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Is conscientiousness positively or negatively related to intelligence? Insights from the national level

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ABSTRACT

Although conceptually conscientiousness should be positively associated with intelligence, existing empirical data do not support this hypothesis. Several recent investigations reported a negative association of the two variables. In the present paper we examine the national data on personality and intelligence. We used the NEO-PI-R data on national personality. We were interested how the analysis conducted at national level may shed new light on the relationship between conscientiousness and cognitive ability. The most important finding concerned the differences in correlations between self-report and observer-rating conscientiousness scores with IQ. The former was negatively associated with cognitive ability, while the latter positively. The analyses of the conscientiousness facets revealed, that in regression models three components of conscientiousness predicted national intelligence. Specifically, achievement striving and deliberation were negatively associated with IQ, while dutifulness was in a positive relationship with cognitive ability. Interestingly, this pattern was the same in self and observer rating scores.

1. Introduction

The relationship between personality and cognitive ability has been widely explored in the psychological literature (e.g. Ackerman & Heggestad, 1997; Zeidner & Matthews, 2000). One of the most interesting, though puzzling, results concerns conscientiousness (C). Intuitively, this personality trait should be positively related to intelligence. DeYoung (2011) stresses the fact, that conscientiousness is closely and negatively linked to impulsivity. Indeed, some researchers view impulsivity as a negative pole of conscientiousness (Markon et al., 2005). The former has been found to correlate positively with delay discounting (e.g. Ostaszewski, 1996). Delay discounting is typically measured through a series of choices between smaller, more immediate rewards and larger, delayed rewards, with similar outcomes obtained whether these choices are hypothetical or actually result in reward (Shamosh & Gray, 2008). Additionally, a meta-analysis conducted by Shamosh & Gray (2008) showed that delay discounting is negatively associated with cognitive ability.

Moreover, conscientiousness and cognitive ability are positive correlates of several real life outcomes (e.g. Chamorro-Premuzic, 2007). It was proved that both variables are especially important predictors of job performance (Barrick & Mount, 1991; Goff & Ackerman, 1992), school achievements (Chamorro-Premuzic & Furnham, 2004, 2006), and health-related behavior (Gottfredson & Deary, 2004; Bogg & Roberts, 2004). Interestingly, in most studies the effects of conscientiousness and intelligence on life outcomes appear to be independent (see Chamorro-Premuzic & Furnham, 2004).

Although conceptually conscientiousness should be positively associated with intelligence, existing empirical data do not support this hypothesis. Most results did not reveal significant correlations of this personality dimension with various cognitive abilities (Ackerman & Heggestad, 1997). However, several recent investigations reported a negative association of the two variables (Moutafi et al., 2004, 2005). The compensation mechanism has been proposed as a possible explanation of this result (von Stumm, Chamorro-Premuzic & Ackerman, 2011). Particularly, it has been suggested that less able individuals may compensate for their lower intellectual capacity by developing a high level of conscientiousness. People with high intelligence do not need to be very conscientious as they can rely solely on their intellect to accomplish most tasks. To fully understand this idea, one need bear in mind Cattell's (1971) distinction between fluid intelligence (*gf*) which represents information-processing and reasoning ability, dependent on the efficient functioning of the central nervous system, and crystallized intelligence (*gc*) representing abilities to acquire, retain, organize, and conceptualize information that is acquired through experience and education. Since *gf* is more biologically determined, Moutafi et al. (2004) suggest that it is *gc* that can be increased by hard work persistence and dutifulness develop to compensate for quick-wittedness.

In the present paper we examine the national data on personality and intelligence. We were interested how the analysis conducted at national level may shed new light on the relationship between

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conscientiousness and cognitive ability. Over the last decade, a growing interest in investigating differences in psychological and behavioral traits at the national level has been observed. The initial studies were described by Lynn and Vanhanen (2002), who first presented average population IQs for 81 nations measured from samples given a variety of intelligence tests. Subsequently, the authors calculated IQs for 113 and finally 137 countries (Lynn & Vanhanen, 2006). They also provided estimates for additional nations, based on measured IQs of neighboring countries with similar population and culture. Although Lynn and Vanhanen's research were criticized (Hunt & Sternberg, 2006; Wicherts, Dolan, Carlson, & van der Maas, 2010), a number of subsequent studies shown that estimations of national IQ predict many important outcomes, such as GDP, life expectancy, educational achievements, crime rates etc. (see a review in Lynn & Vanhanen, 2012a).

