

Sex Differences in Personality Traits and Gender-Related Occupational Preferences across 53 Nations: Testing Evolutionary and Social-Environmental Theories

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Abstract Using data from over 200,000 participants from 53 nations, I examined the cross-cultural consistency of sex differences for four traits: extraversion, agreeableness, neuroticism, and male-versus-female-typical occupational preferences. Across nations, men and women differed significantly on all four traits (mean d s = $-.15$, $-.56$, $-.41$, and 1.40 , respectively, with negative values indicating women scoring higher). The strongest evidence for sex differences in SDs was for extraversion (women more variable) and for agreeableness (men more variable). United Nations indices of gender equality and economic development were associated with larger sex differences in agreeableness, but not with sex differences in other traits. Gender equality and economic development were negatively associated with mean national levels of neuroticism, suggesting that economic stress was associated with higher neuroticism. Regression analyses explored the power of sex, gender equality, and their interaction to predict men's and women's 106 national trait means for each of the four traits. Only sex predicted means for all four traits, and sex predicted trait means much more strongly than did gender equality or the interaction between sex and gender equality. These results suggest that biological factors may contribute to sex differences in personality and that culture plays a negligible to small role in moderating sex differences in personality.

Keywords BBC Internet study · Big Five traits · Culture · Gender-related interests · Gender roles · Personality · Sex differences

Introduction

On average, men and women differ in a number of personality traits. When assessed in terms of the five-factor model of personality, men score higher than women on some extraversion facets (e.g., assertiveness, dominance) but lower on others (sociability, warmth), whereas women score higher than men on many neuroticism and agreeableness facets (Costa, Terracciano, & McCrae, 2001; Feingold, 1994; Schmitt, Realo, Voracek, & Allik, 2008). In a large-scale study that used Tellegen's (1982) Multidimensional Personality Questionnaire to assess the personality traits of an entire cohort of young adults in Dunedin, New Zealand, men scored much higher than women on trait aggressiveness, whereas women scored much higher than men on harm avoidance, and moderately higher than men on self-control, stress reaction (i.e., anxiety), and social closeness (sociability; the need to be with people) (Moffitt, Caspi, Rutter, & Silva, 2001). Finally, men and women show very large differences in their gender-related interests, with men more interested in thing-oriented activities and occupations (e.g., mechanics, carpentry, engineering) and women more interested in people-oriented activities and occupations (e.g., counseling, elementary school teaching, nursing) (Lippa, 1998, 2001, 2005).

Although sex differences in personality have been well documented, the reasons for these differences remain unclear, with evolutionary and social-environmental theories offering contrasting explanations. Evolutionary theories propose that natural selection has produced on-average dispositional differences between men and women, particularly in traits that differentially impacted male and female reproductive fitness over the course of human evolution (Buss, 1999). For example, men's higher aggressiveness and assertiveness may have fostered their fitness in ancestral environments by increasing their chances of rising in dominance hierarchies and acquiring

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resources that added to their mate value, whereas women's higher agreeableness may have fostered their fitness by increasing their desirability as mates and their success as mothers. Presumably, evolved dispositional sex differences are caused at a more proximate level by genetic differences between the sexes and by genetically guided biological mechanisms (e.g., sex-linked hormonal factors at critical stages of development) that lead to sex differences in nervous systems and behaviors (see Hines, 2004; Lippa, 2005). Recent research shows that same-sex homosexual and heterosexual individuals differ in personality in ways that mirror sex differences—i.e., gay men are shifted in female-typical directions and lesbians are shifted in male-typical directions—and this adds to evidence that there may be sex-linked hormonal factors that lead both to sex differences in personality and to gender-related variations in personality within each sex (Lippa, 2008).

In contrast to biological theories, social role theory (Eagly, Wood, & Diekmann, 2000; Wood & Eagly, 2002), gender socialization theories (Ruble & Martin, 1998), and social stereotype and cognitive developmental theories (Kohlberg, 1966; Martin, Ruble, & Szkrybalo, 2002) have appealed to social, environmental, and cultural factors to explain sex differences in personality. Social role theory proposes that psychological sex differences result from gender roles that have evolved in some societies—particularly modern agricultural and industrial societies—as a result of physical differences between the sexes (e.g., greater male upper body strength, female gestation and lactation), and the economic divisions of labor and social structures that followed from these physical differences (Eagly et al., 2000). The proximate causes of sex differences are theorized to be social structure (e.g., greater male than female power, patriarchy), social roles (men as workers, women as housekeepers), and the gender ideologies that accompany and sustain these patriarchal social structures and social roles. In addition to causing differences in men's and women's behaviors, social roles are hypothesized also to generate and sustain common stereotypes about sex differences in personality (e.g., men are agentic, women expressive; men are assertive, women submissive). Social role theory implies that, across societies, strong gender roles are associated with larger sex differences in personality, and weak gender roles are associated with smaller sex differences in personality.

Overlapping with social role theories, socialization theories propose that, in virtually all cultures, boys and girls are subject to different socialization pressures and practices, which result in sex-differentiated patterns of behaviors. For example, boys and girls are encouraged by parents and other socialization agents to engage in sex-typed play, which encourages different interests and activity levels in boys and girls (Langlois & Downs, 1980; Lytton & Romney, 1991). In many cultures, boys are granted more independence by parents and are assigned non-domestic chores and tasks that

take them outside the home, whereas girls are monitored and sequestered more by parents and assigned domestic chores, including the care of the other children. Such socialization practices may inculcate somewhat different personality traits and social skills in boys and girls (e.g., independence in boys, nurturance in girls). Socialization theories imply that gender-polarized societies that socialize boys and girls very differently will produce large sex differences in personality, whereas gender-nonpolarized societies that socialize boys and girls more similarly will produce smaller sex differences in personality.

Once gender stereotypes and self-concepts are established, they may then create self-fulfilling prophecies that guide the behaviors of boys and girls and of men and women through behavioral confirmation and self-verification processes (Snyder, 1981; Swann, 1999). Such processes may influence men's and women's responses to personality tests, particularly their responses to test items that assess gender-related traits. To the extent that gender stereotypes are prescriptive and portray some personality traits to be more socially desirable for one sex than the other, gender stereotypes may lead men and women to describe their personality in gender-stereotypic ways. For example, men may be motivated to describe themselves as being more aggressive and assertive than women, whereas women may be motivated to describe themselves as being warmer and more agreeable than men. Thus, sex differences in personality traits, as assessed by commonly used personality tests, may to some extent reflect stereotype-induced artifacts as well as actual behavioral differences between the sexes (see Feingold, 1994). They may also reflect the extent to which individuals use their own sex versus the other sex as a basis for social comparison when rating their personality (Guimond et al., 2007).

Cross-Cultural Research as a Testing Ground for Biological and Social-Environmental Theories of Sex Differences in Personality

In recent years, cross-cultural research has provided an empirical route to testing biological and social-environmental theories of sex differences (see Lippa, 2005, in press). The goal of such research is to investigate whether sex differences show cross-cultural consistencies or inconsistencies. To the extent that sex differences in personality show strong consistency—sometimes even universality—across cultures, the likelihood increases that biological factors contribute to these differences. In contrast, to the extent that sex differences in personality show strong variability across cultures, and, even more decisively, if such variability is strongly predicted by structural and economic features of cultures, the likelihood increases that there are systematic cultural factors that contribute to these sex differences, and the plausibility of social-environmental theories is bolstered.

Although it is possible to make meaningful inferences from both cross-cultural consistencies and variations in sex differences, some researchers have argued that cross-cultural inconsistencies are more informative than consistencies. As Costa et al. (2001) explained:

[I]t is... possible that pancultural gender differences result from universals in learned gender roles. For example, because men in all cultures are physically stronger than women, they may universally be assigned roles as leaders, and in these roles may learn to become more assertive than women. Cross-cultural studies would be most revealing if they showed no consistency in gender differences; strictly biological explanations would essentially be ruled out by such findings. (p. 324)

It is important to note, however, that large, cross-culturally universal sex differences that are impervious to cultural influences may provide more compelling evidence for biological causation. Furthermore, it is important also to state the converse of Costa et al.'s caveat: that cross-cultural variations in sex differences may sometimes result from biological as well as from cultural and social-environmental factors. Evolutionary theorists have proposed in recent years that evolved patterns of behavior may often be quite sensitive to environmental contingencies (Buss, 2005; Schmitt, 2005). Rather than “wiring in” all-or-none behavioral tendencies, natural selection may instead provide “menus” of behavioral responses that are selectively triggered by environmental factors. Recent research on sociosexuality provides an illustration, when it shows that men and women adopt more restricted patterns of sexuality in stressed reproductive environments (e.g., those characterized by poor resources, high disease load, and high infant mortality) and more unrestricted patterns of sexuality in nonstressed reproductive environments (Lippa, in press; Gangestad & Simpson, 2000; Schmitt, 2005). Furthermore, sex differences in sociosexuality tend to be larger in stressed environments and smaller in nonstressed environments (Lippa, in press).

