Homogeneity, heterogeneity, or independence? A multilevel exploration of Big Five personality traits and cultural values in 40 nations

By: Madelynn Stackhouse, Marketa Rickley, Yonghong Liu, Vasyl Taras

Abstract:

This study performs a multilevel analysis of personality traits and cultural values. With data from 7489 participants across 40 nations, we explore the relationship between Big Five personality traits (openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism) and Hofstede's cultural values (power distance, collectivism, achievement and assertiveness, gender egalitarianism, long-term orientation, uncertainty avoidance, and teamwork preference), considering multilevel data structures. We extend prior research by performing (1) variance decomposition tests to assess how differences in Big Five personality traits are explained by variations between nations versus individuals, (2) variance decomposition tests to determine how differences in Hofstedian cultural values are explained by variations between nations versus individuals, and (3) multilevel correlations to examine "true" personality-culture associations. Findings suggest some disparities between observed versus theoretically expected decomposition patterns. They also indicate minimal between-country variation, which underscores the challenges of categorizing individuals into distinct cultural groups and suggests globalization's shared cultural influence across borders. Multilevel analyses show weaker personality-culture associations than aggregate national-level analyses, emphasizing the need to consider nested data structures in research to prevent skewed correlation estimates and the risk of Simpson's paradox. Overall, findings highlight the importance of adopting multilevel approaches to human behavior theorizing and analysis.

Keywords: Big Five | Cross-cultural research | Cultural values | Hofstede | Multilevel research | Personality | Traits | Simpson's paradox

Article:

***Note: Full text of article below

Homogeneity, heterogeneity, or independence? A multilevel exploration of Big Five personality traits and cultural values in 40 nations

Madelynn Stackhouse [*], Marketa Rickley , Yonghong Liu , Vasyl Taras

University of North Carolina at Greensboro, Bryan School of Business and Economics, 516 Stirling Street, Greensboro, NC 27412, United States of America

ABSTRACT

This study performs a multilevel analysis of personality traits and cultural values. With data from 7489 participants across 40 nations, we explore the relationship between Big Five personality traits (openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism) and Hofstede's cultural values (power distance, collectivism, achievement and assertiveness, gender egalitarianism, long-term orientation, uncertainty avoidance, and teamwork preference), considering multilevel data structures. We extend prior research by performing (1) variance decomposition tests to assess how differences in Big Five personality traits are explained by variations between nations versus individuals, (2) variance decomposition tests to determine how differences in Hofstedian cultural values are explained by variations between nations versus individuals, and (3) multilevel correlations to examine "true" personality-culture associations. Findings suggest some disparities between observed versus theoretically expected decomposition patterns. They also indicate minimal between-country variation, which underscores the challenges of categorizing individuals into distinct cultural groups and suggests globalization's shared cultural influence across borders. Multilevel analyses show weaker personality-culture associations than aggregate national-level analyses, emphasizing the need to consider nested data structures in research to prevent skewed correlation estimates and the risk of Simpson's paradox. Overall, findings highlight the importance of adopting multilevel approaches to human behavior theorizing and analysis.

1. Introduction

Human identity is a complex and multifaceted construct. To understand its nature, content, and boundaries, scholars have explored a variety of domains, including frameworks for personality traits (Digman, 1990; McCrae & Costa, 1987) and cultural values (Hofstede, 1980; Schwartz, 1992). Both domains strive to capture and explain the essence of what it means to be human. Personality traits reflect the relatively stable and enduring tendencies in individual cognition, emotions, and behavior (McCrae & Costa, 1987, 1997). Cultural values are defined as "the collective programming of the mind which distinguishes the members of one group or category of people from others" (Hofstede, 1984, p. 51). Although these domains are most commonly studied separately (Parks-Leduc et al., 2015), they intersect and influence one another (Allik et al., 2023; Allik & Realo, 2019; Fischer & Boer, 2015; Parks-Leduc et al., 2015; Roccas et al., 2002), especially among individuals who share a common social environment (Lu et al., 2023). This observation has led to a resurgence in interest in how personality and

culture are related (Allik et al., 2023; Czerniawska & Szydlo, 2021; Mehta et al., 2023). Indeed, a number of empirical studies have shown meaningful relational patterns between several dimensions comprising each of the two constructs, including the seminal works of McCrae (2001), Hofstede and McCrae (2004), and McCrae and Terracciano (2005a), and recent works by Arpaci et al. (2018) and Haas et al. (2023), among others.

So far, however, empirical investigations into the personality-and-culture relationship have predominantly derived conclusions by analyzing mean-aggregate (nation) personality traits and cultural values, without consideration of the multilevel nested structure of the underlying data (e.g., Hofstede & McCrae, 2004; McCrae & Terracciano, 2005a). While this approach accurately captures associations between average personality trait levels and cultural values within a country, it cannot be used to infer or inform associations between these variables among individuals. Collapsing individual heterogeneity within nations into a single summary statistic may potentially produce biased associations, such as overestimated correlations at the aggregated level, or

even anomalous findings (Humphrey & LeBreton, 2019; Kievit et al., 2013; Moerbeek, 2004). Furthermore, aggregation of individual responses may yield a Simpson's Paradox (Simpson, 1951), a statistical phenomenon where observed associations between variables become distorted when aggregated across individuals or subgroups (Kievit et al., 2013). The paradox occurs when associations between aggregated variables reverse, disappear, or change in strength, compared to associations between variables when the data is disaggregated (Winkelmann, 2023).

Another set of personality-and-culture studies have analyzed associations using individual-level data and methods (e.g., Arpaci et al., 2018; Burton et al., 2021; Migliore, 2011). In contrast to national-level associations, which collapse within-nation heterogeneity in traits and values to the population mean to derive correlation estimates, individual differences serve as the conceptual and theoretical foundation of individual-level associations. However, this approach introduces different challenges to interpretation by not accounting for variability in higher units. Such studies inadvertently and unintentionally imply (by virtue of the analytic approach) that individual-level personality and cultural values are not subject to nation-level influence. Yet cross-cultural research demonstrates that differences in human behavior are attributable in part to group membership and in part to individual differences (Fischer & Schwartz, 2011; Saucier et al., 2015). Accounting for the multilevel structure of the data, where individuals (at the lower level) are nested within nations (at the higher level), is therefore critical for accurately estimating "true" associations between individual personality traits and cultural values. A multilevel approach to the data addresses additional challenges as well. First, such an approach recognizes and incorporates the hierarchical and nested nature of the data in the analysis, considering variability at multiple levels (Nezlek, 2001, 2012). Second, given that individuals from the same nation may be more similar to each other than those from another nation (Allik et al., 2017; Haas et al., 2023), multilevel correlation techniques can account for potential non-independence between observations. When the assumption of independence between observations is violated, multilevel analysis can help to address the biases and distortions that may arise from ignoring the nested nature of the data (Nezlek, 2012), such as inflated standard errors and parameter estimates (Aarts et al., 2014). Furthermore, instability or non-equivalence of instruments across groups can serve as an additional source of bias in both nation-level and individual-level associations (Milfont & Fischer, 2010); multilevel analysis can help mitigate these biases by appropriately modeling dependencies in the data.

