

Self- and parent-rated facets of Conscientiousness predict academic outcomes: Parent-reports are more predictive, particularly for approach-oriented facets☆



Carolyn MacCann^{a,*}, Anastasiya A. Lipnevich^{b,c}, Arthur E. Poropat^d, Melissa J. Wiemers^e, Richard D. Roberts^f

^a School of Psychology, University of Sydney, Australia

^b Queens College, The City University of New York, United States

^c The Graduate Center, United States

^d Griffith University, Australia

^e Hudson Global Inc., United States

^f Professional Examination Service, United States

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ABSTRACT

Meta-analyses have demonstrated that other-ratings of Conscientiousness are stronger predictors of academic achievement than are self-ratings. The current study ($N = 410$ high school students) examined whether this effect applies for all facets of Conscientiousness. Compared to self-reports, parent-reports showed stronger prediction of GPA and of other school life variables such as disciplinary infractions and involvement in school clubs. The difference between parent- and self-reports was stronger for outcome-linked facets such as Industriousness than for process-linked facets such as Tidiness. We suggest that this difference is due to the different types of information used by the self as compared to observers when rating personality items. Our results help to explain the reporting biases evident in self- and parent-ratings, have implications for the appropriateness of self- and parent-report personality protocols in applied settings (e.g., training, selection), and should provide guidance for educational interventions focused upon goals, habits and motivations.

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1. Introduction

Poropat's (2009) initial meta-analysis of personality and academic performance showed that Conscientiousness correlates at .21 with student achievement in secondary school, compared to $-.03$ to $.12$ for the other four Big Five factors. However, this meta-analysis was restricted to self-reports of personality and did not include observer ratings. More recent meta-analyses demonstrate that observer-ratings of personality provide substantially stronger prediction of academic performance—correlations were .38 for Conscientiousness versus .05 to .28 for the other Big Five factors (Poropat, 2014a,b). Similar findings have been observed for the facets of Conscientiousness, particularly Achievement Striving (Ziegler, Danay, Schölmerich, & Bühner, 2010). Other-rated Conscientiousness predicts nearly four times the variability in academic performance as self-rated Conscientiousness. This represents one of the strongest meta-analytic correlations with academic performance ever

reported (cf., Hattie, 2009). In fact, the correlation of other-rated Conscientiousness with academic performance is substantially higher than the association of intelligence with academic performance (Poropat, 2009, 2014b). Moreover, Connelly and Ones's (2010) meta-analysis demonstrates that other-ratings of Conscientiousness have superior prediction to self-ratings across a range of personal and social outcomes in addition to academic performance.

In the present study, we test two possible explanations as to why other-reports provide superior prediction over self-reports: (1) differences in reliability for self- versus other-reports (cf. Balsis, Cooper, & Oltmanns, 2014); and (2) differences in the type of information used by the self versus others in making personality ratings. To address this question, we compare prediction of academic performance and school life variables from self- and parent-reported facets of Conscientiousness. In the passages that follow, we present a framework for interpreting the differences between facets of Conscientiousness in terms of the type of information that may be used to rate items from these facets (approach versus avoidance). We argue that parent-reports may be both more reliable, and more predictive for approach-related facets.

To begin with, we note that self- and other-reports of personality are not perfectly correlated, relating at about $r = .50$ for adults (Connolly, Kavanagh, & Viswesvaran, 2008; Laidra, Allik, Harro, Merenakk, & Harro, 2006) and around $r = .30$ for children and adolescents

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* Corresponding author at: School of Psychology, University of Sydney, Sydney, NSW 2007, Australia.

E-mail address: carolyn.maccann@sydney.edu.au (C. MacCann).

(Barbaranelli, Caprara, Rabasca, & Pastorelli, 2003). Moreover, evidence suggests that the non-overlapping variance is not measurement error but may instead tap into systematic (and quite different) sources of personality variance captured by self and observer ratings. For example, parent- and self-rated scores of the Conscientiousness facet of Industriousness shared only 30% of their variance but predicted 36% of the variation in academic achievement (Fogarty, Davies, MacCann, & Roberts, 2014).

1.1. Explanation 1: other-reports are more predictive because they are more reliable

As yet, it is unclear why other-rated personality should provide so much better prediction of academic performance. Multiple regression analyses have ruled out intelligence and its associated constructs as explanations for this difference (Poropat, 2009, 2014a,b). Our first potential explanation is that observer-reports may simply be more reliable than self-reports, resulting in stronger prediction due to the greater proportion of true score variance represented by the observed scores. Observers may have a more consistent perspective on the target than the target themselves for two reasons. First, observers use one source of information (observed behavior) to evaluate the target's personality, whereas targets are using multiple sources of information (behavior, as well as internal motivations, feelings, and beliefs; Vazire, 2010). Second, most observers will generally observe the target's behavior across a limited range of situations. For example, teachers observe students in the classroom or playground, but not with siblings or family, whereas parents observe their children mainly in home-based interactions with family, and rarely see them in the classroom with their same-age peers. In contrast, the self is privy to its own behavior across all situations that are encountered. If people show systematically different patterns of behavior in different situations (which research on the frame-of-reference effect would support; e.g., Lievens, De Corte, & Schollaert, 2008), then targets should show lower internal consistency on personality ratings than observers. In fact, there is recent empirical evidence that Cronbach's alpha coefficients are higher for other-reports than self-reports for ratings of older adults on the NEO (Balsis et al., 2014). We propose that this phenomenon (higher internal consistency for other-ratings than self-ratings) will also occur for children's versus parents' ratings of Conscientiousness facets. To test whether this reliability-based explanation accounts for differences in prediction for self- and other-reports, we will compare prediction of outcomes using reliability-corrected correlations with achievement.