Recent studies on sex differences in a variety of psychological dispositions—personality traits, sexual traits such as sociosexuality and sex drive, and various kinds of mate preferences—have offered evidence for both cross-cultural consistency and variation, and thus they have often been inconclusive in distinguishing biological and social-environmental explanations of psychological sex differences. Evolutionary theorists have argued that the strong and near-universal sex differences observed in some traits (e.g., sociosexuality; see Lippa, in press; Schmitt, 2005) indicate that strong biological predispositions contribute to these sex differences. Social role theorists counter that all modern societies are patriarchal, albeit to varying degrees, and thus it is not surprising that studies often document unidirectional sex differences in many traits, which vary in magnitude across societies depending on structural and ideological features of the

societies (e.g., their degree of patriarchy, their level of economic development, and their social attitudes toward men and women) (Eagly & Wood, 2005).

Despite the ambiguities inherent in cross-cultural evidence on psychological sex differences, many recent findings nonetheless run counter to the predictions that follow most directly from social role and gender socialization theories, e.g., that stronger gender roles will be associated with larger sex differences, across cultures. Instead, empirical evidence shows that many sex differences (e.g., in values, emotions, and many personality traits; for some kinds of mate preferences) are *weaker* in societies with strong gender roles and *stronger* in societies with weak gender roles (Guimond et al., 2007). Also inconsistent with the predictions of social role theory are findings that sex differences in some traits (e.g., the value assigned to a mate's physical attractiveness) are unrelated to the strength of societies' gender roles (Eagly & Wood, 1999; Lippa, 2007). In yet other domains, psychological sex differences follow the patterns predicted by social role theory. For example, large sex differences in preferences for mate characteristics such as domestic skills and earning capacity are associated with stronger and more traditional gender roles, across cultures (Eagly & Wood, 1999).

Costa et al. (2001) conducted the first comprehensive study on the consistency of sex differences in personality across cultures. Using the Revised NEO Personality Inventory to assess Big Five factors and facets in over 23,000 men and women from 26 cultures, they documented cross-culturally consistent sex differences in Big Five agreeableness and neuroticism and also in a number of facets of extraversion and openness. They further showed that, across cultures, the magnitude of sex differences in one personality trait correlated strongly with the magnitude of sex differences in other personality traits, suggesting a generalized tendency for members of given societies to show large or small sex differences in personality. Most relevant to the predictions of social role and gender socialization theories, Costa et al. found that larger sex differences in personality were associated with weaker gender roles and with nations' modernity, across nations. These findings have recently been replicated in a large-scale study of sex differences in Big Five personality traits across 55 nations surveyed as part of the International Sexuality Description Project (Schmitt et al., 2008).

To explain their unexpected findings, Costa et al. (2001) offered an attributional explanation, suggesting that in societies with strong gender roles, people attribute behavioral differences between the sexes to salient and powerful gender roles rather than to men's and women's dispositions, whereas in societies with weak gender roles, people attribute behavioral sex differences more to men's and women's internal dispositions. Costa et al. (2001) offered the following illustration: “In individualistic, egalitarian countries, an act of kindness by a woman may be perceived (by her and others) as a free

choice that must reflect on her personality. The same act by a woman in a collectivistic, traditional country might be dismissed a mere compliance with sex role norms” (p. 329). Bolstering this attributional explanation is evidence for similar cross-cultural patterns of sex differences when participants rate other peoples’ personality traits, rather than their own traits (McCrae et al., 2005a; see also Williams & Best, 1990).

More recently, Guimond et al. (2007) offered a social comparison explanation for the finding that sex differences in personality are larger in societies with weak gender roles than in societies with strong gender roles. Specifically, they proposed that in more traditional, gender-inegalitarian societies, people are more likely to compare themselves with in-group members (i.e., same-sex individuals) when making self-ratings of personality, whereas in more individualistic, gender-egalitarian societies, people are more likely to compare themselves with out-group members (other-sex individuals). Guimond et al. further suggested that gender differences in personality in individualistic, western nations may reflect gender stereotypes more than actual gender differences in personality. If their explanation is correct, then cross-cultural patterns of gender differences (e.g., larger gender difference in gender-egalitarian than in gender-nonegalitarian nations) should be consistent across personality traits, and these cross-cultural variations should be strongest for traits that are stereotypically seen to show the strongest sex differences.

Additional studies are needed to confirm whether Costa et al.’s (2001) and Schmitt et al.’s (2008) findings on sex differences in personality replicate in other cross-cultural data sets. Unfortunately, it is difficult to conduct replications, because large cross-cultural data sets on personality are rare. The current report presents data from a recent BBC Internet survey to investigate the cross-cultural consistency of sex differences in four traits: extraversion, agreeableness, neuroticism, and male-versus-female-typical occupational preferences. Using the BBC data, I analyzed the cross-cultural consistency of sex differences in these four traits, across 53 nations, and I conducted many of the same sorts of analyses conducted by Costa et al. (2001) and by Schmitt et al. (2008). At the same time, the current analyses move beyond those of Costa et al. and Schmitt et al. in that they also study cross-cultural patterns in men’s and women’s *mean levels* of personality and cross-cultural patterns in the *variability* of men’s and women’s personality traits.¹ These additional analyses hold the promise of

more conclusively testing between biological and social-environmental accounts of sex differences in personality (see Lippa, in press). Also, the current results extend previous findings by examining gender differences in populations that were more diverse in age, educational status (e.g., not primarily college students), and geographical locales within nations than were the populations assessed in previous studies.

Although Costa et al. (2001) did not make explicit predictions about cross-nation patterns of SDs for men’s and women’s personality traits, a reasonable hypothesis, based on their attributional model, is that self-reported personality will show greater variability in low-patriarchal than in high-patriarchal nations. The reason for this prediction is that, according to Costa et al.’s attributional model, men and women in weak-gender-role, low-patriarchal nations are theorized to make stronger dispositional attributions from their behaviors than people in strong-gender-role, high-patriarchal nations, and therefore variability in self-reported gender-related personality traits will reflect actual behavioral variability more in low-patriarchal than in high-patriarchal societies. McCrae (2002) reported just such a pattern of results in analyses of NEO facet SDs across 36 cultures. Trait variability tended to be higher in European than in Asian and African cultures, and mean trait variability correlated positively with nations’ assessed individualism.

An argument for the opposite pattern can also be made, based on social role theory. If the actual within sex variability of men’s and women’s behavior in specific behavioral domains is reduced in cultures with strong gender roles, compared to cultures with weak gender roles, and if the within-sex variability of men’s and women’s self-reported personality veridically reflects the variability of their actual behavior, then men and women in patriarchal cultures might be expected to show *lower* within-sex variation in personality than men and women in low-patriarchal cultures. Whichever of these two opposing hypotheses is correct, the prediction made by both attributional and social role theories is that there should be culture “main effects” on men’s and women’s trait SDs. To the extent that social role theory also hypothesizes that gender roles are stronger and more restrictive for one sex than the other (e.g., cultures restrict female more than male sexuality; see Baumeister & Twenge, 2002), then they also predict sex-by-culture interactions in trait SD’s—e.g., more traditional and gender-nonegalitarian nations are predicted to restrict women’s more than men’s SDs for certain kinds of sexual behaviors (see Lippa, in press).

Biological theories, in contrast, predict the possibility of cross-culturally consistent sex differences in trait SDs, particularly in cases where traits have been subject to sexual

¹ In analyses of data from 57 cultures, McCrae (2002) reported that correlations between men’s and women’s SDs for NEO facets ranged from .42 to .88, across cultures, with a median value of .68 (see also McCrae et al., 2005b). This suggests that not only do trait means vary in consistent ways across cultures, but trait variances do as well. In explaining these results, McCrae (2002) wrote, “It is not yet clear whether the consistency is due to the culture or to the language. In the Filipino subsamples, facet SDs were, on average, 14% larger when the

Footnote 1 continued
NEO-PI-R was administered in Filipino than when it was administered in English” (p. 114).

selection. For example, if a trait has consistently had higher fitness value in one sex than the other, then the sex experiencing higher selection pressure might show less variability on that trait, as well as higher mean trait levels. In contrast, if within-sex trait variability fostered fitness by allowing various male or female subgroups to prosper in different mating niches (e.g., some men are attractive to mates because they are physically attractive, dominant, and virile, whereas others are attractive because they are sensitive, committed, and agreeable), then the sex with more variable mating outcomes and with more possible mating niches (in humans, typically men) would show more trait variation than the other sex (Archer & Mehdkhani, 2003). One goal of the current research was to investigate the extent to which men's and women's personality trait SDs showed, across nations, sex main effects, culture main effects, and sex-by-culture interactions.

As noted earlier, a related goal was to attempt to replicate Costa et al.'s (2001) and Schmitt et al.'s (2008) cross-cultural findings on sex differences in personality in a new large cross-cultural data set. Such a replication would offer further support for Costa et al.'s attributional model of sex differences in self-reported personality or, alternatively, for Guimond et al.'s (2007) social comparison model. If previously found patterns of results did not replicate for some traits in the current data, then additional theories might be needed to explain results. For example, if large sex differences in personality proved to be associated, across cultures, with strong gender roles, and if there were culture main effects and sex-by-culture interactions in personality trait means and SDs, then social role theory would garner support. In contrast, if sex differences in personality and if men's and women's mean trait levels proved to be highly consistent across cultures and unrelated to the strength of societies' gender roles, and if there were sex main effects in trait SDs across cultures, but not culture main effects or sex-by-culture interactions, then evolutionary theories that propose innate, dispositional sex differences in personality would garner support. Finally, if sex differences in personality varied across cultures most strongly for those traits that are most stereotypically linked to sex, then Guimond et al.'s (2007) social comparison theory would garner support.