In the present research, we apply multilevel correlation techniques to estimate the relationships between personality traits and cultural values using the Big Five model of personality (McCrae & Costa, 1987) and Hofstede's cultural values model (Hofstede, 1980) with data from 7489 individuals in 40 countries. The Big Five and Hofstede's cultural values are two distinct multidimensional frameworks used to understand human identity. A large body of research has documented the cross-cultural validity of both models (McCrae & Terracciano, 2005b; Taras et al., 2023). The Big Five model focuses on individual differences in personality traits – that is, a set of relatively stable characteristics and traits that shape individual cognition, emotions, and behavior (McCrae & Costa, 1987, 1997). The Big Five model outlines five trait dimensions thought to capture individual-level differences: openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism (Digman, 1990; McCrae & Costa, 1987). In contrast, Hofstede's cultural values model focuses on cultural differences in values – that is, sets of beliefs, attitudes, goals, and behaviors that are shared by a group of people, with the presumption that the national culture we are born into shapes who we are (Hofstede, 1980). Hofstede's model and its derivatives outline seven dimensions theorized to capture cultural values: achievement and assertiveness, gender egalitarianism (formerly masculinity), individualism-collectivism, long-term orientation, power distance, uncertainty avoidance, and teamwork preference (Hofstede,

1980; Taras et al., 2023).

By adopting multilevel techniques to study personality traits, cultural values, and their association, we aim to deepen understanding of human behavior from a personality and cultural values standpoint. Specifically, a multilevel lens is important because it addresses fundamental questions about human behavior theorizing: 1) How much of the variance in individuals' personality traits can be explained by differences between nations compared to within-nation individual differences? 2) How much of the variance in individuals' cultural values can be attributed to differences between nations compared to within-nation individual differences? 3) Does what we know about personality-and-culture associations hold true upon accounting for the multilevel structure of the underlying data, or does ignoring the multilevel structure of the data yield distorted, unstable, or biased relations? Ultimately, variance decomposition techniques and multilevel correlation allow for a more nuanced understanding of how individual and nation-level factors contribute to the overall patterns observed in personality traits and cultural values. Further, a deeper and more accurate understanding of the personality-and-culture relationship offers a strong foundation for future research on issues including national profiles (Haas et al., 2023; Jonason et al., 2020), how personality traits and cultural values evolve over time (Mehta et al., 2023; Taras et al., 2012b), and whether personality traits influence cultural values – or vice versa (Allik et al., 2023; Vecchione et al., 2019).

2. Personality and cultural values

Although personality and cultural values studies share a common interest in understanding human identity and behavior, they differ in their focus and assumptions. Personality models focus on individual-level analysis and investigate individual psychology and individual patterns of thinking, feeling, and behaving, while cultural values models focus on group-level analysis and the study of values and behaviors across different countries. Early personality models defined personality as stable within individuals and its structure as universal across cultures (Costa & McCrae, 1992; Eysenck, 1990), with later perspectives noting traits within individuals are "relatively" stable throughout the lifespan though subject to some malleability (Bleidorn et al., 2021; Klimstra et al., 2013; McAdams & Olson, 2010; Specht et al., 2011). Conversely, cultural value models, in particular those by Hofstede (Hofstede, 1980), assume that cultural values vary across countries. Moreover, although debates continue regarding whether national cultural values influence the development of individual trait characteristics (Hofstede & McCrae, 2004; McCrae & Terracciano, 2005a), or vice versa (Vecchione et al., 2019), there are strong arguments that cultural values and personality should be related (Allik et al., 2023; Mehta et al., 2023). Indeed, previous cross-cultural studies performed at the individual level report meaningful associations between personality and other value models (Fischer & Boer, 2015; Parks-Leduc et al., 2015).

To examine the nature of the personality-and-culture relationship further, we focus on the Big Five model of personality and Hofstede's cultural values model, as both are broadly accepted and wide-reaching models that have a documented history of cross-cultural validation and generalizability (McCrae & Costa, 1997; McCrae & Terracciano, 2005a; Taras et al., 2023). The Big Five model, the most popular framework for understanding personality traits, includes five well-defined trait characteristics. Hofstede's cultural values model sometimes has five, six, or seven discrete characteristics depending on the measurement scale used (Taras et al., 2023). The constructs within each domain are shown in Table 1.

2.1. Motivation

Several important questions remain unanswered about the universality of personality traits and the specificity of values across national cultures. First, there persists a long-standing debate about whether

Table 1
Construct definitions and scale descriptives.

Construct	Construct definition The extent to which …
Hofstedian cultural values[a]	
Achievement and assertiveness	… an individual displays a willingness to win and advance, and how this is self-assertive.
Gender egalitarianism	… an individual prioritizes masculine qualities such as advancement and earnings over feminine qualities such as a quality of life, cooperation, and personal relationships.
Individualism-collectivism	… people prioritize their own interests above those of the group.
Long-term orientation	… an individual emphasizes long-term gains and goals versus short-term, quick gains even at the loss of future gains.
Power distance	… an individual accepts power inequalities, defers to those in power, and embraces hierarchical structures.
Teamwork preference	… an individual prefers to work in a team rather than alone and is willing to share responsibilities and rewards among team members.
Uncertainty avoidance	… an individual prefers clear rules and guidance and strives to avoid ambiguity in personal and social contexts.
Big Five personality traits[b]	
Agreeableness	… an individual is friendly, compassionate, and approachable.
Conscientiousness	… an individual is efficient, organized, and detail-oriented.
Extraversion	… an individual is outgoing, sociable, and talkative.
Neuroticism	… an individual is sensitive, nervous, and easily upset.
Openness to experience	… an individual is inventive, curious, and independent-minded.

[a] Refer to Hofstede (1980) with these exceptions: Given recent revisions to Hofstede's cultural values construct of masculinity/femininity (House et al., 2002), the dimension is now assessed as two dimensions: gender egalitarianism and achievement and assertiveness. Teamwork preference has been included as an important cultural value dimension, given findings in more recent research (Taras et al., 2023).

[b] Refer to John and Srivastava (1999).

Hofstedian cultural values are an individual or a societal phenomenon (Taras et al., 2023), with researchers questioning whether cultural values indeed represent broadly held national values (Taras et al., 2010). Related to this debate is the question of the magnitude of cross-national differences in cultural values. Similarly, while the Big Five is commonly accepted as describing individual phenomena (Poortinga et al., 2002), it has come under some scrutiny with the argument that it may have some degree of national-culture specificity (Church, 2000; Migliore, 2011). Therefore, understanding what part of human identity and behavior can be explained by societal membership and what part is individually determined remains disputed, and what portion of the variance in personality and culture can be attributed to societal and individual factors remains unknown. Results from variance decomposition studies in other psychological domains suggest that understanding the extent to which variance can be attributed to differences between and within nations could offer important insights for cross-cultural research on personality and cultural values. For example, Fischer and Schwartz's (2011) study, which examined the relative contribution of between-nation and within-nation differences to constructs in the European Social Survey and World Values Surveys, revealed that individual differences outweighed national effects in explaining variations in basic individual values. Subsequent research by Saucier et al. (2015), focusing on cross-cultural differences across 281 survey items, highlighted that items related to religion, regularity norms, and ethnonationalism were most effective in differentiating between national samples. More commonly used items, such as those comprising Schwartz's values (Schwartz, 1992) and GLOBE normative practices (House et al., 2004), showed moderate effects. Together, these studies underscore the need for further investigation into the extent to which personality traits and cultural values reflect individual versus societal phenomena.

