



Empirical identification of the major facets of Conscientiousness

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ABSTRACT

Conscientiousness is often found to predict academic outcomes, but is defined differently by different models of personality. High school students ($N = 291$) completed a large number of Conscientiousness items from different models and the Big Five Inventory (BFI). Exploratory and confirmatory factor analysis of the items uncovered eight facets: Industriousness, Perfectionism, Tidiness, Procrastination Refrainment, Control, Cautiousness, Task Planning, and Perseverance. Correlations between these facets and the BFI revealed that all facets related strongly to Conscientiousness. Criterion-related validity was demonstrated by relationships between facets and academic outcomes such as grade-point-average, disciplinary infractions, and attainment of academic honors. Compared to BFI Conscientiousness, Industriousness and Perfectionism showed significantly stronger prediction of absenteeism and cognitive test scores, respectively. Results are discussed in terms of the usefulness of facet scores, the interpretation of personality scores for selection, and the development of intervention programs.

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1. Introduction

Conscientiousness has been linked to a myriad of positive outcomes across educational, health, and personnel psychology, and appears to be the personality trait with the most predictive utility (e.g., Barrick & Mount, 1991; Bogg & Roberts, 2004; Poropat, 2009). Meta-analyses demonstrate that Conscientiousness correlates from .23 to .27 with college grades, and .21 with academic achievement at high school, with these relationships holding after accounting for general cognitive ability (Nofle & Robins, 2007; O'Connor & Paunonen, 2007; Poropat, 2009; Trapmann, Hell, Hirn, & Schuler, 2007). However, different models of personality define and measure Conscientiousness differently, and also propose different facet-level structures (e.g., Costa & McCrae, 1992; Lee & Ashton, 2004). Some aspects of Conscientiousness may correlate more highly with academic achievement than others; i.e., narrow facets of personality sometimes show higher criterion correlations than broad dimensions with outcome variables (e.g., Lounsbury, Sundstrom, Loveland, & Gibson, 2003; Paunonen & Ashton, 2001). The current research aims to clarify the underlying facets of Conscientiousness when many different personality models are considered, as well as to examine the relationship of different facets of Conscientiousness to academic achievement in a high school sample.

Table 1 summarizes existing empirical research on the structure of Conscientiousness. This research primarily used a psycho-lexical approach (i.e., adjectives), a circumplex model of personality, and undergraduate and workplace samples (Peabody & de Raad, 2002; Perugini & Gallucci,

1997; Roberts, Bogg, Walton, Chernyshenko, & Stark, 2004; Roberts, Chernyshenko, Stark, & Goldberg, 2005; Saucier & Ostendorf, 1999). Three facets were common to all five studies (Orderliness, Industriousness, and Responsibility/Reliability), a Control facet emerged in four studies, and Decisiveness and Conventionality facets emerged in two studies. The remaining facets of Persistence, Punctuality, Formality, and Virtue uniquely emerged in different studies. Since the circumplex model allows factor overlap, some Conscientiousness-facets were blends of Conscientiousness and another broad dimension (e.g., Responsibility/Reliability was a blend of Conscientiousness and Agreeableness). Thus, only three exclusively-Conscientiousness facets emerged from these analyses: *Orderliness*, *Industriousness*, and *Control*. Results from the current study are included in the final column of Table 1.

The current study follows directly this line of research, empirically examining the structure of Conscientiousness across multiple personality models. We introduce three key modifications. First, full-sentence items rather than adjectives or scale scores were used as the unit of analysis (items were drawn from the International Personality Item Pool [IPIP], Goldberg et al., 2006). In deciding which personality models to include, we considered definitions of Conscientiousness from the “big five” adjective analysis research as well as more recent questionnaire models of personality (Costa & McCrae, 1992; Digman & Takemoto-Chock, 1981; Fiske, 1949; French, 1953; Goldberg, 1990; Lee & Ashton, 2004; Norman, 1963; Trapnell & Wiggins, 1990; Tupes & Christal, 1992). Second, the explicit intention was to exclude any concepts that were not pure measures of Conscientiousness, in contrast to a theoretical starting point based on circumplex models. To accomplish this goal, an a priori set of item selection criteria included deleting items that predominantly assessed personality constructs other than Conscientiousness. Correlations

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Table 1

Underlying structure of Conscientiousness from five recent studies and current results.

	Perugini & Gallucci (1997)	Saucier & Ostendorf (1999)	Peabody & de Raad (2002)	Roberts et al. (2004)	Roberts et al. (2005)	Current study
Model	NEO/BFQ	ABF5C adjectives	AB5C adjectives	AB5C adjectives	Many (NEO, 16PF, CPI, Hogan, Jackson, MPQ, AB5C)	Many (see Appendix)
Unit analyzed	Adjectives	Adjectives	Adjectives	Adjectives	Scale scores	IPIP Items
Sample	Undergraduates (40%), employees (60%)	U.S. Undergraduates, German community volunteers	6 studies: 2× Italian, Hungarian, Dutch, Polish, Czech	Mostly undergraduates (89%)	Community sample	High school students
Analysis	EFA	EFA	Conceptual judgments	EFA	EFA	EFA/CFA
Factor 1	Meticulousness	Orderliness	Orderliness	Orderliness	Order	Tidiness + Task planning
Factor 2	Superficiality	Industriousness	Work	Industriousness	Industriousness	Industriousness + Perfectionism
Factor 3	Reliability ^a	Responsibility ^a	Responsibility ^a	Reliability ^a	Responsibility ^a	Control + Cautiousness
Factor 4	Recklessness	Decisiveness-consistency	Impulse control	Impulse control	Self-control	
Factor 5			Persistence ^a	Decisiveness	Traditionalism ^a	Procrastination
Factor 6				Conventionality ^a		Perseverance ^a
Factor 7						
Factor 8				Punctuality		
Factor 9				Formalness		
Factor 10					Virtue ^a	

