European Management Review, (2020)
DOI: 10.1111/emre.12425

Testing the Homogeneity Hypothesis of Personality: Replication and Extension across European Countries, Industry Sectors and Organizations

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This paper builds on previous studies testing the homogeneity hypothesis of personality as presented in seminal works in the field. Using a sample of 2,745 managers from 165 organizations operating in 51 sectors, spanning 30 European countries, we explore the Attraction-Selection-Attrition (ASA) framework in European organizations, and examine managerial personality variability within and between: (1) organizations; (2) industry sectors; and (3) European countries. To explore personality, the Myers-Briggs Type Indicator (MBTI) was used and the hypotheses tested with Bayesian Multilevel analysis, along with the within-group interrater reliability statistic (r_{WG}) and average deviation from the mean (ADM) agreement indices. Results revealed significant variance in personality between organizations and countries – but not within sectors. Evaluation of within group agreement revealed that agreement in personality profiles within organizations is relatively low (10–39%); the agreement is higher within countries (56–68%) and within industry sectors (30–63%). The results reveal that perhaps organizations are not as homogeneous as previously suggested. Earlier cautions about the consequences of Attraction-Selection-Attrition yielding relative homogeneity are discussed as unnecessary, and complementary fit is suggested. This is the first study to empirically test within group agreement across levels.

Keywords: ASA framework; Bayesian multilevel analysis; homogeneity hypothesis; personality

Introduction

Human beings are fascinated by diversity, despite being enamored with the idea of homogeneity. Homogeneity holds the promise of preserving trust and *tribal* identity, and complex myths have been constructed to protect it (Spaltro, 1990).

Management literature acknowledges that organizations grow and survive when diversity is embraced (Van Knippenberg *et al.,* 2004; Bilimoria, 2006), and yet organizations have a natural tendency towards homogeneity (Oh *et al.,* 2015; King *et al.,* 2017; Schneider and Bartram, 2017). This was theorized at an early stage in the similarity-attraction hypothesis (Byrne, 1971), as individuals with similar attributes are attracted to working together (Ployhart *et al.,* 2006).

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Schneider (1987) partially explained the tendency towards homogeneity through his Attraction-Selection-Attrition (ASA) framework. The ASA framework proposes that three interrelated dynamic processes – attraction, selection and attrition – yield relative homogeneity in the types of people who work in an organization. People who *fit* the organization will be attracted to, selected by and stay with it; this cycle returns increased homogeneity. Schneider's insight has shaped the research agenda regarding homogeneity for over 25 years.

The first direct validations of the framework in business organizations appeared 20 years ago (Schneider *et al.,* 1998), and the latest extend the model to online communities (Butler *et al.,* 2014), human capital research (Oh *et al.,* 2015) and the competitive advantage of homogeneity of personality in a firm's financial performance (Schneider and Bartram, 2017). Further work has recently revealed the power of the ASA in explaining organizational phenomena such as leaders'

unethical behaviour (Cialdini *et al.,* 2019) and safety performance (Chu *et al.,* 2019). Scholars have concentrated latterly on expanding the model to include conceptualizations and reflection on the person-environment fit (cf. Van Vianen, 2018; De Cooman *et al.,* 2019; Weller *et al.,* 2019).

In the present paper, we test the ASA model on European organizations in different countries and in different industries to explore the homogeneity effect amongst managers. In addition, we explore homogeneity as agreement within organizations in contrast to earlier evidence based on differences between organizations. In effect, we follow Schneider *et al.* (1998) to replicate their study in the European context but also extend their work to address additional questions.

This study aligns with recent contributions addressing cross-cultural management and comparing national contexts (cf. Barthélemy, 2019). In particular, we explore the extent to which the ASA model applies in Europe, contributing to the field of global management (Andersen *et al.,* 2018).

Overall, this study expands the knowledge on managerial personality homogeneity in organizations, industry sectors and countries in three ways. First, similarly to the original ASA study (Schneider *et al.,* 1998), we assume homogeneity effects manifesting as between organizational differences, and assess the homogeneity across industry sectors and countries, in order to achieve a more complete understanding homogeneity hypothesis. We extend previous assessments of organizational homogeneity by assessing homogeneity across European countries, and across industries simultaneously. Second, we test the theoretical proposition of the ASA – which, to the best of our knowledge has not been done before – whereby people are not randomly assigned to organizations, but naturally choose to place themselves in and out of organizations (Schneider, 1987; Schneider *et al.,* 1995). We assess this idea explicitly by testing the degree to which managers within organizations will be more alike than a random sample of managers. Third, we provide a methodological contribution using Bayesian hierarchical models and the within-group interrater reliability statistic (r_{WG}) (James *et al.,* 1993) and average deviation from the mean (ADM) (Burke and Dunlap, 2002) agreement indices, which examine within group agreement, rather than between group differences. Prior work in this arena has explored the main effects for organizations on personality, and interpreted such effects as yielding support for homogeneity. However, to the best of our knowledge, these studies have not reported within group agreement as direct estimates of homogeneity. By using Bayesian hierarchical models to test between-group differences and the r_{wg} and ADM agreement indices to examine within group agreement, we address both *within* agreement and *between* differences. Estimates of personality can potentially be biased by the use of restricted samples, for example, employees within occupational groups and organizations (Ployhart *et al.,* 2006; Bradley-Geist and Landis, 2012; King *et al.,* 2017) or the same cultural context. Thus, by assessing a large sample from several European organizations, countries and sectors, we expanded our current understanding of the effect of contextual variables (e.g., organizations, country and sectors) on homogeneity (e.g., organizations, country and sectors) on homogeneity effects.

The ASA model

The similarity-attraction hypothesis (Byrne, 1971) predicts that homogeneous individuals and teams that share similar attributes are more likely to be attracted to work with each other (Ployhart *et al.,* 2006). With a foundation in the aforementioned paradigm, the ASA model (Schneider, 1987: Schneider *et al.,* 1995) is based on three interrelated hypothesized processes. The initial process, attraction, predicts that people will choose an organization based on their perceptions of the congruence between their own personal characteristics and the attributes of potential employers. The organization will then select people with the attributes the organization desires (e.g., perceptions on the part of the organization of the congruence of individuals with the organization). Finally, the attrition process predicts that people will leave an organization if they do not fit (Schneider, 1987). These three dynamic processes are said to result in organizations having relatively homogenous dispositions (Ployhart *et al.,* 2006), which in turn are hypothesized by Schneider (1987) to serve as a foundation for the uniqueness of organizations. In his original formulation, Schneider noted that the personal characteristics associated with these processes may include personal values, individuals' attitudes and needs, and personality traits, and studies have directly or indirectly tested the model (cf. Cable and Judge, 1996; De Cooman *et al.,* 2009).

Over time, however, research testing the homogeneity hypothesis and its specification within the ASA framework has mainly focused on personality as the chosen domain. The first comprehensive empirical investigation of Schneider *et al.* (1998) used the Myers-Briggs Type Indicator (MBTI) (Myers and McCaulley, 1985) measure of personality on a sample of 13,000 managers across 142 organizations in the USA. It was proposed that there would be relative homogeneity across organizations, and this was tested 'indirectly' with multivariate analysis of variance (MANOVA). It was tested 'indirectly' because MANOVA reveals differences

between (organizations) rather than providing an index of agreement within organizations. The results indicate that organizational membership had a multivariate effect on the four MBTI dimensions, and accounted for 24% of the variance in MBTI scores (16% when controlling for industry across organizations). Thus, it was concluded that the variance in personality *between* organizations is greater than *within* organizations. This relative homogeneity result was seen as undesirable, as homogeneity might hinder organizational innovation and development (Schneider, 1987).

Since Schneider's (1987) theorization and seminal study (Schneider *et al.,* 1998), other empirical investigations using personality have been undertaken. These both confirm and extend the initial validation, and indicate some relevant differences in the findings (Schaubroeck *et al.,* 1998; Denton, 1999; Giberson *et al.,* 2005; Slaughter *et al.,* 2005; Ployhart *et al.,* 2006; Halfhill *et al.,* 2008; Bradley-Geist and Landis, 2012; Butler *et al.,* 2014; Oh *et al.,* 2015; King *et al.,* 2017; Schneider and Bartram, 2017). For example, when the homogeneity of personality was tested by assessing the relationship between the degree of variability in personality characteristics and organizational tenure in a single gender study (e.g., women), contrary to expectations, the correlation between mean tenure and variability within-groups of Extroversion-Introversion was positive and significant, suggesting that as tenure increases within groups, so does variability (Denton, 1999).

