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Abstract

During the past decades, a number of studies have explored personality group differences in the Big Five personality traits among students in different academic majors. To date, though, this research has not been reviewed systematically. This was the aim of the present review. A systematic literature search identified twelve eligible studies yielding an aggregated sample size of 13,389. Eleven studies reported significant group differences in one or multiple Big Five personality traits. Consistent findings across studies were that students of arts/humanities and psychology scored high on *Neuroticism* and *Openness*; students of political sc. scored high on *Openness*; students of economics, law, political sc., and medicine scored high on *Extraversion*; students of medicine, psychology, arts/humanities, and sciences scored high on *Agreeableness*; and students of arts/humanities scored low on *Conscientiousness*. Effect sizes were calculated to estimate the magnitude of the personality group differences. These effect sizes were consistent across studies comparing similar pairs of academic majors. For all Big Five personality traits medium effect sizes were found frequently, and for Openness even large effect sizes were found regularly. The results from the present review indicate that substantial personality group differences across academic majors exist. Implications for research and practice are discussed.

Keywords: personality, Big Five, group differences, academic majors

1. Introduction

The choice of education is perhaps the first highly important decision that young people have to make for themselves in the developed world. Each education paves the way for certain vocational paths, and the choice has a lasting impact on the young adult's life. In tertiary education students try to find academic majors that suit their abilities, interests, and future vocational goals in order to maximise the likelihood of obtaining a degree. This is in the students' own interest, both financially and in terms of well-being, but society has an interest too in helping students find the right major since higher education and high retention rates are economically desirable (Bloom, Hartley, & Rosovsky, 2007). As a result of this convergence of interests, academic advising has become a societal priority and has captured the attention of researchers (Frost & Brown-Wheeler, 2003).

Two lines of psychological research have sought to inform academic advising. The first line has explored antecedents of students' academic performance, such as cognitive abilities, personality, motivation, etc. (see Richardson, Abraham, & Bond, 2012, for an overview). The second line has examined group differences in these same variables among students in different academic majors. Especially the Big Five personality traits *Neuroticism*, *Extraversion, Openness*, *Agreeableness*, and *Conscientiousness* (Costa & McCrae, 1992) have been studied in recent years in order to determine if different academic fields attract different types of students (e.g. Kaufman, Pumaccahua, & Holt, 2013; Lievens, Coetsier, De Fruyt, & De Maeseneer, 2002; Lounsbury, Smith, Levy, Leong, & Gibson, 2009; Rubinstein, 2005). An often-stated rationale in this research is that there may be an optimal "fit" between student and major based on the student's personality, an idea that has been put forth by Holland (e.g. Holland, 1997), among others. If, in fact, some academic majors are

more suitable for some students than others due to the students' personality, then that knowledge would be useful in both academic advising, counselling, and educational practice more broadly.

However, the research on Big Five personality group differences among students in different majors has not yet been reviewed in a systematic way. It is therefore unclear what we know about personality group differences across majors, and there is a need for this research to be summarised and evaluated in order to become useful for researchers and practitioners. The aim of the present review is exactly this: to systematically review the existing research on Big Five personality group differences across academic majors and to estimate the magnitude of the findings from this research.

2. Method

2.1. Literature search

A systematic search by thematically relevant electronic databases was conducted to identify studies on the relationships between the Big Five personality traits and academic majors. Using ProQuest the following electronic databases were searched simultaneously with the last search run January 29th 2015: Australian Education Index (1977 – present), ERIC (1966 – present), ProQuest Education Journals, (1988 – present), ProQuest Research Library, ProQuest Science Journals, and PsycINFO (1806 – present). Search terms and Boolean operators were ab(personalit* OR Big Five OR Five-Factor Model) AND ab(facult* OR college major* OR academic major* OR study major*) AND peer(yes). No publication date limits were applied. Abstracts of all located studies were reviewed, and potential eligible studies were identified. Full text copies of potential eligible studies were

obtained and examined applying the inclusion criteria outlined in the section below. References of included studies were searched manually to identify additional relevant studies not located in the formal search. Finally, this author's personal collection of personality research articles was searched to identify additional eligible studies.

2.2. Inclusion criteria

Only studies available in English were examined further. There were two basic requirements for inclusion: 1) a Big Five personality measure had been administered to students in tertiary education representing two or more academic majors/groups of majors, and 2) a statistical procedure had assessed the relationships between the Big Five personality traits and academic majors, or the means, standard deviations, and sample size had been reported for each major. Studies using personality measures not directly measuring the Big Five personality traits were not included. Neither were studies using samples of fully trained academics or high school students.

2.3. Data extraction

Included studies were examined in order to extract relevant study characteristics: country in which the study was conducted, academic majors in which the students were enrolled, sample size, mean age, gender distribution, study design, and personality measure used. Results on group differences in the Big Five personality traits across academic majors were extracted, and mean scores on the Big Five personality traits and standard deviations were extracted for each group if reported. If not reported, the corresponding author was contacted in order to retrieve this information.

For those studies that included gender as an independent variable in factorial designs, gender differences in the Big Five personality traits were extracted also.

2.4. Data synthesis

A qualitative data synthesis approach was adopted and combined with effect size calculations of mean differences in the Big Five personality traits across academic majors. Formal meta-analysis was not possible due to profound differences between studies in their selection of academic majors being compared. For more about the issue of incomparability of primary studies in meta-analysis, see Higgins and Green (2011).

3. Results

3.1. Study characteristics

Following the guidelines outlined in the PRISMA Statement (Liberati et al., 2009), a flow diagram is presented in Figure 1 to illustrate the process of study selection. As a result of the study selection process, 12 empirical studies meeting all inclusion criteria were included in the review. The aggregated sample size was 13,389. Extracted study characteristics are presented ordered by study author(s) in Table 1.