Method

Participants

From February through May 2005, the British Broadcasting Corporation (BBC) conducted an English-language Internet survey, which focused on human sex differences in cognition, motivation, personality, and sexuality. The survey, designed to produce data for use in the BBC 1 documentary *Secrets of the Sexes*, was advertised on the BBC website, and participants

responded online. Because of the broad reach of the BBC as an international news source, survey participants came from all over the world. Participants could complete a variety of psychological tests and questionnaires, which were arranged in six modules, each of which took about 5 min to complete. A total of 255,114 people responded to at least some items in every module. In the course of responding to approximately 200 questions, most participants reported their sex and completed 50 personality and occupational preference items.

Fifty-three nations in the BBC data set had samples of 90 or more participants (see Figs. 2–5). The cross-cultural analyses in this report are based on these national samples.

Measures

Demographics

Demographic information collected by the BBC Internet survey included age, relationship status, country of residence, ethnicity, education level, and income level. Some of these measures will be discussed in more detail in the results section. The current analyses focused on participants whose ages were ≥ 18 and ≤ 80 years. For an overview of the BBC Internet survey, its questions, and their response formats, see Reimers (2007).

Personality

The BBC survey assessed a number of personality traits with items taken from the International Personality Item Pool (IPIP; see <http://ipip.ori.org/>). A number of these items were intended to measure the following traits assessed by Cattell's 16PF inventory: friendliness, warmth, emotional stability, and introversion (scale items are listed in Table 1). The nine computed IPIP subscale scores relevant to the current research were: positive friendliness, negative friendliness, positive warmth, negative warmth, positive emotional stability, negative emotional stability, positive introversion, and negative introversion (subscales are presented in Table 1). From these subscale scores, I computed proxy measures for three Big Five traits: (1) extraversion (the sum of positive friendliness, negative friendliness [reversed], positive introversion [reversed], and negative introversion), (2) agreeableness (the sum of positive warmth and negative warmth [reversed]), and (3) neuroticism (the sum of positive emotional stability [reversed] and negative emotional stability). For additional information about the computation of these scales, their reliability, and their relation to other Big Five measures see Lippa (2008).

In addition to responding to IPIP items, BBC Internet survey participants also completed a 10-item measure of gender-related occupational preferences, which asked them to rate on 7-point scales ranging from "strongly dislike" to

Table 1 International Personality Item Pool (IPIP) Scales and Items Administered in the BBC Internet Survey and Used to Create Extraversion, Agreeableness, and Neuroticism Scales

Positive Friendliness (Extraversion component)	
Am the life of the party.	
Feel comfortable around people.	
Start conversations.	
Talk to a lot of different people at parties.	
Don't mind being the centre of attention.	
Negative Friendliness (Extraversion component, reversed)	
Don't talk a lot.	
Keep in the background.	
Have little to say.	
Don't like to draw attention to myself.	
Am quiet around strangers.	
Positive Warmth (Agreeableness component)	
Am interested in people.	
Sympathize with others' feelings.	
Have a soft heart.	
Take time out for others.	
Feel others' emotions.	
Make people feel at ease.	
Negative Warmth (Agreeableness component, reversed)	
Am not really interested in others.	
Insult people.	
Am not interested in other people's problems.	
Feel little concern for others.	
Positive Emotional Stability (Neuroticism, reversed)	
Am relaxed most of the time.	
Seldom feel blue.	
Negative Emotional Stability (Neuroticism component)	
Get stressed out easily.	
Worry about things.	
Am easily disturbed.	
Get upset easily.	
Change my mood a lot.	
Have frequent mood swings.	
Get irritated easily.	
Often feel blue.	
Positive Introversion (Extraversion component, reversed)	
Want to be left alone.	
Prefer to do things by myself.	
Enjoy spending time by myself.	
Seek quiet.	
Don't mind eating alone.	
Enjoy silence.	
Enjoy my privacy.	

“strongly like” how much they were interested in the following jobs: *car mechanic, costume designer, builder, dance teacher, carpenter, school teacher, electrical engineer, flo-*

Table 1 continued

Negative Introversion (Extraversion component)

- Enjoy being part of a group.
- Enjoy teamwork.
- Can't do without the company of others.

Note: In response to the prompt—“How do you see yourself?”—participants rated themselves on the previous items using a 7-point rating scale that ranged from “disagree” to “agree.” A Big Five extraversion scale was computed as the sum of positive friendliness, negative friendliness (reversed), positive introversion (reversed), and negative introversion. A Big Five agreeableness scale was computed as the sum of positive warmth and negative warmth (reversed), and a Big Five neuroticism scale was computed as the sum of positive emotional stability (reversed) and negative emotional stability

rist, inventor, and social worker. Pre-testing had shown that the odd-numbered items in this list tended to be preferred more by men than women, whereas the even-numbered items tended to be preferred more by women than by men, and all items tended to be linked to the people-things dimension of interests (Lippa, 1998). A scale of male-typical versus female-typical occupational preferences (MF-Occ) was computed by averaging the masculine items and the reversed feminine items.

The reliabilities (alphas) of this scale for all screened BBC participants, men, and women were, respectively, .74, .64, and .59. Occupational preference items are often corrected for “elevation response set”—the general tendency for respondents to prefer many or few occupations—by computing ipsatized items (e.g., subtracting from each item the individual's mean rating on all items) (Lippa, 1998; Prediger, 1982; Tracey & Rounds, 1993). The reliabilities of MF-Occ computed from ipsatized items for all participants, men, and women were respectively .82, .76, and .71. There were equal numbers of masculine and (reversed) feminine items in the MF-Occ scale, which guaranteed that the elevation response set was removed from scale scores. Indeed, in this case, MF-Occ computed from raw items was identical to MF-Occ computed from ipsatized items. However, the alphas computed from ipsatized items probably provide a more accurate estimate of scale reliabilities.

Gender Equality and Economic Development

Statistics for United Nations gender-related development and gender empowerment indices were taken from the United Nations 2005 and 2001 Human Development Reports (available at: <http://hdr.undp.org/statistics/data/>, see the section on “data by indicator”). The UN gender-related development index assesses nations' gender equity on three dimensions: health and longevity, standard of living, and knowledge and education. The UN gender empowerment measure assesses nations' gender equity on three power dimensions: power over

economic resources, participation in economic decision making, and participation in political decision making. In several cases, when 2005 statistics were not available for given nations, I used 2001 statistics instead. United Nations gender empowerment statistics were not available for six of the 53 nations studied here. Two indices of economic development were also obtained from UN Human Development reports: nations' per capita income in US dollars and life expectancy.²

Results

Demographic Characteristics of the Total BBC Sample and National Subsamples

For the entire BBC sample, men's median age was 30 ($M = 32.26$, $SD = 11.26$), and women's median age was 28 ($M = 31.11$, $SD = 10.83$). Participants came from countries across the world, but the largest numbers were from the United Kingdom (45%), the United States (29%), Canada

² To probe the impact of other dimensions of cultural variation, I also analyzed national scores on Hofstede's (1991) four cultural dimensions: power distance (the acceptance of unequal distributions of power in organizations and institutions), individualism versus collectivism, masculinity versus femininity (instrumental versus communal values in work-related settings), and uncertainty avoidance (the degree to which members of various cultures are uncomfortable with uncertainty and ambiguity). Hofstede (1991) presents scores on these dimensions for 50 nations, 40 of which overlapped with the nations assessed in the current study (see also Hofstede & Hofstede, 2005; Peabody, 1999).

When nations' scores on Hofstede's four cultural dimensions were correlated with the UN gender and economic development scores used in the current study, correlations were high for two of Hofstede's dimensions: power distance and individualism/collectivism. Specifically, the Hofstede power dimension correlated $-.58$ with UN gender development, $-.68$ with UN gender empowerment, $-.36$ with life expectancy, and $-.70$ with per capita income (all $ps < .001$ except for the third, which was $<.05$), and individualism/collectivism dimension correlated with the same indices $.62$, $.73$, $.36$, and $.75$ (p values the same as before). These generally strong correlations imply that nations high on gender equality and economic development tended also to be individualistic nations that had relatively low inequality in their organizational power distributions—findings that are consistent with the results of other studies (see Hofstede & Hofstede, 2005; McCauley, Ottati, & Lee, 1999). The other two Hofstede dimensions—masculinity-femininity and uncertainty avoidance—were not significantly related to UN or economic indices, nor were they related much to sex differences in personality.