Slaughter *et al*. (2005) who found differences in the personality profiles of people attracted to a focal organization and people who passed the first screening, thus confirming ASA as a cycle (additive), confirmed homogeneity. Halfhill *et al*.'s (2008) study based on two out of the big five factors (agreeableness and conscientiousness) of personality attempted to integrate Schneider's (1987) ASA framework into a model of group personality composition and effectiveness. The results were only partially supportive of the ASA framework. In reality, while group average agreeableness and conscientiousness correlated positively with group performance ratings in 47 military service teams, within-team variances for group agreeableness correlated negatively with group performance. In addition, groups with high scores on both traits received higher performance ratings than all other group compositions. In other words, as variance goes up, performance goes down.

The authors' results are relevant for two reasons. The finding that the teams with higher homogeneity had the best performance encouraged research on the effects of homogeneity on performance and the link between personality composition, group norms and performance. Conversely, they cautioned against generalizing the results, challenging the assumption that the effects of group composition and effectiveness generalize across organizational levels, as their investigation took place at the team level (Halfhill *et al.,* 2008). Caution was expressed against generalizing across occupational groups, similarly to Schaubroeck *et al*. (1998) whose study found that, although there was an effect for organization, the effect for occupation was larger.

In an unusual test of the homogeneity hypothesis, Giberson *et al*. (2005) tested for the effects of fit between incumbents and the personality of a company CEO, and found main effects for such fit across organizations. This is congruent with the original ASA proposition (Schneider, 1987) about the effects of founders/leaders and a later update (cf. Schneider *et al.,* 1995).

In a unique test, Bradley-Geist and Landis (2012) deliberated the advantages of direct statistical testing of homogeneity when testing the ASA framework (e.g., using ADM and r_{wg} instead of MANOVA that rely on between-group differences to evaluate within group agreement). Although mostly supportive of the homogeneity hypothesis across both organizations and occupations, the results also suggested possible boundary conditions to ASA, as heterogeneity was observed in one out of the four observed personality variables.

Recent studies have found support for the ASA framework in testing virtual workgroups (cf. Butler *et al.,* 2014), the effect of vocational interests on homogeneity (King *et al.,* 2017) and the impact of homogeneity on relevant outcomes, such as job satisfaction and labour productivity (Oh *et al.,* 2015) or organizational financial performance (Schneider and Bartram, 2017).

Support for homogeneity was found for most personality variables in the aforementioned studies. For example, Schneider and Bartram (2017) found significant organizational effects of personality across 152 organizations, and showed that the Big 5 strength (variance) alone is a significant correlate of organizational financial performance for all but *extraversion*. In a similar study Oh *et al*. (2015) found support for homogeneity, and demonstrated significant effects on organizational level outcomes. King *et al*. (2017) provide evidence of relative homogeneity effects and mechanisms within organizations and occupations, although homogeneity estimates were smaller than prior estimates in the literature based on smaller, more diverse samples. In addition, as in Ployhart *et al*. (2006) and Schaubroeck *et al*. (1998), occupational homogeneity was significantly greater than organizational homogeneity for two out of the Big Five personality variables (e.g., neuroticism and extraversion). In these studies the overall effect for occupations (Schaubroeck *et al.,* 1998) and jobs (Ployhart *et al.,* 2006) was greater than the organizational effect.

In summary, scholars have addressed the homogeneity hypothesis from different angles with, at times, mixed results. Analytical perspectives varied widely too, from constructivist approaches, where reality is seen as a subjective creation (Warr and Pearce, 2004) to positivistic methods based on quantitative observation (Schneider *et al.,* 1998). The extent of the investigations also varied from the assessment of one or two personality variables, to the investigation of comprehensive models of personality – either the MBTI (Schneider *et al.,* 1998; Denton, 1999) or the FFM (Bartram, 2013; Giberson *et al.,* 2005; Oh *et al.,* 2015; King *et al.,* 2017; Schneider and Bartram, 2017). Furthermore, while the indirect investigations with values and needs were mostly based on laboratory studies or prospective workers, studies on personality are field investigations. This variety of approach may pose a challenge to the integration of the results.

Thus, as there is some concordance on *trait* homogenization, further research is needed to disentangle the relative variance of individuals and larger contextual variables, such as organizations, countries and potentially the industry effect.

Extending research on the ASA model

This investigation aims to extend previous work by first replicating the main effect for organizations on personality in a European setting, then moving on, to the best of our knowledge, to that which has not been tested before, that is, that organizations are more homogeneous than a random sample of people. We then analyze similar effects for countries and industry sectors.

The homogeneity hypothesis as developed in the ASA framework predicts that there will be less variety *within* organizations with respect to personality characteristics of employees than *between* organizations. It does not claim that people will change their personality because they belong to a certain organization, but that organizations attract, select and retain psychologically similar individuals (Schaubroeck *et al.,* 1998), leading to trait homogeneity.

This implies that in order to understand variance of personality, we first need to confirm variance between organizations of managers' personality in Europe, as American and European profiles tend to be similar (Allik and McCrae, 2004). Schneider *et al*. (1998) tested the homogeneity hypothesis through a multivariate analysis of variance (MANOVA) with a sample of managers from 142 organizations in the United States. Using MBTI data, the study revealed a significant homogeneity effect for organizational membership. Slaughter *et al*. (2005) also identified this effect in a sample of perspective employees, as did Bradley-Geist and Landis (2012), King *et al*. (2017) and Chu *et al*. (2019) to a partial extent.

Building on the results, we have tested for homogeneity in a European sample of managers, estimating the magnitude of the organizational effect, and having the expectation of a significant main effect on personality. Thus:

Hypothesis 1a. Managers' personalities (as captured by the MBTI) will vary between organizations.

In fact we expect organizations to have an effect on personality, as homogeneity was confirmed in the literature reviewed earlier and mostly based on American samples (e.g., Schneider *et al.,* 1998; Oh *et al.,* 2015; King *et al.,* 2017).

The ASA model predicts that besides differences between organizations in personality, there should be homogeneity within organizations (Bradley-Geist and Landis, 2012), and tests to evaluate between-group differences do not directly establish within-group agreement (George and James, 1993). In a theoretical paper, Schneider (1987) claims that people are not randomly assigned to organizations, but they naturally choose themselves in and out of organizations. This element of choice is stronger for people in the higher ranks on the organizational ladder, namely, managers. Therefore, it follows that managers within organizations will be more like each other than a random sample of managers from across organizations. Although this is a logical conclusion and repeatedly reiterated (Oh *et al.,* 2015; King *et al.,* 2017), to the best of our knowledge, this has never been explicitly tested. To this effect, we formulate this additional hypothesis with regard to homogeneity:

Hypothesis 1b. The personalities of managers (as captured by the MBTI) within an organization are more alike than a random sample of managers.

Thus, Schneider *et al*. (1998) having revealed a significant homogeneity effect for organizational membership, the question is the degree to which the data reveals an organizational homogeneity effect that is significantly different from a random sample.

Previous analyses were performed mostly in US settings, using US samples. Research results and conclusions from these samples might not automatically be used to describe European organizations (Boxall and Macky, 2009; Guest and Zijlstra, 2012; Andersen *et al.,* 2018). Europe's different cultural and historical background is reflected in national and economic differences, managerial styles and practices varying across countries (cf. House *et al.,* 2004). This calls into question the need to test the ASA model and validate the fact that it applies to organizations in the European context.

From a theoretical perspective, the mechanism of the ASA framework operates at organizational level rather than country level. Compared with other developed countries, labour mobility in Europe is not as high, either within or between countries (cf. Recchi, 2008; OECD, 2007; Bonin *et al.,* 2008; Ivulska, 2012; Amior and Manning, 2018), and at times, migration within Europe has declined markedly (Bentivogli and Pagano, 1999). Thus, we cannot expect a similar mechanism to play a role at country level. People do not tend to *choose* countries, and countries do not tend to *choose* people.