So far, few attempts have been made to assess Big Five personality traits among different countries. For instance, Schmitt et al. (2007) reported data from 56 nations on the Big Five Inventory (BFI). As part of a broader project, the BFI was translated from English into 28 languages and administered to convenience samples of around 200 participants (mostly college students) from each country. Recently Bartram (2012, 2013) considered a large data set from the Occupational Personality Questionnaire (OPQ), an instrument widely used around the world in the field of occupational assessment (i.e., for selection or development in the workplace). The OPQ measures 32 work-related personality traits from which "Big Five" scale scores can be produced (by scale aggregation: Bartram & Brown, 2005). Bartram (2013) used the results from the OPQ for cross-cultural comparisons. His analysis was based on data from 31 different countries, with a total sample of over one million participants. The data were obtained through online administration from people who were being assessed either for job selection or succession planning purposes or for personal development within a job.

One of the biggest and possibly most reliable data sets was provided by McCrae et al. (2005) on Revised NEO Personality Inventory (NEO-PI-R) scales. In this study, college students from 51 nations rated an individual from their country whom they knew well. Raters could choose anyone they knew well as a target, which resulted in a wider age and educational range than would normally be obtained in self-report studies. The mean scores of 51 cultures were standardized and transformed into *T*-scores relative to international means. The authors concluded that the five factors are universal across age and sex groups as well as cultures. Most important, NEO-PI-R allows to assess five higher-order personality traits as well as six facets within each trait. Moreover, before the project described in the 2005 paper, McCrae (2002) provided also data on self-report NEO-PI-R scales.

Lynn and Vanhanen (2002, 2012b) assumed that results observed among individuals should hold also for nations, because the latter can be considered as aggregates of individuals. Following this assumption one might expect a negative association between conscientious behavior and cognitive ability measured at the country level. So far, two studies explored the pattern of associations between Big Five traits and national IQs (Stolarski, Zajenkowski & Meisenberg, 2013; Zajenkowski, Stolarski & Meisenberg, 2013). In these investigations positive correlations of intelligence with openness and extraversion were found, whereas conscientiousness was not significantly related to IQ (Stolarski et al., 2013). However, there are some reasons to believe, that this result might be different when other data are analyzed. First, Stolarski et al. (2013) used personality data from McCrae et al. (2005), which were based on observer-ratings, and studies reporting the negative C-IQ association used self-ratings. Therefore, it is possible, that results from the self-report questionnaires measured at the national level will show different relationship with intelligence. Second, Mottus, Allik, and Realo (2010) notice that some associations between conscientiousness measured at the national level and external variables are not consistent with theoretical expectation. The authors suggest that one should analyze not only the higher-order trait, but also its lower-level facets. Indeed, Mottus et al. (2010) found, that different facets of C relate differently to external criteria.

2. Method

National IQ is from Lynn and Vanhanen (2006), with the extensions and amendments reported in Lynn and Vanhanen (2012b). Missing data points were extrapolated from the school achievement data as reported in Meisenberg and Lynn (2011).

Conscientiousness is taken from two international studies of the Five Factor Model, which used NEO-PI-R (McCrae, 2002; McCrae et al., 2005). One of these researchers (McCrae et al., 2005) used observer-rating method to assess personality, while others used self-report. McCrae (2002) and McCrae et al. (2005) also used data on facets from the conscientiousness scale, including competence, order, dutifulness, achievement, self-discipline, and deliberation.

3. Results

First, we correlated conscientiousness scores and their facets with IQ (Table 1). Generally we found, that self-report measure of C reported by McCrae (2002) was negatively associated with cognitive ability, whereas observer-rating score from McCrae et al. (2005) tended to positively correlate with IQ, although the latter result was not significant. Interestingly, in case of self-report, the conscientiousness facets tend to be negatively related with intelligence. On the other hand, observer-rating scores are more diverse, specifically, competence, dutifulness and self-discipline facets are positively correlated with IQ, while deliberation is negatively associated with cognitive ability. Moreover, the correlations of observer-rated order and achievement with IQ are close to zero.