Because of the strong overlap between the Hofstede power distance and individualism/collectivism dimensions and the other indices assessed in the current study, I report here only results for the UN gender equality and economic development indices. The fact that two of the Hofstede dimensions correlated strongly with the UN gender equality and economic development measures lends some ambiguity to the proper interpretation of the cultural dimension that is tapped by the UN measures. On the other hand, the strong intercorrelation of these four quite different measures suggests that the dimension of cultural variation that is being assessed in common by all four measures is a fundamental one.

(5%), and Australia (4%). Participants from continental Western Europe made up about 6% of the sample.

In many of the 53 national samples there were roughly equal numbers of men and women, although there was a tendency for male samples to be larger than female. In all national samples but two, both male and female sample sizes were larger than 40. The two exceptions were Venezuela and Saudi Arabia. For additional demographic information about the BBC sample see Lippa (2007) and Reimers (2007).

Intercorrelations of Personality Measures at the Level of Individuals and Nations

Table 2 presents the intercorrelations of the four assessed traits, both at the level of individuals and at the level of nations. Partial correlations were computed at the level of individuals, controlling for sex, because some of the covariation between traits resulted from the fact that traits were correlated with sex. At the level of nations, mean personality traits were computed as the average of male national means and female national means for a given trait, thus eliminating possible confounds resulting from unequal male and female samples sizes in national samples.

As Table 2 shows, at the level of individuals the four assessed traits were largely independent of one another. This was also true at the level of nations, except for the negative correlation of MF-Occ and neuroticism ($r = -.48$, $p < .001$). This association reflected the fact that nations whose citizens preferred more male-typical occupations tended also to be nations whose citizens were lower on neuroticism. As will be reported later, mean national levels of both neuroticism and MF-Occ were sometimes correlated with gender equality and economic development, and thus the correlation between these two traits might have resulted from these mutual associations. Arguing against the adequacy of this hypothesis, however, was the finding that the correlation between MF-Occ and neuroticism remained significant even after the effect of UN indices of gender equality and of per capital income

Table 2 Intercorrelations of Extraversion, Agreeableness, Neuroticism, and Male-Versus-Female-Typical Occupational Preferences (MF-Occ) at the level of individuals and nations

	Extraversion	Agreeableness	Neuroticism	MF-Occ
Extraversion	–	.26*	-.18*	-.13*
Agreeableness	.20	–	-.03*	-.25*
Neuroticism	.10	.12	–	-.11*
MF-Occ	-.19	-.02	-.48*	–

Note: * $p < .001$. Correlations above the diagonal are for individuals, with sex partialled out; $n = 172,251$. Correlations below the diagonal are for national means (the average of men's and women's national trait means); $n = 53$

were partialled out (respective partial r s = $-.34, p = .01$, and $-.37, p = .008$).

Intercorrelation of Indices of Gender Equality and Economic Development

Across the 53 nations, the two UN indices (gender development and gender empowerment) were highly correlated ($r(46) = .82, p < .001$), and they were also substantially correlated with indices of economic development (gender development correlated .78 with per capita income and .84 with life expectancy; gender empowerment correlated .79 with per capita income and .69 with life expectancy, all p s $< .001$). In general, these high intercorrelations show that countries that were gender egalitarian also tended to be high on economic development (see Footnote 2).

Extraversion

Correlations between Men's and Women's Means and between Men's and Women's SDs

Men's and women's mean extraversion levels correlated significantly, across nations ($r = .58, p < .001$), indicating that there were fairly consistent national levels of extraversion. Men's and women's extraversion SDs were not significantly correlated, across nations ($r = .11$).

Correlations between Social Indices and Male and Female Means, Male and Female SDs, and Sex Differences in Extraversion

Were sex differences in extraversion predicted, across nations, by cultural and social structural factors? Table 3 presents correlations between societal indices and the five parameters of interest: men's means, women's means, men's SDs, women's SDs, and sex differences in extraversion. The right-most

column of Table 3 shows that correlations between societal indices and sex differences in extraversion were not significant. Similarly, the first two columns of correlations show that correlations between societal indices and men's and women's mean levels of extraversion were also not significant.

The pattern of correlations presented in Table 3 is clarified by Fig. 1, which graphically portrays male and female trait means and male and female SDs across the 53 nations, arrayed in order of their degree of gender equality. The graphs for men's and women's national means show a small but consistent sex difference, with women generally higher than men on extraversion (mean national d for the sex difference = $-.15$). Differences in men's and women's mean levels of extraversion were highly significant across nations, paired-data $t(52) = -8.43, p < .001, d = -1.16$. This large d value may seem puzzling, given that the mean of the 53 national sex difference d s was $-.15$. However, in the paired-data t -test just reported, *nations* is the unit of analysis and the data points are national means. Thus, at the aggregated level of nations, women's mean extraversion levels were consistently considerably higher than men's mean levels. Examination of Fig. 1 further shows that women's extraversion SDs tended to be higher than men's SDs, and this difference too was significant, paired-data $t(52) = -3.48, p = .001, d = -.48$, mean male-to-female variance ratio = $.93$).

Sex differences in extraversion did not systematically covary with nations' degree of gender equality. In fact, variations in effect sizes appear to have resulted from sampling error, not from systematic factors. Figure 2 makes this point more apparent by plotting effect sizes as a function of the log of sample sizes. The scatter plot shows that for large-sample nations effect sizes were stable, clustering around $-.15$ to $-.20$, whereas for small-sample nations effect size values scattered considerably about this mean level. The small number of nations in which men scored higher on extraversion than women were small-sample nations, and thus these reversals from the mean sex difference probably reflect sampling error rather than true reversals.

Table 3 Correlations across nations between social indices and extraversion parameters

	Men's Mean Extraversion	Women's Mean Extraversion	Men's SDs	Women's SDs	Sex Differences (d s)
UN Gender Development	.02 (53)	.09 (53)	.02 (53)	.21 (53)	-.08 (53)
UN Gender Empowerment	.02 (47)	.18 (47)	-.03 (47)	.17 (47)	-.19 (47)
Per Capita Income	.13 (52)	.11 (52)	-.08 (52)	.10 (52)	.00 (52)
Life Expectancy	.05 (53)	.00 (53)	-.09 (53)	.11 (53)	.04 (53)

Note: Numbers in parentheses are sample sizes

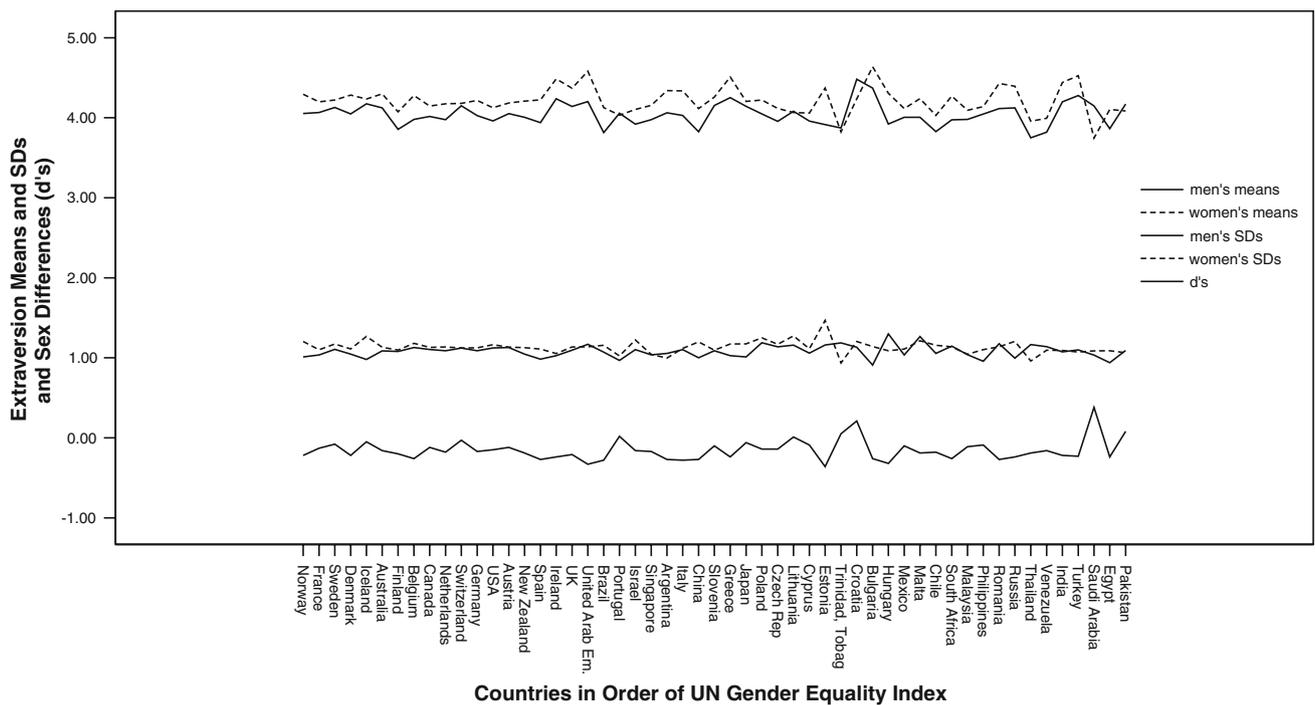


Fig. 1 Extraversion parameters across 53 nations presented in order of nations’ levels of gender equality