In the European Union, the average mobility between states is 3.1% based on 2000–2005 statistics (EU15). If people do not move very much from country to country, then one might argue that the variance within countries would not be great, given such lack of mobility. In addition, the literature on cross-cultural comparisons is mixed, and while comparisons between national cultures show marked differences across national boundaries (e.g., House *et al.,* 2004; Gelfand *et al.,* 2011), there are also studies reporting how personality and values intra-cultural variation is substantially greater than inter-cultural variation (Allik and McCrae, 2004; Smith *et al.,* 2013). Allik and McCrae (2004) built their 'geography' of personality trait using a national-level factor analysis of data on personality based on the Five-Factor Model, from approximately 40 nations, and found a similarity in geographically proximate cultures. Nevertheless, if we attend to the original 'culture and personality' school (cf. Kardiner *et al.,* 1945), we would expect less variance within a country than between countries, as individuals are trained through early life experience to assume the personality profile most common to their culture. This could be seen as a validation of the underlying process of the ASA framework (i.e., divergent validity); however, it has not been envisaged to date.

While people may choose to apply to certain companies, and companies choose to hire certain people, this is not true when we apply the ASA model to countries. Thus, while the ASA model is not likely to be strictly applicable at the country level, we can still expect some heterogeneity between countries, as in Bartram's (2013b, 2013a) research.

Previous studies mostly ignored nesting of organizations within countries, as their target population was from American companies. Conversely, in his multi-level examination of between-country differences in personality and total score variances, Bartram (2013b, 2013a) shows that between 3% and 15% can be attributed to between-country effects. Nevertheless, he did not investigate the effect of organizational level variability, as his study held a different focus and concentrated on construct equivalence of personality measurements. Also, Schneider and Bartram's (2017) study showed the effect of country on personality. Therefore, we incorporated country into multilevel analysis by treating country variance at the group level. Thus:

> **Hypothesis 2a.** The personalities of managers (as captured by the MBTI) will vary between countries.

This means that there will be a main effect of country on personality.

In this investigation, therefore, organizations are nested within countries to explore the relative influence of each on homogeneity. As some organizations operate in different countries, there is partial nesting.

Similar to the first hypothesis, we then also hypothesize that there is within-country homogeneity of managers or:

> **Hypothesis 2b.** The personalities of managers (as captured by the MBTI) within a country are more alike than a random sample of managers from many different countries.

Central to the ASA framework is the concept of goals, as the founder originally articulates them (implicitly or explicitly). Some organizations pursue business-related goals; others a service for the community at large, and this is the main divide, for example, between public and private organizations, as it was argued that different industry sectors engage a range of different individual profiles (George and James, 1993). George (1990) posits that ASA processes may operate to make work units homogeneous with respect to state and trait affect. In her empirical study, high levels of within-group homogeneity were found for positive affect (extraversion), thus suggesting that this variable reflects a preference for working in organizations that contain more organic structural elements (i.e., low standardization, formalization, vertical specialization and centralization). Persons scoring higher in trait negative affect (e.g., neuroticism), on the other hand, tend to be antagonistic and prone to distrust others, preferring bureaucratic structures, characterized by high standardization, formalization, vertical specialization and centralization (George, 1990). Thus, relative levels of bureaucracy and the differences in organizational structures undoubtedly vary across industry sectors, and it might be assumed that different personalities are attracted to, selected by, or leave if they do not fit, companies in different industrial sectors. Even more compelling is the evidence in Holland's (1997) notion of career environments on differences between industry sectors where jobs/occupations may attract and select different vocational personality types, or in Furnham *et al.*'s (2014) study across three occupational sectors. This is also in line with Carmeli and Schaubroeck (2005) that, although only comparing public

and private sectors, found support for personality differences. These conjectures and research findings suggest testing the trait homogeneity hypothesis, controlling also for a covariate at the organizational level.

Therefore, it is reasonable to expect that there will be more homogeneity of personality within industry, as well as more heterogeneity between different industries. Thus:

Hypothesis 3a. The personalities of managers (as captured by the MBTI) will vary between industry sectors.

Differences in personality across industry sectors have been detected with multivariate and univariate analyses of co-variance and logistic regressions, and significant differences across sectors were detected (Carmeli and Schaubroeck, 2005; Furnham *et al.,* 2014). In H3a, differently, we use multilevel analysis. By using multilevel analysis, we examine the effect of sector, whilst controlling for the effect of country and of organizations on personality.

Furthermore, similar to hypotheses 1b and 2b and accordingly to the theory on sector preferences (cf. Lyons *et al*., 2006), the effect of sector was investigated. The overall idea, previously tested and partially confirmed, is that employees and managers with specific traits are attracted to specific sectors (Schneider *et al.,* 1998; Boyne, 2002; Buelens and Van den Broeck, 2007; Furnham *et al.,* 2015). Although not many studies have investigated the psychological differences between people enrolled in different work sectors, it is assumed that through experience and socialization people in different jobs become more homogeneous in background within certain sectors and therefore different from those in others (cf. Furnham *et al.,* 2015). Studies have focused on different factors with mixed results, for example various type of fit might relate to specific personal characteristics (e.g., the finance sector could attract people with low relatedness) (cf. Greguras and Diefendorff, 2009). What is more, is that also the factors under investigation were mixed, such as needs and personality were mostly addressed together (e.g., Bourantas and Papalexandris, 1999; Buelens and Van den Broeck, 2007). We therefore tested sector, to assess the effect of sector on homogeneity of managers' personality. Thus, we propose *vis a vis* industry sector that:

Hypothesis 3b. The personalities of managers (as captured by the MBTI) within an industry sector are more alike than a random sample of managers.

This is particularly interesting to assess, as the studies on sector, to the best of our knowledge, have concentrated on the difference between sectors, while similarity/homogeneity within sectors is taken for granted and not directly addressed. This is the claim of H3b and the expectation that the personalities of managers within an industry sector are more alike than a random sample of managers.

Method

Sample

Data were collected as part of a pre-training assessment for a leadership development program for incumbent employees. The final sample consisted of 2,745 managers from 165 organizations operating in 51 industry sectors, spanning 30 European countries. We included in the sample only people holding a managerial position (e.g., professing to lead or coordinate people in their job), from any organization or European country for which we had at least two participants. From the sample, 23.6% of the managers were female, and the average age of respondents was 40.5 years (ranging from 26 to 88). In terms of education, 83.9% had at least a university diploma or Master's degree, or they had attained a higher level of education. The maximum number of managers from a single organization was 214, and the minimum was two. The mean number of participants per organization was 16.6. The maximum number of managers from each country was 621, and the minimum was two (cf. Table 1). The organizations were from a variety of sectors, ranging from retail organizations, to finance and insurance, to education and health. Finance, insurance and banking was the sector with the highest number of organizations (525), while some sectors such as media, utilities and aerospace were only represented by a few organizations.

In sum, we assessed European incumbent managerial employees (as in Schneider *et al.,* 1998) rather than job seekers. This means that we were testing the effects of the entire ASA cycle.

The reason for including all organizations, countries or industries with more than two participants is that we wanted to utilize most of our available sample. Nevertheless, to ensure robustness and that the smaller groups did not bias our results in any way, we re-analysed the data after excluding any organizations, industries and countries with fewer than five participants (2,498 managers from 77 organizations, from 37 sectors and 24 countries). The results from this reduced sample were consistent and comparable to those using the full dataset, with very small discrepancies between the two. Given that there was no indication that the smaller groups biased the results in any way, it was decided to use the full sample. It should also be noted that the robustness of the results is partly due to using a Bayesian multilevel model with random effects instead of a fixed effects MANOVA.

TABLE 1 Distribution of the sample by country

Country	*N*	*%*
Austria	36	1.31
Belgium	223	8.12
Bulgaria	6	0.22
Czech Republic	8	0.29
Denmark	72	2.62
Estonia	2	0.07
Finland	42	1.53
France	298	10.86
Germany	368	13.41
Greece	13	0.47
Hungary	6	0.22
Iceland	21	0.77
Ireland	133	4.85
Italy	82	2.99
Lithuania	5	0.18
Luxembourg	10	0.36
Malta	2	0.07
Netherlands	384	13.99
Norway	51	1.86
Poland	43	1.57
Portugal	13	0.47
Romania	10	0.36
Russia	46	1.68
Serbia-Montenegro	2	0.07
Slovakia	2	0.07
Spain	91	3.32
Sweden	61	2.22
Switzerland	91	3.32
Ukraine	3	0.11
United Kingdom	621	22.62
Total	2,745	100

Specifically, the sample sizes of specific groups will have a proportional contribution to the estimates of the parameters, so that larger groups will exert a larger influence than small groups.