3.1.1. Study designs and samples

Most studies were conducted in North America and Europe, and all but two studies (Lievens et al., 2002; Vedel, Thomsen, & Larsen, 2015) were retrospective in that the students had been enrolled for months or years in their majors before completing the personality questionnaire. Samples were large in most studies and

ranged from 168 to 3,295 students, and mean age in the studies ranged from 18.2 to

25.8 years. In three studies mean age was not reported, though (Clariana, 2013;

Marrs, Barb, & Ruggiero, 2007; Pringle, DuBose, & Yankey, 2010). There were

generally more females than males in the study samples, although this varied

depending on the specific majors being compared. Only one study failed to report any

gender information (De Fruyt & Mervielde, 1996). Studies differed greatly pertaining

to which academic majors were compared. The majority of studies compared four to

eight different academic majors/groups of majors covering a wide range of academic

fields. One study, though, compared eight rather similar majors in business

administration fields (Pringle et al., 2010), and two studies compared only two groups

each: business versus nonbusiness students (Lounsbury et al., 2009) and psychology

versus nonpsychology students (Marrs et al., 2007).

3.1.2. Personality measures

Nine different Big Five measures were administered across the twelve studies.

The nomenclature for the Big Five personality traits varies in these personality

measures: the factor in the PPQ denoted *Tough-mindedness* is the opposite pole of the

factor Agreeableness in the other Big Five measures, and the factor in the PPQ

denoted *Conformity* is the opposite pole of the factor Openness. Similarly, the factor

Emotional Stability in the IPIP and APSI is the opposite pole of Neuroticism in the

other Big Five measures. These primarily semantic differences originate in the

historical development of the various Big Five personality measures (John, Naumann,

& Soto, 2008), which is outside the scope of this review. There is a practical

consequence of the diversity, though. In order to make the results from the reviewed

studies comparable, the directions of the group differences were reversed in instances

where opposite poles of Neuroticism, Agreeableness, or Openness had been measured[1]. All results in Table 1 therefore refer to the same five terms for the Big Five factors irrespective of personality measures originally used in the included studies.

3.1.3. Statistical approaches

Ten studies used one or multiple omnibus tests (ANOVA, ANCOVA, MANOVA, or MANCOVA) to test the statistical significance of Big Five mean differences among academic majors/groups of majors. Statistically significant results were then followed up with post-hoc tests (Bonferroni, Tukey's Honestly Significant Differences, Newman-Keuls, or Scheffé). Lounsbury et al. (2009) compared only two groups, though, and therefore conducted independent *t*-tests exclusively. Finally, Sánchez-Ruiz, Hernández-Torrano, Pérez-González, Batey, and Petrides (2011) did not test the statistical significance of personality group differences among academic majors. However, means on the Big Five personality traits, standard deviations, and sample sizes were reported for three groups of majors in the article, and this information enabled current pairwise comparisons of the three groups of majors using the Bonferroni correction; hence the inclusion of this study (see section 2.2.). Half of the studies included gender as a covariate or independent variable in addition to academic major, but Clariana (2013) performed all statistical analyses separately for males and females in four different groups of majors instead. In order to make the results from this study comparable to the results from the other included studies, the standard deviations were retrieved form the author (M. Clariana, personal

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[1] Results for Neuroticism extracted from Sánchez-Ruiz et al. (2011) were also reversed after confirmation of this author's suspicion that the results reflected scores on Emotional Stability, not Neuroticism as originally reported (M. J. Sánchez-Ruiz, personal communication, March 16, 2015).

communication, March 18, 2015), and the descriptives were combined for males and females. Pairwise comparisons of the four groups of majors were subsequently performed using the Bonferroni correction.

3.2. Personality group differences across majors

Results on personality group differences across majors are presented in Table 1. On a general level, the studies found significant differences across academic majors in most Big Five personality traits. Exceptions were the studies by Larson, Wei, Wu, Borgen, and Bailey (2007), Marrs et al. (2007), and Sánchez-Ruiz et al. (2011). Larson et al. (2007) found no significant personality group differences across academic majors, while Marrs et al. (2007) and Sánchez-Ruiz et al. (2011) found significant group differences in the trait Openness exclusively. The study by Pringle et al. (2010) differs from the other studies in that only the two traits Extraversion and Conscientiousness were measured. In this study significant group differences were found in the trait Extraversion but not in the trait Conscientiousness.

3.2.1. Effect sizes

Statistical significance is the preferred criterion in most psychological research, and statistical significance was therefore generally reported in the studies included in the present review. Judging by these results on statistical significance presented in Table 1, there are consistent personality group differences among academic majors. However, statistical significance is highly influenced by sample size, and in large samples even trivial effects can be statistically significant (e.g. Cohen, 1990). Effect sizes such as Cohen's *d* (Cohen, 1977) overcome this problem and give standardised estimates, which is useful when evaluating the magnitude of for

example differences between groups. None of the included studies reported effect sizes, though. Cohen's *d* was therefore calculated in the present review using means and standard deviations for the various groups in the included studies to estimate the magnitude of the personality group differences. Half of the included studies reported means and standard deviations for each of the groups compared. Corresponding authors of the studies not reporting means and standard deviations were contacted with the request to provide this information[2]. The requested information was retrieved in one instance (M. Clariana, personal communication, March 18, 2015). The corresponding authors of the remaining studies were no longer able to locate the requested information or did not respond. Consequently, effect sizes were calculated for the personality group differences in eight studies, though in the case of Marrs et al. (2007) only for differences in Openness due to the lack of information on the other Big Five personality traits. Effect sizes are presented in Table 2. Following Cohen's guidelines for effect sizes (Cohen, 1977), medium effect sizes were frequently found for group differences in all Big Five personality traits. For the trait Openness even large effect sizes were found regularly. A synthesis of the results on personality group differences from Table 1 and Table 2 is given below for each Big Five personality trait.

3.2.2. Neuroticism

Arts and Humanities scored consistently high on Neuroticism compared to all other groups, and medium effect sizes were often found in comparisons with Engineering, Law, and Sciences. Psychology also scored higher than most other groups, sometimes

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[2] Marrs et al. (2007) reported means and standard deviations for the trait Openness only, and the corresponding author was consequently contacted along with the corresponding authors of studies not reporting means and standard deviations for any of the Big Five personality traits.

rivalling Arts and Humanities, and medium effect sizes were found in comparisons with Economics. Economics and Business scored consistently lower than other groups. Results were inconsistent for other academic majors, or the majors were sampled in a couple of studies only.