Note. Factors from the current analysis have been re-ordered to show commonality across other models. Although some facet labels appear different, such as Superficiality and Industriousness, underlying content was similar.

^a These facets are a mix of C and other five-factor model dimensions.

between the Conscientiousness facet scores and scores on the five dimensions of the Big Five Inventory (BFI; Benet-Martínez & John, 1998) were then calculated to empirically check that the Conscientiousness facets related only to the Conscientiousness scores of the BFI, and not to the other four broad dimensions of personality. Third, an adolescent sample rather than an adult sample was used, necessitating further item-selection criteria. To ensure items were both developmentally and reading-age appropriate for a younger sample, items with difficult words, difficult grammar, and adult concepts were removed. The procedure for developing the initial item pool is described in more detail in the Appendix to this paper.

After structural analysis of Conscientiousness items is undertaken, the relationship between the identified Conscientiousness facets and different academic outcomes can be examined. The criterion space for academic achievement is conceptualized as participation in school life as well as grade-point-average and test scores, in line with recent suggestions that both cognitive and noncognitive components play a key role in school, workplace, and life success (e.g., Borghans, Duckworth, Heckman, & ter Weel, 2008; Camara, 2005; Matthews, Zeidner, & Roberts, 2006). Criteria for academic achievement examined include school grades, teacher-ratings, high-stakes cognitive test performance, school attendance, attendance at sports, disciplinary infractions, a place on the school's "honor role", and holding office within a school organization (e.g., yearbook committee chair).

1.1. Aims and expectations

There are three aims of this study. First, to describe the underlying factors explaining Conscientiousness in a high school sample, with the expectation that Orderliness, Industriousness, and Control will emerge as major factors. Second, to test the relationship of these Conscientiousness facets with the five-factor dimensions from the BFI, with the expectation that Conscientiousness facet scores will relate most strongly to BFI Conscientiousness scores and be relatively independent from the other four dimensions of the BFI (i.e., correlate less than .30, based on Cohen's (1988) rubric that less than .30 is small). Third, to examine the relationship of Conscientiousness and its facets with academic outcomes (report-card grades, test scores, attendance, academic honors and election to a school office), with the expectations that: (a) different facets of Conscientiousness will show different relationships to these outcomes, and (b) some Conscientiousness facets may show higher criterion-correlations than the broad Conscientiousness dimension of the BFI.

2. Method

2.1. Sample

Participants ($N = 291$, 58% female) were freshmen ($n = 52$), sophomores ($n = 82$), juniors ($n = 75$), and seniors ($n = 82$) from a large private high school on the East Coast of the U.S. Age ranged from 13 to 19 years ($M = 16.35$, $SD = 1.23$).

2.2. Test battery

2.2.1. Conscientiousness

Students rated 117 items (51 reverse-keyed) drawn from the IPIP (Goldberg et al., 2006) on a five-point scale from "Not at all like me" (1) to "Very much like me" (5). Items represented 18 IPIP scales relating to Conscientiousness content (e.g., Industriousness, Prudence), and were drawn from 12 different personality models. The selection of these 117 items is described in more detail in the Appendix.

2.2.2. The Big Five Inventory (BFI; Benet-Martínez & John, 1998)

Each of the Big Five personality factors were assessed with 8 to 10 items, and test-takers rated their agreement with an overall total of 44 items on a five-point scale from "Disagree Strongly" (1) to "Agree Strongly" (5). For example, "worries a lot" (Neuroticism).

2.2.3. Teacher ratings of students' social behaviors

For each student, one teacher rated the student's positive classroom behaviors, using a 13-item scale (e.g., "Communicates well", "Behaves in an open and friendly manner"). Each item was rated on the following 5-point scale: "Below Average" (1), "Average" (2), "Above Average" (3), "Outstanding" (4), and "Truly Exceptional" (5).

2.3. Procedure

Students were emailed a link to a computerized assessment battery that included the Conscientiousness items and the BFI as well as several other tests not reported in this study. Students completed the tests in their own time. The school provided the researchers with students' school records, including Secondary School Admission Test percentiles (SSATs), grade point average (GPA), and behavioral indexes (number of absences from class and sport, attainment of high honors, and number of school offices held). For each student, a teacher from one of their enrolled classes

completed the teacher-rating form. All tests and protocols were approved under the ETS human subjects review committee and fairness review process.