1.2. Explanation 2: other-reports are more predictive because they are based on different types of information

An alternative explanation is provided by Vazire's (2010) self-other knowledge asymmetry model. This model explains differences between self- and observer-ratings in terms of self-presentation biases and the relative emphasis on different types of information available to these different raters. In part, Vazire's model is linked with Funder's (1995, 2001) argument that the information used by a personality judge can substantially affect their ratings. Vazire argued that other-raters base ratings more upon behaviors and self-raters would have a comparatively greater emphasis on information about thoughts and feelings. However, Poropat (2014b) found that Vazire's model did not account for the differences in correlations of academic performance with self- and other-rated personality. Instead, Poropat (2014b) argued that self-other differences could be explained by the findings of Gill and Swann (2004) who showed that people attend to information that is of pragmatic value to them. This implies that personality ratings will be based upon information of value to the rater, regardless of whether that information is linked with thoughts, feelings, or actions.

We propose that the degree to which observers value different traits may relate to the distinction between *approach-related traits* (focusing

on behaviors that approach, cause, or bring about positive outcomes) and *avoidance-related traits* (focusing on avoiding errors, conflict, or negative outcomes). We believe that approach and avoidance-related traits differ in three ways. First, approach tendencies may be more observable than avoidance tendencies, as they are associated with actions rather than the absence of actions. For this reason, approach tendencies may be more accurate for other- versus self-ratings. Second, because others can more easily observe approach tendencies, they can also more easily observe the link between approach tendencies and positive outcomes (as compared to the link between avoidance tendencies and the absence of negative outcomes). For this reason, others may value approach tendencies more than avoidance tendencies—to the outside observer, they appear more valuable. Third, approach tendencies may genuinely be more valuable than avoidance tendencies in predicting positive educational outcomes. For example, learning strategies emphasizing an approach towards goals and achievement (e.g., effort regulation, time/study management, and a strategic approach to learning) show stronger associations with academic performance compared to learning strategies emphasizing the avoidance of error (e.g., organization or rehearsal; Richardson, Abraham, & Bond, 2012). A related line of research distinguishes between approach and avoidance academic goals, with evidence indicating that approach goals are more predictive than avoidance goals (in fact, avoidance goals may show negative relationships with academic performance; Elliot & McGregor, 2001). For these reasons, we propose that it is not the thoughts/feelings versus actions distinction that differs for self- versus other-ratings but rather the distinction between approach versus avoidance content.

Recent research on the underlying facets of Conscientiousness provides an opportunity to test these three differences. MacCann, Duckworth, and Roberts (2009) identified eight facets of Conscientiousness that reliably described differences among school students, and were related to academic outcomes. We propose that these facets differ in the degree to which they reflect *approach* and *avoidance* tendencies. Four of the facets explicitly reflect approach towards goals, tasks, or behaviors: Industriousness (reflecting behavioral engagement with work; e.g., "I accomplish a lot of work"); Perseverance (reflecting maintenance of motivation; e.g., "I give up easily"); Proactivity (reflecting a focus on work tasks; e.g., "I get to work at once"); and Task Planning (reflecting goal focus; e.g., "I make plans and stick to them"). The remaining facets reflect avoidance of errors: Cautiousness (reflecting carefulness and avoidance of mistakes; e.g., "I avoid mistakes"); Control (reflecting the avoidance of impulsive errors; e.g., "I make rash decisions"); Perfectionism (emphasizing freedom from errors or imperfections; e.g., "I detect mistakes"); and Tidiness (reflecting the avoidance of disorder; e.g., "I like to tidy up"). To test this designation, eight graduate psychology students from the third author's institution classified each facet scale as reflecting "Task-focus (approach towards completing tasks)" or "Error-focus (avoidance of mistakes and errors)", without being told the purpose of the exercise. This categorization reliably confirmed expectations: intra-class correlation = .95, $p = .000$.

For self-raters, both approach and avoidance facets of Conscientiousness are directly relevant and of personal value, because it is the self-rater's own time and resources that are being committed to the associated behaviors. However, other-raters will find approach facets both more observable and more valuable than avoidance facets. Observers will primarily value approach-related facets because the associated behaviors lead directly to outcomes, which are observable by the presence of desired behaviors and consequences. Avoidance-related facets will be less valuable and less identifiable for other-raters because they can only be identified by the absence of the avoided behaviors and consequences. The presence of a behavior or consequence is inherently both more observable and more interpretable than its absence, in part because absence of observed behaviors and consequences is not always evidence of absence of the associated trait. Regardless of the heuristics used to interpret absence of observations, the interpretations are inevitably

ambiguous and hence less reliable (Hattori & Oaksford, 2007). Consequently, other-raters are likely to be better informed about approach-related Conscientiousness facets and their associated outcomes than about avoidance-related Conscientiousness facets.

That is, approach-related facet scales: (a) show stronger prediction of academic performance than avoidance-related facet scales, and also (b) are more accurately rated by observer-reports. Consequently, any increase in correlations resulting from using other-rated measures should be greatest with those facet scales that are best assessed by other-raters and best reflect motivational factors that contribute most to academic performance. In addition to students' grades, we also compare self- and parent-ratings on other aspects of students' behavior at school: the number of clubs joined, absences from school, infractions of the school rules, whether students hold a school office, and whether students made the honor roll. The current study was conducted to determine whether the pattern of stronger correlations for other-reports holds across all facets of Conscientiousness, and whether outcome-focused facets are more strongly affected by varying the source of ratings.