3.2.3. Extraversion

Economics, Law, Political Sc., and Medicine scored higher than Arts, Humanities, and Sciences, and the differences often represented medium effect sizes. In one instance (Lievens et al., 2002), the difference between Medicine and Humanities represented even a large effect size. Results were inconsistent for other academic majors, or the majors were sampled in a couple of studies only.

3.2.4. Openness

Humanities, Arts, Psychology, and Political Sc. scored higher than other academic majors, and effect sizes were often moderate or even large in comparisons with Economics, Engineering, Law, and Sciences. Results were inconsistent for other academic majors, or the majors were sampled in a couple of studies only.

3.2.5. Agreeableness

Law, Business, and Economics scored consistently lower than other groups, and a few medium effect sizes were found in comparisons with Medicine, Psychology, Sciences, Arts, and Humanities. Results were inconsistent for other academic majors, or the majors were sampled in a couple of studies only.

3.2.6. Conscientiousness

Arts and Humanities scored consistently lower than other academic majors, and medium effect sizes were found in comparisons with Sciences, Law, Economics, Engineering, Medicine, and Psychology. Results were inconsistent for other academic majors, or the majors were sampled in a couple of studies only.

3.3. Gender differences

Four studies (Larson et al., 2007; Marrs et al., 2007; Rubinstein, 2005; Vedel et al. 2015) included gender as an independent variable in factorial designs, and Clariana (2013) performed t-tests to compare males and females in terms of the Big Five personality traits. Clariana (2013), Larson et al. (2007), Rubinstein (2005), and Vedel et al. (2015) found significant gender differences in Agreeableness; females scored significantly higher than males ($p < .01$). Clariana (2013), Rubinstein (2005), and Vedel et al. (2015) also found significant gender differences in Conscientiousness; again, females scored significantly higher than males ($p < .05$). Finally, Clariana (2013) and Vedel et al. (2015) found significant gender differences in Neuroticism; females scored significantly higher than males ($p < .001$). Results were contradictory for Openness, and no significant gender differences in Extraversion were found.

4. Discussion

4.1. Power, statistical significance, and effect sizes

As stated in the results section (see Section 3.2.), Larson et al. (2007) failed to find group differences in any of the Big Five personality traits across different academic majors, and Marrs et al. (2007) and Sánchez-Ruiz et al. (2011) found group differences in the personality trait Openness only. However, Larson et al. (2007)

applied an unusually strict significance criterion ($p < .005$), and both Larson et al.
(2007), Marrs et al. (2007), and Sánchez-Ruiz et al. (2011) employed small samples
with low numbers of students in each group compared to the sampling in the other
included studies. Consequently, these studies lacked the statistical power necessary to
detect group differences, and the non-significant results reported in these studies
should be interpreted with caution. In fact, the effect sizes calculated in the present
review and presented in Table 2 show that these studies actually did find both small
and medium effect sizes very similar to those obtained in the other included studies.
This was not evident from the original studies, and it highlights the need to focus
more on effect sizes and less on statistical significance in research.

4.2. Gender effects

One might wonder if the personality group differences found in the included
studies could be gender effects caused by uneven gender distributions in various
majors. The higher scores for females on Agreeableness, Conscientiousness, and
Neuroticism found in some of the included studies fit well with results from previous
research on gender differences in the Big Five personality traits (e.g. Costa,
Terracciano, & McCrae, 2001; Schmitt, Realo, Voracek, & Allik, 2008), and the
comparatively higher scores for females arguably explain part of the personality
group differences among majors with different percentages of females enrolled.

However, several facts indicate that the personality group differences found
are not pure gender effects. Firstly, two of the included studies (Kaufman et al., 2013;
Lievens et al., 2002) controlled for gender in the statistical analyses and still found
personality group differences in line with results from the other studies. Treating
gender as a covariate that can be "controlled for" in these studies is questionable,

though, since gender and choice of major are not independent; more females choose psychology than males, and the opposite is true for the sciences. The effect of gender contains some of the variance from the effect of academic major, and it is not possible to separate this shared variance into gender variance and academic major variance; it will always be shared. For more on this issue, see Miller & Chapman (2001). The problem with shared variance was overcome in one of the other included studies (Rubinstein, 2005) by employing a quota sampling strategy to obtain equal numbers of males and females in all groups. Medium effect sizes were found for group differences in Neuroticism, and even large effect sizes were found for group differences in Openness in this study. Also, medium effect sizes were found in studies with pairwise comparisons of academic majors with comparable, though not 50/50, gender distributions; in Vedel et al. (2015), for example, medicine students (67% females) scored much higher ($d = 0.56$) than law students (66% females) on Agreeableness, and political science students (56% females) scored much higher ($d = 0.78$) than economics students (54% females) on Openness (see Table 2). Moreover, across all studies, the Big Five personality trait that yielded the largest effect sizes and distinguished students in different academic majors from each other the most was a trait with no clear gender differences; Openness. All this indicates that the personality group differences across academic majors found in the included studies are not mere gender effects.

4.3. Socialisation versus pre-existing differences

Another key question pertains to the nature of these personality group differences across majors: are they derived from socialisation processes within the faculties or caused by pre-existing differences between students enrolling in different

majors? Most of the research summarised in the present review administered

personality questionnaires to students well into their studies. This opens up the

possibility that the students' personality was influenced by the unique environment

within their faculty. Various personality traits may be valued and rewarded in

different academic fields, and this could potentially create group differences between

academic majors. Two of the included studies (Lievens et al., 2002; Vedel et al.,

2015), though, measured the students' personality just after enrolment thereby

precluding socialisation effects. As evident from Table 1 and 2, these studies found

personality group differences corresponding perfectly with the results from the other

studies. This supports the interpretation that the personality group differences across

academic majors are pre-existing and not a result of socialisation processes.