3. Results

3.1. Exploratory factor analysis of Conscientiousness items

Parallel analysis of the 117 IPIP items indicated that nine factors be extracted. Accordingly, nine EFAs with between one and nine factors were conducted with maximum likelihood extraction and oblimin rotation. Meaningful factors were extracted from the one-factor through to the seven-factor solution (these factors are described in more detail in the [Appendix](#)). However, the eight-factor solution produced a five-item factor where three of the items had salient ($>.30$) cross loadings on another factor. Two of these three items were removed, along with four items that did not load saliently on any of the ten analyses, and EFAs were re-run. This time, the eight-factor solution was meaningful, but the nine-factor solution produced a triplet. The eight factors were best described by the following construct labels: (a) *Industriousness* (“I make an effort”, “I am always prepared”); (b) *Perfectionism* (“I want to be the very best”, “I demand quality”); (c) *Tidiness* (“I like to tidy up”, “I leave a mess in my room” [reverse-keyed]); (d) *Procrastination Refrainment* (“I get to work at once”, “I am easily distracted” [reverse-keyed]); (e) *Control* (“I rush into things” [reverse-keyed], “I do unexpected things” [reverse-keyed]); (f) *Cautiousness* (“I think before I speak”, “I make careful choices”); (g) *Task Planning* (“I follow a schedule”, “I work according to a routine”); and (h) *Perseverance* (“I give up easily” [reverse-keyed], “I am easily discouraged” [reverse-keyed]).

3.2. Reduction of the item pool for CFA

For each factor, the ten highest-loading items were retained. Items with substantial cross-loadings were then removed, (unless this resulted in less than eight items per factor), as were items with low item-total correlations ($<.30$), or items that lowered the Cronbach alpha reliability of the scale. The remaining 68 items and their EFA factor loadings are shown in [Table 2](#).

3.3. Confirmatory factor analysis (CFA) of Conscientiousness items

CFA was run with LISREL v8.8, using a Diagonally-Weighted-Least-Squares estimator, setting the variances of the latent variables to 1.00, and inputting a matrix of polychoric correlations and matrix of asymptotic co-variances (no cross-loadings were included). Two models were run: (a) a one-factor model (Satorra-Bentler $\chi^2 = 10875$, $df = 2210$), and (b) an eight-factor model (Satorra-Bentler $\chi^2 = 4932$, $df = 2182$). Factor loadings for both these models are shown in [Table 2](#). The one-factor model showed low loadings for the Perfectionism and Control items, and generally did not demonstrate a good fit to the data (RMSEA = .116; 90% CI of the RMSEA = .114, .118; CFI = .853; GFI = .875). In comparison, all but one item loaded saliently on the eight-factor model (the item “I remain calm under pressure” loaded at .28, and was retained in the interests of content coverage). The eight-item solution showed good fit to the data (RMSEA = .066; 90% CI of the RMSEA = .064, .068; CFI = .953; GFI = .935). The AIC estimate for the eight factor model was less than half that of the one-factor model, indicating a large improvement in fit (5259.669 versus 11147.467).

3.4. Reliability and descriptive statistic for Conscientiousness scales and criterion variables

Reliability and descriptive statistics for the continuous variables in this study are shown in [Table 3](#). Reliability was acceptable for all Conscientiousness scales with alphas ranging from .80 to .91. Facet means ranged from 2.95 to 3.87 out of 5. Reliability was acceptable for all criterion

variables, ranging from .79 to .95. SSAT percentiles averaged 85, compared to a national median of 50.

3.5. Relationships of Conscientiousness facets to the broad dimensions of the Big Five

[Table 3](#) shows the correlations of the BFI scales with the Conscientiousness facet scales. All eight facets correlated more highly with broad Conscientiousness than with the other four broad dimensions. However, both Control and Perseverance showed salient relationships with other dimensions of personality: Control correlated at .32 with Agreeableness and Perseverance correlated at $-.55$ with Neuroticism.

3.6. Relationships of Conscientiousness facets to academic outcomes

The associations of broad Conscientiousness, and its underlying facets, with continuously- and dichotomously-scored academic outcomes are presented in [Tables 3 and 4](#), respectively. All facets but Tidiness related to teacher ratings, absenteeism, and attainment of high honors, and all but Tidiness and Control significantly related to GPA (although correlations were small, ranging from .12 to .23). All facets but Perfectionism predicted disciplinary infractions, although Perfectionism was the only facet with a significant, positive relationship with performance on a high-stakes aptitude test (i.e., SSAT percentiles). Broad Conscientiousness and its various facets were unrelated to students holding office. There were two cases in which a facet of Conscientiousness showed a significantly stronger relationship to criteria than broad Conscientiousness: (a) Perfectionism related more strongly related to SSAT percentiles (and was the only facet to show a non-trivial positive relationship), and (b) Industriousness related more strongly to absence from class (students with no recorded absences scored almost a standard deviation higher on Industriousness than students with one or more recorded absences – a very large effect size).

4. Discussion

In this study, eight factors of Conscientiousness were identified. These facets proved to be important predictors of academic outcomes, particularly absenteeism (although these facets did not invariably show superior prediction over broad Conscientiousness in every instance). Implications and integration with previous work are discussed in terms of the study's primary aims.