Personality measure

We collected data with the English version of the Myers-Briggs Type Indicator (MTBI; Myers *et al.,* 1998). The MBTI taps into four hypothesized bipolar dimensions or indices. The sensing-intuition (SN) index reflects perceiving the environment through the five senses, or through intuition. The thinking-feeling (TF) index reflects whether judgments are made through logic or through a focus on personal or social values. The extraversion-introversion (EI) index reflects one's orientation of energy – either inward or outward. Finally, the judging-perceiving (JP) index is intended to assess one's preference for using either judgment processes (thinking or feeling) or perceptive processes (sensing or intuition) in dealing with the outer world. Participants responded to 93 items of the MBTI (forced-choice items, two choices per item). The MBTI forced respondents to choose between one of two answers that reflected the two poles for each specific index (E-I, S-N, T-F, and J-P). Each response was weighted 0, 1, or 2 points, the total points for each index indicating a person's preference on that pole. The current study used form M that had internal consistency reliabilities in the 0.90 range or higher, based on a large sample of 3,009 participants (Myers *et al.,* 1998). Exemplar item: 'Sociable vs. reserved'.

The four indices combine to yield 16 distinct personality types that represent permutations of the four bipolar dimensions. Research has revealed that the bipolar dimensions are not as useful in academic studies (although they may be useful in practice) as continuous scores for each of the four proposed facets (Gardner and Martinko, 1996); therefore, data were analyzed as four continuous dimensions, and each indicator was standardized so that it ranged from −30 to +30.

The MBTI preferences are an indicator of the type of environment in which workers feel most comfortable (Furnham and Stringfield, 1993), so it follows that if people are attracted to organizations they feel they fit well to, they will then be comfortable there. The MBTI should be able to pick up such inclinations. Indeed, Levinson (1987) suggests that there is such a phenomenon as the 'organizational personality', which influences people's decisions to join and to stay in a certain workplace. No personality measure is perfect, and the MBTI is no exception. Yet it is widely used in research (cf. Madter *et al*., 2012; Creasy and Anantatmula, 2013; Park *et al*., 2014), in the organizational setting (Andersen, 2000; Higgs, 2001; Bradley-Geist and Landis, 2012; Montequín *et al*., 2013), or for leadership and leadership development in the United States and internationally (cf. Fitzgerald, 1997; Cohen *et al*., 2013). Some reviews are supportive of continued research and practice with MBTI in the managerial setting (Gardner and Martinko, 1996: Kirby, 1997; McCaulley and Moody, 2007) and in change management programs (Garrety *et al.,* 2003). Furthermore, Massey (2008) conducted a study of 104 national cultures, employing the MBTI theory to establish the national character for each culture based on the theoretical model. Finally yet importantly, as the MBTI personality inventory indicates psychological type preferences, and it is considered unethical or unwise to use it for hiring processes (cf. Kirby, 1997), we were not measuring the reason for homogeneity, as companies are increasingly using psychological personality testing as part of the recruitment process. Also, research indicates that: (1) the continuous scores of the MBTI have been useful in testing Levinson's (1987) idea and the homogeneity hypothesis (Schneider *et al.,* 1998); and (2) the MBTI is not an outlier measure, with evidence revealing that it recovers four of the five dimensions of the dominant descriptive taxonomy for individual-level personality, the Five-Factor Model (John, 1990).

Control variables

Organizational demography, from structural theories of sociology and with the focus on less psychologically oriented characteristics, claims homogeneity at organizational level as a result of attributes such as gender, among others. Therefore, gender is a common demographic control in personality research. Furthermore, previous studies on the ASA framework had limitations on the generalizability of results due to the use of a subject pool of the same gender (Denton, 1999). Also, recruitment at managerial level might lead to recruiting similar people, so that men may look for other men similar to themselves, and we might expect women to do the same. This should also apply during the attrition process. For this reason, we tested gender as a control variable in the data analyses and tested gender effects on personality.

Analysis procedures

Analysis was performed with R (R Core Team, 2018) and Stan 2.6.0 (Stan Development Team, 2014a, 2014b). Stan was used for testing the Bayesian models using Hamiltonian Monte Carlo (HMC) simulation.

For hypotheses H1a, H2a and H3a we employed a random effects MANOVA using Bayesian hierarchical models (described below), whilst we evaluated H1b and H2b and H3b using the r_{WG} scores and the ADM (average deviation from the mean) scores for each organization and each country.

Multilevel analysis (H1a, H2a and H3a). While Schneider *et al.* (1998) used multivariate analyses of variance (MANOVA) with fixed effects to test their homogeneity hypothesis we used a random effects MANOVA. Random effects models (or multilevel analysis) offer a number of advantages, making them more appropriate for testing our hypotheses. First, organizations are hierarchically nested systems, which can potentially violate the assumption of independence of errors (Bryk and Raudenbush, 1992). Second, in its simplest form, a multilevel model without any exploratory variable is equivalent to random effects analysis of variance (ANOVA). Since the sample of organizations, sectors and countries was not exhaustive, the random effects approach was a more accurate representation of the data. Third, using the random effects approach permitted us to generalize our findings to the population of organizations, sectors and countries that our sample represents. Finally, the fact that we had some organizations and countries with a small number of observations was addressed implicitly by using multilevel models or random effects ANOVA instead of fixed effects ANOVA. Random effects models can be thought of in terms of partial pooling, that is, an intermediate approach between estimating a model by pooling together data from different sources to fit a single regression model and by estimating a different model for each data source (i.e., organization, sector or country).

We fitted a series of five models, and for each model included additional levels of analysis. Model 1 was a fixed effects model with gender as a predictor (control variable) of each of the four personality traits, and Model 2 included a random intercept for organizations (in addition to gender). Since organizations are nested in both countries and sectors, the order of adding the random effects for these could potentially influence the results; as such, we fitted Model 3 with an additional random intercept for countries, and Model 4 with a random intercept for organizations and a random intercept for sectors (without including countries). Finally, Model 5 evaluated all levels simultaneously: individual level, organizations, sectors and countries.

Table 1 shows which model comparisons were used to evaluate H1a, H2a and H3a. To assess the effect of organizations (H1a), we compared Models 1 and 2. To assess the effects of countries (H2a) we first compared Models 2 and 3 (i.e., model with organizations vs. model with organizations and countries), and second, we compared Models 4 and 5 (model with organizations and sectors vs. model with organizations, sectors and countries). To evaluate the third hypothesis about sectors (H3a), we first compared Models 2 and 4 (with organizations vs. model with organizations and sectors), and then compared Models 3 and 5 (model with organizations and countries vs. model with organizations, countries and sectors).

The four personality indicators were analyzed jointly using a multivariate approach. Thus, instead of specifying independent errors for each variable, we employed a covariance matrix for the errors at each level. In effect, this is similar to a MANOVA, as it allows for evaluating multiple dependent variables simultaneously. Finally, we used cross-classified random effects because some organizations were operating in multiple countries, and therefore, not all managers from the same organization were working in the same country. The exact model specification is provided in Appendix 1, and details of the Bayesian model are discussed in Appendix 2.

Evaluating homogeneity (H1b, H2b and H3b). To evaluate whether there is homogeneity of managers' personality within organizations and countries, we adopted the approach used by Bradley-Geist and Landis (2012) and evaluated r_{WG} and ADM scores for each organization, sector and country. Although it is customary in the literature to evaluate agreement using cut-off values of 0.7 and above for $r_{WG,}$ and 2.5 and below for ADM, results can be arbitrary because group sample size influences the score, regardless of level of agreement (Dunlap *et al.,* 2003). As such, we opted for a similar procedure to the Monte Carlo approach advocated by

Dunlap *et al*. (2003) to obtain p-values. For each group size in our sample, we simulated 100,000 samples from a uniform distribution to obtain the empirical cumulative distributions of the r_{WG} and the ADM. From these we calculated the exact p-values for the r_{WG} and ADM of each group (i.e., for each country, sector and organization), which were then adjusted for inflated type-I error (due to multiple testing) using Bonferroni corrections.

It should be noted that in order to calculate the r_{WG} of each group, we assumed that random variance would be equal to that of a uniform distribution. This is a non-conservative assumption, and therefore the results will tend to show more homogeneity than there really is. Coupling the r_{WG} scores with ADM scores helps to at least ensure that the r_{WG} scores are not overly optimistic (Table 2).

Results

The first-order correlations among the four MBTI variables at level 1 were calculated and are reported in Table 3. The correlations are moderate, indicating that the four personality factors are relatively independent of each other. Visual examination of density plots and QQ-plots for the four personality variables revealed no issues with data normality.