Few if any previous studies have actively tested differences between self- and other-ratings of Conscientiousness facets as statistical predictors of academic performance, so this study was designed to examine this among secondary school students. We tested three primary hypotheses. First, compared to self-reports, parent-reports will show: (a) higher internal consistency (as estimated by Cronbach's alpha) and (b) stronger prediction of academic performance and other school-life variables. Second, school achievement will be more strongly correlated with *approach-related* Conscientiousness facets than it will be with *avoidance-related* Conscientiousness facets. Third, we propose a novel hypothesis, that differences in correlations of academic performance between self- and parent-rated Conscientiousness facets will be linked with the extent to which the facets are approach-related.

2. Method

2.1. Participants

2.1.1. Student sample

Students in the ninth and tenth grades of schooling participated in this study ($N = 410$, 214 females). Participants were drawn from five geographically diverse sites across the United States (the cities of Fort Lee (New Jersey), Atlanta (Georgia), Chicago (Illinois), Los Angeles (California), and Denver (Colorado)). At the time of testing, students were aged between 13 and 16 years, with most aged 14 (56.1%) or 15 (37.1%) years.

2.1.2. Parent sample

For each of the 410 students, one parent/guardian reported demographic information for themselves, along with a series of ratings about their child. Caregivers were primarily the mother (84%) or father (13%) of the child.

2.2. Test battery

2.2.1. Comprehensive Conscientiousness measure (MacCann et al., 2009)

Both students and parents completed a 68 item, eight-facet measure of Conscientiousness. Facets and example items are as follows: (a) Industriousness (10 items; "I make an effort"); (b) Perfectionism (9 items; "I demand quality"); (c) Tidiness (9 items; "I like to tidy up"); (d) Proactivity (7 items; "I get to work at once"); (e) Control (8 items; "I rush into things" [Reverse]); (f) Cautiousness (7 items; "I make careful choices"); (g) Task Planning (9 items; "I follow a schedule"); and (h) Perseverance (9 items; "I give up easily" [Reverse]). For self-reports, students rated their agreement with each statement on a five-point scale, ranging from (1) "Very inaccurate" to (5) "Very accurate". For parent-reports, items were rephrased from the first person to represent "My child" (e.g., "I make an effort" to "My child makes an

effort"). Parents rated their agreement with each statement on a five point scale from (1) "Very incorrect" to (5) "Very correct".

2.2.2. Vocabulary test

Students completed 20 items that were taken from a version of the Vocabulary Levels Test (Schmitt, Schmitt, & Clapham, 2001). Each item consisted of three words that had to be matched to one of six synonyms, such that scores could range from 0 to 60. In this sample, Cronbach's alpha was .90 ($M = 45.30$, $SD = 9.70$).

2.2.3. School grades

Both students and parents reported the student's previous semester's grades in four subject areas: Reading/Language Arts, Math, Science, and Social Studies. Grades were converted to a 13-point scale from 0 (E or Fail) to 12 (A+). For each of the four subject areas, cases were removed if self-reports and parent-reports differed by more than one letter grade (i.e., more than 3 on the 13-point scale). An aggregate grade was calculated as the average student-reported grade across all four subjects. After exclusions and aggregation, 399 grades were available for analysis (i.e., 97% of the sample).

2.3. Procedure

Each student–parent pair was tested at a local site. Students completed a self-paced, proctored computerized test battery whereas parents completed a paper-and-pencil booklet of questions in a separate room. The parent-reported booklet also asked about the school life variables: (1) the number of school clubs their child is a member of; (2) the number of disciplinary infractions their child has had in the past year; (3) the number of absences from school in the last month; (4) whether their child holds a school office; or (5) whether their child made the honor roll last year. For the parent-reported Conscientiousness items, missing responses were replaced with the sample mean, as no more than 2% of the data was missing for any one item. At the end of the testing sessions, participants were reimbursed for their time. All tests and protocols were approved by the Educational Testing Service Human Ethics and Fairness Review Committee.

3. Results

3.1. Comparison of reliability, level, and order of self- and parent-reports

Reliability and descriptive statistics for the self- and parent-reported Conscientiousness facets are given in Table 1. Hypothesis 1a (that reliability would be higher for parent-reports) was supported. Reliability was significantly higher for parent- than self-reports for all facets and for the broad domain of Conscientiousness, using Hakstian and Whalen's (1976) test for comparing the difference between Cronbach's alphas. Although there was no significant or meaningful mean difference for Conscientiousness total scores, mean differences between self- and parent-reports were significant for five of the eight facets. These differences did not correspond to differences in approach versus avoidance-related facets. Self-report scores were significantly higher for Industriousness, Perfectionism, and Tidiness, with a small effect size for Industriousness and Perfectionism and a moderate effect size for Tidiness. However, parent-report scores were significantly higher for Control and Task Planning, with a very large effect size for Control, and a moderate effect size for Task Planning. Mean differences for Control were substantial for all items in the Control facet, and strongest for the most obviously negative items ("I do crazy things", "I make a fool of myself", and "I do unexpected things"). Self- and parent-reported scores correlated at .54 for the broad Conscientiousness dimension, and between .30 and .49 at the facet level (Fig. 1).