Another unanswered question concerns whether personality traits and cultural values are highly associated. As theorized by Hofstede and McCrae, two of the most seminal scholars in the field of cultural values and personality, respectively, cultural values and personality traits should be related at the group level (cf. Hofstede & McCrae, 2004; McCrae, 2001). Their research indicates that associations between cultural values and personality exist when both constructs are conceptualized and measured at the group level using national averages and correlated at the national level of analysis (and when the individual level of influence is ignored) (Hofstede & McCrae, 2004; McCrae, 2001). For example, Hofstede and McCrae (2004) found that some cultural values were highly correlated with certain personality traits (e.g., masculinity

and neuroticism at $r = 0.57$, $p < 0.001$; individualism and extraversion at $r = 0.64$, $p < 0.001$), while others were not. Associations between cultural values and personality have also been uncovered when both constructs are conceptualized, measured, and correlated at the individual level (ignoring group-level national influence) (Arpaci et al., 2018; Burton et al., 2021; Migliore, 2011). For example, Arpaci et al. (2018) found a small, positive correlation between individualism and extraversion ($r = 0.20$, $p < 0.05$).

What is not clear, however, is if the uncovered trends and associations are stable and unbiased. This uncertainty arises from the methodologies underlying both sets of studies, which may have adopted oversimplified or imperfect assumptions about within-nation heterogeneity, potentially leading to aggregation bias or susceptibility to Simpson's Paradox. By ignoring the nested structure of the data, where individuals are nested within groups (e.g., nations), important variability and patterns at both levels are overlooked and may overemphasize nation-level characteristics, neglecting the unique heterogeneity between and within those nations. As a result, associations derived solely from mean-aggregated nation-level data may not accurately reflect the complexities of the underlying relationships between personality traits and cultural values. For example, research findings at the group level, as well as conventional thinking, would suggest that the cultural value of collectivism and the trait of agreeableness are associated (Hofstede & McCrae, 2004; McCrae, 2001). Since collectivism stresses group cooperation, it may be aligned with altruistic behaviors, cooperation-seeking, and thus greater agreeableness. Classic group-level findings and conventional thinking would further suggest that gender egalitarianism is associated with neuroticism (Hofstede & McCrae, 2004; McCrae, 2001). Ostensibly, gender egalitarian values associated with expressing emotions, communicating with others, and empathizing with others would align with greater emotional stability and the ability to experience emotions (low neuroticism). Another example is that, at the group level, power distance relates to extraversion (Hofstede & McCrae, 2004; McCrae, 2001). Because power distance allows individuals to accept unequal power distributions, theoretically, it may operate to reinforce a blend of dominance and sociability – characteristics that are core components of extraversion. However, the empirical assumption implicit in past studies that rely on national average scores is that every person in a particular nation will have the same cultural value scores – a flawed assumption. Yet, if associations between cultural values and personality are not as strong as previous work suggests when multiple levels of analysis are accounted for, then these speculations could be misleading and lead to stereotyping

and inaccurate expectations of people based on their national cultural background. Equally problematic, scholarship that considers only individual-level associations and does not account for national influences is also flawed by making the simplistic assumption that national culture exerts no influence on its people and their behavior.

2.2. Study aims

The purpose of the current work is to test models on cultural values, personality traits, and their associations using multilevel data structures that consider individuals nested within nations. Our aims were, first, to better understand the locus of cultural values and personality as housed at the individual versus national (group) level. Analyzing data from over seven thousand people across 40 nations, we used a variance decomposition technique to partition out the variance attributable to individual and national influence in seven cultural values variables and five personality trait variables. If the seven Hofstede cultural values accurately represent a national-culture influence process, we should observe a larger explained variance in each cultural value at the national-culture (group) level. If personality accurately represents individual differences in behavior, we should observe weak variance contributions to national-culture (group) influences and larger contributions to the within-nation individual level.

Second, we question whether the associations between personality and cultural values identified in previous work, which has examined associations at either the group level alone or the individual level alone, accurately represent the true complexity of these relationships. We use multilevel correlation analysis (Makowski et al., 2020) as a modern statistical approach to explore the "true" association between variables; this approach analyzes differences between personality and culture in a way that accounts for individual- *and* group-level associations. Using this novel approach, we predicted that there are weak associations between cultural values and personality when the individual associations consider group-level influences. In fact, it may be that the "true" relationships between personality and cultural values that account for the group (national culture) and individual are different. Positive and negative trends found at the national level may simply be an artifact of differences within or between nations.

3. Method

The materials and data for this study are publicly available on the Open Science Framework at: https://osf.io/5s2fr/?view_only=d7475a1fd1394367affca790b2cf4b52. This research is pre-registered, available at: https://osf.io/p7qha/?view_only=f41635ae516f4863b0970dffbb697616.

3.1. Participants and procedure

Participants were recruited from the X-Culture Project, which is an eight-week international hub where participants collaborate on solving business problems (Taras et al., 2012a; Taras et al., 2013a). Sample business problems that participants worked on included developing a marketing strategy for a large international plastics corporation, creating a business expansion strategy for a large consulting corporation based in Nigeria, and conducting a customer behavior and profile analysis for a large hospitality business operating in Dubai, among many others.

We gathered data from 8238 individual respondents from 150 nations. Multilevel correlation analysis requires at least three observations per group (nation) (Raudenbush & Bryk, 2002), and we opted for an even more stringent minimum of 30 observations per group (nation) for robustness and to improve reliability and precision. After excluding nations that had fewer than 30 observations per group, and participants

who reported a different nation of origin and nation of residence, our final sample comprised 7489 participants from 40 nations. The nations with the most participants include the United States ($n = 2564$), Colombia ($n = 622$), India ($n = 618$), France ($n = 307$), and China ($n = 268$). On average, participants were 22.9 years old ($SD = 4.20$, ranging from 18 to 60). Participants completed demographic items at Time 1 (Week 1), personality trait items at Time 2 (Week 2), and cultural value items at Time 3 (Week 6). All measures were anchored from 1 to 5 (e.g., strongly disagree/agree; not important/very important; never/always). The surveys were completed in English. All respondents were conversational in English, confirmed by a short English language test, self-report, and post-project peer evaluations.

For an overview of the final sample characteristics, nation-level means, and standard deviations for the five personality traits and seven Hofstedian cultural values dimensions, see the Appendix.

3.2. Materials

3.2.1. Hofstedian cultural values

Participants completed the 36-item Hofstedian cultural values measure created by Taras et al. (2023). The scale measures the Hofstedian cultural value dimensions of achievement and assertiveness, gender egalitarianism, individualism-collectivism, long-term orientation, power distance, teamwork preference, and uncertainty avoidance (Taras et al., 2023). Sample items from this measure include: "I feel that winning is important in both work and games (achievement and assertiveness); "It is preferable to have a man in a high-level position rather than a woman" (gender egalitarianism); "Group success is more important than individual success" (individualism-collectivism); "People should be preparing for the future even if it means giving up pleasures today" (long-term orientation); "Managers should make most decisions without consulting subordinates" (power distance); and "A good job is one where what is to be done and how it is to be done is always clear" (uncertainty avoidance). The scales were sufficiently reliable on each dimension, as indicated by both Cronbach's Alpha (α) and Coefficient Omega (ω), an alternative estimate of reliability (McDonald, 1999), with the following descriptive information for each cultural values dimension: achievement and assertiveness ($\alpha = 0.81$, $\omega = 0.82$, $M = 2.88$, $SD = 0.99$), gender egalitarianism ($\alpha = 0.88$, $\omega = 0.88$, $M = 2.02$, $SD = 1.03$), individualism-collectivism ($\alpha = 0.74$, $\omega = 0.75$, $M = 3.64$, $SD = 0.79$), long-term orientation ($\alpha = 0.73$, $\omega = 0.73$, $M = 3.74$, $SD = 0.78$), power distance ($\alpha = 0.76$, $\omega = 0.78$, $M = 2.48$, $SD = 0.83$), teamwork preference ($\alpha = 0.83$, $\omega = 0.85$, $M = 3.44$, $SD = 0.95$), and uncertainty avoidance ($\alpha = 0.82$, $\omega = 0.82$, $M = 4.15$, $SD = 0.71$).