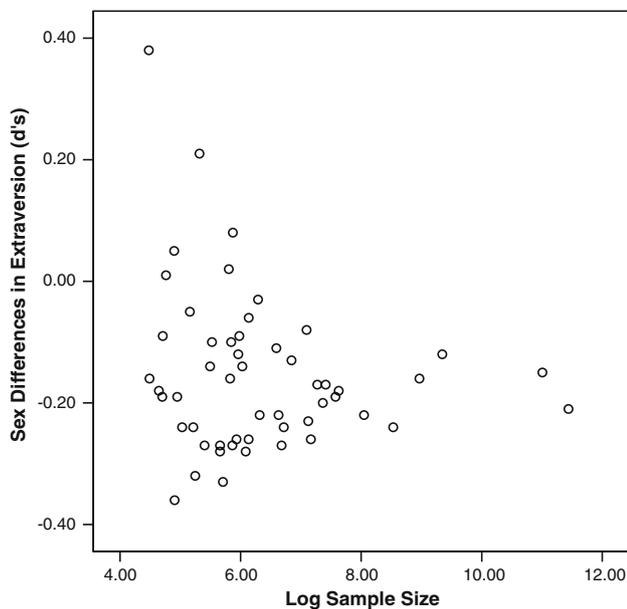


Fig. 2 Sex differences in extraversion in 53 nations as a function of the logarithm of sample sizes

Sex and Gender Equality as Predictors of Mean Levels of Extraversion

Using regression analysis, I examined the power of sex and gender equality to predict male and female means across

cultures. The data points were the 53 male means and the 53 female means for extraversion. The predictor variables were sex, coded as “1” for males and “2” for females, and gender equality (the mean of the two highly correlated UN indices). An interaction term was also entered into the regression—the product of the standardized sex and gender equality variables.

These three orthogonal variables significantly predicted male and female extraversion means moderately well, multiple $r = .49$, $r^2 = .24$, $p < .001$, with sex the strongest predictor: β for sex = $.48$, $p < .001$; β for gender equality = $.07$, ns ; and β for the interaction = $.07$, ns .

When a corresponding regression was run on men’s and women’s SDs, the prediction was weaker but still significant, multiple $r = .34$, $r^2 = .11$, $p < .01$: β for sex = $.31$, $p = .001$; β for gender equality = $.09$, ns ; and β for the interaction = $.11$, ns . The significant β -weight for sex showed once again that women had larger extraversion SDs than men did across nations. In both the regression on means and the regression on SDs, sex differences were much more powerful than culture effects or sex-by-culture interactions.

Agreeableness

Correlations between Men’s and Women’s Means and between Men’s and Women’s SDs

Men’s mean agreeableness correlated moderately and significantly ($r = .43$, $p < .01$) with women’s mean agreeableness

across nations), indicating that there were modestly consistent national levels of agreeableness. Men's and women's agreeableness SDs were also modestly but significantly correlated, across nations ($r = .37, p < .01$).

Correlations between Social Indices and Male and Female Means, Male and Female SDs, and Sex Differences in Agreeableness

Were sex differences in agreeableness predicted, across nations, by cultural and social structural factors? Table 4 presents correlations between societal indices and the five parameters of interest: men's means, women's means, men's SDs, women's SDs, and sex differences in agreeableness. The right-most column of Table 4 shows that many correlations between social indices and sex differences in agreeableness were significant. These correlations indicate that gender equality and economic development tended to be associated with larger sex differences in agreeableness. (Note that d values for agreeableness ranged from smaller to larger negative values, and thus the negative correlations in Table 4 indicate that higher levels of gender equality and economic development were associated with larger effect sizes.) There was also a significant correlation between UN Gender development and men's mean levels of agreeableness, suggesting that higher levels of gender equality were associated, across nations, with lower levels of male agreeableness.

The pattern of correlations presented in Table 4 is clarified by Fig. 3, which graphically portrays men's and women's agreeableness means and men's and women's SDs across the 53 nations, arrayed in order of nations' degree of gender equality. The graph lines for men's and women's national means show a moderately large and consistent sex difference, with women always higher than men on agreeableness (mean national $d = -.56$). Differences in men's and women's mean levels of agreeableness were significant and large across nations, paired-data $t(52) = -23.30, p < .001, d = -3.20$. Examination of Fig. 3 also shows also that men's agreeable-

ness SDs were higher than women's SDs, on average, paired-data $t(52) = -5.68, p < .001, d = .78$, mean male-to-female variance ratio = 1.19.

Sex and Gender Equality as Predictors of Mean Levels of Agreeableness

As before, I conducted a regression analysis in which sex, gender equality, and their interaction were used to predict men's and women's national means. These three orthogonal variables significantly predicted male and female agreeableness means, multiple $r = .87, r^2 = .76, p < .001$, with sex the strongest predictor: β for sex = .87, $p < .001$; β for gender equality = $-.02, ns$; and β for the interaction = .11, $p < .05$. The significant interaction indicated once again that gender equality moderated sex differences in agreeableness. However, the regression analysis showed that although the power of culture (i.e., gender equality) to moderate sex differences was significant for agreeableness, when one predicted the overall pattern of male and female means, the main effect for sex ($\beta^2 = .76$) was much stronger than the moderating effect of culture on sex differences ($\beta^2 = .01$ for the interaction). Stated another way, although culture did indeed moderate the magnitude of sex differences in agreeableness, it was never the case that culture did away with these sex differences, which were universally present across the 53 nations, despite the presence of a significant sex-by-culture interaction.

When a corresponding regression was run on men's and women's agreeableness SDs, the prediction was weaker but still significant, multiple $r = .44, r^2 = .19, p < .001$, and again sex was the strongest predictor: β for sex = $-.40, p < .001$; β for gender equality = .13, ns ; and β for the interaction = $-.12, ns$. The significant β -weight for sex showed again that men displayed greater variability in agreeableness than women did across nations. In both the regression on means and in the regression on SDs sex differences were much more powerful than culture effects or sex-by-culture interactions.

Table 4 Correlations across nations between social indices and agreeableness parameters

	Men's Means, Agreeableness	Women's Means, Agreeableness	Men's SDs	Women's SDs	Sex Differences (d s)
UN Gender Development	$-.30^*$ (53)	.19 (53)	.16 (53)	$-.01$ (53)	$-.47^{***}$ (53)
UN Gender Empowerment	$-.21$ (47)	.17 (47)	.30* (47)	.03 (47)	$-.34^*$ (47)
Per Capita Income	.05 (52)	.27 [†] (52)	.12 (52)	$-.03$ (52)	$-.22$ (52)
Life Expectancy	$-.14$ (53)	.25 [†] (53)	.10 (53)	.01 (53)	$-.36^{**}$ (53)

Note: * $p < .05$, ** $p < .01$, *** $p < .001$, [†] $p < .1$. Numbers in parentheses are sample sizes

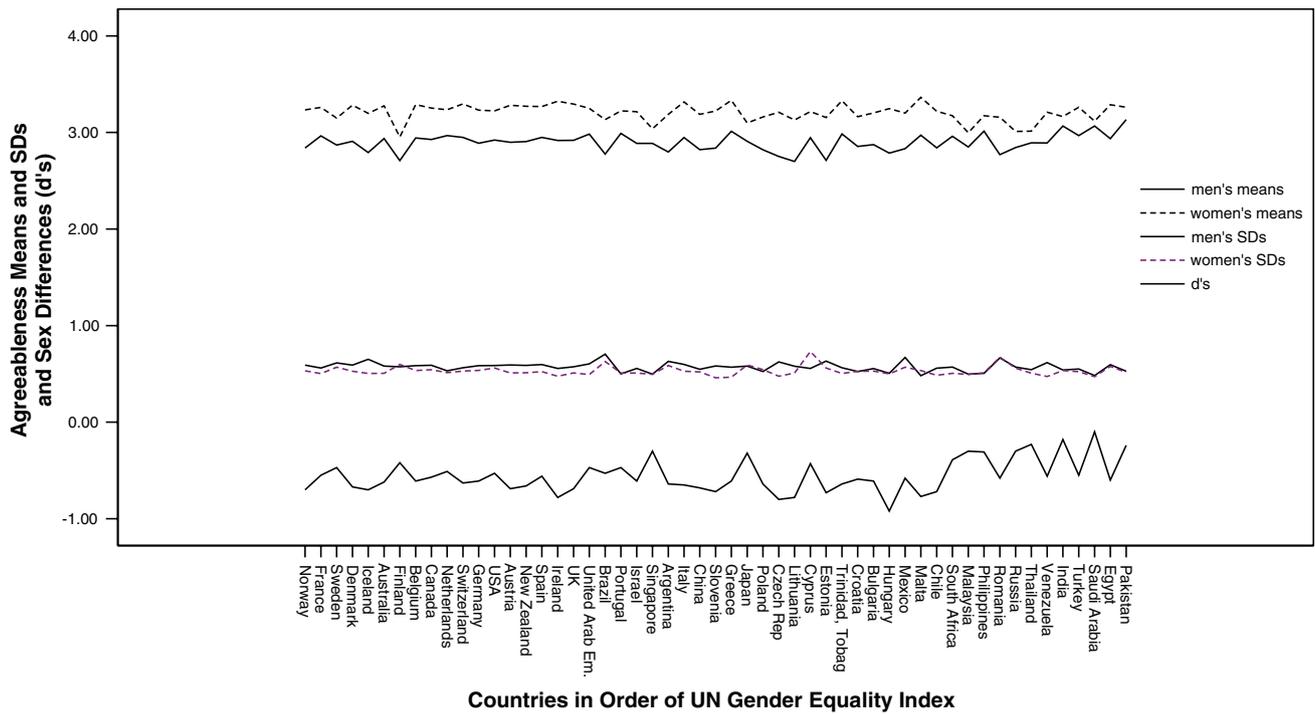


Fig. 3 Agreeableness parameters across 53 nations presented in order of nations' levels of gender equality

Neuroticism

Correlations between Men's and Women's Means and between Men's and Women's SDs

Men's mean neuroticism correlated significantly and relatively strongly ($r = .62, p < .001$) with women's mean neuroticism, across nation, indicating that there were fairly consistent national levels of neuroticism. Men's and women's neuroticism SDs were modestly but significantly correlated, across nations ($r = .35, p < .01$).