4.4. Implications for academic advising, teaching, and research

Decades of research have consistently shown positive effects of earning

academic degrees on desirable outcomes such as occupational status, work force

participation, and salary (e.g. Pascarella & Terenzini, 1991). Sadly, though, many

students drop out and never finish an academic major. As mentioned in the

introduction, it is frequently stated that findings on personality group differences

across majors could inform academic advising by helping students to find an

academic major that matches their personality. Accordingly, the findings from the

present review could be used to guide students in their choice of academic major

based on the student's scores on the Big Five personality traits. The rationale for this

application of the findings rests upon the premise that students matching the typical

personality profile in a specific academic major are also more successful than students

not matching the typical personality profile. If students with personality

characteristics typically found within their major actually achieve higher grades, have higher retention rates, and enjoy greater academic satisfaction than their peers, then application of the findings from the present review would benefit indeed both students and educational institutions. Unfortunately, this has not yet been explored much. A large body of research has been conducted on personality-performance relationships, and now we know that the Big Five personality trait Conscientiousness is a robust predictor of academic success at university, while the other Big Five traits have more modest predictive validity (e.g. Poropat, 2009; Vedel, 2014). However, we know very little about what characterises academically successful students within specific majors. One of the included studies in the present review (Vedel et al., 2015) explored if different Big Five personality traits predicted academic success in different academic majors, and the results of the study supported this hypothesis. However, this study is currently the only study that has explored this directly. It is therefore yet not known as to which extent the results on personality group differences found in the present review can be applied to academic advising.

The personality group differences across academic majors found in the present review could perhaps be of interest to teachers, instructors, and professionals in general in educational institutions. It seems likely that some teaching methods and learning activities may be more fruitful in some academic majors than others. By taking into account some general personality characteristics of student populations, teachers and instructors may be better equipped to the task of structuring the learning environment in a way that engages the students, makes them feel comfortable, and facilitates their learning process.

The results from the present review could potentially be used to develop combinations of personality traits, interests, and abilities with predictive validity

within specific academic majors. The trait-complex approach by Ackerman and Heggestad (1997) is an example of this and encompasses cognitive, affective, and motivational variables. Trait-complexes have successfully been used to predict grades, attrition rates, and domain knowledge, among other things, in tertiary education (Ackerman, 2000; Ackerman & Beier, 2003; Ackerman, Kanfer, & Beier, 2013), and the personality group differences across majors found in the present review could feed into such integrative approaches. Again, the rationale for this requires research findings that support the notion that students who match the typical personality profile in a specific academic major are more successful than students not matching the typical personality profile.

4.5. Limitations and future directions

There are some limitations in the present review. One of the great challenges in conducting the review was the diversity in sampling across the included studies. While some research designs covered a broad spectrum of academic fields from humanities to engineering (e.g. De Fruyt & Mervielde, 1996), others narrowed their scope to a more uniform selection of academic majors (e.g. Pringle et al., 2010). Similarly, the number of groups compared in the studies varied greatly; some studies compared as much as eight academic majors (e.g. Lievens et al., 2002), while others compared only two different groups (e.g. Lounsbury et al., 2009). This diversity complicated the process of summarising the findings from the included studies and rendered statistical meta-analysis futile. A systematic qualitative approach combined with effect size calculations was therefore chosen instead. However, this approach did make it possible still to synthesize and evaluate the magnitude of personality group differences across a range of academic majors thereby fulfilling the study aims. A few

academic majors (e.g. pharmacy) were sampled only once, though, and we need more research sampling these majors before we can conclude anything regarding their relative scores on the Big Five personality traits compared to other majors.

Another limitation concerns the use of different Big Five personality measures across the studies included in the present review. This could be problematic and harm the comparability of the results due to dissimilar construct validities of the "traditional" Big Five measures such as the NEO-inventories and the more uncommon measures such as the web-based instrument in Pringle et al. (2010), the APSI in Lounsbury et al. (2009), the PPQ in Kline and Lapham (1992), and the application of the Chinese version of the NEO-FFI applied to a Taiwanese sample in Larson et al. (2007). Satisfactory information on construct validity of the APSI was given, though (see Lounsbury et al., 2003), and regarding application of the Chinese version of NEO-FFI to a Taiwanese sample, references on successful application of this version to similar cultures such as Hong Kong (see Wan, Luk, & Lai, 2000) and Mainland China (see Zhang, 2005) were given. However, the study by Kline and Lapham (1992) referred to a validity study (Kline & Lapham, 1991) showing satisfactory convergent correlations of the PPQ with the Eysenck Personality Questionnaire (EPQ; Eysenck & Eysenck, 1975), not with a Big Five measure. Additionally, later validity studies of the PPQ have shown unsatisfactory convergence between several of the PPQ scales and scales from traditional Big Five measures. In the validity study by Ostendorf and Angleitner (1994) for example, only the Conventionality scale of the PPQ correlated strongly and exclusively (.72) with its purported corresponding factor Openness. These low construct validities of some of the PPQ scales may explain the non-significant results on group differences in Neuroticism and Extraversion across academic majors found in Kline and Lapham

(1992). Another potentially problematic measure was the one used in the study by Pringle et al. (2010). No references on construct validity studies of this measure were given in Pringle et al. (2010), and no validity studies of this measure have been located. However, the item wordings of the personality measure were reported in the study and formed the basis for inclusion of the results for Extroversion and Conscientiousness. The results from Kline and Lapham (1992) and Pringle et al. 2010) were included despite some concerns about the construct validity of their measures in an effort not to exclude too much data. This methodological choice could possibly have harmed the comparability of the results from the various studies. However, the studies using untraditional measures of the Big Five did not yield results very different from the studies using traditional Big Five measures, they just found somewhat smaller group differences generally, so inclusion of these studies does not seem to have had substantial adverse effects in the present review.

The previous sections in the discussion give rise to a few suggestions for future research. More prospective studies are needed in order to make firm conclusions regarding the pre-existence of personality group differences across academic majors. Pre-existing group differences do not preclude socialisation effects, though, and it would be interesting also to see longitudinal studies exploring if pre-existing group differences increase or decrease over time.

Furthermore, it would be interesting to see more research splitting up the broad academic fields such as business, sciences, and arts/humanities to analyse more narrow units; there may be large personality group differences between marketing and accounting students, for example. This would not be easy due to problems with insufficient recruitment and the power issues discussed earlier (see Section 4.1.), but it might yield valuable results.