3.2.2. Big Five personality traits

Participants completed 44 items from John and Srivastava's Big Five Inventory (John & Srivastava, 1999) to assess each of the Big Five personality dimensions, including extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience. This is the most commonly used and referenced measure of the Big Five (Blevins et al., 2021). Sample items include: "I see myself as someone who is talkative" (extraversion); "I see myself as someone who is helpful and unselfish with others" (agreeableness); "I see myself as someone who is a reliable worker" (conscientiousness); "I see myself as someone who worries a lot" (neuroticism); "I see myself as someone who is original, comes up with new ideas" (openness to experience). The scales were sufficiently reliable on each dimension and produced the following descriptive information for each personality dimension: extraversion ($\alpha = 0.82$, $\omega = 0.82$, $M = 3.49$, $SD = 0.69$), agreeableness ($\alpha = 0.76$, $\omega = 0.76$, $M = 3.96$, $SD = 0.57$), conscientiousness ($\alpha = 0.79$, $\omega = 0.80$, $M = 3.85$, $SD = 0.60$), neuroticism ($\alpha = 0.79$, $\omega = 0.79$, $M = 2.57$, $SD = 0.69$), and openness to experience ($\alpha = 0.73$, $\omega = 0.71$, $M = 3.56$, $SD = 0.54$).

Table 2
Variance decomposition results and within-and-between analysis by nation.

Variable	Between-nation variance	Total variance	ICC1	E ratio[a]
Big Five Personality Traits				
Extraversion	0.015	0.489	0.031	0.130
Agreeableness	0.039	0.350	0.110	0.190
Conscientiousness	0.040	0.379	0.107	0.195
Neuroticism	0.033	0.492	0.067	0.154
Openness to experience	0.014	0.298	0.046	0.155
Hofstedian Cultural Values				
Achievement and assertiveness	0.036	1.000	0.036	0.126
Gender egalitarianism	0.107	1.103	0.097	0.218
Individualism-collectivism	0.040	0.649	0.062	0.150
Long-term orientation	0.046	0.628	0.073	0.175
Power distance	0.030	0.705	0.042	0.155
Teamwork preference	0.087	0.927	0.094	0.219
Uncertainty avoidance	0.040	0.521	0.077	0.170

Note: ICC1 refers to the *Intraclass Correlation Coefficient 1* (ICC1) for a construct, representing the proportion of total variance that is attributable to differences between groups (nations) relative to the total variance. Values range from 0 to 1, with higher values indicating that a significant portion of the variance in the data is due to differences between groups (nations), with high (low) scores suggesting that the group has a strong (weak) impact.

[a] We only report the WABA 1 *E* ratio. Full WABA results are available from the authors on request.

3.2.3. Demographics

Participants reported basic demographic information (age, gender, and nation of origin) and other items not relevant to the present study. We also collected information on each participant's nation of residence to ensure that the nation of origin captured the group category accurately. We found a match in nation of origin and nation of residence for 99% of participants.

3.3. Analytical approach

To answer our focal research question, we exploited variance decomposition and contemporary multilevel modeling techniques, which incorporate the empirical reality that personality and culture constructs exist at different (and likely multiple) levels of analysis – and that individuals are neither archetypes of their society or nation of origin nor independent of its influence. We used the intraclass correlation coefficient 1 (ICC1) score to assess the proportion of total variance in a variable that can be attributed to differences between groups. This approach quantifies the degree to which observed patterns of variance can mathematically be attributed to between-group (nation) differences. ICC1 values represent the proportion of variance in ratings attributed to group (nation) level membership (Bliese, 2000). Values closer to 1 indicate more national-level influence on individual personality traits and cultural values. Theoretical reasoning would suggest that the proportion of the total variance in cultural values is largely attributed to between-nation differences. Thus, we expect high between-group (nation) variation in Hofstedian cultural value scores, expressed by high ICC1 scores for constructs. Theoretical reasoning may also suggest that we should expect smaller variance attributed to between-nation differences in Big Five personality traits and, thus, lower ICC1 values.

Next, we applied multilevel correlation analysis (Makowski et al., 2020) to examine the 35 relationships between the seven individual cultural values (Taras et al., 2013b) and the five individual personality traits (John & Srivastava, 1999). Multilevel correlation analysis is a statistical method used to examine the relationships between variables that have a hierarchical structure; in our case, individuals nested within nations. Multilevel analysis allows for an assessment of the "true" associations between cultural values and personality traits by taking into account nation-level influences, thereby offering a more accurate understanding of the overarching pattern of associations within the hierarchical structure inherent in our research. Put differently, this approach allowed us to better estimate whether or to what extent individual personality and cultural values are associated when accounting for national influences.

Finally, as a point of comparison with the multilevel findings, we conducted both national-level analysis of the associations between mean cultural values and mean personality traits and individual-level analysis. Both multilevel correlation analysis and single-level analysis were performed using RStudio (Version 2023.06.1) with the package "correlation" (Makowski et al., 2020).[1]

4. Results

4.1. Main results

We first estimated ICC1 to assess the variance of each focal variable that is attributable to between-group (national) level influences (see Table 2). The analyses comparing national over total variance show that variances explained by nations are low for both cultural values (ranging from 3.6% to 9.7% variance explained) and personality variables (ranging from 3.1% to 11.0% variance explained). The generally low ICC1 scores for personality traits and Hofstedian cultural values indicate that individual differences are not significantly influenced by group (national) membership and that individuals' nations of origin have only a modest impact in explaining individual cultural values and individual personality traits. This result yields the first important finding: one cannot assume that an individual from a certain nation will be endowed with certain characteristics, beliefs, or behaviors, and this holds for both personality and cultural value characteristics.