4.1. Aim 1: Factorial structure of Conscientiousness

The eight-factor structure of Conscientiousness uncovered factors similar to the Orderliness, Industriousness, and Control factors identified in previous research (e.g., [Perugini & Gallucci, 1997](#); [Roberts et al., 2004, 2005](#); [Saucier & Ostendorf, 1999](#)). However, orderliness split into ordering of tasks and time (Task Planning) and ordering of physical possessions (Tidiness). Relationships with other variables indicated that these were separate constructs: Although both related to GPA and teacher ratings, Tidiness did not relate to absences or a place on the honors list, and in fact showed a negative relationship with SSAT percentiles. In contrast, Task Planning related to absenteeism and attaining high honors. Similarly, the control construct differentiated into two factors in the current study: Control of impulses (Control) and carefulness (Cautiousness). Our analysis suggested three additional factors: Perfectionism, Procrastination Refrainment, and Perseverance.

4.2. Aim 2: Relationship of Conscientiousness facets to the Big Five factors

Like [Peabody and de Raad \(2002\)](#), we uncovered a Persistence-like factor (Perseverance) that was not located wholly within the Conscientiousness domain (overlapping with Neuroticism in this study, Extraversion in Peabody and de Raad). As the goal of this study

Table 2

Factor loadings from EFA, one-factor CFA, and eight-factor CFA for final 68 Conscientiousness items used to form the Conscientiousness sub-scales.

	EFA								CFA	
	F1	F2	F3	F4	F5	F6	F7	F8	1-fac	8-fac
<i>F1 Industriousness: 10 Items</i>										
Q1: I accomplish a lot of work.	.69	.14	.03	.08	.05	-.05	-.04	.08	.75	.84
Q6: I am always prepared.	.47	.19	.09	.10	.15	-.08	-.22	.03	.74	.83
Q35: I do just enough work to get by. [R]	.72	-.05	.04	.09	.12	.07	.05	.09	.75	.84
Q36: I do more than what's expected of me.	.62	.19	.05	.03	-.10	.18	.02	-.02	.67	.75
Q39: I do too little work. [R]	.75	-.07	.02	.17	.10	-.14	-.01	-.01	.67	.76
Q72: I make an effort.	.53	-.02	.01	-.18	.03	.11	-.10	.16	.62	.71
Q87: I push myself very hard to succeed.	.63	.11	.01	-.15	-.03	.18	-.08	.20	.78	.87
Q88: I put little time and effort into my work. [R]	.69	-.05	.08	-.09	.14	.07	.00	.04	.73	.82
Q114: I work hard.	.70	.10	-.06	-.13	.03	.12	-.08	.15	.80	.88
Q115: I work too much.	.62	.01	.07	-.27	.01	.03	-.09	-.16	.45	.52
<i>F2 Perfectionism: 9 Items</i>										
Q28: I continue until everything is perfect.	.33	.49	.24	.07	.00	.15	.07	.00	.66	.92
Q29: I demand perfection in others.	-.06	.73	.06	.18	-.01	.00	-.03	-.17	.35	.59
Q30: I demand quality.	.09	.68	.00	.11	.00	.12	-.04	-.13	.47	.74
Q31: I detect mistakes.	-.01	.69	.06	.02	.00	.21	.15	-.03	.35	.57
Q53: I go straight for the goal.	.14	.36	-.05	.18	-.02	.02	-.23	.20	.59	.82
Q106: I try to outdo others.	.00	.62	-.09	-.06	.06	-.19	-.05	.06	.17	.37
Q108: I want every detail taken care of.	.10	.47	.16	-.17	.04	.14	-.15	.04	.54	.78
Q110: I want to be in charge.	.00	.51	.09	-.23	-.10	-.20	-.13	.29	.27	.47
Q111: I want to be the very best.	.04	.56	-.05	-.24	.03	.04	-.11	.02	.29	.52
<i>F3 Tidiness: 9 Items</i>										
Q12: I am not bothered by disorder. [R]	.00	.02	.66	-.16	.01	-.04	.01	-.07	.32	.52
Q13: I am not bothered by messy people. [R]	-.04	.22	.68	.01	.01	-.04	.13	-.15	.31	.51
Q59: I leave a mess in my room. [R]	.08	-.15	.81	.08	-.03	-.01	.00	-.02	.57	.80
Q60: I leave my belongings around. [R]	.12	-.12	.68	.09	.05	.00	-.02	.08	.62	.85
Q63: I like to organize things.	-.03	.08	.55	-.07	-.07	.17	-.34	-.12	.59	.82
Q67: I like to tidy up.	-.05	-.01	.73	-.12	-.12	.18	-.11	-.12	.47	.68
Q69: I love order and regularity.	.02	.25	.46	-.03	.17	-.04	-.26	-.20	.53	.73
Q71: I make a mess of things. [R]	-.02	-.02	.48	.07	.18	.13	.07	.29	.55	.74
Q79: I often forget to put things back in their proper place. [R]	-.04	-.07	.59	.17	-.02	.03	.03	.23	.49	.69
<i>F4 Procrastination Refrainment: 7 Items</i>										
Q9: I am easily distracted. [R]	.19	-.05	.07	.34	.24	.03	-.03	.28	.70	.73
Q51: I get to work at once.	.26	.02	.09	.45	-.01	.10	-.34	-.08	.62	.81
Q55: I have difficulty starting tasks. [R]	.34	-.09	.11	.41	.01	-.05	-.10	.23	.32	.73
Q65: I like to take it easy. [R]	.22	.09	-.07	.38	.08	.10	.00	-.15	.56	.38
Q89: I put off unpleasant tasks. [R]	.13	-.10	.15	.40	.02	.18	-.09	.17	.67	.67
Q97: I start tasks right away.	.23	-.04	.13	.42	-.04	.03	-.39	-.05	.67	.78
Q112: I waste my time. [R]	.35	-.08	.10	.39	.00	.05	-.08	.26	.61	.79
<i>F5 Control: 8 Items</i>										
Q2: I act impulsively when something is bothering me. [R]	-.04	-.20	.10	.04	.36	.14	-.06	.14	.32	.50
Q3: I act without planning. [R]	.10	-.09	.26	-.03	.30	.09	-.28	.10	.60	.84
Q34: I do crazy things. [R]	-.06	.06	-.01	.05	.73	.10	.02	-.14	.29	.46
Q40: I do unexpected things. [R]	-.04	.14	.05	.09	.78	-.11	.01	-.05	.33	.52
Q70: I make a fool of myself. [R]	-.11	.11	.05	.24	.45	.29	.18	.11	.38	.56
Q76: I make rash decisions. [R]	.13	-.06	.15	.04	.33	.19	.08	.14	.47	.68
Q93: I resist authority. [R]	.14	-.14	-.02	-.08	.53	.00	-.17	.00	.34	.50
Q94: I rush into things. [R]	.14	-.13	.09	.03	.40	.26	.00	.14	.53	.76
<i>F6 Caution: 7 Items</i>										
Q15: I avoid mistakes.	.04	.19	-.10	.05	.22	.29	-.12	-.19	.32	.41
Q18: I behave properly.	.02	.08	-.02	-.05	.23	.34	-.15	.06	.45	.56
Q25: I choose my words with care.	.09	.05	.12	.02	-.11	.63	.03	.01	.46	.58
Q68: I look at the facts.	-.01	.27	.02	-.09	-.01	.30	-.11	.16	.42	.54
Q73: I make careful choices.	.21	.08	.04	-.14	.11	.41	-.23	.03	.62	.78
Q103: I think ahead.	-.02	.07	.12	-.14	.02	.41	-.41	.19	.65	.82
Q104: I think before I speak.	-.11	-.01	.06	.00	.14	.73	-.06	.09	.49	.63
<i>F7 Task Planning: 9 Items</i>										
Q4: I am a goal-oriented person.	.24	.21	.04	.04	-.09	-.05	-.37	.23	.64	.75
Q37: I do things according to a plan.	.18	.04	.12	-.04	.07	.04	-.61	-.08	.68	.80
Q46: I follow a schedule.	.11	.02	.10	.08	.02	-.02	-.69	-.14	.63	.75
Q47: I follow directions.	.14	.18	.02	-.10	.29	.07	-.33	.07	.58	.67
Q64: I like to plan ahead.	.02	.04	.26	.00	-.05	.13	-.62	-.09	.66	.78
Q75: I make plans and stick to them.	.07	.03	.03	.09	.03	.01	-.60	.17	.65	.76
Q98: I stick to my chosen path.	-.05	.16	-.01	.23	.13	.08	-.47	.11	.61	.73
Q99: I stick with what I decide to do.	-.03	.12	-.01	.18	.00	.03	-.48	.19	.56	.66
Q113: I work according to a routine.	.00	.16	.23	-.05	.10	-.09	-.65	-.07	.65	.76