Each of the models was run with four chains for 5,000 iterations without thinning, half of which were used for the warm-up and half for sampling from the posterior. The effective sample size, Monte Carlo errors and the potential scale reduction factor $\widehat{R}$ $\widehat{R}$(Gelman *et al.,* 2013) indicated that there was good convergence for all the model parameters. Visual inspection of the traceplots of the chains, density and autocorrelation plots revealed good mixing of the chains and no autocorrelation issues.

As shown in Table 4, at every step, models with additional levels provided a better fit for the data using either Watanabe-Akaike information criterion (WAIC; Watanabe, 2010) or leaving one out cross-validation (LOO-CV), and the fixed effects model (i.e., individual level) had the worst fit. The comparison between the individual level model and the model with both individual and organizational levels indicated considerable improvement for both WAIC ($\widehat{\Delta elpd}_{waic}$ = 106.97, se = 15.56) and LOO-CV ($\widehat{\Delta elpd}_{loo}$ =106.62, se = 15.57), thus providing support for H1a that the personality of managers vary between organizations. Similarly comparison between Models 2 and 3 showed that Model 3, which includes countries, is preferable to Model 2, providing support for H2a, thus suggesting that the personalities of managers will vary between countries ($\widehat{\Delta elpd}_{waic}$ = 32.03, se = 8.55; $\widehat{\Delta elpd}_{loo}$ =32.06, se = 8.56).. However, no support was found for H3a – that the personalities of managers will vary between industry sectors; and the comparison of Models 2 and 4 showed that the predictive performance of the model with organizations and sectors is no better than the model with organizations only ($\widehat{\Delta elpd}_{waic}$= 9.59, se = 5.07; $\widehat{\Delta elpd}_{loo}$ =9.60, se = 5.07) . This means that while there is an effect of organization and country on personality, there is no effect for the industry sector. Furthermore, the comparisons of the full model (Model 5) to Models 3 and 4 showed a similar pattern, indicating that sectors ($\widehat{\Delta elpd}_{waic}$= 4.36, se = 4.65; $\widehat{\Delta elpd}_{loo}$ =4.30, se = 4.65) do not improve the predictive ability of the model but countries do ($\widehat{\Delta elpd}_{waic}$ =26.81, se = 8.25; $\widehat{\Delta elpd}_{loo}$ =26.77, se = 8.25). $\widehat{\Delta elpd}_{loo}$. Both these results provide additional evidence supporting H2a on variance between countries, but do not support H3a on variance between industry sectors.

In summary, there was support for the homogeneity hypothesis between organizations and between countries, but not between sectors. This shows an effect for

TABLE 3 Means, standard deviations and correlations among the four study variables

	Mean	*SD*	*EI*	*SN*	*TF*
EI	−5.7	14.26			
SN	−2.41	12.03	−0.08		
TF	−10.39	10.89	−0.13	0.27	
JP	−4.14	14.26	−0.11	0.4	0.36

EI = Extraversion-Introversion; SN = Sensing-Intuition; TF = Thinking-Feeling; JP = Judging-Perceiving.
All correlations are significant at $p < 0.001$. $N = 2{,}745$

TABLE 2 Hypotheses and model comparisons

Mode 1	*Random effects*	*H1a*	*H2a*	*H3a*
1	None (fixed intercept only)			
2	Organizations	M1 VS M2		
3	Organizations and countries		M2 VS M3	
4	Organizations and sectors			M2 VS M4
5	Organizations, countries and sectors		M4 VS M5	M3 VS M5

TABLE 4 WAIC and LOO-CV estimates and comparisons between the five models

		Model 1	*Model 2*	*Model 3*	*Model 4*	*Model 5*
WAIC	WAIC	86018.26	85804.32	85740.26	85785.15	85731.53
	$\widehat{elpd}_{waic}$	−43009.13	−42902.16	−42870.13	−42892.57	−42865.77
	p_{waic}	18.37	162.26	174.32	179.26	190.87
LOO-CV	$\widehat{elpd}_{loo}$	−43009.13	−42902.51	−42870.44	−42892.91	−42866.14
	p_{loo}	18.37	162.61	174.64	179.59	191.25
		$\Delta_{M1,M2}$ (H1a)	$\Delta_{M2,M3}$ (H2a)	$\Delta_{M2,M4}$ (H3a)	$\Delta_{M3,M5}$ (H3a)	$\Delta_{M4,M5}$ (H2a)
WAIC	$\widehat{\Delta elpd}_{waic}$	106.97	32.03	9.59	4.36	26.81
	se($\widehat{\Delta elpd}_{waic}$)	15.56	8.55	5.07	4.65	8.25
LOO-CV	$\widehat{\Delta elpd}_{loo}$	106.62	32.06	9.60	4.30	26.77
	se($\widehat{\Delta elpd}_{loo}$)	15.57	8.56	5.07	4.65	8.25

Model 1: Individuals only, Model 2: Individuals and organizations, Model 3: Individuals, organizations and countries, Model 4: Individuals, organizations and sectors, Model 5: Individuals, organizations, countries and sectors, Δ refers to comparisons between models and M_n refers to the models compared: e.g. $\Delta_{M1,\ M2}$ refers to the comparison between Model 1 and Model 2

organizations and countries. The tests were run with simultaneous levels, teasing apart whether and to what extent each level had a significant effect.

For the final model with the four levels (individuals, organizations, countries and sectors) the model intercepts and effects of gender are presented in Table 5, as gender was assessed as a control variable. The intercepts here represent the overall means for each of these variables, and the regression coefficients show the difference between males and females in each of the four personality traits. Specifically, the results indicate that gender has a significant relationship with three out of the four personality traits. Specifically, males tend to show higher levels of Extraversion (EI) than females (M = 2.98, CrI95% = 1.75: 4.18), while females tend to show higher levels of Thinking (TF) (M = –4.57, CrI95% = −5.53: −3.60) and Judging (JP) (M = –1.54, CrI95% = −2.83: −0.20). There were no significant effects for SN.

TABLE 5 Intercepts and slopes of gender on personality

			Credible intervals		
	M	*SD*	*2.5%*	*50%*	*97.5%*
Intercept					
EI	−13.64	1.89	−17.32	−13.62	−9.94
SN	−0.86	1.56	−3.88	−0.85	2.20
TF	2.35	1.48	−0.59	2.34	5.24
JP	−0.20	1.91	−4.04	−0.15	3.57
Gender					
EI	2.98	0.63	1.74	2.99	4.18
SN	−0.24	0.54	−1.30	−0.25	0.83
TF	−4.57	0.49	−5.53	−4.57	−3.60
JP	−1.54	0.66	−2.83	−1.55	−0.20

Note: For gender the reference category is Male. This means that a positive coefficient indicates a positive score for Males.
M, SD = Means and Standard deviations of the posterior distributions of the intercepts and regression slopes
EI = Extraversion-Introversion; SN = Sensing-Intuition; TF = Thinking-Feeling; JP = Judging-Perceiving.

The variance components for the final model are summarized in Table 6. Overall, the results indicate that the primary source of variance is the individual level (residual), representing 95.28% for EI, 95.20% for SN, 92.64% for TF and 96.85% for JP. In contrast, the variance component at every other level captured a small portion of the total variance, ranging from 0.34 to 4.08 for organization, and from 0.44 to 3.45 for countries. We were testing what the model includes after exclusion for the random effect, or the unexplained variance.