Correlations between Social Indices and Male and Female Means, Male and Female SDs, and Sex Differences in Neuroticism

Were sex differences in neuroticism predicted, across nations, by cultural and social structural factors? Table 5 presents correlations between societal indices and the five parameters of interest: men's means, women's means, men's SDs, women's SDs, and sex differences in neuroticism. The right-most column of Table 5 shows that no correlation between social indices and sex differences in neuroticism was

Table 5 Correlations across nations between societal variables and neuroticism parameters

	Men's Means, Neuroticism	Women's Means, Neuroticism	Men's SDs	Women's SDs	Sex Differences (ds)
UN Gender Development	-.55*** (53)	-.44*** (53)	-.14 (53)	-.08 (53)	-.11 (53)
UN Gender Empowerment	-.64*** (47)	-.48** (47)	-.30* (47)	.07 (47)	-.15 (47)
Per Capita Income	-.54*** (52)	-.46** (52)	-.11 (52)	.07 (52)	-.06 (52)
Life Expectancy	-.27* (53)	-.33* (53)	.04 (53)	-.03 (53)	.08 (53)

Note: * $p < .05$, ** $p < .01$, *** $p < .001$. Numbers in parentheses are sample sizes

significant. However, there were many significant correlations between social indices and men's and women's mean levels of neuroticism. In general, higher levels of gender equality and economic development tended to be associated, across nations, with *lower* mean levels of neuroticism for both men and women.

The pattern of correlations presented in Table 5 is clarified by Fig. 4, which graphically portrays male and female trait means and male and female SDs across the 53 nations, arrayed in order of nations' degree of gender equality. The graphs for men's and women's national means show a moderate and consistent sex difference, with women higher than men on neuroticism in all but one nation (mean national $d = -.41$). A paired-data t -test showed that differences in men's and women's mean levels of neuroticism were highly significant and substantial across nations, $t(52) = -24.23$, $p < .001$, $d = -3.33$. Examination of Fig. 4 also shows that women's neuroticism SDs tended to be similar to men's SDs; however, there was a weak, marginally significant tendency for women's SDs to be higher than men's, paired-data $t(52) = -1.71$, two-tailed $p = .09$, $d = .23$.

Sex and Gender Equality as Predictors of Mean Levels of Neuroticism

As before, I conducted a regression analysis in which sex, gender equality, and their interaction were used to predict men's and women's national means. These three orthogonal variables significantly predicted male and female neuroticism means, multiple $r = .88$, $r^2 = .77$, $p < .001$, and sex was the strongest predictor: β for sex = $.83$, $p < .001$; β for

gender equality = $-.30$, $p < .001$; and β for the interaction = $.02$, ns . When a corresponding regression was run on men's and women's neuroticism SDs, the prediction was weak and nonsignificant, multiple $r = .23$, $r^2 = .05$, $p = .13$.

MF-Occ

Correlations between Men's and Women's Means and between Men's and Women's SDs

Men's mean MF-Occ scores correlated weakly ($r = .22$, ns) with women's mean scores, across nations, indicating that there were not consistent national levels of MF-Occ. Men's and women's MF-Occ SDs were not significantly correlated, across nations ($r = .21$).

Correlations between Social Indices and Male and Female Means, Male and Female SDs, and Sex Differences in MF-Occ

Were sex differences in MF-Occ predicted, across nations, by cultural and social structural factors? Table 6 presents correlations between societal indices and the five parameters of interest: men's means, women's means, men's SDs, women's SDs, and sex differences in MF-Occ. The right-most column of Table 6 shows that no correlation between social indices and sex differences in MF-Occ was significant. However, there were several weak but significant correlations between social indices and men's and women's mean levels of MF-Occ. To the extent correlations were significant, higher levels of gender equality and economic development were asso-

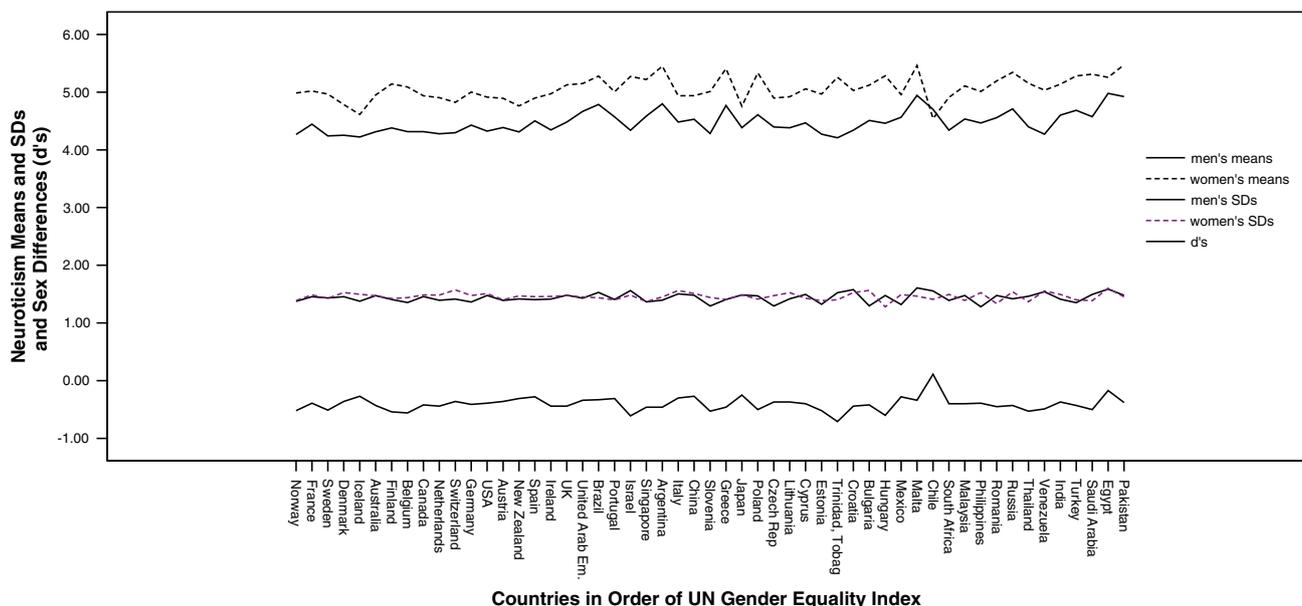


Fig. 4 Neuroticism parameters across 53 nations presented in order of nations' levels of gender equality

ciated, across nations, with preferences for more male-typical occupations.

The pattern of correlations presented in Table 6 is clarified by Fig. 5 which graphically portrays male and female trait means and male and female SDs across the 53 nations, arrayed in order of nations' gender equality. The graph lines for men's and women's national means show a large and consistent sex difference, with men always preferring more male-typical occupations than women (mean national *d* for the sex difference = 1.40). A paired-data *t*-test showed that differences in men's and women's mean levels of MF-Occ were highly significant across nations and very large, $t(52) = 43.24, p < .001, d = 5.94$. Examination of Fig. 5 shows that women's and men's MF-Occ SDs tended to be similar;

however, there was a weak but significant tendency for women's SDs to be larger than men's, paired-data $t(52) = -2.17, p < .05, d = .30$.