Table 1
Reliability, descriptive statistics, correlations with GPA, and comparisons of level and order for self-report versus parent-report conscientiousness facets (correlations corrected for reliability are shown in parentheses, and partial correlations controlling for vocabulary are shown in italics).

	Self-report				Parent-report				Comparison (self–parent)	
	Descriptive statistics		Correlation with GPA		Descriptive statistics		Correlation with GPA		<i>d</i>	<i>r</i>
	α	M (SD)	<i>r</i>	<i>r_{partial}</i>	α	M (SD)	<i>r</i>	<i>r_{partial}</i>		
App: Industriousness	.87	3.62 (0.72)	.33** (.35)	.32**	.92 ^a	3.44 (0.86)	.43** (.45 ^b)	.43**	0.36**	.49**
App: Perseverance	.77	3.47 (0.63)	.22** (.25)	.17**	.83 ^a	3.50 (0.74)	.36** (.40 ^b)	.35**	–0.03	.36**
App: Proactivity	.77	2.93 (0.71)	.19** (.22)	.25**	.88 ^a	2.92 (0.89)	.32** (.34 ^b)	.34**	0.05	.39**
App: Task planning	.80	3.41 (0.66)	.19** (.21)	.24**	.88 ^a	3.65 (0.71)	.36** (.38 ^b)	.35**	–0.44**	.43**
Av: Cautiousness	.78	3.62 (0.65)	.23** (.26)	.23**	.86 ^a	3.69 (0.72)	.31** (.33)	.31**	–0.11	.43**
Av: Control	.74	2.99 (0.63)	.22** (.26)	.23**	.87 ^a	3.67 (0.81)	.24** (.26)	.23**	–1.30**	.38**
Av: Perfectionism	.76	3.31 (0.62)	.16** (.18)	.15**	.84 ^a	3.21 (0.73)	.27** (.29)	.27**	0.23**	.30**
Av: Tidiness	.79	3.07 (0.72)	.06 (.07)	.10*	.87 ^a	2.78 (0.85)	.13** (.14)	.20**	0.54**	.47**
Total C	.94	3.31 (0.48)	.28** (.29)	.29**	.97 ^a	3.36 (0.65)	.37** (.38 ^b)	.38**	–0.08	.54**

Note. App = Approach-related facet; Av = avoidance-related facet. Mean differences between parent- and self-reports are calculated using Hedge's *g* (negative values = higher scores for parent-report), with significance determined from a dependent sample *t*-test.

^a Difference in Cronbach's alpha reliability is significant at $p < .01$ (Hakstian & Whalen, 1976).

^b Difference in corrected correlation with GPA is significant at $p < .05$ (using a dependent samples *t*-test with the corrected correlation between C facets).

* $p < .05$.

** $p < .01$.

3.2. Relationship of conscientiousness facets to grades and school life variables

Correlations of both self- and parent-reported Conscientiousness facets with student GPA are given in Table 1, which also reports these correlations after correcting for reliability, and after controlling for vocabulary test scores. The association of the broad domain of Conscientiousness with academic achievement was similar to previous meta-analytic findings for both self- and parent-rated scores (.28 versus .21 for self-reports and .43 versus .38 for parent-reports; Poropat, 2009, 2014b), indicating that this sample is generally consistent with previous research. For self-reported facets, correlations with GPA were uniformly positive, and were significant for all facets except for Tidiness. Effect sizes ranged from .06 (for Tidiness) to .33 (for Industriousness). All associations were still significant after controlling for vocabulary (and in fact, the correlation of Tidiness with GPA was significant after controlling for vocabulary, indicating that vocabulary was acting as a suppressor). For parent-reported facets, correlations with GPA were significant and positive in all cases, ranging from .13 (for Tidiness) to .43 (for Industriousness).

Correlations of the school life variables with both self- and parent-reported Conscientiousness facets are given in Table 2. Correlations were in the expected direction in all cases. That is, higher Conscientiousness was associated with belonging to more clubs, holding school office, and being on the honor roll, while lower Conscientiousness was associated with disciplinary infractions and absences. Most of these

relationships were significant (32 out of 45 correlations for self-report, and 42 out of 45 correlations for parent-report).

3.2.1. H1: stronger prediction of outcomes from parent-reported facets

Hypothesis 1b (that parent-reports would show stronger prediction of GPA and school life variables than self-reports) was supported. Compared to self-reports, parent-reports showed stronger correlations with GPA for all eight facets. After correcting for reliability, this difference was still found for seven of the eight facets (but not for Control, which showed the same relationship for self- and parent-reports). However, differences between self- and parent-reports were only significant for four of the eight facets—the four approach-related facets. For the school life variables, almost all correlations (42 out of 45) were stronger for parent-report than those for self-report, and these differences were significant for 19 comparisons (using the dependent samples *t*-test, see Table 2).