Most importantly, though, research should be undertaken to explore if students matching the typical personality profile in a specific academic major are also more successful than students not matching the typical personality profile.

5. Conclusion

The present review found consistent Big Five personality group differences across academic majors. Calculated effect sizes of these differences were fairly homogenous across studies for comparisons of the same or similar pairs of academic majors. Medium effect sizes were frequently found for all Big Five personality traits, and for Openness even large effect sizes were found regularly.

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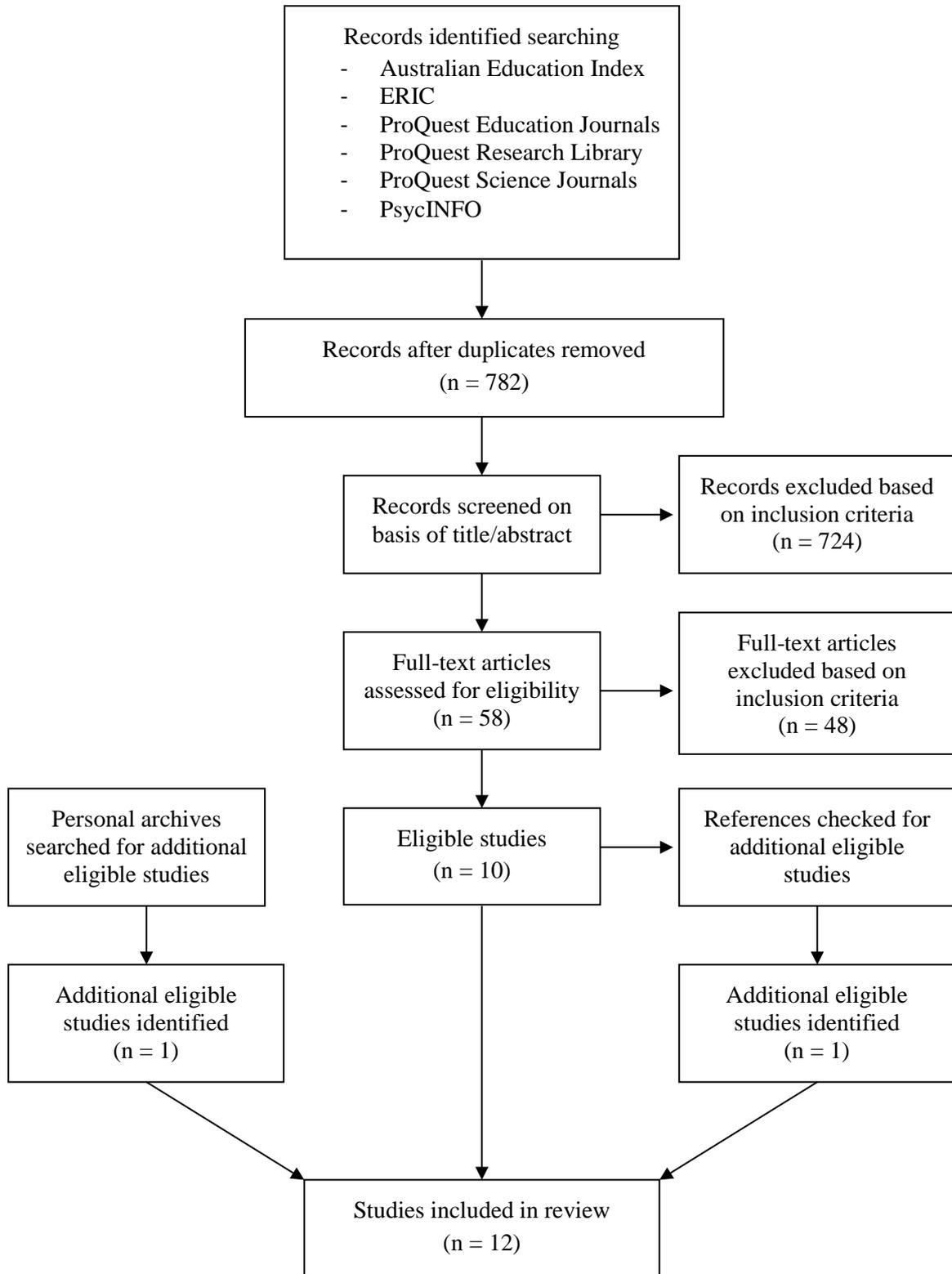
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Records identified searching
- Australian Education Index
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- ProQuest Research Library
- ProQuest Science Journals
- PsycINFO

Records after duplicates removed
(n = 782)

Records screened on basis of title/abstract

Records excluded based on inclusion criteria
(n = 724)

Full-text articles assessed for eligibility
(n = 58)

Full-text articles excluded based on inclusion criteria
(n = 48)

Personal archives searched for additional eligible studies

Eligible studies
(n = 10)

References checked for additional eligible studies

Additional eligible studies identified
(n = 1)

Additional eligible studies identified
(n = 1)

Studies included in review
(n = 12)

Fig. 1. Study selection process.
Note: Adapted from the PRISMA 2009 Flow Diagram (Moher, Liberati, Tetzlaff, & Altman, 2009).

Table 1

Study characteristics and results on personality group differences.