Table 2 (continued)

	EFA								CFA	
	F1	F2	F3	F4	F5	F6	F7	F8	1-fac	8-fac
<i>F8 Perseverance: 9 Items</i>										
Q8: I am easily discouraged. [R]	.11	.01	.01	.13	.09	.07	.08	.53	.48	.62
Q16: I avoid responsibilities. [R]	.14	–.09	.05	.03	.06	.09	–.16	.39	.51	.64
Q49: I forget to do things. [R]	.16	.12	.20	.17	.19	–.17	–.11	.40	.64	.80
Q52: I give up easily. [R]	.25	–.06	–.04	.00	.09	.04	.06	.61	.55	.71
Q74: I make careless mistakes. [R]	.03	–.05	.15	.16	.06	.17	–.04	.36	.51	.65
Q90: I quickly lose interest in the tasks I start. [R]	.28	–.07	.04	.06	.09	.10	–.06	.45	.60	.76
Q91: I react slowly. [R]	.03	.12	.08	.09	.15	.03	.11	.38	.38	.50
Q92: I remain calm under pressure.	–.18	.04	–.07	.10	–.03	.17	.04	.50	.19	.28
Q116: My interests change quickly. [R]	.15	–.07	–.03	.06	.23	.01	–.09	.38	.47	.61

Note. EFA was run on 111 items using Maximum Likelihood estimator and Oblimin Factor rotation. One-factor and eight-factor CFA was run on 68 items using DWLS estimation. Salient loadings ($\geq .30$) are shown in bold text.

was to locate the underlying facets only within the Conscientiousness factor space (and not across the other four broad dimensions), we might in fact conclude that there are *seven* facets of Conscientiousness, with Perseverance better considered a facet crossed between Neuroticism and Conscientiousness.