3.2.2. H2: stronger prediction of outcomes from approach versus avoidance facets

Hypothesis 2 was that approach-related facets would show stronger prediction of academic outcomes than avoidance-related facets. For GPA, this hypothesis was supported for parent-reports (where all four approach-related facets showed stronger prediction than all four avoidance-related facets) but not for self-reports. There was a similar pattern of results for school life variables. Approach-related facets showed stronger relationships with criteria than avoidance-related facets for both self- and parent-reports. However, this difference was

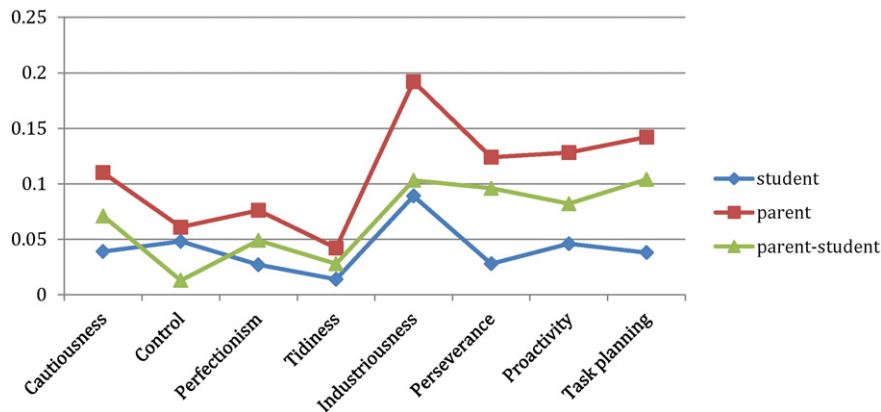


Fig. 1. Comparison of grade variance accounted for by facets across raters. NB. The parent–student values are the difference in variance accounted (i.e., the amount of variance in grades accounted for by parent-ratings, after subtracting the amount of variance in grades accounted for by student-ratings).

Table 2
Correlations of self- and parent-reported Conscientiousness facets with school life variables (N = 396).

	No. club memberships (15% = 0, 26% = 1, 29% = 2, 17% = 3, 10% = 4, or 3% ≥ 4)		Discipline infraction last year No = 0 (n = 357) Yes = 1 (n = 48)		Absent last month No = 0 (n = 273) Yes = 1 (n = 136)		Holds school office No = 0 (n = 370) Yes = 1 (n = 36)		Made honor roll this year No = 0 (n = 159) Yes = 1 (n = 246)	
	Self	Parent	Self	Parent	Self	Parent	Self	Parent	Self	Parent
App: Industriousness	.19**	.27** ^c	-.21**	-.34** ^a	-.15**	-.15**	.13**	.20**	.38**	.52** ^a
App: Perseverance	.09	.22** ^b	-.11*	-.27** ^a	-.03	-.12*	.03	.13** ^c	.23**	.42** ^a
App: Proactivity	.04	.19** ^a	-.05	-.24** ^a	-.09	-.13*	.09	.14**	.17**	.36** ^a
App: Task planning	.18**	.20**	-.17**	-.29** ^b	-.13**	-.13**	.14**	.20**	.26**	.38** ^b
Av: Cautiousness	.14**	.22**	-.21**	-.31** ^c	-.10*	-.13*	.10*	.19** ^c	.27**	.34**
Av: Control	.16**	.21**	-.17**	-.33** ^a	-.14**	-.13**	.03	.10*	.26**	.29**
Av: Perfectionism	.14**	.17**	-.02	-.15** ^b	-.01	-.05	.17**	.21**	.19**	.31** ^b
Av: Tidiness	.06	.09	-.04	-.11*	-.12*	-.15**	.07	.09	.14**	.20**
Total C	.17**	.24**	-.17**	-.31** ^a	-.13**	-.16**	.13**	.19**	.33**	.44** ^b

Note. App = Approach-related facet; Av = avoidance-related facet.
^a Parent and self-reports are significantly different at $p < .01$ (2-tailed).
^b Parent and self-reports are significantly different at $p < .05$ (2-tailed).
^c Parent and self-reports are significantly different at $p < .05$ (1-tailed).
 * $p < .05$.
 ** $p < .01$.

larger for parent reports (mean magnitude of correlation of $r = .25$ for approach versus $r = .19$ for avoid) than self-reports (mean magnitude of correlation of $r = .14$ versus $r = .13$).

3.2.3. H3: stronger prediction of outcomes from approach versus avoidance facets is moderated by source of report (self versus parent)

Hypothesis 3 was that differences in prediction for approach-related and avoidance-related facets would be moderated by the source of report (self-report versus parent-report). This hypothesis was supported. Correlations of Conscientiousness facets with GPA were significantly different for self- and parent-reports only for the four approach-related facets but not for any of the four avoidance-related facets. Prediction of club memberships from self- versus parent-reports was significantly different for two of the four approach-related facets, but none of the avoidance related facets. Prediction of disciplinary infractions from self- versus parent-reports was significantly different for all four approach-related facets but only two of the avoidance-related facets. Prediction of making the honor roll from self- and parent-reports was significantly different for all four approach-related facets, but only one of the four avoidance facets. For GPA, hypothesis 3 was also tested by coding each facet as “1” for approach and “0” for avoidance, then calculating the correlation between this dummy-coded variable with the parent-reported GPA-C correlations, the self-reported GPA-C correlations; and the difference in GPA-C correlations for parent-report versus self-report. Facet type did not moderate correlations of grades with self-rated Conscientiousness facets ($r = .44$ ns) but did significantly moderate correlations with parent-rated

Conscientiousness facets ($r = .82, p = .013$), and also moderated the difference in correlation for self- versus parent-rated facets ($r = .86, p = .006$).