To evaluate the robustness of our variance decomposition findings, we employed within-and-between analysis (WABA; Dansereau et al., 1984). Notably, WABA I tests the variance of each variable by partitioning the raw scores into within- and between-group component scores that are then correlated with the raw scores to produce within-group etas and between-group etas. We report the *E* ratio, calculated by dividing the between-group variance by the sum of the within-group variance and between-group variance. Higher values of the *E* ratio indicate that the majority of the variance lies between groups. The results are presented in Table 2. Applying Fischer and Schwartz' (2011) criterion, where scores below 0.58 indicate variation primarily between individuals (within nations), scores 0.59 to 1.72 indicate a similar

---

[1] RStudio (Version 2023.06.1) with the package "correlation" (Makowski et al., 2020) was used for multilevel correlation analysis and single-level correlation analysis. Rstudio (Version 2023.06.1) with the package "misty" was used to calculate ICC1 for each variable (Yanagida, 2020). SPSS-29 was used to produce variable reliabilities and other statistics in the Appendix.
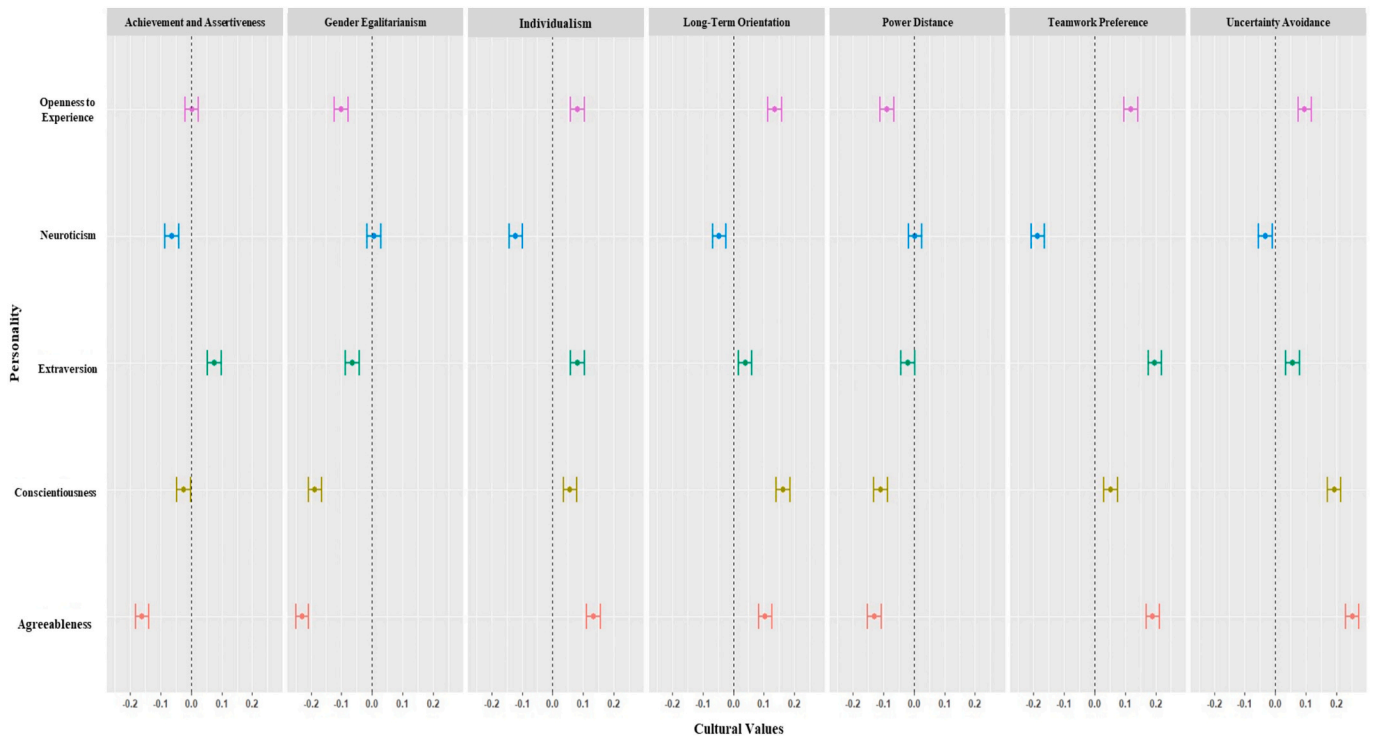
Fig. 1. Multilevel associations between the Five Factor Model and cultural values.

Table 3
Multilevel correlations, national-level correlations, and individual-level correlations.

Variable	E	A	C	N	O
Multilevel correlations ($n = 7489$ participants in 40 nations)					
Achievement and assertiveness	0.074***	−0.161***	−0.025*	−0.064***	0.002
Gender egalitarianism	−0.065***	−0.229***	−0.187***	0.006	−0.101***
Individualism-collectivism	0.082***	0.135***	0.057***	−0.121***	0.081***
Long-term orientation	0.039***	0.105***	0.163***	−0.046***	0.136***
Power distance	−0.020$^\pm$	−0.130***	−0.109***	0.004	−0.089***
Teamwork preference	0.197***	0.190***	0.052***	−0.186***	0.119***
Uncertainty avoidance	0.057***	0.252***	0.193***	−0.033**	0.096***
National-level correlations ($n = 40$ nations)					
Achievement and assertiveness	0.093	0.525***	0.370*	−0.358*	0.321*
Gender egalitarianism	−0.596***	−0.331*	−0.553***	0.405**	−0.498**
Individualism-collectivism	0.066	0.560***	0.282$^\pm$	−0.334*	0.167
Long-term orientation	−0.064	0.710***	0.548***	−0.401*	0.419**
Power distance	−0.419**	−0.226	−0.475**	0.257	−0.418**
Teamwork preference	−0.027	0.525***	0.243	−0.396*	0.292$^\pm$
Uncertainty avoidance	0.101	0.791***	0.627***	−0.414**	0.509***
Individual-level correlations ($n = 7489$ participants)					
Achievement and assertiveness	0.077***	−0.142***	−0.017	−0.072***	0.008
Gender egalitarianism	−0.079***	−0.222***	−0.206***	0.017	−0.112***
Individualism-collectivism	0.081***	0.148***	0.062***	−0.125***	0.087***
Long-term orientation	0.032**	0.135***	0.181***	−0.056***	0.136***
Power distance	−0.030**	−0.123***	−0.117***	0.008	−0.095***
Teamwork preference	0.194***	0.195***	0.047***	−0.191***	0.136***
Uncertainty avoidance	0.054***	0.275***	0.209***	−0.044***	0.105***

Note: E = Extraversion; A = Agreeableness; C = Conscientiousness; N = Neuroticism; O = Openness to Experience. $^\pm$ $p = 0.07$/direction of significance.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

degree of variation between individuals and nations, and scores above 1.73 indicate variation primarily between nations, none of the *E* ratio scores met the threshold of 0.58, suggesting that national differences minimally explain variance in personality traits and Hofstedian cultural values.

Multilevel correlational analyses between dimensions of cultural values and personality are presented in Fig. 1 and Table 3 and show that they are significantly though weakly associated.[2] The second important finding of our results is thus that the multilevel correlation coefficients do not exceed an absolute value of 0.26, indicating small effect sizes. The three largest correlations, shown in descending order of absolute value, are between uncertainty avoidance and agreeableness ($r = 0.25$, $p < 0.001$), gender egalitarianism and agreeableness ($r = -0.23$, $p < 0.001$), and teamwork preference and extraversion ($r = 0.20$, $p < 0.001$). These results suggest that we can make only weak inferences about the personality traits of individuals based on their cultural values.

Table 3 also contrasts the national-level only associations[3] and individual-only associations with the multilevel associations. A comparison of the top and middle panels in Table 3 and Figs. 1 and 2 highlights that the multilevel and national-level results differ considerably, with many large-sized correlations at the national level becoming much smaller at the multilevel, and with some correlations even changing direction. The multilevel results are relatively similar to the individual-level results.

