unexpected things (R)	**-**	**-**	**.52**
Q70: I make a fool of myself (R)	**.41**	**.62**	**.56**
Q76: I make rash decisions (R)	.26	**.41**	**.68**
Q93: I resist authority (R)	**.37**	**.55**	**.50**
Q94: I rush into things (R)	**.41**	**.65**	**.76**
Factor 6. Caution			
Q15: I avoid mistakes	**.35**	**.41**	**.41**
Q18: I behave properly	**.52**	**.60**	**.56**
Q25: I choose my words with care	**.48**	**.56**	**.58**
Q68: I look at the facts	**.46**	**.54**	**.54**
Q73: I make careful choices	**.62**	**.72**	**.78**
Q103: I think ahead	**.68**	**.79**	**.82**
Q104: I think before I speak	**.36**	**.42**	**.63**
Factor 7. Task Planning			
Q4: I am a goal-oriented person	**.68**	**.74**	**.75**
Q37: I do things according to a plan	**.68**	**.75**	**.80**
Q46: I follow a schedule	**.62**	**.69**	**.75**

Table 3 (continued)

Q47: I follow directions	**.55**	**.60**	**.67**
Q64: I like to plan ahead	**.62**	**.69**	**.78**
Q75: I make plans and stick to them	**.58**	**.64**	**.76**
Q98: I stick to my chosen path	**.47**	**.53**	**.73**
Q99: I stick with what I decide to do	**.60**	**.65**	**.66**
Q113: I work according to a routine	**.53**	**.59**	**.76**
Factor 8. Perseverance			
Q8: I am easily discouraged (R)	**.43**	**.52**	**.62**
Q16: I avoid responsibilities (R)	**.60**	**.70**	**.64**
Q49: I forget to do things (R)	**.50**	**.60**	**.80**
Q52: I give up easily (R)	**.52**	**.62**	**.71**
Q74: I make careless mistakes (R)	**.47**	**.58**	**.65**
Q90: I quickly lose interest in the tasks I start (R)	**.56**	**.68**	**.76**
Q91: I react slowly (R)	.27	**.31**	**.50**
Q92: I remain calm under pressure	-	-	.28
Q116: My interests change quickly (R)	**.31**	**.39**	**.61**

Note. Identical item text was presented to subjects in both studies, although MacCann (2009) included 2 items not presented in the current study (Q40, Q92). All CFA models run using diagonally weighted least squares estimation. Salient loadings (≥ .30) are in bold text.
[a](R) = Item was reverse-keyed.

Table 4

Reliability *(Cronbach's alpha) and Intercorrelations* of Conscientiousness Facet Scores

		Facet score intercorrelations						
Conscientiousness facet	α	1	2	3	4	5	6	7
1. Industriousness	.85							
2. Perfectionism	.76	.49						
3. Tidiness	.79	.42	.25					
4. Procrastination refrainment	.76	.55	.22	.45				
5. Control	.74	.33	-.02^{NS}	.40	.46			
6. Cautiousness	.74	.60	.49	.36	.34	.41		
7. Task planning	.84	.68	.54	.48	.44	.34	.64	
8. Perseverance	.75	.57	.21	.44	.60	.53	.44	.43

Note. N = 722. Intercorrelations are Pearson product moment correlations between normalized T scores (M = 50, SD = 10). NS = Not statistically significant at $p < .01$.