The personality traits with most variability between organizations were SN (4.08%) and TF (3.09%), between

TABLE 6 Variance components for all levels

			ICC	*Credible Intervals*		
	M	*SD*	*(% of σ^2)*	*2.5%*	*50%*	*97.5%*
Individual (residuals)						
EI	196.01	5.35	95.28	185.83	195.88	206.96
SN	137.53	3.77	95.20	130.41	137.46	145.23
TF	106.70	2.99	92.64	100.94	106.64	112.71
JP	196.53	5.30	96.85	186.54	196.49	206.89
Organizations						
EI	0.70	0.89	0.34	0.01	0.36	3.20
SN	5.90	1.81	4.08	3.00	5.68	10.06
TF	4.71	1.59	3.09	2.19	4.50	8.30
JP	3.04	1.56	1.50	0.73	2.80	6.72
Countries						
EI	7.09	4.02	3.45	2.05	6.30	17.37
SN	0.63	0.71	0.44	0.01	0.40	2.58
TF	1.03	0.83	0.89	0.03	0.83	3.20
JP	2.90	1.59	1.43	0.79	2.58	6.88
Sectors						
EI	1.92	1.41	0.93	0.14	1.63	5.43
SN	0.41	0.6	0.28	0.00	0.21	2.04
TF	2.74	1.92	2.38	0.24	2.35	7.49
JP	0.46	0.55	0.23	0.01	0.28	1.90

Note: ICC values were calculated by taking into account all the levels in the analysis: i.e. as the percentage of variance attributed to each component
EI = Extraversion-Introversion; SN = Sensing-Intuition; TF = Thinking-Feeling; JP = Judging-Perceiving.

countries was EI (3.45%), and between sectors was TF (2.38%) (see Table 6 for full results). Overall, this indicates that, despite the fact that the predictive ability of the model was improved by adding organizations (H1a, the personalities of managers vary between organizations) and countries (H2a, the personalities of managers vary between countries), but not sectors (H3a), the improvement reflects a very small, albeit significant, portion of variance explained. Thus, the degree to which we can consider the ASA model as valid (at least for organizations and countries) depends on what proportion of variance we consider meaningful for each trait.

Hypothesis 1b (that the personalities of managers within an organization are more alike than a random sample of managers) was evaluated by calculating the r_{wg} and ADM scores for each group. The significance of r_{wg} and ADM was assessed by calculating the empirical cumulative distribution for each group size, as described in the method section. For space-saving reasons, instead of providing estimates for each organization, we only provide summaries of the results as averages and also percentages of organizations with significant homogeneity in Table 7. The detailed results can be made available on request.

Overall, the results are consistent for r_{wg} and ADM, indicating that levels of agreement were relatively low within organizations. For SN and TF, agreement was significant in approximately one third of the organizations (respectively 34% and 39%), while for EI and JP only around 11% of the organizations had significant agreement using either r_{wg} or ADM. This means that there is no confirmed within organization homogeneity for two-thirds of the organizations in the sample for SN and TF, while there is about 90% for EI and JP.

Hypothesis 2b, which evaluated homogeneity of managers' personalities within countries, was examined using the same approach as H1b. Interestingly the results here show higher agreement for countries than for organizations. Using either r_{wg} or ADM for all the personality traits, there was significant agreement in more than half of the countries in the sample, with peaks of 68% of agreement for SN and TF. This implies that institutions and organizations are heavily impacted by the national 'modal personality profile' (Laurent, 1986) or the country/culture they belong to (Furnham and Stringfield, 1993; Bartram, 2013b, 2013a), at least as far as the European context is concerned.

The results for Hypothesis 3b, which tested homogeneity of managers' personalities within sectors, suggest that there is more agreement for SN and TF (60% and 58% respectively) than for either EI or JP (30% and 33% respectively), with significant agreement in more than 50% of the sectors. Similar to the effects for countries, the results suggest that there is more agreement within sectors than there is within organizations.

TABLE 7 Summary results for r_{wg} and ADM scores at the organization, sector and country levels

	r_{WG}			ADM		
	Mean	*Range*	*% with $p < .05$*	*Mean*	*Range*	*% with $p < .05$*
Organization						
SN	.57	0–.98	34	8.95	1.75–15.43	34
EI	.37	0–.93	11	11.00	3.38–17.18	11
TF	.66	.17–.99	41	7.77	0.89–13.09	39
JP	.39	0–.96	13	10.75	2.32–19.61	10
Country						
SN	.57	0–.88	68	8.90	4.80–14.00	68
EI	.39	0–.72	56	11.03	7.11–18.08	56
TF	.63	.39–.83	76	8.42	6.24–10.88	68
JP	.35	0–.59	60	11.28	8.73–14	60
Sectors						
SN	.50	0–.83	60	9.66	5.90–15.09	63
EI	.33	0–.92	30	11.56	3.77–17.76	30
TF	.58	.06–.96	55	8.94	2.63–14.72	58
JP	.33	0–.93	33	11.60	3.11–16.33	33

EI = Extraversion-Introversion; SN = Sensing-Intuition; TF = Thinking-Feeling; JP = Judging-Perceiving

Discussion

The current study used a large sample of European managers from 165 different organizations in 30 different countries, and investigated the homogeneity hypothesis with multilevel analysis. While our findings had some similarity to prior research, there are several unique contributions of this work.

First, we investigated the homogeneity of personality hypothesis across organizations, European countries and industry sectors, the goal being to test the influence of superordinate workplace variables (i.e., organization, country and sector) on the homogeneity hypothesis. More specifically, we hypothesized that the personalities of managers will vary between organizations (H1a confirmed), between countries (H2a confirmed) and between sectors (H3a not confirmed).

Thus, also in the European context – and in line with previous studies (cf. Bradley-Geist and Landis, 2012; Schneider and Bartram, 2017) – we demonstrated that there is a significant effect of organizations on personality. King *et al*. (2017) discussed a similar outcome as a potential bias of their study, as they surveyed a more diverse sample compared to previous studies. As we found the same result in a sample spanning multiple organizations (and European countries), taken together, their results and our results might better represent the actual amplitude of the phenomenon.

When individual personality scale scores are aggregated up to country level, systematic differences between countries are also found.

We also hypothesized, based on the original proposition of the ASA framework – but to the best of our knowledge never tested before – that the personalities of managers within an organization are more alike than those of a random sample of managers (H1b), and that the personalities of managers within a country or sector are more alike than those of a random sample of managers (H2b and H3b). Within-organization homogeneity in our study was lower than within-country homogeneity. The within-country similarity results are in line with Bartram (2013b, 2013a), who found that 3% to 15% can be attributed to country effects.

Thus, these hypotheses were 'partially' confirmed. In fact, the data analysis allowed us to evaluate H1b, H2b and H3b for each organization, country and sector – and the results provide support for some organizations, some countries and some sectors. More specifically, we did not find support for all, but the range of agreement *within* was 10% to 39% for organizations, 30% to 63% for sectors and 56% to 68% for countries.

The agreement in the range of 10–39% for organizations in our study needs to be considered in light of the literature. In fact, studies have shown how homogeneity in organizations has some positive effects in terms of performance (cf. Halfhill *et al.,* 2008; Oh *et al.,* 2015; Schneider and Bartram, 2017), and that organizations become more homogeneous over time (O'Reilly *et al.,* 1991; Schneider *et al.,* 1995; Slaughter *et al.,* 2005). However it may also be that it has negative consequences in terms of routinization, rigidity and inflexibility (Schneider, 1987) or, 'like all seemingly positive things in organizations, too much strength might not be long term benefit of the organization' (Schneider and Bartram, 2017, p. 15).

Our empirical study only partially confirmed homogeneity, although it demonstrated significant effects for organizations and countries, but not sectors, on personality. In other words, the amount of individual variance (differences in EI, SN, TF and JP) that existed *within* organizations *within* countries was substantially larger than the amount of variance at both the country-level and the *between*-organization *within*-country level or sector. The within-group similarity, estimated through *within*-group agreement statistics (e.g., r_{wg}; ADM; LeBreton and Senter, 2008) shows that personality significantly but only slightly varies across countries and organizations (*within* countries), revealing ICCs of 0.01 and 0.05, respectively. In addition, the finding that the variance component for countries was higher than that for organizations contradicts some conventional wisdom that organizational homogeneity reduces the difference between cultural/national variance. In particular, where the amount of unexplained variance is so high, much of the variance in scale means and SDs between organizations and countries can be accounted for by other factors (e.g., individuals), and ranges between 92% and 96%. This confirms previous studies where intra-cultural variation was shown to be substantially greater than inter-cultural variation in personality (Poortinga and Van Hemert, 2001; Allik and McCrae, 2004; Smith *et al.,* 2013), although it does not completely contradict the emergence of a national modal personality profile (House *et al.,* 2004).

Overall, the specific context accounting for 4% of the variance is an important result (e.g., the predicted homogeneity in organizations in Europe). It will be interesting to see if a re-analysis of the US data using multilevel models yields comparative results.