These findings underscore the differences between associations gleaned from national-level data and those from multilevel and individual-level analyses (Winkelmann, 2023). While national-level associations inform on linkages between national average personality trait levels and cultural values, they cannot be used to infer how these traits and values are likely to correlate within individuals. Our research demonstrates that relying solely on national-level analyses to infer individual-level associations can yield misleading conclusions. For example, at the national level, we observe a substantial negative correlation between the average level of gender egalitarianism and extraversion ($r = -0.60$, $p < 0.001$), suggesting that countries with higher average values of gender egalitarianism tend to have less extroverted populations on average. However, the multilevel analyses reveal that upon considering individual differences and national group membership, the correlation is much smaller ($r = -0.07$, $p < 0.001$). Therefore, inferring an individual's stance on gender egalitarianism based on the person's level of extroversion, as indicated by national-level associations, would be misleading. Furthermore, our results indicate that effect sizes are more modest at the individual and multilevel levels compared to the national level. For instance, a large effect size observed nationally (e.g., between uncertainty avoidance and agreeableness, $r = 0.79$, $p < 0.001$) diminishes to a medium effect size at the multilevel level ($r = 0.25$, $p < 0.001$). Generally, multilevel findings align more closely with individual-level results. The third important finding of our study thus highlights the significance of multilevel analyses, and offer valuable

insights complementary to those derived from national-level analyses. While national-level associations provide insights into population averages at the mean-aggregate level, multilevel analyses illuminate associations in individuals' behavioral tendencies while considering national influences and heterogeneity among individuals.

Our fourth finding relates to construct operationalization and measurement, as we found that some personality traits are correlated, albeit weakly, with various cultural values, while others are largely independent (Fig. 1). For instance, the multilevel correlation coefficients between neuroticism and five out of seven cultural value dimensions are all near zero, suggesting that neuroticism may be a nearly pure measure of personality trait, with little variance associated with cultural values. In contrast, there are higher correlations between agreeableness and gender egalitarianism ($r = -0.23$, $p < 0.001$), teamwork preference ($r = 0.19$, $p < 0.001$), and uncertainty avoidance ($r = 0.25$, $p < 0.001$). There are also higher correlations between conscientiousness and three cultural value dimensions (gender egalitarianism, long-term orientation, and uncertainty avoidance) and a higher correlation between extraversion and teamwork preference ($r = 0.20$, $p < 0.001$). This points to potential overlap between constructs (consistent with the notions that national culture may shape individual traits or that personality traits influence cultural values).

5. Discussion

The goals of this project were two-fold. First, we sought to understand what portion of the total variance in Big Five personality traits and Hofstede's cultural values can be attributed to between-group differences and nation of origin as opposed to within-group differences housed at the individual level of analysis. Consistent with theoretical reasoning, personality is largely explainable by individual differences rather than differences between nations. The more interesting takeaway is that the seven cultural values also manifest more meaningfully as individual-level phenomena, with weak variance attributable to differences between groups.

Thus, our variance decomposition results suggest potential misalignment between cultural values when theorized as national-level constructs versus observed patterns and call into question whether Hofstedian cultural values are indeed helpful national-level phenomena. Hofstede himself maintained that they are (Hofstede, 2019, 2020; Minkov & Hofstede, 2012), and using nation as a proxy for culture is commonly, if not ubiquitously, invoked in macro-level international business and strategy research investigating culture. Scholars often use Hofstede's country comparison tool (Hofstede, 2019) to derive scores on various cultural value characteristics, such as power distance and individualism-collectivism (e.g., Chakrabarty, 2009; Chowdhury et al., 2020; Gil et al., 2019). An emerging alternative view questions the efficacy of categorizing nations into distinct cultural groups (e.g., Brewer & Venaik, 2014; Daniels & Greguras, 2014; Steel & Taras, 2010), with Taras et al. (2016) providing the first meta-analytical evidence that cultural values may weakly capture between-nation differences. Our results support this perspective: equating country with culture may overlook nuances and differences within nations. Although cultural values show relatively high ICC2 scores (presented in the Appendix), which would suggest that individuals within the same nation have shared cultural values, the low ICC1 scores (which measure variability between nations) suggest that between-nation differences are also very small. Coupled together, these findings support the theory that globalization has had a common cultural influence across borders. Overall, the results underscore the limitations of using nations and country-score mean aggregate values as the sole unit of analysis when studying cultural phenomena, prompting a re-evaluation of conventional methods that rely solely on national means to represent cultural values.

Our findings are also noteworthy when considered in the context of broader research, particularly concerning the exploration of differences between nations and within nations across various psychological

---

[2] Multilevel correlation adjusts for the random effects of the group level, isolating and accounting for group-level influences, allowing for an estimate of the "true" relationship between variables. It does so by assessing the individual relationships within groups. This is similar to within-group analysis given that it examines the relationship between variables at the individual level while controlling for group-level effects. For comparative purposes, we compared the multilevel correlation results to the within-group correlation results, and the results are similar. These results are available in the Supplemental Analysis.

[3] These are analogous to between-group correlations. National-level only associations involve the aggregation of individual-level data to the group level where individual variations are not considered. With between-group correlations, group-level summary statistics like an aggregated mean are used to determine the correlation between variables across different groups. The Supplemental Analysis show the results of between-group analysis for comparative purposes. The results are analogous to the nation-level correlations reported in Table 3.
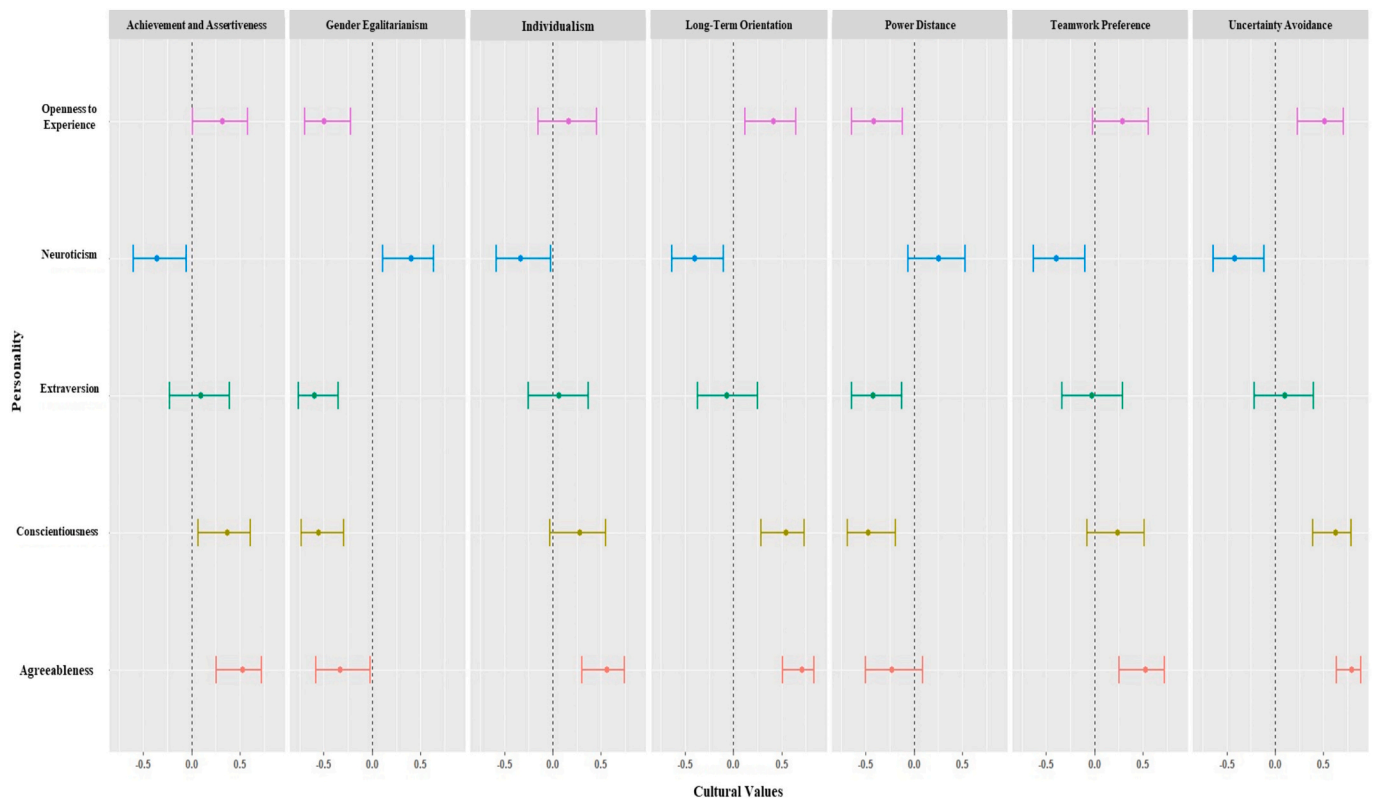
Fig. 2. National-level associations between the Five Factor model and cultural values.
Note: This analysis aggregates across groups assuming null within-nation variance, and is the method used in prior work (Hofstede & McCrae, 2004; McCrae, 2001).