4.3. Aim 3: Prediction of outcomes

The expectation that different facets would show different patterns of correlation with the criteria was met. Industriousness was the most predictive facet, showing moderate to large relationships with all criteria except for the SSAT and holding school office (which did not relate to any facet, nor to broad Conscientiousness), whereas Tidiness was the least predictive, showing small relationships to disciplinary infractions, GPA, and teacher-ratings, but to no other criteria. The hypothesis that facets of Conscientiousness might yield higher criterion validity than the broad dimension also received some support. Compared to broad Conscientiousness, Industriousness was a stronger predictor of absences, and Perfectionism was a stronger predictor of SSAT percentiles. Perfectionism showed among the lowest relationships to grades, teacher ratings, absences, and discipline, but did relate reasonably highly to attaining high honors, suggesting that this facet may predict a narrow range of high-stakes achievement scores.

The different relation of different facets to criterion measures supports selecting a faceted rather than one-factor model of Conscientiousness. For example, the one-factor model showed low loadings for Perfectionism

items, yet Perfectionism was the only significant predictor of higher percentiles at the SSAT (a high-stakes achievement test). If a one-factor model instead of an eight factor model was used to represent Conscientiousness, few Perfectionism items would be selected for scale development, such that little relationship with the SSAT would be observed. Conversely, although Tidiness items all loaded saliently on the one-factor model, Tidiness showed poor criterion validity (was unrelated to absences and academic honors, and in fact significantly negatively related to SSAT percentiles), such that inclusion of Tidiness items in a general Conscientiousness scale might be expected to lower criterion prediction. In conjunction with fit indices justifying the appropriateness of a more complex model, such criterion correlations indicate the usefulness of considering both facets and the broad domain of Conscientiousness.

4.4. Implications and future directions

Linking specific aspects of personality to specific criteria is important both for assessment, and for training and intervention purposes. In a selection context, personnel psychologists might consider Industriousness scales if face-time at the job was an important consideration, but consider Perfectionism scales if performance in high-stakes competitive situations was a key criterion. In terms of interventions, it is clear that training or encouraging Conscientious-related behaviors should be tailored to the most useful facets. For example, Tidiness was not strongly related to most academic outcomes, whereas Industriousness related quite strongly. If there is limited time in an academic readiness training program, a

Table 3

Descriptive statistics, correlations between Conscientiousness facet summed scores (lower left) and factor scores (upper right), and correlations of criterion variables with BFI Conscientiousness and facets.

	Descriptive statistics					Correlations: BFI C scores and C facets							
	N	α	Mean	SD	C	1	2	3	4	5	6	7	8
1. Industriousness	291	.91	3.87	0.76			.47**	.39**	.75**	.50**	.65**	.59**	.66**
2. Perfectionism	291	.85	3.53	0.73		.38**		.24**	.29**	.16**	.58**	.56**	.29**
3. Tidiness	291	.88	3.39	0.84		.35**	.25**		.52**	.49**	.40**	.57**	.34**
4. Procrastination	291	.81	2.95	0.82		.64**	.24**	.41**		.59**	.54**	.61**	.77**
5. Control	291	.80	3.30	0.71		.40**	.11	.40**	.50**		.56**	.44**	.58**
6. Cautiousness	291	.80	3.71	0.64		.53**	.47**	.34**	.43**	.44**		.67**	.55**
7. Task planning	291	.89	3.37	0.76		.54**	.51**	.52**	.54**	.37**	.55**		.45**
8. Perseverance	291	.83	3.74	0.65		.52**	.25**	.29**	.64**	.47**	.44**	.42**	
E: Extraversion	277	.88	3.37	.79		.13*	.14*	–.05	.10	–.19**	–.07	.09	.23**
A: Agreeableness	277	.80	3.70	.61		.25**	–.15*	.18**	.27**	.32**	.27**	.16**	.29**
C: Conscientiousness	277	.84	3.56	.67		.68**	.41**	.52**	.72**	.48**	.51**	.70**	.68**
N: Neuroticism	277	.83	2.82	.72		–.08	–.02	–.01	–.29**	–.17**	–.11	–.13*	–.55**
O: Openness	277	.79	3.75	.57		.13*	.04	–.05	–.05	–.17**	.15*	–.10	.03
Teacher Ratings	175	.95	4.03	.78	.34**	.29**	.08	.16*	.24**	.26**	.20**	.16*	.21**
GPA	275		3.19	.53	.23**	.20**	.07	.14*	.06	.23**	.20**	.13*	.12*
SSAT percentiles	273		85.74	14.03	–.03	.02	.16**	–.19**	–.02	–.03	.03	–.11	.02

Note. Facet-level correlations with teacher ratings, GPA, and SSAT percentiles significantly different from broad-Conscientiousness are marked as follow: **Bold text** = Facet > Broad C ($p < .05$), Dotted underline = Facet < Broad C ($p < .05$), Underline = Facet < Broad C ($p < .01$). Significance was determined using the Fisher r -to- z transformation.

* $p < .05$, ** $p < .01$.

Table 4

Conscientiousness score effect sizes for differences in groups without and with recorded class absences, sports absences, disciplinary infractions, high honors, or holding a school office.