Sex and Gender Equality as Predictors of Mean Levels of MF-Occ

As before, I conducted a regression analysis in which sex, gender equality, and their interaction were used to predict men's and women's national means. These three orthogonal variables significantly predicted male and female MF-Occ means, multiple $r = .97, r^2 = .94, p < .001$, and sex was the strongest predictor: β for sex = $-.97, p < .001$; β for gender equality = $.08, p = .002$; and β for the interaction = $.02$,

Table 6 Correlations across nations between societal variables and MF-Occ parameters

	Men's Means, MF-Occ	Women's Means, MF-Occ	Men's SDs	Women's SDs	Sex Differences (<i>ds</i>)
UN Gender Development	.28* (53)	.28* (53)	-.03 (53)	.10 (53)	-.03 (53)
UN Gender Empowerment	.22 (47)	.37* (47)	-.03 (47)	-.02 (47)	-.13 (47)
Per Capita Income	.14 (52)	.37** (52)	-.05 (52)	.04 (52)	-.19 (52)
Life Expectancy	.13 (53)	.11 (53)	-.01 (53)	.07 (53)	.00 (53)

Note: * $p < .05$, ** $p < .01$. Numbers in parentheses are sample sizes

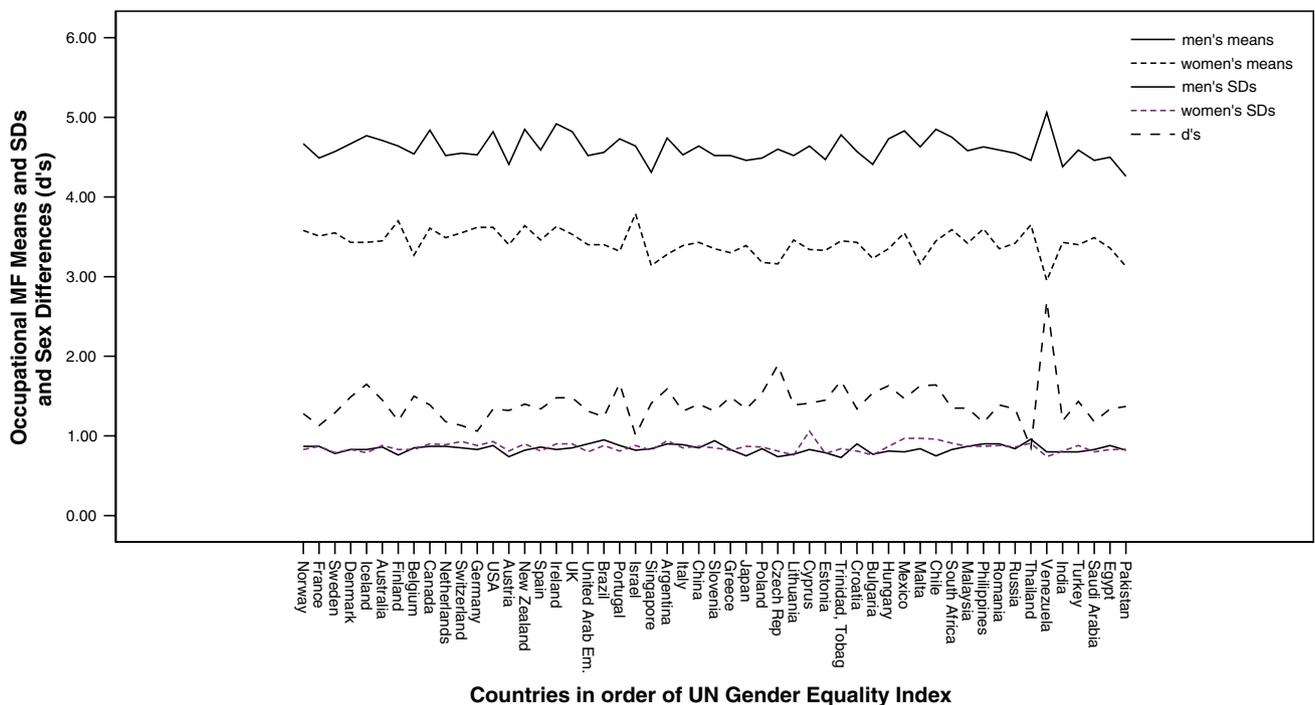


Fig. 5 Male-versus-female-typical occupational preference (MF-Occ) parameters across 53 nations presented in order of nations' levels of gender equality

ns. When a corresponding regression was run on men's and women's SDs, the prediction was not significant, multiple $r = .19$, $p = .29$.

Did Sex Differences in the Four Personality Traits Correlate across Nations?

When the effect sizes for sex differences in extraversion, agreeableness, neuroticism, and MF-Occ were correlated, across nations, associations were modest. Sex differences in extraversion correlated $.33$ ($p < .05$) with sex differences in agreeableness and $-.07$ and $-.05$ with sex differences in neuroticism and MF-Occ (both *ns*). Sex differences in agreeableness correlated $-.04$ (*ns*) and $-.37$ ($p < .01$) with sex differences in neuroticism and MF-Occ, and sex differences in neuroticism correlated $.05$ (*ns*) with MF-Occ. Thus, there was little evidence that sex differences in the four traits showed parallel patterns of variation across cultures.

Discussion

Comparing and Contrasting the Current Results with those of Costa et al. (2001), Schmitt et al. (2008), and McCrae (2002)

Many of the current results differed from those reported by Costa et al. (2001), Schmitt et al. (2008), and McCrae (2002). For example, whereas the results of Costa et al. and of Schmitt et al. indicated that sex differences in personality traits showed parallel patterns of variation across cultures, the current results showed little association between sex differences in extraversion, agreeableness, neuroticism, and MF-Occ, across cultures. Whereas the results of McCrae (2002) and Schmitt et al. (2008) suggested that men's and women's SDs for various personality traits correlated substantially across nations, the current results showed weaker correlations between men's and women's SDs, across nations, for each of the four traits studied. Finally, whereas the results of Costa et al. (2001) and Schmitt et al. (2008) indicated that sex differences in personality consistently tended to be larger in individualistic, gender-egalitarian nations than in collectivistic, gender-nonegalitarian nations, this pattern was replicated in the current data only for sex differences in agreeableness. Until further research clarifies the picture, explanations for these differing patterns of results must be speculative. However, possible explanations include the following.

Different Personality Traits and Measures

Costa et al. (2001) used NEO factor scales and composites of NEO facet scales to assess personality and Schmitt et al. (2008) used the Big Five Inventory (BFI; Benet-Martínez & John, 1998), whereas the current study used extraversion, agreeableness, and

neuroticism scales constructed from IPIP items and an MF-Occ scale constructed from occupational preference items. Although the extraversion, agreeableness, and neuroticism scales used here displayed good reliability and correlated fairly well with corresponding scales of a standard Big Five measure, they were nonetheless different from NEO and BFI scales (see Lippa, 2008). For example, the extraversion scale in the BBC survey assessed primarily gregariousness and sociability, the agreeableness scale assessed primarily altruism, tender-mindedness, and warmth, and the neuroticism scale assessed primarily anxiety and depression. Also, the personality scale items used in the BBC survey tended to focus more on behaviors (e.g., "start conversations," "talk to a lot of different people at parties," for extraversion), whereas items in the BFI scales focused more on summary trait labels ("I see myself as someone who is reserved," "... who is outgoing, sociable").

Language Effects

In the Costa et al. and Schmitt et al. studies, personality scales were translated and administered in participants' native languages, whereas in the current study personality items were in English. Thus, language-related effects could have influenced the respective studies' results. In the case of the Costa et al. and Schmitt et al. studies, culture effects were potentially confounded with linguistic effects (see McCrae, 2002). Some differences across countries (e.g., systematic differences in trait SDs) could have resulted from "slippage" in the translation of personality items and from linguistically influenced response sets. In contrast, the exclusive use of English items in the BBC survey guaranteed that item wording and language were standardized across all participants, but this may have come at the cost of poorer understanding of some items by participants who were not fully fluent in English. Furthermore, implementation of the BBC Internet survey in English had the likely effect of limiting participation in non-English-speaking countries, and this may have restricted the range of participants in some national samples. For example, English-speaking participants in non-English-speaking countries were more likely to have come from the educated elites of those countries.

Differences in the Nations and Countries Sampled

Eighteen of the countries studied in the current study overlapped with countries studied by Costa et al. (2001): Belgium, China (matched with Hong Kong in Costa et al.), Croatia, Estonia, France, German, India, Italy, Japan, Malaysia, the Netherlands, Norway, the Philippines, Portugal, Russia, South Africa (matched with the average of Black and White South Africans in Costa et al.), Spain, and the USA. Thirty-seven of the countries studied in the current study overlapped with countries studied by Schmitt et al. (2008): Argentina,

Australia, Austria, Belgium, Brazil, Canada, Chile, China (matched to Hong Kong in Schmitt et al.), Croatia, Cyprus, the Czech Republic, Estonia, Finland, France, Germany, Greece, India, Israel, Italy, Japan, Lithuania, Malaysia, Malta, Mexico, the Netherlands, New Zealand, the Philippines, Poland, Portugal, Romania, Slovenia, South Africa, Spain, Switzerland, Turkey, the UK, and the USA.

An indirect way to test whether the different nations and cultural groups sampled by each study affected results was to see whether estimated sex differences in personality in overlapping countries corresponded across studies. Agreeableness and neuroticism were the personality traits that corresponded most closely in the current study and in the Costa et al. (2001) study. Estimates of sex differences in agreeableness in the 18 overlapping countries did in fact correlate significantly across these two studies, $r = .60, p < .01$. However, sex differences in neuroticism did not, $r = .37, p = .13$. It is interesting to note that agreeableness was also the trait that showed the most similarities in other patterns of results—e.g., in both the current study and in the Costa et al. study sex differences in agreeableness tended to be largest in individualistic countries and smallest in collectivistic countries. The relatively low cross-study correspondence of sex differences in neuroticism may have resulted from factors such as the different scales used in the two studies or the different within-nation samples obtained in the two studies.