Author(s)	Country	Academic majors, n, N, gender distribution, mean age, and study design	Personality measure		Results on personality group differences
Clariana (2013)	ESP	☐ Maths etc. (Maths, Technology, Computer Sc.), $n = 159$; 27% females ☐ Business etc. (Business, Law, Journalism, Sociology), $n = 168$; 60% females ☐ Educational Sc./Pedagogical Sc., $n = 149$; 89% females ☐ Humanities, $n = 144$; 62% females $N = 620$; 59% females Mean age: Not reported Retrospective study design	BFI10	N	Educational/Pedagogical Sc. scored significantly higher than all other groups, and Humanities scored significantly higher than Maths etc. ($p < .05$).
				E	No significant differences ($p > .05$).
				O	Maths etc. and Humanities scored significantly higher than Business etc. and Educational/Pedagogical Sc. ($p < .05$).
				A	Educational/Pedagogical Sc. scored significantly higher than Humanities ($p < .05$).
				C	Educational/Pedagogical Sc. scored significantly higher than all other groups ($p < .05$).
De Fruyt & Mervielde (1996)	BEL	☐ Humanities, $n = 153$ ☐ Law, $n = 121$ ☐ Sciences, $n = 63$ ☐ Applied Sc./Engineering, $n = 308$ ☐ Economics, $n = 71$ ☐ Psychology/Educational Sc., $n = 96$ ☐ Applied Biological Sc., $n = 19$ ☐ Political Sc./Social Sc., $n = 102$ $N = 934$; gender distribution not reported Mean age: 23.4 years Retrospective study design	NEO-PI-R	N	Humanities and Psychology/Educational Sc. scored significantly higher than all other groups ($p < .05$).
				E	Humanities and Applied Biological Sc. scored significantly lower than all other groups ($p < .05$).
				O	Humanities, Psychology/Educational Sc., and Political/Social Sc. scored significantly higher than all other groups ($p < .05$).
				A	Sciences scored significantly higher than all other groups ($p < .05$).
				C	Law, Sciences, Applied Sc./Engineering, and Economics scored significantly higher than Political/Social Sc., which in turn scored significantly higher than Humanities, Psychology/Educational Sc., and Applied Biological Sc. ($p < .05$).
Kaufman et al. (2013)	USA	☐ Criminal Justice/Political Sc., $n = 207$; 63% females	IPIP	N	No significant differences ($p > .05$).

Author(s)	Country	Academic majors, *n*, *N*, gender distribution, mean age, and study design	Personality measure	Results on personality group differences
		☐ Psychology etc. (Psychology, Sociology, Anthropology, Health Sc., Geography), *n* = 1,672; 87% females ☐ Sciences, *n* = 273; 68% females ☐ Arts/Humanities, *n* = 447; 79% females ☐ Social Sc., *n* = 480; 90% females ☐ Economics etc. (Economics, Marketing, Management, Accounting, Public Administration), *n* = 216; 60% females *N* = 3,295; 82% females Mean age: 23.7 years Retrospective study design	(50-item version)	E Criminal Justice/Political Sc. and Economics etc. scored significantly higher than Sciences. Economics etc. also scored significantly higher than Arts/Humanities ($p < .05$). O Psychology etc. scored significantly higher than Criminal Justice/Political Sc., Arts/Humanities, and Social Sc. Arts/Humanities and Economics etc. scored significantly higher than Social Sc. ($p < .05$). A Psychology etc. scored significantly higher than Criminal Justice/Political Sc., Sciences, and Economics etc. ($p < .05$). C Criminal Justice/Political Sc. scored significantly higher than Arts/Humanities and Economics etc. Psychology etc. scored significantly higher than Economics etc. ($p < .05$).
Kline & Lapham (1992)	GBR	☐ Arts, *n* = 357 ☐ Sciences, *n* = 326 ☐ Social Sc., *n* = 557 ☐ Engineering, *n* = 62 ☐ Mixed (mixed main subjects), *n* = 125 *N* = 1,472; 62% females Mean age: 19.2 years Retrospective study design	PPQ	N No significant differences ($p > .05$). E No significant differences ($p > .05$). O Arts and Mixed scored significantly higher than Sciences and Engineering. Mixed also scored significantly higher than Social Sc., which in turn scored significantly higher than Engineering ($p < .05$). A Arts and Mixed scored significantly higher than Sciences, Social Sc., and Engineering ($p < .05$). C Sciences and Engineering scored significantly higher than Arts. Engineering also scored significantly higher than Social Sc. and Mixed ($p < .05$).
Larson et al. (2007)	TWN	☐ Finance, *n* = 95; 77% females ☐ Counselling and Guidance, *n* = 88; 78% females	NEO-FFI	There were no significant group differences in any of the Big Five personality traits.

Author(s)	Country	Academic majors, *n*, *N*, gender distribution, mean age, and study design	Personality measure	Results on personality group differences
		☐ Engineering, *n* = 74; 8% females ☐ Pharmacy, *n* = 55; 56% females *N* = 312; 57% females Mean age: 20.2 years Retrospective study design		
Lievens et al. (2002)	BEL	☐ Medicine, *n* = 631; 63% females ☐ Law, *n* = 121; 50% females ☐ Economics, *n* = 71; 50% females ☐ Sciences, *n* = 63; 60% females ☐ Psychology/Pedagogical Sc., *n* = 96; 70% females ☐ Political Sc./Social Sc., *n* = 102; 50% females ☐ Engineering, *n* = 308; 20% females ☐ Humanities, *n* = 153; 70% females *N* = 1,545; 53% females Mean age: 18.2 years (medical students only) Prospective study design	NEO-PI-R	N Humanities scored significantly higher than Engineering, Law, Sciences, and Economics. Psychology/Pedagogical Sc. scored significantly higher than Law (*p* < .05). E Medicine scored significantly higher than Engineering, Humanities, and Sciences. Law, Economics, Psychology/Pedagogical Sc., and Political/Social Sc. scored significantly higher than Humanities (*p* < .05). O Humanities and Psychology/Pedagogical Sc. scored significantly higher than Engineering, Law, Sciences, and Economics. Political/Social Sc. scored significantly higher than Engineering, Sciences, and Economics (*p* < .05). A Medicine and Sciences scored significantly higher than Economics and Political/Social Sc. (*p* < .05). C Economics, Engineering, Law, and Sciences scored significantly higher than Humanities and Psychology/Pedagogical Sc. Medicine scored significantly higher than Humanities (*p* < .05).
Lounsbury et al. (2009)	USA	☐ Business, *n* = 347 ☐ Non-Business (majors not specified), *n* = 2,252	APSI	N Business scored significantly lower than Nonbusiness (*p* < .01). E Business scored significantly higher than Nonbusiness (*p* < .01).