	Class absence ($n_1 = 85$, $n_2 = 206$)	Sport absence ($n_1 = 38$, $n_2 = 253$)	Disciplinary infraction ($n_1 = 73$, $n_2 = 218$)	High honors ($n_1 = 122$, $n_2 = 169$)	Office holder ($n_1 = 70$, $n_2 = 221$)
Industriousness	-0.92**	-0.55**	-0.60**	0.62**	0.07
Perfectionism	-0.31*	-0.16	-0.09	0.43**	0.09
Tidiness	-0.18	-0.31	-0.30*	0.10	0.12
Procrastination	-0.76**	-0.52**	-0.53**	0.29*	0.00
Control	-0.55**	-0.43*	-0.54**	0.34**	0.16
Cautiousness	-0.28*	-0.19	-0.27*	0.33**	0.01
Task planning	-0.55**	-0.63**	-0.40**	0.36**	0.00
Perseverance	-0.47**	-0.54**	-0.31*	0.34**	0.22
BFI Conscientiousness	-0.69**	-0.83**	-0.61**	0.51**	0.09

Note. n_1 = meets condition (has a recorded absence, infraction, high honors, or holds office); n_2 = does not meet condition. Effect size = Cohen's d (mean difference/pooled standard deviation; small = .20; medium = .50, large = .80), with significance evaluated using the t -test. Facet effects significantly different from broad Conscientiousness effects (using a 2-tailed t -test) are marked as follows: **Bold text** = Facet > Broad C ($p < .01$); Underline = Facet effect < Broad C ($p < .01$); Dotted underline = Facet < Broad C ($p < .05$).

* $p < .05$, ** $p < .01$.

program teaching students that effort and hard work pays off (e.g., Blackwell, Trzesniewski, & Dweck, 2007) may ultimately be more successful than program that teaches effective organization of learning materials.

Given the probability of different personality structures at different ages (e.g., Soto, John, Gosling, & Potter, 2008) the eight-factor structure needs to be replicated across adult and childhood samples, as well as adolescents. In fact, the model may also need replication in less able adolescent samples, given that personality may be more differentiated at high levels of ability (e.g., Brand, Egan, & Deary, 1994), and that the high SSAT percentiles of the current sample imply high levels of ability. In addition, if Conscientiousness items were intermixed with items from other scales (e.g., Extraversion, Neuroticism), rather than presented as a single block, this might feasibly affect factor structure or criterion correlations through the effects of item context (e.g., Weinberger, Darkes, Del Boca, Greenbaum, & Goldman, 2006).

Findings illustrate the importance of considering personality at the facet level rather than as broad over-arching dimensions and of integrating different personality models that have the Big Five as a base. This research also highlights the importance of expanding the criterion space to include behavioral indexes such as absenteeism. Such research might be particularly useful in both education and personnel psychology for selection and training applications, and indicate ways that interventions might be more efficiently administered.

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Appendix

This appendix provides further methodological detail on the process for obtaining the final eight-factor structure of Conscientiousness. The working definition of Conscientiousness is given, and three scale development stages are described: (a) scale selection from the International Personality Item Pool; (b) theoretical criteria for a priori item exclusion from the test battery; and (c) results from exploratory factor analyses illustrating the results of a one-factor through to ten-factor solution.

Definition of Conscientiousness

In defining the content coverage of Conscientiousness, the panel considered both the canon of research findings from the “big five” adjective research, and the later personality models derived from questionnaire data. Adjectives defining a broadly similar “Conscientiousness” factor included: (a) orderliness, responsibility, conscientiousness, perseverance and conventionality (Tupes & Christal, 1992); (b) fussy, tidy, responsible, scrupulous, and persevering versus careless, undependable, unscrupulous, quitting, and fickle (Norman, 1963); (c) industry, order, organization, efficiency, dependability, reliability, formality, precision, caution, punctuality, thrift, grace, religiosity, and dignity versus negligence, disorganization, irreverence, inconsistency, forgetfulness, provinciality, intemperance, sloth (Goldberg, 1990); (d) Organized, orderly, tidy, neat, efficient, planful, systematic, thorough, and self-disciplined versus disorganized, unordered, unsystematic, untidy, unplanful, inefficient, undisciplined, unreliable, reliable, forgetful (Trapnell & Wiggins, 1990). Different labels for the Conscientiousness factor have variously been suggested as “Dependability”, “Conformity” and “Will to Achieve” (Digman & Takemoto-Chock, 1981; Fiske, 1949; French, 1953). Faceted questionnaire models of Conscientiousness include facets of Competence, Order, Dutifulness, Achievement-Striving, Self-Discipline, Deliberation, Organization, Diligence, Perfectionism, and Prudence (Costa & McCrae, 1992; Lee & Ashton, 2004).

A. Scale selection from the International Personality Item Pool (IPIP, <http://ipip.ori.org>)

A panel of three trained personality psychologists (i.e., the authors) reviewed each scale from the IPIP, selecting 18 scales conceptually representing Conscientiousness. The panel discussed each scale to consensus, such that scales were selected only if all three agreed on inclusion. The panel examined all scales that were based on theoretical model of Conscientiousness, or theoretical model of a similar construct (as related to the adjective-based composition of Conscientiousness). All subscales of the NEO-PI-R and HEXACO-PI sub-scales were examined. Scales that included a substantial number of items (i.e., one third or more) thought to represent Agreeableness, Extraversion, Neuroticism, or Openness to Experience were discarded.