Further, using Steiger's (1980) method we examined whether the correlation magnitudes differ with respect to IQ and self-report and observer-rating scores (see Table 1). All the respective correlation coefficients are significantly different, excepting deliberation facet. Thus, we may conclude that the method of measurement significantly influences the size and (in some cases) direction of the relationships between country-level C facets and IQ score. For self-report measurement of C, the correlation coefficients tend to be negative, whereas for the observer-ratings, the coefficients are all shifted towards positive values (see Fig. 1). This phenomenon might be labeled as the *perspective shift* effect.

What is even more interesting, we can observe a specific pattern of the correlations: definitely some facets of C (i.e., competence, dutifulness, self-discipline) tend to correlate more positively with IQ (or less

Table 1
Comparison of the correlation coefficients for self-report ($n = 40$ countries) and observer-rating (n = 46 countries) conscientiousness and IQ.

	C (general)	Competence	Order	Dutifulness	Achievement	Self-discipline	Deliberation
				Self-report			
IQ	−.39*	−.18	−.54**	−.02	−.61**	−.21	−.51**
				Observer-rating			
	.11	.29*	−.06	.42**	−.08	.30*	−.31*
Z	−2.23*	−2.10*	−2.68**	−1.96*	−3.08**	−2.27*	−.89

* $p < .05$.
** $p < .001$.

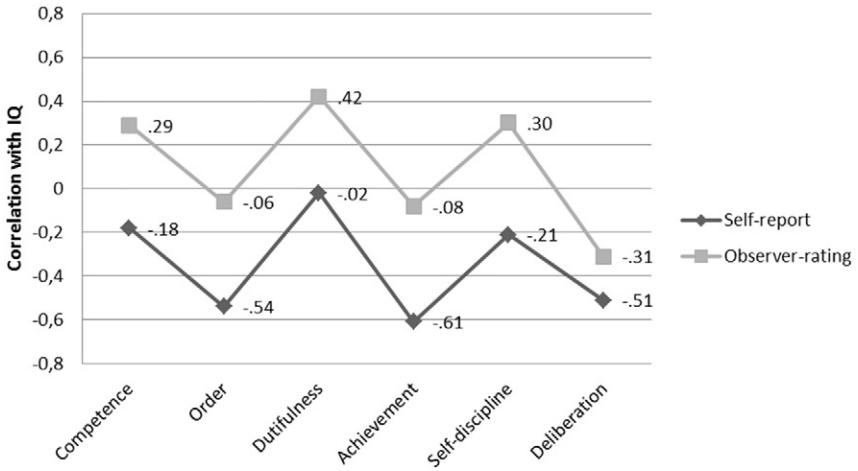

Fig. 1. Illustration of the pattern of correlation coefficients for the relationship between country-level IQ and Conscientiousness facets.

negatively), whereas the others (i.e., order, achievement and deliberation), are significantly lower (or higher – in a negative direction). The effect is observable both for self-report and observer rating, so that the pattern seems almost perfectly parallel, only shifted through the perspective effect.

Aiming to take an in-depth look into the nature of relationships between country IQ and C facets we conducted two regression analyses, predicting the former with the latter (see Table 2). We believed that such analyses would reveal the pattern of specific relationships for particular predictors, at least to a certain extent, purified from C facets' joint covariance.

The analyses revealed that regardless of the assessment perspective (self-reported vs. observer-rated), there is a similar pattern of relationships between C facets and IQ. For each perspective we obtained the same three significant predictors of national IQ, namely: dutifulness (positively), achievement and deliberation (both negatively). Self-reported deliberation proved to predict national IQ at tendency level.