3.3. Multiple regressions predicting GPA: the relative importance of self- versus parent-reported facets

Hierarchical regressions were conducted separately for self- and parent-reports, entering vocabulary step 1 and the eight Conscientiousness facets in Step 2. Results are shown in Table 3. For self-reported facets, tolerance ranged from .391 (for Industriousness) to .658 (for Tidiness). For parent-reported facets, tolerance ranged from .252 (for Industriousness) to .575 (for Tidiness). Due to concerns about collinearity, we consider relative weights rather than standardized beta-weights, as relative importance analysis factors out the intercorrelation among independent variables. When independent variables are highly correlated (as in the present case with personality facets), relative weights are an accurate estimator of the importance of each predictor (Johnson, 2000).

After accounting for vocabulary, self-reports accounted for an additional 11.1% of the variance in GPA whereas parent-reports accounted for an additional 16.2% of the variance in GPA. This result provides further support for H1 (that parent-reports are stronger predictors than self-reports). For parent reports, the four most important facets were the four approach-related facets—all approach-related facets showed a higher contribution to the R^2 than all avoidance-related facets. This was not the case for self-reports. These results provide partial support for H2 (that approach-related facets would show stronger prediction

Table 3
Standardized regression coefficients and relative importance indices for separate predictions of GPA from self-reported and parent-reported facets of Conscientiousness (N = 399).

	Self-report				Parent-report			
	ΔR^2	β	Relative weight	% of R^2	ΔR^2	β	Relative weight	% of R^2
Step 1	.159				.159			
Vocabulary		.387**	.147	54.3%		.344**	.133	41.4%
Step 2	.111				.162			
Industriousness		.233**	.042	15.6%		.374**	.062	19.3%
Perseverance		-.102	.008	3.1%		.044	.027	8.4%
Proactivity		.069	.013	4.6%		.017	.023	7.1%
Task planning		.062	.012	4.6%		.104	.028	8.8%
Cautiousness		-.003	.012	4.4%		.048	.019	6.0%
Control		.178**	.025	9.1%		-.095	.009	2.8%
Perfectionism		.025	.007	2.7%		-.090	.014	4.2%
Tidiness		-.101	.004	1.5%		-.042	.006	2.0%
Total R^2	.271				.321			

Note. App = Approach-related facet; Av = avoidance-related facet.
 ** $p < .01$.

than avoidance-related facets), and also support H3 (that such a difference would be stronger for parent- than self-reports). For both self- and parent-reports, the most important facet was Industriousness, which explained 15.6% of the R^2 for self-reports and 19.3% of the R^2 for parent-reports.

Table 4 shows the result of a multiple regression where both parent- and self-reports were entered into the same regression (along with vocabulary scores). This regression was run twice: (1) entering self-reports first, to check the incremental validity of parent-reports over self-reports; and (2) entering parent-reports first, to check the incremental validity of self-reports over parent-reports. Tolerance values ranged from .218 (for parent-reported Perseverance) to .816 (for vocabulary). Five variables showed tolerance values less than .30 (all parent-reported C facets) and a further five variables showed tolerance values less than .40, indicating considerable collinearity. For this reason, we consider incremental R^2 values and relative importance rather than partial regression coefficients. When vocabulary, self-reports, and parent-reports were entered at steps 1, 2, and 3 respectively, incremental R^2 values were .159, .111, and .085 for steps 1, 2, and 3 respectively (all significant at $p < .05$). When vocabulary, parent-reports, and self-reports were entered at steps 1, 2, and 3 respectively, incremental R^2 values are .159, .162, and .034 for steps 1, 2, and 3 respectively (all significant at $p < .05$). That is, self-reports account for an additional 3.4% of the variance above vocabulary and parent-rated Conscientiousness whereas parent-reports account for an additional 8.5% of the variance above vocabulary and self-rated Conscientiousness. The fact that parent-reports explain more than twice as much incremental variance provides additional support for H1.

There are two other important things to note about this regression. First, self- and parent-reported facets (taken together) incrementally predict nearly a fifth of the variation in students' grades (19.5%), which is a very large effect. Second, parent-reported facets collectively account for 42.2% of the R^2 (31.9% from the approach facets and 10.3% from the avoidance facets) whereas self-reports collectively account for 22.1% of the R^2 (12.6% from the approach facets and 9.5% from the avoidance facets). That is, parent-reports are nearly twice as important as self-reports for predicting GPA, and parent-rated approach facets are

more than three times as important as parent-rated avoidance facets. These results provide further support for H1 and H3 but not H2.

4. Discussion

Results show strong support for two of our three hypotheses: (a) parent-reports were more reliable and more predictive than self-reports (H1), and (b) approach-related facets were more predictive than avoidance-related facets for parent-reports (H3). Our second hypothesis was not supported: Approach-related facets were *not* generally more predictive than avoidance-related facets across both parent- and self-reports (H2). The stronger prediction of outcomes by other-reports compared to self-reports was not due to the higher internal consistency, as we controlled for this by comparing correlations that had been corrected for attenuation. In general, results are consistent with our proposal that one of the mechanisms for the stronger prediction of other-reports compared to self-reports is the information content that others use to make the ratings. Parent and self-reports differed very little for the avoidance-related facets, but parent-reports were much more predictive of a range of outcomes for the approach-related facets. In other words, the information that raters use when assessing personality appears to be what makes the difference between self- and other-raters, and it is this that accounts for differences in correlations of academic performance with self- and other-rated personality.

For both self- and parent-reports, Industriousness was the strongest predictor. Planning was among the most predictive of facets for parent-reports, and among the least predictive for self-reports, indicating that parents had a better appreciation of their offspring's planning, potentially because they observe the consequences of good planning in their children. By contrast, Tidiness was the weakest predictor in both cases—a well-ordered desk may not in fact indicate a well-ordered mind, at least not to the degree that would influence academic outcomes.