Table 5

Intercorrelations between Facets of Conscientiousness and both Collegiate Grade Point Average and Cognitive Ability

				Correlations with Conscientiousness Facets (all M = 50, SD = 10)								
Measure	n	M	SD	1[a, d, e]	2 [c, e]	3 [c, e]	4 [c, d]	5 [d]	6 [e]	7 [c, e]	8 [c, d, e]	[9]
University GPA[b]	426	3.16	0.54	.28**	.16**	.08	.22**	.23**	.13**	.16**	.19**	.26**
Cognitive Ability												
General	699	0.01	0.95	.10**	.14**	-.02	-.14**	.12**	.22**	.07	.08*	.09*
Crystallized	706	0.00	0.93	.11**	.13**	-.03	-.12**	.13**	.22**	.06	.08*	.09*
Quantitative	706	0.00	0.77	.08*	.14**	.00	-.05	.05	.14**	.06	.07	.08*
Fluid	706	0.00	0.90	.10*	.10**	.02	-.13**	.12**	.19**	.09*	.10*	.10**
Visual	706	0.00	1.00	.05	.13**	-.01	-.08*	.06	.15**	.07	.05	.07
Retrieval	699	0.01	0.87	.07	.12**	-.04	-.12**	.03	.12**	.04	.00	.03

Table 5 (continued)

Personality												
Openness	722	3.57	0.51	.40**	.38**	.03	.11**	.01	.47**	.30**	.31**	.34**
Neuroticism	722	2.54	0.51	-.39**	-.11**	-.19**	-.39**	-.40**	-.37**	-.22**	-.65**	-.49**
Conscientiousness	722	3.42	0.44	.81**	.54**	.68**	.73**	.62**	.75**	.79**	.75**	1.00
Extraversion	722	3.26	0.46	.16**	.27**	-.07	-.07	-.39**	.05	.11**	.12**	.02
Agreeableness	722	3.49	0.31	.38**	.00	.21**	.12**	.31**	.39**	.30**	.28**	.35**

Note. Correlations are Pearson product moment correlations. *p < .05, **p < .01.
[a]Facets of Conscientiousness: 1. Industriousness, 2. Perfectionism, 3. Tidiness, 4. Procrastination Refrainment, 5. Control, 6. Cautiousness, 7. Task Planning, 8. Perseverance, [9]. General Conscientiousness.
[b]GPA = Grade Point Average. Sample restricted to students attending a 4-year university.
[c]The facet's correlation with GPA differs significantly from the correlation between Industriousness and GPA (Steiger's z-test, p < .05).
[d]The facet's correlation with GPA differs significantly from the correlation between Tidiness and GPA (Steiger's z-test, p < .05).
[e]The facet's correlation with GPA differs significantly from the correlation between General Conscientiousness and GPA (Steiger's z-test, p < .05).

Table 6

Stepwise Regression Analyses Predicting Collegiate GPA (N = 417)

	Industriousness			Perfectionism		
Variable	*β*, Step 1	*β*, Step 2	*β*, Step 3	*β*, Step 1	*β*, Step 2	*β*, Step 3
General Cognitive Ability (G)	.24**	.23**	.24**	.24**	.23**	.22**
Conscientiousness facet (Cf)		.27**	.24**		.14**	.12**
G x Cf			.08			.06
R^2	.06	.13	.14	.06	.08	.08
ΔR^2		.07	.01		.02	<.01
ΔF	26.35**	34.19**	2.72	26.35**	8.09**	1.58
	Tidiness			Procrastination Refrainment		
General Cognitive Ability (G)	.24**	.26**	.27**	.24**	.28**	.28**
Conscientiousness facet (Cf)		.10*	.07		.25**	.25**
G x Cf			.11*			<.01
R^2	.06	.07	.08	.06	.12	.12
ΔR^2		.01	.01		.06	.00
F for ΔR^2	26.35**	4.65*	4.22*	26.35**	29.22**	<.01
	Control			Cautiousness		
General Cognitive Ability (G)	.24**	.22**	.22**	.24**	.23**	.22**

Table 6 (continued)