4. Discussion

We analyzed the relationship between conscientiousness and intelligence at national level. The most important result concerned the differences in correlations between self-report and observer-rating conscientiousness scores with IQ. The former was positively associated with cognitive ability, while the latter negatively. These results are to some extent consistent with previous findings indicating, that self-report conscientiousness has a negative relationship with intelligence among individuals (e.g. Moutafi et al., 2004, 2005). However, the correlation concerning observer-rated C and IQ is new. It seems then, that the perspective taken in the C assessment influences the C-IQ association.

The negative relationship between self-report C and intelligence might be explained in many ways. For instance, some researchers try to explain counterintuitive effects of national C in terms of cultural standards. Schmitt et al. (2007) noticed that a relatively low level of conscientiousness was reported by people living in such countries as Japan and South Korea, while the top nations in C were African (e.g. the Democratic Republic of the Congo or Ethiopia). These results are surprising, because the countries differ in terms of economic status and work-related indices (e.g. working hours) in the way that would suggest rather opposite levels of C. One should bear in mind that these countries differ also in terms of IQ. Schmitt et al. (2007) suggest, that perhaps conscientiousness is estimated with respect to cultural norms. It is considered that a culture defines how strong-willed and reliable people are supposed to be. If the standards are extremely high, it would be hard to adhere to them. On the other hand, it is easier to describe oneself as conscientious by comparing with lower standards. This phenomenon is known in the psychological literature as the reference group effect (e.g. Mottus et al., 2012). Although, it seems a plausible explanation for our results on self-report C and IQ, there are also arguments against it. In a recent study Mottus et al. (2012) employed an anchoring vignettes method in order to test whether people from 21 different countries have varying standards for conscientiousness. Participants rated their own conscientiousness and that of hypothetical persons. The latter differed in the level of C and were portrayed in short vignettes. This procedure was expected to reveal individual differences in standards of conscientiousness. The results revealed, that vignettes were rated relatively similarly in all countries, suggesting no substantial culture-related differences in standards for conscientiousness. Moreover, controlling for the differences in standards did not substantially change the rankings of countries on mean self-ratings. Mottus et al. (2012) concluded, that probably other factors than the reference group effect are responsible for the specific differences in national C.

As an alternative explanation for the reference group effect, Mottus et al. (2012) consider self-enhancement. In particular, although people may refer to more or less universal standards, they present themselves in a favorable manner (i.e. high on conscientiousness). Referring to our results, one might wonder whether people from less intelligent countries have higher tendency for self-enhancement in comparison to more able nations. What complicates this interpretation is the suggestion made by some researchers, who argue, that high conscientiousness might be a compensation mechanism for low intelligent individuals (e.g. von Stumm et al., 2011). This implies, that the differences in conscientiousness are real, and do not depend on biased self-presentation. A

Table 2
Regression models predicting national IQ scores with self-report (model 1) and observer-rating (model 2) conscientiousness facets.

Predictor	β	*p*	Regression
Model 1: Self-reported conscientiousness facets and IQ			
Competence	−.14	.353	
Order	−.27	.100	$R = .74$
Dutifulness	**.36**	**.019**	$R^2 = .54$
Achievement	**−.34**	**.038**	adjusted $R^2 = .46$
Self-discipline	−.10	.536	$F(6, 33) = 6.40$, $p < .001$
Deliberation	**−.30**	**.056**	
Model 2: Observer-rated conscientiousness facets and IQ			
Competence	−.20	.374	
Order	.05	.765	$R = .72$
Dutifulness	**.88**	**.000**	$R^2 = .52$
Achievement	**−.57**	**.001**	adjusted $R^2 = .44$
Self-discipline	.17	.452	$F(6, 39) = 6.93$, $p < .001$
Deliberation	**−.35**	**.019**	

Note: Significant results (p.

possible test for this hypothesis would be to see how national IQ and C together predict some indices related to effort or hard working. For instance, it would be interesting to analyze economic growth, rather than GDP, since the former shows a change (and possible effort), while the latter describes only static differences between countries.