Differences in personality across industry sectors have been detected with multivariate and univariate analyses of co-variance and logistic regressions, and significant differences across sectors (Carmeli and Schaubroeck, 2005; Furnham *et al.,* 2014) were detected. We hypothesize that the personalities of managers will vary between industry sectors (H3a). Using multilevel analysis, we examine the effect of sector while controlling for the effect of country and the effect of organizations on personality. Contrary to expectations, we did not find an effect for the industry sector. While one could argue that different industry sectors engage a range of different individual profiles (George and James, 1993; Holland, 1997; Furnham *et al.,* 2014), from our model, including sectors does not improve the statistical fit of the model. Nevertheless, the next hypothesis that the personalities of managers within an industry sector are more alike than those of a random sample of managers (H3b) was partially confirmed. We found agreement ranging from 30% to about 60% of the sample. Similarly to King *et al.* (2017), who found an occupational-level mechanism for homogeneity, we can support a sector-level mechanism of homogeneity.

The use of a subject pool of the same gender in previous research (Denton, 1999) made unclear the extent to which gender has any effect on personality. Gender is a common demographic control in personality research, and gender differences are usually found for the MBTI (McCaulley, 1975). Studies specifically found women are higher in Extraversion, Intuition and Feeling compared with their male counterparts, but no significant difference was detected for Perceiving (Furnham and Stringfield, 1993; Fitzgerald and Kirby, 1997). Using gender as a control variable allows us to equalize mean differences between men and women in terms of the MBTI dimensions.

One central issue that homogeneity hypothesis researchers disagree on is the level at which the variance needs to be measured (Ryan and Kristof-Brown, 2003). Thus, a further contribution of this study is the

examination of the homogeneity hypothesis through the lens of multilevel analysis that accounts for the *hierarchical* structure in the workplace. Employees are nested within organizations, and organizations nested within countries, and therefore likely to be influenced by either or both their organizational or their countries' membership (Hofstede *et al.,* 1990; Javidan *et al.,* 2006) or sector.

Also, ASA is a process, and it is commonly accepted that people's career concepts gradually develop as a result of experiencing different events and employment settings. Thus addressing previous concerns that studies of individuals older than college students are needed, as are investigations outside the USA (cf. Kirby, 1997; Warr and Pearce, 2004), a further contribution of this study is its examination of a cross-cultural and non-student sample, as well as incumbent employees rather than job seekers.

In conclusion, our investigation is in line with previous research insofar as finding an effect of organizations on personality. It does nevertheless extend previous studies, as similarity *within* levels was also assessed. The research framework and the use of more advanced statistical techniques increased the precision of the measurement. The assessment of the impact of the covariates at the individual level, and the use of a broad structure of personality also extended previous research.

Theoretical implications

Empirical research corroborating or rejecting the ASA framework has been sparse for the simple reason that it is difficult to collect data (or even obtain archival data) that can fit such a purpose, although it still represents a steady stream of research and study. A contribution of our empirical investigation is testing the fundamental assumption that people *within* an organization will be more like each other than would a random sample of people *across* organizations.

Another theoretical contribution of our study is the analytical framework used. The ambiguity in the conceptualization of the environment/organization was resolved with the use of multilevel theory and analyses. Concepts are not the same when observed at different levels of analysis, and an organization defined at the higher level is different from the subjects at a lower level. Influential theories emphasize fit and composition effects (Beersma *et al.,* 2003). The simple average of a group is not the best indicator of its properties (e.g., Barrick *et al.,* 1998), and work focused on assessing traditionally individual-level constructs (e.g., personality or perception of HRM practices) across levels of analysis are of growing relevance in HRM (cf. Shen *et al.,* 2018).

Studies have mostly looked at differences between organizations, investigating heterogeneity in terms of attributes, attitudes or organizational outcomes. Here we investigated heterogeneity; but with the r_{wg} and ADM index we also empirically investigated homogeneity *per se* within levels.

In sum, we provide a methodological update to decompose and compare organizational and country influence on personality homogeneity. We assess homogeneity by partitioning variance in four levels (individual, organizational, country and sector) and show that homogeneity within organizations in the European sample is smaller than expected from the results of previous studies. The use of more sophisticated statistical techniques supports a fine-grained analysis of the variance.

As the ASA model is a stream of research in the PersonOrganization fit literature, this result aligns with a model of complementary fit – compared to a supplementary fit.

Fit from a supplementary perspective considers similarity of employees in the same organization, as theory suggests that people have an ultimate need for consensual validation of their perspectives, which can be fulfilled by interacting with similar others (Kristof-Brown *et al.,* 2002). Since personality is based on stable characteristics, the only way to obtain supplementary fit for the individual is to meet the *modal personality* or to leave. To date, empirical investigations of the ASA framework have mostly confirmed the supplementary model of fit (e.g., homogeneity), where fit is based on employees holding similar values and a match with the firm's culture (De Cooman *et al.,* 2009; O'Reilly *et al.,* 1991;) or the personality homogeneity effect for organizational membership (cf. Schneider *et al.,* 1998; Bradley-Geist and Landis, 2012).

The variability detected in our study brings to the surface a different perspective. When fit is portrayed as *complementary* fit, the attention is on the compensation among individuals and the environment's weaknesses or strengths (Muchinsky and Monahan, 1987). Perhaps, within organizations, the variability of personality characteristics emerging from our study actually underlines complementary fit. This means that people in the managerial ranks complement the work environment (Van Vianen, 2000), or hold key attributes that fill an existing void in the organization or allow them to blend into the labour force.

Implications for practice

Individual personality traits are reasonably stable over time (Costa and McCrae, 1986; McCrae *et al.,* 1999; McCrae and Costa, 2003; Terracciano *et al*., 2010). Overall, the common expectation is that individuals 'self-select' themselves to be part of an organization. Although we discuss the ASA framework, we recognize

that there are many factors driving this, including socio-economic aspects. This impacts on why individuals choose to work for an organization, as on an individual basis, this choice might not be there, but has been a series of choices that have narrowed the path of that individual.

Nevertheless, there are also practical implications in homogeneity, as this could help inform the unique organizational procedures and processes (e.g., selection, training and socialization tactics) (Schneider, 1987; King *et al.,* 2017) and expats' assignments. This is particularly relevant in Europe as, with the recent inclusion of more countries in the EU, a significant process of immigration is registered at the lower organizational levels, particularly from Eastern to Western European countries. In addition, movements are registered in the opposite direction, with expat assignments for managerial positions or global companies moving production or services, or opening new branches in Eastern European countries. This means managers with different nationalities working side by side, particularly at the board level.

The ASA framework was explicitly aimed at personality congruence in organizations. The amount of unexplained variance (e.g., individual-level differences) shows that organizations are not range-restricted on personality variables or profiles in the managerial population.

Although both personality and values are relatively enduring, personal values are influenced by the social environment and are likely to change over time (Giberson *et al.,* 2005); they can thus support a modal value system. Values motivate action and are a link between deeply held individual beliefs and behaviour. When employees' values and priorities match those of their organization, they are more likely to stay, and as organizations mature, they become increasingly occupied by similar people in terms of values and interests (De Cooman *et al.,* 2009).

Personality is different and ASA literature suggests that organizations reflect their founders' personality, or possibly those of top management. We expected this effect to be even stronger for employees at the managerial level. Our results show a large amount of unexplained variance or variation at the individual level within organizations, as well as a significant effect of organizations on personality. Personality and organizational psychologists alike support that variation in individual characteristics is adaptive (Slaughter *et al.,* 2005). As one reviewer suggested, it is certainly important to understand the impact on motivation, performance and turnover when organizations have employees with similar personality attributes. However, from our findings, variation of personality is a naturally occurring phenomenon, notwithstanding overt/covert attempts at homogenization. This shows that organizations naturally recruit managers with a large variety of personality profiles; this reaffirms the common-sense notion that individuals are different, and that, no matter what organizational practices are in place to boost similarity, a high margin of variance remains. Monitoring the level of variation in the workplace means representing a better slice of the general population and their potential. Socialization practices ought to include consideration of personality variance. This may encourage longer-range planning for human resource needs, particularly in professional firms with long career paths. In addition, this will move the conversation from the fear of stagnation to the opportunity arising from diversity and complementary fit.