Agreeableness, neuroticism, and extraversion were the traits that corresponded most closely in the current study and in the Schmitt et al. (2008) study. Estimates of sex differences in agreeableness in the 37 overlapping countries correlated significantly across the two studies, $r = .55, p < .001$. However, sex differences in neuroticism did not correlate significantly, $r = .22, ns$, nor did sex differences in extraversion, $r = -.10, ns$. Once again, agreeableness was the trait that also showed the most similarities in other patterns of results—e.g., in both studies sex differences in agreeableness tended to be largest in individualistic countries and smallest in collectivistic countries.

Differences in the Size and Representativeness of National Samples

Some of the national samples in the BBC study were considerably larger than those studied by Costa et al. and by Schmitt et al. Because the BBC data were generated by an Internet survey, within-nation samples in the BBC data set were probably more diverse and geographically dispersed than in the Costa et al. and Schmitt et al. samples, which were often obtained from geographically and demographically restricted populations (e.g., college students at a particular university). This confounding of nation/culture with the characteristics of local cohorts could have affected results in both the Costa et al. and the Schmitt et al. studies. For

example, it may have caused men's and women's trait means and SDs to be more similar, across nations, than would have been the case in more diverse and representative national samples.

One finding is consistent with the hypothesis just offered. Specifically, both the Costa et al. and Schmitt et al. studies reported generalized patterns of results that were parallel across various traits, whereas the current study found that results varied across traits. Different patterns of results for different traits are difficult to explain in terms of general response sets or sampling artifacts, whereas parallel patterns of results across personality traits could more plausibly result from such factors.

Comparing and Contrasting the Current Results for Extraversion, Agreeableness, Neuroticism, and MF-Occ

As noted before, the results reported here for extraversion, agreeableness, neuroticism, and MF-Occ differed in a number of ways. One difference was that the correlation between men's and women's mean trait levels, across nations, varied for the four traits. In order of magnitude, these correlations were .62 ($p < .001$) for neuroticism, .58 ($p < .001$) for extraversion, .43 ($p < .001$) for agreeableness, and .22 (*ns*) for MF-Occ. Thus, there was fairly strong evidence for stable "national traits" of neuroticism and extraversion, weaker evidence for stable national levels of agreeableness, and little evidence for stable national levels of MF-Occ. Cross-nation correlations between men's and women's trait SDs also varied for the four traits. Correlations were modest but significant for agreeableness and neuroticism (respective r s = .37, $p < .01$, and .35, $p < .05$), but they were weak and non-significant for MF-Occ ($r = .21$) and extraversion ($r = .11$).

Perhaps the most noteworthy difference, across traits, was that findings for agreeableness were consistent with Costa and colleagues' attributional hypotheses (or, alternately, with Guimond et al.'s 2007 social comparison hypothesis), but findings for other traits were not. A second noteworthy difference, across traits, was that national levels of gender equality and economic development were associated with men's and women's mean levels of neuroticism; however, they were not associated with mean levels of other traits.

Finally, although sex differences in all four traits were significant across nations, mean effect sizes varied substantially: mean d s = 1.40 for MF-Occ, $-.56$ for agreeableness, $-.41$ for neuroticism, and $-.15$ for extraversion. By conventional standards (Cohen, 1977), the first effect size was very large, the next two were moderate, and the last one was small. When corrected for attenuation due to the unreliability of measures, effects sizes were even larger (d s = 1.64 for MF-Occ, $-.60$ for agreeableness, $-.44$ for neuroticism, and $-.16$ for extraversion). Despite differences in mean effect sizes across the four traits, the *direction* of sex differences tended to be quite consistent, across nations, for all four traits. In all 53

nations, within-nation sex differences in agreeableness (women higher than men) and MF-Occ (men higher than women) were in the same direction as the overall mean sex difference. Within-nation sex differences in neuroticism (women higher than men) were in the same direction as the overall mean sex difference in 52 of 53 nations, and within-nation sex differences in extraversion (women higher than men) were in the same direction as the overall mean sex difference in 47 of 53 nations (all patterns significant at $p < .001$ using binomial sign tests to test for disproportionate numbers of effect sizes \geq or $<$ zero). When reversals from overall sex differences occurred in individual nations, they tended to occur in nations with small sample sizes, and the d values for these reversals were often close to zero, suggesting that reversals resulted from sampling error rather than from true cross-cultural variation in the direction of sex differences.

It seems likely that people stereotypically believe that there are larger sex differences in interests than in Big Five personality traits (see Cejka & Eagly, 1999; Lippa, 2005). Thus, theories that appeal to gender stereotypes and social comparison processes, like the theory proposed by Guilmond et al. (2007), would seem to predict substantial cross-cultural variation in sex differences in interests. However, such variation was not found in the current data.

In summary, the current results strongly supported Costa et al.'s (2001) and Schmitt et al.'s (2008) findings that sex differences in personality are highly replicable across cultures. However, they were sometimes inconsistent with Costa et al.'s conclusion that sex differences in personality are necessarily "modest in magnitude" (p. 328). The mean effect sizes for sex differences in agreeableness and neuroticism, although moderate in magnitude, were still well within the range of effect sizes for many classic person and situation effects in psychology (Eagly, 1995; Lipsey & Wilson, 1993). More dramatically, when analyzed at the aggregated level of men's and women's national means, sex accounted for 93% of the variance in MF-Occ means, 75% of the variance in agreeableness means, 68% of the variance in neuroticism means, and 23% of the variance in extraversion means, and in each case, sex accounted for much greater amounts of variance than did either UN gender equality or the interaction of sex and gender equality.

Conclusion

Sex differences in extraversion, agreeableness, neuroticism, and MF-Occ were all significant and consistent across 53 nations—findings in accord with the hypothesis that there may be biological components to some of these differences. When sex differences were assessed at the level of individuals (i.e., in terms of mean national d values), sex differences in extraversion were small, sex differences in agreeableness and

neuroticism were moderate, and sex differences in MF-Occ were very large and about the same magnitude as sex differences in height (mean d for height = 1.63 in the BBC data; see Lippa, in press). When sex differences were analyzed at the aggregated level of national means, sex differences were very large and cross-culturally consistent for MF-Occ, agreeableness, and neuroticism, and smaller but still consistent for extraversion. Sex consistently predicted men's and women's national personality means much more strongly than gender equality or the interaction between sex and gender equality did.

The current results differed from those of other researchers in a number of ways. Most notably, while results for agreeableness conformed, in part, to Costa et al.'s (2001) attributional model and to Guilmond et al.'s (2007) social comparison model of sex differences in personality, results for extraversion, neuroticism, and MF-Occ did not. Further cross-cultural research will be necessary to sort out the reasons for these differing patterns of results across studies and across traits.

In general, gender equality and the highly associated variable of economic development were not associated with mean national levels of personality, with one exception: they were associated with lower levels of neuroticism. This finding is intriguing and worthy of further study. The most plausible interpretation is that people in economically undeveloped countries experience higher levels of anxiety as a result of their economic stress. The fact that the association between economic development and neuroticism was equally strong for men and women favors the interpretation that it was economic development rather than gender equality that drove these associations. The current study may have been more likely to demonstrate such associations than previous ones because its participant samples extended beyond the college student samples at particular universities commonly employed in previous studies.

One goal of the current research was to use the BBC data to test several models of how biological and cultural factors might influence sex differences in personality. In general, the current results conformed more strongly to the biological dispositions model than to models that hypothesized various kinds of social structural, attributional, or social comparison influences. Two main findings—(1) that men's and women's mean personality levels (with the exception of neuroticism levels) tended not to be associated with gender equality, and (2) that sex differences in personality (with the weak exception of sex differences in agreeableness) tended not to be moderated by gender equality—argued against social structural accounts of sex differences in personality. To the extent that sex differences in agreeableness were moderated by gender equality, the moderating effect was opposite to that predicted by social role theory, but consistent with attributional and social comparison theories—i.e., sex differences were larger in gender egalitarian societies than in gender

nonegalitarian societies. Although it is possible that universal features of gender roles contributed to some of the observed cross-culturally consistent sex differences in personality, this possibility is made less likely by the relative absence of culture main effects and sex-by-culture interactions in men's and women's national personality trait means, for it seems implausible that culture (i.e., the strength of gender roles) would have all of its impact in ways that are perfectly confounded with biological sex, but no impact at the level of cultural differences or sex-by-culture interactions. Furthermore, the predictions for trait SDs that follow from social role theory—that men's and women's trait SDs will be related to gender equality, across nations, and that there may be sex-by-culture interactions in trait SDs—found little support in the current data.

Certainly, the current study does not constitute the final word on cross-cultural consistencies and variations in sex differences in personality. However, it does provide new methods that can be used in future studies on this topic, and it offers new data from broader participant populations than have typically been assessed. The results presented here suggest that there may be biological components to some sex differences in personality and that the power of cultural and social structural factors to moderate sex differences in personality may be limited.

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