As regards observer-rated C, its relationship with IQ is less obvious, because there are no previous data in this area. However, one may try to refer to the assessment process while explaining obtained results. In the cited study by McCrae et al. (2005) students rated an individual from their country whom they knew well. Allik, Realo, Mottus, Kuppens, Burkenau and Hrebickova (2010) notice, that observers need to know their targets well, and are in many cases intimately related to or involved with their targets (close relatives, spouses or friends). It is highly probable, that targets belonged to the observer's in-groups, and his or her judgment might have been affected, to some extent, by intimate relationship or in-group favoritism. Allik et al. (2010) suggest then, that it is the observer, rather than the self, who enhances personality descriptions.

Explaining the observer rated C and IQ, we can't exclude another possibility. If we assume that participants chose a typical inhabitant of their country, and were aware of his/her intelligence level, then it is possible, that they described their compatriots according to a stereotype of an intelligent person. It is known from the literature, that descriptions of intelligence in questionnaires are related positively to descriptions of C (DeYoung et al., 2007), and when people think about a typical person believed to have high intelligence, they also attribute other socially desirable characteristics to the person, such as high conscientiousness (Mottus, Allik, Konstabel, Kangro & Pullmann, 2008).

More light is shed on the C-IQ relationship by the regression analyses of the personality facets. Interestingly, we found that three components of C were associated with national intelligence, regardless of the assessment perspective assumed. When all facets were taken jointly in the regression models, achievement and deliberation were negatively related to IQ, while dutifulness was in a positive relationship with it. These results require further interpretation because apparently they are related to different mechanisms.

In both the observer and self-rated perspective achievement striving was the strongest negative predictor of IQ. Individuals who score high on this facet are described as ambitious, with high aspiration level, working hard to achieve their goals (Costa & McCrae, 1992). The most likely explanation for the inverse association between Achievement Striving and IQ might be aforementioned compensation mechanism (von Stumm et al., 2011). Costa and McCrae (1998) emphasize, that for high scorers on achievement striving it is important to have a clear set of goals which are pursued in an orderly fashion. It is possible that people in low IQ countries developed higher Achievement Striving which acts as a "compensatory force" for lower cognitive ability.

Deliberation is defined as the tendency to think carefully before acting, and high scorers are characterized as cautious and deliberate (Costa & McCrae, 1992). This facet reflects time-related aspects, i.e. how quick an individual makes decisions and starts to act. Moreover, Costa and McCrae (1998) found deliberation to be positively correlated with cognitive structure, i.e. low tolerance of ambiguity and uncertainty in information. On the other hand, a huge body of research shows that high intelligence is linked to faster responses in cognitive tasks (Jensen, 2006). Additionally, Gottfredson (2004) emphasizes, that more able individuals deal more efficiently with new, complex, unexpected and unstructured problems, and learn new professions faster (Gottfredson, 2004). It is possible, that people from countries with higher IQ developed an adaptive mechanism of low deliberation which helps them to deal with the high complexity and speed of life.

Dutifulness reflects the strength of a person's sense of duty and obligation; high scorers tend to adhere to ethical principles and moral obligations (Costa & McCrae, 1992). Our knowledge of national IQ seem to be in agreement with its positive correlation with dutifulness. Lynn and Vahnanen (2012a) show that cognitive ability is related to many social outcomes associated with respecting the rules, including the corruption level and crime rate. According to Lynn and Vahnanen (2012a), this might be explained in a straightforward manner: higher intelligence leads to higher moral standards. This would suggest that the level of national dutifulness was developed on the foundation of intelligence.

The present study raises also some questions regarding the nature of national intelligence construct. The most important is the question, whether it represents general cognitive ability, or is more related to fluid or crystallized component of intelligence. As we mentioned above, the compensation theory suggests, that a negative relationship of self-report C with abilities, is more likely for the fluid intelligence, rather crystallized, because the former is more biologically determined, while the latter can be increased by hard work (Moutafi et al., 2004, 2005). This is in agreement with the fact that most of the data reported by Lynn and Vahnanen (2002, 2006, 2012b) were based on such tests as Raven's or Cattell's, measuring fluid reasoning.

Our analyses showed some interesting results concerning C, its facets and intelligence at national level. However, many questions remain open. For instance, the specific mechanisms underlying positive and negative associations between C and IQ are still unknown. Future studies may shed some light on this relationship by exploring how C and cognitive ability measured at national level, predict jointly other variables.

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