Strengths, limitations and future research

This study contributes to the ASA literature by consolidating existing research and pointing towards important directions for future research. Despite this, it does have some limitations which are worth noting. First, in our study we did not address variance across organizational units or subgroups (cf. Schaubroeck *et al.,* 1998; Halfhill *et al.,* 2008). This was not relevant here, as we were interested in examination of the congruence – or lack thereof – within organizations, as in the original ASA theory. Second, this study is based on a cross-sectional design, and our results only apply to the personality as defined and measured by the MBTI. This suggests that more studies are needed to confirm if this is the case for other personality traits. Also further tests of the homogeneity hypothesis might involve conducting a longitudinal study with cohorts of people experiencing a common set of organizational conditions. Such research design could potentially shed light on the relative contribution of attraction, selection and attrition to homogeneity, although this is undeniably a complex cycle. Such studies could also consider the outcomes in terms of motivation or turnover when similar personality attributes are detected – or their lack thereof. As candidates may search for, prefer and perform better when organizational values match their own values (Schneider, 1987), future longitudinal studies should jointly explore personality and values and their interaction in predicting variation and similarity *within* and *between* organizations – and maybe countries as well.

As one reviewer pointed out, the study has not addressed values. There is a body of literature on values fit (cf. Chatman, 1989; Farh *et al.,* 1991 O'Reilly *et al.,* 1991; Judge and Bretz, 1992; Cable and Judge, 1994; Cable and Judge, 1996; De Cooman *et al.,* 2009),

which yields similar results to those presented here. Research on values has conceptualized homogeneity as congruence with organizational values or culture. Chatman (1989) and O'Reilly *et al.* (1991) examined homogeneity in perceived culture or perceived values (e.g., organizational innovativeness, supportiveness,

decisiveness). Fit of incumbent perceptions of organizational values to newcomer values predicted turnover and performance; the results confirmed congruence and further demonstrated changes in personal and organizational values enhancing congruence. Perceived values congruence between job seekers and organizations indirectly influenced organizational attractiveness to hypothetical target organizations (Judge and Bretz, 1992; Cable and Judge, 1996) and the relationship between employees' work values and their organization's values, over a two-year time interval (De Cooman *et al.,* 2009). After entry, socialization increased values' homogeneity, so that the lower the perceived match between their own and organizational values at entry, the more likely employees were to leave the organization. Culture has been also conceptualized in terms of the formal practices (e.g., compensation and reward systems) which influence the job search process or organizational attractiveness (Cable and Judge, 1994; Soyean *et al.*, 2014). Top performers are more attracted by a performance-contingent rewards organizational culture than poor performers are (Farh *et al.,* 1991), accounting for the relation between attitudes at the individual level (e.g., service attitude) and culture at the organizational level (e.g., compensation system) (Lynn *et al.,* 2011). We are not, however, aware of studies that have highlighted personality and values similarity, so the suggestion that values similarity is more important is not familiar to us, although we would expect comparable results if values, rather than personality had been assessed. In doing so, the impact on creativity and innovation should also be considered.

Studies have assumed that different measures of fit have additive effects; that is, good fit on one dimension can compensate for poor fit on another. However, poor fit with one area might spill over into other areas (Kristof-Brown *et al.,* 2002). By examining multiple types of homogeneity, the spillover effect can be discerned.

Comparisons across personality theoretical frameworks (e.g., MBTI and FFM) would also provide a stronger foundation when the results replicate in the same sample.

The results of our study have implications for future research on the homogeneity hypothesis in the context of selection, socialization practices and decision-making. Other studies have examined the effects of multiple types of fit on work attitudes, but few have examined the combined effects of PO fit and PJ fit on job performance, the most widely used criterion in selection decision-making (Sekiguchi and Huber, 2011). Since PO fit is usually demonstrated through values' congruence, and the favorite candidate for PJ fit has been personality, it might be useful to analyze their interactive effect too.

Conclusion

Of all the issues in psychology that have fascinated scholars and practitioners alike, as well as non-professionals, none has been more pervasive than individual similarities/differences. Employees and managers are not isomorphic representations of the organization. Our results support variance in organizational contexts and European countries. In addition, perspective matters as an analytical strategy. Our results disentangle the relative influence of levels and the use of analytical strategies in line with the non-linearity of the phenomenon.

We tested central propositions of the ASA framework and addressed major concerns. Our goal at the outset of this study was to contribute to the debate on the ASA framework by replicating and extending previous studies in the European context. We provided conceptual clarity, from the scrutiny of the multiple conceptualizations to the suggestion of measurement strategies that can seemingly advance knowledge and understanding.

Overall, we addressed compelling questions in human resource management research and applications. Context matters, and this was incorporated into the analyses. Organizational life presents a complex structure, and the design of our study helped to capture part of this complexity. Investigating homogeneity effects with a large, representative sample, and simultaneously considering individual, organizational and country variances helped to advance our theoretical understanding of the ASA framework. There are also practical implications in homogeneity, which could help inform unique organizational procedures and processes (Schneider, 1987; King *et al.,* 2017) and cross-cultural management.

Our results might challenge scholars to re-evaluate their conceptual and analytical approaches to examining the ASA framework, and further reflection on the trade-offs of homogeneity.

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Appendix 1

Equation for the full model with gender as covariate:

$$y_{ijk[n]} \sim N_4\left(a_{1[n]} + a_{2[n]}\text{gender} + \beta_{i[n]} + \gamma_{j[n]} + \delta_{k[n]}, \Sigma_y\right)$$

$$\beta_i \sim N_4(0, \Sigma_i)$$

$$\gamma_j \sim N_4\left(0, \Sigma_j\right)$$

$$\delta_k \sim N_4(0, \quad \Sigma_k).$$

$$\text{Where } y_{ijk} = \begin{pmatrix} EI_{ijk} \\ SN_{ijk} \\ TF_{ijk} \\ JP_{ijk} \end{pmatrix}$$

N_4 is a four dimensional multivariate normal distribution 0 is a vector of 4 zeros,

then, i, j, k, and n subscriptis correspong to the individual, organization, sector and country sample sizes respectively,

and Σ_y, Σ_i, Σ_j and Σ_k are 4x4 covariance matrixes that correspond to the individual, organization, sector and country levels respectively.

Appendix 2

Bayesian model specification

Bayesian analyses offer a number of advantages over traditional approaches, and are ideally suited for complex multilevel models (Kruschke *et al*., 2012; Zyphur *et al*., 2015). For this study, however, there were two additional reasons that necessitated the use of Bayesian estimation. First, some of the groups were very small, as we restricted our sample to include any group (organization, sector or country) as long as the group sample was at least 2. With Bayesian analysis, uncertainty is directly integrated in the credible intervals of the model parameters, and thus there are no sample size restrictions, as long as we can consider the sample to be representative. The second reason for using Bayesian methods is that our model was both multilevel and multivariate (four correlated dependent variables), which to our knowledge is not possible to estimate without Bayesian inference with Markov chain Monte Carlo simulation. Other techniques that can account for multiple dependent variables simultaneously, such as structural equation models, cannot be easily extended to incorporate more than two levels (to our knowledge available SEM software can currently only be used with two levels). On the other hand, multilevel regressions that can account for all the different levels of analysis using restricted maximum likelihood cannot be used for more than one dependent variable at a time. Yet, with Bayesian inference this can easily be estimated using Markov Cchain Monte Carlo simulations (MCMC) (Gelman *et al.,* 2013).

In Bayesian analyses it is necessary to specify prior distributions for the model parameters which represent prior knowledge or beliefs about the model. Because of the large sample size, we decided to use weakly informative priors and allow the data to dominate the results. For the four fixed intercepts and the four fixed effects of gender we used normal distributions with mean of 0 and standard deviation of 100. Each of the covariance matrixes were decomposed into correlation matrixes and a scale for the parameters. For the correlation matrix we used the LKJ distribution (Lewandowski et al., 2010), and for the scale parameters the half-Cauchy distribution. The shape of the LKJ distribution signifies the degree to which variables are correlated, and was set to 2 for the four covariance matrixes. A value of 2 signifies that we expect that some correlation must be present between the four personality traits at all levels of the model. For the residual covariance matrix, the scale of the half-Cauchy distribution was set to 2.5, while for the other levels, it was specified as a uniform hyper-prior with a positive value. The reason for this is that initial runs of the model indicated that most of the variance could be attributed to the individual level, and it was thus decided to explicitly use a larger scale for the residual, rather than using the same hyper-prior for all errors in the model.

To perform the model comparisons we used the Watanabe-Akaike information criterion (WAIC; Watanabe, 2010) and truncated importance sampling for leaving one out cross-validation (LOO-CV). WAIC represents the predictive performance of the model for new samples based on the existing groups (Gelman *et al*., 2014) and LOO-CV represents the predictive performance of the model for new samples based on new groups (Gelman *et al*., 2014). Both WAIC and LOO-CV, along with their respective number of effective parameters (P_{waic} and P_{LOO}) are calculated for the five models.

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