Author(s)	Country	Academic majors, n, N, gender distribution, mean age, and study design	Personality measure		Results on personality group differences
		N = 2,599; 68% females Mean age: Not reported Retrospective study design		O A C	Business scored significantly lower than Nonbusiness ($p < .01$). Business scored significantly lower than Nonbusiness ($p < .01$). Business scored significantly higher than Nonbusiness ($p < .01$).
Marrs et al. (2007)	USA	☐ Psychology, n = 110; 79% females ☐ Non-Psychology (Arts, Criminal Justice, Maths, Natural Sciences, Business), n = 58; 52% females N = 168; 70% females Mean age: Not reported Retrospective study design	BFI	N E O A C	No significant differences ($p > .05$). No significant differences ($p > .05$). Psychology scored significantly higher than Nonpsychology ($p < .05$). No significant differences ($p > .05$). No significant differences ($p > .05$).
Pringle et al. (2010)	USA	☐ Accounting, n = 150 ☐ CIS (Computer Information Systems), n = 29 ☐ Economics, n = 32 ☐ Finance, n = 174 ☐ HTM (Hospitality and Tourism Management), n = 89 ☐ International Business, n = 59 ☐ Management, n = 151 ☐ Marketing, n = 196 N = 882; 49% females Mean age: Not reported Retrospective study design	Web-based three-item scales, C and E only (Robins & Judge, 2007)	E C	Marketing scored significantly higher than all other majors. International Business and HTM scored significantly higher than Finance, Management, and Economics, which in turn scored significantly higher than Accounting. Accounting scored significantly higher than CIS ($p < .05$). No significant differences ($p > .05$).

Author(s)	Country	Academic majors, n, N, gender distribution, mean age, and study design	Personality measure		Results on personality group differences
Rubinstein (2005)	ISR	☐ Sciences, $n = 80$; 50% females ☐ Law, $n = 80$; 50% females ☐ Social Sc., $n = 80$, 50% females ☐ Arts, $n = 80$, 50% females $N = 320$; 50% females Mean age: 24.0 years Retrospective study design	NEO-FFI	N E O A C	Arts scored significantly higher than Social Sc. and Sciences. Law scored significantly higher than Sciences ($p < .05$). No significant differences ($p > .05$). Law scored significantly lower than all other groups ($p < .05$). Law scored significantly lower than all other groups ($p < .05$). No significant differences ($p > .05$).
Sánchez-Ruiz et al. (2011)	ESP	☐ Technical Sc./Sciences (Engineering, Computer Sciences, Chemistry, Biology), $n = 64$ ☐ Social Sc., $n = 69$ ☐ Arts, $n = 46$ $N = 175$; 53% females Mean age: 25.8 years Retrospective study design	Goldberg's Bipolar Adjectives (25-item version)	N E O A C	No significant differences ($p > .05$). No significant differences ($p > .05$). Arts scored significantly higher than Social Sc. ($p < .05$). No significant differences ($p > .05$). No significant differences ($p > .05$).
Vedel et al. (2015)	DNK	☐ Medicine, $n = 131$; 67% females ☐ Psychology, $n = 97$; 86% females ☐ Law, $n = 96$; 66% females ☐ Economics, $n = 84$; 54% females ☐ Political Sc., $n = 70$; 56% females ☐ Sciences, $n = 217$; 43% females ☐ Arts/Humanities, $n = 372$; 71% females	NEO-FFI	N E O	Arts/Humanities and Psychology scored significantly higher than Medicine and Economics ($p < .05$). Medicine and Political Sc. scored significantly higher than Sciences and Arts/Humanities. Sciences scored significantly lower than all other groups ($p < .05$). Arts/Humanities, Medicine, Psychology, and Political Sc. scored significantly higher than Law,

Author(s)	Country	Academic majors, *n*, *N*, gender distribution, mean age, and study design	Personality measure	Results on personality group differences
		N = 1,067; 64% females Mean age: 22.2 years Prospective study design		Economics, and Sciences. Arts/Humanities also scored significantly higher than Medicine (*p* < .05). A Medicine, Psychology, Sciences, and Arts/Humanities scored significantly higher than Law and Economics (*p* < .05). C Medicine and Psychology scored significantly higher than Sciences and Arts/Humanities (*p* < .05).

Note: *n* = sample size of each academic major; *N* = overall sample size; BFI10 = the 10-item version of the Big Five Inventory (Rammstedt & John, 2007); NEO-PI-R = the Revised NEO Personality Inventory (Costa & McCrae, 1992); IPIP = the International Personality Item Pool (Goldberg, 1992; Goldberg, 1999; Goldberg et al., 2006); PPQ = the Professional Personality Questionnaire (Kline & Lapham, 1990); NEO-FFI = the NEO Five-Factor Inventory (Costa & McCrae, 1992); APSI = the Adolescent Personal Style Inventory (Lounsbury & Gibson, 2008); BFI = the Big Five Inventory (John, Donahue, & Kentle, 1991); N = Neuroticism; E = Extraversion; O = Openness; A = Agreeableness; C = Conscientiousness.