Conscientiousness facet (Cf)		.22**	.22**		.10*	.09
G x Cf			.01			.07
R^2	.06	.11	.11	.06	.07	.07
ΔR^2		.05	.00		.01	<.01
F for ΔR^2	26.35**	22.61**	.05	26.35**	3.99*	2.05
	Task Planning			Perseverance		
General Cognitive Ability (G)	.24**	.24**	.25**	.24**	.24**	.24**
Conscientiousness facet (Cf)		.15**	.12*		.19**	.19**
G x Cf			.11*			-.01
R^2	.06	.08	.09	.06	.09	.09
ΔR^2		.02	.01		.03	.00
F for ΔR^2	26.35**	9.53**	5.25*	26.35**	15.62**	.02
	General Conscientiousness					
General Cognitive Ability (G)	.24**	.24**	.24**			
Conscientiousness (C)		.25**	.23**			
G x C			.06			
R^2	.06	.12	.12			
ΔR^2		.06	<.01			
F for ΔR^2	26.35**	28.87**	1.58			

Table 6 (continued)

		All Conscientiousness Facets
General Cognitive Ability	.24**	.24**
Industriousness		.28**
Perfectionism		.11
Tidiness		-.06
Procrastination Refrainment		.10
Control		.22**
Cautiousness		-.17**
Task Planning		-.07
Perseverance		-.04
R^2	.06	.18
ΔR^2		.12
F for ΔR^2	26.35**	7.55**

Note: General Cognitive Ability and each Conscientiousness facet were centered at their means.

*p < .05. **p < .01.

Appendix A. Correlations between All Study Variables

		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	N	722	722	722	722	722	722	722	426	699	706	706	706	706	706	699	722	722	722	722
	Conscientiousness Facets																			
1	Industriousness	.49**	.42**	.55**	.33**	.60**	.68**	.57**	.28**	.10**	.11**	.08*	.10*	.05	.07	.40**	-.39**	.81**	.16**	.38**
2	Perfectionism		.25**	.22**	-.02	.49**	.54**	.21**	.17**	.14**	.13**	.14**	.10**	.13**	.12**	.38**	-.11**	.54**	.27**	.00
3	Tidiness			.45**	.40**	.36**	.48**	.44**	.08	-.02	-.03	.00	.02	-.01	-.04	.03	-.19**	.68**	-.07	.21**
4	Procrastination Refrainment				.46**	.34**	.44**	.60**	.21**	-.14**	-.12**	-.05	-.13**	-.08*	-.12**	.11**	-.39**	.73**	-.07	.12**
5	Control					.41**	.34**	.53**	.24**	.12**	.13**	.05	.12**	.06	.03	.01	-.40**	.62**	-.39**	.31**
6	Cautiousness						.64**	.44**	.14**	.22**	.22**	.14**	.19**	.15**	.12**	.47**	-.37**	.75**	.05	.39**
7	Task Planning							.43**	.16**	.07	.06	.06	.09*	.07	.04	.30**	-.22**	.79**	.11**	.30**
8	Perseverance								.19**	.08*	.08*	.07	.10*	.05	.00	.31**	-.65**	.75**	.12**	.28**
9	University GPA									.24** a	.23** b	.18** b	.22** b	.14** b	.20** a	.06 d	-.08 d	.26** d	-.11* d	.14** d
	Cognitive Ability																			
10	General										.86** c	.66** c	.91** c	.70** c	.68** c	.36** c	-.16** c	.09* c	-.03 c	.23** c
11	Crystallized											.45**	.68**	.48**	.56** c	.41**	-.14**	.09*	-.04	.25**
12	Quantitative												.57**	.46**	.40** c	.15**	-.13**	.08*	-.04	.01
13	Fluid													.62**	.51** c	.26**	-.12**	.10**	-.05	.23**
14	Visual														.38** c	.24**	-.14**	.07	-.02	.07
15	Retrieval															.27** c	-.10** c	.03 c	.06 c	.16** c
	Personality																			
16	Openness																-.35**	.34**	.37**	.37**
17	Neuroticism																	-.49**	-.25**	-.20**
18	Conscientiousness																		.02	.35**
19	Extraversion																			.11**
20	Agreeableness																			

Note. *p < .05, **p < .01.
[a]N = 417.
[b]N = 419.
[c]N = 699.
[d]N = 426.