constructs beyond those investigated in this study (e.g., Fischer & Schwartz, 2011; Saucier et al., 2015). Our study revealed that nation of origin explains between three and 10% of the total variance in Hofstede's cultural values and between three and 11% of the variance in personality traits. By comparison, Fischer and Schwartz (2011) found that nation of origin accounted for an average of 12% of the total variance in personal values, using dimensions derived from the Schwartz values model (Schwartz, 1992). Although Hofstede's cultural values model and the Schwartz values model adopt different approaches to values, Fischer and Schwartz's (2011) findings resonate with our own regarding the utility of conceptualizing culture solely at the national level. Indeed, our findings show low similarity (i.e., low homogeneity) in cultural values and personality trait scores within country groups. Furthermore, the limited explanatory power of nation of origin in explaining variance in cultural values and personality traits challenges traditional notions of culture as determined by geographic national borders. Moreover, the results imply considerable, though not complete, independence in responses, suggesting that cultural values and personality traits vary independently of national borders. Together, this highlights the limitations of using countries and country-score mean aggregate values as the sole unit of analysis when studying cultural phenomena. Indeed, the results underscore the possibility that "culture knows no borders" and prompts a re-evaluation of how we study culture. Future scholarship should avoid reliance on nation-based scores toward a more comprehensive, multilevel understanding of cultural dynamics.

Second, we used multilevel correlation techniques to calculate "true" associations (i.e., less "untrue" bias based on random variation) between individual cultural values and personality while accounting for national influence. Through this effort, we found that national-level correlations between cultural values and personality traits, when not adjusted for

individual differences and within-nation heterogeneity, may potentially lead to distorted perceptions about the "true" strength of these associations. We found differences in the strength of associations solely at the aggregate national level, compared to solely the individual-level and multilevel associations. For instance, taking the association between individualism-collectivism and agreeableness as an example, we find a weak association at the multilevel ($r = 0.14$), moderate to strong association at the national mean-aggregate level ($r = 0.56$), and a weak association at the individual level ($r = 0.15$). As another example, the association between teamwork preference and extraversion is negative and weak at the national mean-aggregate level ($r = -0.03$), and the sign is reversed at the multilevel ($r = 0.20$) and individual level ($r = 0.19$). Thus, considering mean-aggregate nation-level results, without accounting for within-nation heterogeneity, may contribute to distorted perceptions of the "true" strength and directionality of these associations. This pattern is reminiscent of Simpson's paradox, where aggregated data may present a different picture compared to disaggregated data. Our findings thus underscore the importance of considering all sources of variance. Failing to account for individual differences and within-nation heterogeneity may introduce random "untrue" variation, potentially leading to distorted, biased, or inflated correlations compared to the "true" correlations identified using multilevel methods.

We consider the findings presented here crucial from a theoretical standpoint in understanding human behavior, particularly in light of prior research on the influence of culture on personality (Arpaci et al., 2018; Hofstede & McCrae, 2004; McCrae, 2001; McCrae & Terracciano, 2005a; Migliore, 2011). Such research has shown, for example, that power distance and extraversion are significantly associated, which we also find at the national level. However, our results show that associations at the individual level while accounting for the group level may

differ from these nationally aggregated findings (e.g., the null multilevel association between power distance and extraversion). In general, we also found that the strengths of the multilevel associations between culture and personality are weaker than those at the national level. While we cannot say for certain that national cultural values have a weaker influence on personality compared to existing theorizing, these findings suggest it is certainly plausible. These findings are important as, following the logic of past group (national-level) findings, educators and businesses have proposed prescriptive advice on how to communicate with, lead, and work with individuals from other countries (cf. Browaeys & Price, 2015; Deresky & Christopher, 2015). To be effective in a cross-national context (educators and business leaders would say), people should model their actions and behaviors in accordance with the cultural values of those with whom they are interacting. Our findings suggest that this perspective advice may not always be helpful; the risk of assuming someone from a certain nation embodies certain characteristics and values has the potential to lead to inaccurate assumptions or bias and stereotyping.

In sum, the richness of our data and findings reveal important nuances in cultural values and personality, with neither construct fully nor completely representing its theorized domain at either the national or individual level. Thus, our findings add a layer of complexity to concepts in the study of human identity and behavior by showing that there may be greater individual variability in cultural values and societal variability in personality traits than previous research and conventional wisdom would suggest or expect. By combining Big Five trait personality research with Hofstedian cultural values research and studying them together using a multilevel perspective, we offer a more complete picture of what shapes human behavior and how much the national culture we are born into shapes who we are as people.

5.1. Strengths and limitations

A strength of this research is that the 40-nation sample includes many non-WEIRD (western, educated, industrialized, rich, and democratic; Henrich et al., 2010) nations that are often under-represented in cross-cultural personality research or had previously been under-sampled (e.g., Hofstede & McCrae, 2004), including, among others, Bhutan, Botswana, Grenada, and Kenya. Our multilevel correlation analysis also addresses the problems in extant research that ignore either individual differences (e.g., Hofstede & McCrae, 2004) or national influence (e.g., Arpaci et al., 2018; Burton et al., 2021; Migliore, 2011) when studying the personality-and-culture relationship.

Several limitations of this research should be noted, serving as a starting point for future research. First, this research is based on a relatively young population who were, on average, 22.9 years old. Although we believe the current sample nevertheless allowed us to make conservative tests about cultural values and personality, whether our findings generalize to older age groups remains to be determined. Second, our cross-sectional design and correlation analysis do not allow causal inference. It cannot be determined whether personality influences cultural values or vice versa. Although we did not plan to address the causal relationships between cultural values and personality, we agree this is a challenging and important question (Allik et al., 2023). Third, this research relies on self-reported data, which may be subject to self-serving bias. Future studies may want to use other-rated assessments, particularly with respect to personality data (e.g., personality ratings by family members), to replicate our findings.