Parents rate their children as less tidy, industrious, or achievement-driven than their offspring self-rate, but give higher ratings on impulse control and being organized with time. It is probably not surprising that teenagers believe they are not as messy or lazy as their parents think. The more surprising finding is the extent of the difference in Control ratings—the mean parent-reported score is equivalent to a score in the top 10% of self-reports, such that score levels are clearly not comparable across self- and parent-ratings. The reasons for this are unclear, although it may relate to relative standards of assessment. For example, students may be comparing themselves against their most self-controlled friends and/or parents may be comparing students against either media images of teenagers or their own potentially-colored recollections of their own levels of self-control when they were of a similar age. Using such disparate anchoring points for comparison and subsequent ratings would be likely to produce disparate ratings, even if the observations they were based upon were similar. A different explanation could be that student ratings of their own levels of Control are more likely to be based upon their own felt experience of struggling with self-control both while around adults and among their peer-group, while parents based their ratings of Control on observations of their offspring's behavior while around adults and under their supervision. This would explain not only why the parent-ratings of Control were higher, but also why these ratings were more closely correlated with school achievement.

Parent-ratings were both more reliable and predictive of academic outcomes than self-ratings. Results from the regressions indicated that parent-rated Conscientiousness facets explained nearly three times as much variation in grades as did the self-rated facets. Although such results might be used to justify the idea that children in their pre- and early teens might lack the psychological-mindedness or cognitive ability to accurately self-rate on personality questionnaires, it is worth comparing current results to studies of self- versus other-reports in older teenagers and adults. Research thus far suggests that peer-, co-worker-, supervisor-, and customer-ratings may be more reliable and more predictive of valued outcomes than self-ratings, particularly for

Table 4

Standardized regression coefficients and relative importance indices for separate predictions of student GPA from self-reported and parent-reported facets of Conscientiousness ($N = 399$).

Conscientiousness facet	β	Relative weight	% of R^2
Vocabulary	.348**	.128	35.9%
Industriousness (self-report)	.108	.024	6.7%
Perseverance (self-report)	-.066	.006	1.7%
Proactivity (self-report)	.070	.008	2.3%
Task planning (self-report)	.021	.007	1.9%
Cautiousness (self-report)	-.015	.006	1.8%
Control (self-report)	.142*	.016	4.5%
Perfectionism (self-report)	.053	.006	1.6%
Tidiness (self-report)	-.131*	.006	1.6%
Industriousness (parent-report)	.323**	.049	13.9%
Perseverance (parent-report)	.042	.022	6.2%
Proactivity (parent-report)	.028	.019	5.4%
Task planning (parent-report)	.101	.023	6.4%
Cautiousness (parent-report)	.020	.014	4.0%
Control (parent-report)	-.113	.007	2.0%
Perfectionism (parent-report)	-.107	.010	2.8%
Tidiness (parent-report)	-.012	.005	1.5%
R^2	.355		

Note. When vocabulary, self-reports, and parent-reports are entered at steps 1, 2, and 3 respectively, ΔR^2 values are .159, .111, and .085 for steps 1, 2, and 3 respectively (all significant at $p < .05$). When vocabulary, parent-reports, and self-reports are entered at steps 1, 2, and 3 respectively, ΔR^2 values are .159, .162, and .034 for steps 1, 2, and 3 respectively (all significant at $p < .05$).

* $p < .05$.

** $p < .01$.

Conscientiousness (Connelly & Ones, 2010). In combination with reasonable internal consistency for self-reports, the results obtained here should be interpreted as replicating the greater accuracy and utility of other- over self-reports found for older samples, rather than indicating that self-report assessments lack accuracy in younger samples.

In any case, the fact that adolescent self-ratings are less valid as predictors of academic performance does not necessarily mean that they are less valid as measures of personality. Ratings obtained in the current study were obtained using a generic frame-of-reference, rather than one which explicitly asks students to assess their personality at school. Previous research that has asked students to use an at-school frame-of-reference when self-rating personality has produced correlations with academic performance that are similar to those obtained from using other-ratings (i.e., correlation of Conscientiousness with academic performance = .37; Lievens et al., 2008). When responding from an at-school frame-of-reference, self-raters will inherently limit themselves to observations of themselves that are more closely linked with academic performance.

Although it appears that the informational basis of self- and other-ratings explains most of the observed differences in reliability and validity that are reported here, it is important to acknowledge that other factors can contribute to such variations. In particular, various writers have noted that self- and other-ratings of personality are differentially affected by self-presentation biases (e.g., Funder, 2001; John & Robins, 1993; Vazire, 2010). Such biases have long been recognized and have been argued to be likely to affect self-ratings in ways that make them less valid as measures of personality and hence less valid as predictors of outcomes. Unfortunately, the evidence presented here provides little insight into the extent of this effect, which in any case was likely to be relatively minimized by the fact that no reward or punishment was contingent upon the results of these assessments, unlike what would be expected in selection situations.

Another alternative explanation is that the stronger prediction from observer-reports is due to criterion contamination (i.e., parents using academic performance as a cue or index of approach-related Conscientiousness traits). A stronger test of the utility of observer-reports versus self-reports would be to use observers who did not have access to the criteria. Future research could test this issue either by collecting observer-reports before grades are available, or by collecting observer-reports from observers who would not normally know the students' grades (e.g., members of a sporting team not associated with the school).