Table 2

Effect sizes of personality mean differences

Author(s)	Compared groups	Cohen's *d*				
		N	E	O	A	C
Clariana (2013)	Business etc. – Educational/Pedag. Sc.	**-0.53**	0.00	0.18	-0.26	-0.35
	Business etc. – Humanities	-0.23	0.15	-0.38	0.10	0.04
	Business etc. – Maths etc.	0.11	0.13	**-0.52**	0.03	0.14
	Educational/Pedag. Sc. – Humanities	0.30	0.16	**-0.59**	0.37	0.39
	Educational/Pedag. Sc. – Maths etc.	**0.65**	0.14	**-0.74**	0.30	0.49
	Humanities – Maths etc.	0.35	-0.01	-0.14	-0.08	0.10
Larson et al. (2007)	Counselling/Guidance – Engineering	0.04	0.09	0.12	**0.52**	0.38
	Counselling/Guidance – Finance	-0.26	0.02	0.38	**0.53**	0.18
	Counselling/Guidance – Pharmacy	0.16	0.09	0.03	**0.63**	-0.17
	Engineering – Finance	-0.30	-0.07	0.25	0.05	-0.19
	Engineering – Pharmacy	0.12	0.00	-0.09	0.15	**-0.55**
	Finance – Pharmacy	0.43	0.08	-0.37	0.09	-0.35
Lievens et al. (2002)	Economics – Engineering	0.23	0.32	0.01	-0.32	0.14
	Economics – Humanities	-0.44	**0.74**	**-0.70**	-0.05	**0.78**
	Economics – Law	0.26	0.12	-0.16	-0.15	0.12
	Economics – Medicine	-0.07	-0.14	-0.20	-0.44	0.28
	Economics – Political/Social Sc.	-0.01	0.17	**-0.50**	0.05	0.44
	Economics – Psychology/Pedag. Sc.	-0.17	0.11	**-0.61**	-0.31	**0.63**
	Economics – Sciences	0.08	0.43	0.01	-0.45	0.18
	Engineering – Humanities	**-0.68**	0.43	**-0.66**	0.26	**0.69**
	Engineering – Law	0.05	-0.18	-0.16	0.16	-0.02
	Engineering – Medicine	-0.29	-0.43	-0.21	-0.17	0.16
	Engineering – Political/Social Sc.	-0.24	-0.12	**-0.51**	0.40	0.31
	Engineering – Psychology/Pedag. Sc.	-0.40	-0.24	**-0.60**	0.00	**0.51**
	Engineering – Sciences	-0.15	0.11	0.00	-0.18	0.04
	Humanities – Law	**0.69**	**-0.59**	0.53	-0.09	**-0.66**
	Humanities – Medicine	0.34	***-0.88***	0.39	-0.39	-0.49
	Humanities – Political/Social Sc.	0.42	**-0.53**	0.12	0.11	-0.37
	Humanities – Psychology/Pedag. Sc.	0.25	**-0.69**	0.03	-0.25	-0.19
	Humanities – Sciences	**0.52**	-0.32	**0.67**	-0.40	**-0.61**
	Law – Medicine	-0.32	-0.25	-0.06	-0.30	0.17
	Law – Political/Social Sc.	-0.27	0.02	-0.36	0.21	0.31
	Law – Psychology/Pedag. Sc.	-0.42	-0.03	-0.46	-0.15	0.49
	Law – Sciences	-0.19	0.28	0.16	-0.31	0.05
	Medicine – Political/Social Sc.	0.06	0.31	-0.28	**0.50**	0.12
	Medicine – Psychology/Pedag. Sc.	-0.09	0.24	-0.36	0.16	0.30
	Medicine – Sciences	0.15	**0.54**	0.21	0.00	-0.12
	Pol./Soc. Sc. – Psychology/Pedag. Sc.	-0.16	-0.09	-0.08	-0.40	0.19
	Pol./Soc. Sc. – Sciences	0.09	0.22	0.48	**-0.57**	-0.26
	Psychology/Pedag. Sc. – Sciences	0.25	0.37	**0.58**	-0.17	-0.45
Lounsbury et al. (2009)	Business – Nonbusiness	-0.25	0.27	-0.20	-0.49	0.23

Author(s)	Compared groups	Cohen's *d*				
		N	E	O	A	C
Marrs et al. (2007)	Psychology – Nonpsychology			0.34		
Rubinstein (2005)	Arts – Law	0.02	-0.39	*0.95*	0.17	-0.23
	Arts – Sciences	**0.57**	0.02	0.42	-0.09	-0.19
	Arts – Social Sc.	0.28	-0.23	-0.20	-0.08	-0.03
	Law – Sciences	**0.60**	0.40	**-0.63**	-0.24	0.03
	Law – Social Sc.	0.29	0.24	*-1.12*	-0.24	0.21
	Sciences – Social Sc.	-0.26	-0.26	**-0.63**	0.02	0.16
Sánchez-Ruiz et al. (2011)	Arts – Social Sc.	0.05	-0.40	**0.56**	-0.15	-0.20
	Arts – Technical Sc./Sciences	0.33	-0.16	0.47	-0.08	-0.30
	Social Sc. – Technical Sc./Sciences	0.29	0.24	-0.06	0.09	-0.12
Vedel et al. (2015)	Arts/Humanities – Economics	0.44	-0.14	*1.23*	**0.65**	-0.32
	Arts/Humanities – Law	0.18	-0.33	*0.97*	**0.55**	-0.33
	Arts/Humanities – Medicine	0.33	-0.37	**0.52**	0.01	**-0.60**
	Arts/Humanities – Political Sc.	0.27	-0.41	0.32	0.36	-0.31
	Arts/Humanities – Psychology	-0.08	-0.31	0.18	0.06	**-0.55**
	Arts/Humanities – Sciences	0.15	0.32	*0.91*	0.14	-0.14
	Economics – Law	-0.27	-0.20	-0.22	-0.07	-0.02
	Economics – Medicine	-0.11	-0.25	**-0.64**	**-0.70**	-0.31
	Economics – Political Sc.	-0.18	-0.28	**-0.78**	-0.27	0.00
	Economics – Psychology	**-0.55**	-0.18	*-1.05*	**-0.57**	-0.27
	Economics – Sciences	-0.28	0.45	-0.25	**-0.52**	0.17
	Law – Medicine	0.16	-0.04	-0.41	**-0.56**	-0.27
	Law – Political Sc.	0.10	-0.09	**-0.55**	-0.18	0.02
	Law – Psychology	-0.27	0.03	**-0.78**	-0.45	-0.22
	Law – Sciences	-0.02	**0.65**	-0.03	-0.41	0.18
	Medicine – Political Sc.	-0.06	-0.06	-0.17	0.39	0.28
	Medicine – Psychology	-0.42	0.07	-0.35	0.06	0.06
	Medicine – Sciences	-0.17	**0.70**	0.38	0.14	0.45
	Political Sc. – Psychology	-0.37	0.13	-0.15	-0.29	-0.23
	Political Sc. – Sciences	-0.11	**0.72**	**0.53**	-0.23	0.16
	Psychology – Sciences	0.23	**0.63**	**0.72**	0.07	0.41

Note: Negative numbers indicate that the last-mentioned group in the comparison scored higher on the trait. Numbers in bold indicate medium effect sizes. Numbers in bold and italics indicate large effect sizes. N = Neuroticism. E = Extraversion. O = Openness. A = Agreeableness. C = Conscientiousness.