The final 18 scales included were: (a) Achievement Striving; (b) Activity; (c) Cautiousness; (d) Deliberation; (e) Diligence; (f) Dutifulness; (g) Efficiency; (h) Enthusiasm; (i) Industriousness; (j) Initiative; (k) Methodicalness; (l) Orderliness; (m) Organization; (n) Perfectionism; (o) Planfulness; (p) Prudence; (q) Purposefulness; (r) Self-Discipline. There were 206 items in this pool of 18 scales. These IPIP scales were intended to represent 12 different personality models: (a) the 16PF (Cattell & Cattell, 1995); (b) the Abridged Big Five Dimensional Circumplex Model (AB5C; Hofstee, De Raad & Goldberg, 1992); (c) the California Personality Inventory (CPI, Gough, 1957); (d) the Comprehensive Health Survey (CHS Perfectionism Scale, Foa, Kozak, Salkovskis, Coles, & Amir, 1998); (e) Hogan Personality Inventory (HPI; Hogan & Hogan, 1992); (f) the Honesty/Humility, Emotionality, eXtraversion, Agreeableness, Conscientiousness, Openness model (HEXACO; Lee & Ashton, 2004); (g) the Jackson Personality Inventory (JPI, Jackson, 1994); (h) the Multi-dimensional Personality Questionnaire (Tellegen & Waller, 1992); (i) the NEO-PI-R model (Costa & McCrae, 1992); (j) the Six Factor Personality

Questionnaire (Jackson, Paunonen, & Tremblay, 2000); (k) Temperament and Character Inventory (Cloninger, Svrakic, & Przybeck, 1993); and (l) Values in Action (VIA; Peterson & Seligman, 2004).

B. Theoretical criteria for a priori item exclusion

Before administering the item pool, eight criteria for item exclusion were used to reduce the initial pool of 206 items to the 117 items that were administered to test-takers. These criteria were designed to minimize: (a) item overlap, (b) item content unrelated to the C construct; and (c) item content considered inappropriate for an adolescent sample (i.e., difficult language and adult concepts were removed). Again, the panel discussed each item deletion to consensus. The eight criteria were as follows:

1. Negations. We wanted to avoid items with negations (e.g., “Can’t make up my mind”). If possible, items were rephrased in the affirmative rather than deleted. If the positive version of this item was already included in the item list, the item was totally omitted. Note that this criterion did not exclude all reverse-coded items, but only those with a negation. For example, “Do things at the last minute” was acceptable, whereas “Am not easily distracted” was omitted (the phrase “not bothered” was retained, as it was argued this phrase occurs naturally in language and has a different meaning than the opposite to “bothered”).
2. Abstract expressions. We eliminated items with abstract expressions (e.g., “Want everything to be “just right”” or “Have an eye for detail”).
3. Two or more conjunctions. Items with two or more conjunctions were omitted because a respondent agreeing with only one part of the question might become unsure how to answer (e.g., “Set high standards for myself and others”).
4. Superfluous items. We avoided superfluous items which had almost identical content to other items (e.g., “Am a hard worker” and “Work hard”). The simplest or easiest to understand item was kept, and repetitions of it were deleted.
5. Inappropriate or difficult words. We eliminated items consisting of inappropriate or difficult words which might be misunderstood (e.g., “Like to act on a whim”).
6. Ambiguity. We deleted items with an ambiguous meaning that might be interpreted in more than one way (e.g., “Like order” might be interpreted as liking orderliness, or liking to be ordered around, or to take orders).
7. Construct irrelevance. Items which would primarily measure a personality trait other than Conscientiousness were omitted (e.g., “Don’t have much energy” was thought to assess Extraversion).
8. Age inappropriate. Items that would apply to adults but not to youths were omitted (e.g., “Pay my bills on time”).

C. Results from one-factor through to nine-factor exploratory factor analyses

To begin, nine exploratory factor analyses of the remaining 117 items were undertaken, extracting from one to nine factors. The table below illustrates which factors emerged and split when each additional factor was extracted. The first clear conceptual division was into Industriousness, Perfectionism, and Organization, with Focus emerging in the four-factor solution, Control emerging in the five-factor solution, Organization splitting into Task Planning and Tidiness in the six-factor solution, Cautiousness emerging in the eight-factor solution, and Perseverance emerging in the nine-factor solution.

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1-factor	One factor							
2-factor	Reverse-key vs non-Reverse-key items							
3-factor	Industriousness	Perfectionism	Organization					
4-factor	Industriousness	Perfectionism	Organization					
5-factor	Industriousness	Perfectionism	Organization					
6-factor	Industriousness	Perfectionism	Task Planning	Tidiness				
7-factor	Industriousness	Perfectionism	Task Planning	Tidiness	Distractible	Procrastination		
8-factor	Industriousness	Perfectionism	Task Planning	Tidiness	TRIPLET	Procrastination	Control	Cautiousness
9-factor	Industriousness	Perfectionism	Task Planning	Tidiness	TRIPLET	Procrastination	Control	Cautiousness Perseverance

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