4.1. Practical issues for applications of personality testing in secondary education

Given that personality robustly predicts school grades, it would be tempting to consider using personality tests as an adjunct for selection in an educational context (e.g., into gifted and talented programs, or streaming of classes). However, the obvious problem with these relatively high-stake situations is that such tests are vulnerable to response distortion. Other-reports have been suggested as a potential solution to the issue of response distortion, but it is far from obvious that other-ratings would be immune from positive bias. Indeed, it is entirely credible that parents, for example, would be highly motivated to provide

more positive ratings of their offspring if this could lead to more positive outcomes for their children. Similar concerns might also occur in applications of teacher-report measures of personality, particularly if: (a) the stakes attached to the assessment would reflect well on the teacher or school (e.g., admissions into selective high schools, colleges, or other programs); or (b) item content resembles trainable classroom behaviors that may reflect good pedagogical techniques (e.g., the Conscientiousness item "I check over my work"). It is for reasons such as these that Poropat (2009, 2014b) advocated caution in the use of personality assessments within educational selection. In addition, note that the current data were not collected under high-stakes conditions and therefore cannot be used to directly inform selection issues.

However, the use of Conscientiousness assessments in education is well-justified when the purpose is to provide guidance and learning development to students. Within this study, both self- and parent-reports demonstrated that the work ethic or industriousness elements of Conscientiousness are the key driver of academic success, with organization of possessions virtually unrelated to success. Therefore, student preparation courses that focus on organization of learning material (e.g., teaching students to organize and order their work space, study materials, or class notes) should be reconsidered, whereas courses focusing on motivation, avoiding procrastination, planning, and goal-achievement (e.g., suggesting students create goals to work towards and providing techniques to do so) should be encouraged. The potential that such courses offer has already been established for children in elementary and preschool education (Diamond & Lee, 2011; Heckman, 2011). Consequently, more attention to identifying adolescents with ineffective academic Conscientiousness-related habits and ameliorating these behaviors should be encouraged.

4.2. Summary and conclusions

Evidence from the current study demonstrates that personality is a vitally important predictor of academic achievement in high-school students. The Industriousness facet of Conscientiousness appears to be one of the main drivers of this relationship, and parent-reports of Conscientiousness facets show greater utility than self-reports in predicting achievement. Further, those facets of Conscientiousness that are most clearly approach-related have the most immediate potential for assessing students and guiding educational interventions. Educational practitioners are encouraged to use parent-reports of children's Conscientiousness facets to guide teaching practice, such as by directly intervening to ameliorate student behaviors or by scaffolding the development of self-management strategies using alternative performance strategies within classroom or online learning.

Alternatively, researchers should further consider how to assess avoidance-related facets of Conscientiousness. There is substantial independent evidence of the reliability of these scales, but the results reported here suggest that they may be less valid than approach-related facet scales when assessed using parent-reports. Alternative approaches for assessing avoidance-related facet scales should be considered, such as the use of ipsative scales or situational judgment tests to address with student self-reports in order to minimize self-presentation biases (Lipnevich, MacCann, & Roberts, 2013).

Appendix A. Correlations among study variables ($N = 399$, missing data deleted listwise).

	GPA	Voc	Ind	Pers	Pro	Plan	Caut	Con	Perf	Tidy	IndP	PersP	ProP	PlanP	CautP	ConP	PerfP
GPA																	
Voc	.40																
Ind	.33	.09															
Pers	.22	.16	.53														
Pro	.19	-.09	.65	.64													
Plan	.20	-.07	.64	.35	.48												

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(continued)

	GPA	Voc	Ind	Pers	Pro	Plan	Caut	Con	Perf	Tidy	IndP	PersP	ProP	PlanP	CautP	ConP	PerfP
Caut	.23	.04	.62	.44	.46	.68											
Con	.22	.05	.35	.58	.47	.25	.38										
Perf	.16	.06	.47	.23	.31	.52	.46	-.02									
Tidy	.06	-.08	.43	.42	.49	.45	.34	.38	.28								
IndP	.43	.11	.48	.27	.31	.39	.37	.30	.20	.31							
PersP	.36	.11	.38	.34	.34	.32	.37	.31	.18	.26	.79						
ProP	.32	.03	.38	.25	.38	.34	.31	.25	.21	.36	.79	.77					
PlanP	.36	.10	.41	.29	.31	.42	.38	.29	.18	.30	.76	.75	.71				
CautP	.31	.08	.35	.30	.30	.36	.42	.34	.17	.22	.68	.73	.60	.75			
ConP	.24	.07	.25	.25	.22	.30	.36	.36	.07	.18	.57	.70	.56	.61	.72		
PerfP	.27	.05	.42	.30	.32	.37	.34	.23	.30	.35	.68	.60	.64	.69	.57	.31	
TidyP	.13	-.14	.24	.17	.27	.29	.21	.29	.08	.46	.52	.53	.63	.54	.43	.42	.50

Note. Self-reported Conscientiousness facets are: Ind = Industriousness; Pers = Perseverance; Pro = Proactivity; Plan = Task-planning; Caut = Caution; Con = Control; Perf = Perfectionism; Tidy = Tidiness. Parent-reported Conscientiousness facets are: IndP = Industriousness; PersP = Perseverance; ProP = Proactivity; PlanP = Task-planning; CautP = Caution; ConP = Control; PerfP = Perfectionism; TidyP = Tidiness; Voc = vocabulary.

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