Fourth, our analysis emphasized participants' nation of origin to capture their "home" nation, aligning with research noting the importance of early-life experiences on identity formation (Erikson, 1959; Syed & Fish, 2018) and maintaining consistency with previous cultural

identity studies (e.g., Fischer & Zeugner-Roth, 2017). Despite this focus, it is worth considering that current-country residence might also influence participants' human identity, personality, and cultural values. Future research on identity formation could explore this aspect in further detail to gain a more comprehensive understanding.

Fifth, our study did not include tests for invariance across different national samples. Thus, it is possible that variations in the operationalization of measures across national samples may have influenced the observed relationships, potentially contributing to the weakness of the observed relationships in the individual-level and multi-level associations. We attempted to mitigate this limitation by utilizing well-validated measures. However, future research could delve deeper into this aspect to provide a more comprehensive understanding of the findings.

Relatedly, participants completed the survey from many nations around the globe, requiring conversational English proficiency. While we aimed for global inclusivity, relying on participants' understanding of conversational English may introduce bias or noise. Indeed, prior cross-national studies have demonstrated that when participants with diverse native languages complete surveys in a shared language (English), their responses tend to become homogenized, masking the true variability (Harzing, 2005). Consequently, our findings, which indicate considerable heterogeneity in cultural values and personality traits, may underestimate the variability in individuals' traits and values. That said, the alternative – back-translating surveys into different languages – poses its own challenges with linguistic nuances and potential biases in translation interpretation. We chose to prioritize conversational English to ensure consistency, but the interpretation of our findings should consider limits on inclusivity and the potential impacts this may have on generalizability.

Finally, there is the possibility that several demographic variables, such as gender, education level, marital status, or household wealth, moderate the findings outlined here or that there is a third unmeasured level of analysis. For example, it may be that the proportion of total variance attributable to the between-group level is attributable to national culture differences, but it may also be associated with gender, where gender contributes to meaningful variability in the construct. Research approaches that consider additional variables and levels of analysis would offer a more nuanced understanding of the variability between individual characteristics and national cultural influences.

5.2. Future research

When exploring the intricate dynamics and nuances of human identity from a personality and cultural values lens, our research affirms the importance of acknowledging within-nation differences while considering nation-level scores. Future research can build on our contribution by focusing on the following key areas. First, future scholarship may extend our approach to include micro-cultural analyses. It would be interesting to understand the significance of subcultures, regional disparities, and the impact of local contexts on shaping distinct value systems using the methodologies adopted here. Second, future scholarship may examine temporal changes and adaptation over time. Taras et al. (2010) showed a decade ago that culture measured at national levels is becoming increasingly individualistic and isomorphic over time. Building on their insights and the findings of the present research, future scholars may examine how cultural values and personality characteristics evolve over time within and between countries, considering societal shifts, generational changes, and the influences of globalization, the internet, and social media on the evolving cultural landscapes. For example, researchers may extend the longitudinal, multilevel designs of Chopik and Kitayama (2018) and Vecchione

et al. (2019) to measure cultural values and personality over time and across nations and test their multilevel associations, not only to track changes in ostensibly relatively stable differences but also to determine whether they are causally related. Third, future scholarship may explore the intersection between personality traits, cultural values, and their relationship with various other demographic characteristics such as gender, age, marital or socioeconomic status or contextual characteristics, such as financial, ecological, or social threat (Fischer & Boer, 2015) using multilevel methods to better understand human identity and behavior from a multilevel perspective.

Our results also prompt future consideration of broader trends. While our results cannot definitively attribute globalization as the reason for weak between-nation variability and high within-nation agreement, its potential influence aligns with discussions and postulates raised in earlier meta-analytic research by Taras et al. (2012b), who demonstrated that cultural values have changed between the 1980s and 2000s. Although they focused on mean-aggregate changes over time, their findings, together with ours – which looked at the relative variance attributable to nations versus individuals – hint at the possibility of cultural convergence and homogenization facilitated by globalization. Further investigation could explore globalization and other broader trends' potential influence on within- and between-nation differences in cultural values, personality traits, and their implications.

Most fundamentally, we hope our research stimulates the exploration of personality and cultural values using multilevel approaches that investigate idiosyncrasies beyond the conventional dichotomies that view cultural values as between-nation constructs and personality traits as between-individual constructs. Future research efforts in these directions can not only enhance the depth and applicability of culture and personality research in both academic and practical domains, but, importantly, can also yield sophisticated and contextually relevant insights into human identity and behavior.

6. Conclusion

Overall, findings from this study suggest heterogeneity in cultural values and personality traits across individuals with little between-nation variation. Furthermore, cultural values and personality associations show statistical independence across individual and national levels, suggesting the two levels are distinct. The conclusion of our study supports a more nuanced approach to cross-cultural research – one that avoids aggregating means that assume no within-group variation. We advocate for multilevel approaches to account for both individual and group-level variations in studies of culture. This methodological shift is essential for achieving generalizable and meaningful results, providing a more comprehensive understanding of cultural influence, and improving the robustness and reliability of future cultural studies.

Ethics approval

This research received Institutional Review Board approval and meets ethical standards for the treatment of human participants.

Consent to participate

Informed consent was obtained from all participants.

CRediT authorship contribution statement

Madelynn Stackhouse: Writing – review & editing, Writing – original draft, Visualization, Project administration, Methodology, Data curation, Conceptualization. **Marketa Rickley:** Writing – review & editing, Writing – original draft, Conceptualization. **Yonghong Liu:** Writing – review & editing, Visualization, Validation, Methodology, Formal analysis, Data curation. **Vasyl Taras:** Writing – review & editing, Resources, Data curation.

Declaration of competing interest

The authors declare no financial or non-financial conflicts of interest.

Data availability

Publicly available on OSF.

Appendix A. Sample description, Five Factor model of personality scale means, cultural value scale means

Country	N	Age (years) M	SD	Gender Identity % Female	% Male	% Non-binary/n.a.	Personality Trait - Mean (SD) E	A	C	N	O	Cultural Values - Mean (SD) AA	GE	IC	LTO	PD	TP	UA
Reliability scores of national-level means (ICC2)							0.857	0.959	0.957	0.931	0.900	0.874	0.953	0.925	0.937	0.893	0.951	0.940
Australia	55	20.8	1.6	70.9	29.1		3.91 (0.66)	4.13 (0.57)	4.22 (0.56)	2.37 (0.82)	3.67 (0.55)	2.61 (0.91)	1.55 (0.96)	3.85 (0.81)	3.41 (0.83)	2.17 (0.88)	3.07 (1.12)	4.29 (0.56)
Belgium	31	21.4	2.4	51.6	48.4		3.54 (0.58)	3.73 (0.55)	3.71 (0.54)	2.58 (0.70)	3.60 (0.54)	2.73 (0.95)	2.10 (1.06)	3.13 (0.73)	3.45 (0.80)	2.37 (0.72)	3.03 (0.71)	3.90 (0.73)
Bhutan	39	21.6	1.7	64.1	33.3	2.6	3.49 (0.58)	3.98 (0.56)	3.66 (0.61)	2.60 (0.55)	3.46 (0.45)	3.03 (0.92)	2.56 (0.95)	4.19 (0.76)	3.87 (0.77)	2.83 (0.86)	4.21 (0.74)	4.33 (0.76)
Botswana	37	20.9	1.4	56.8	43.2		3.51 (0.77)	4.44 (0.51)	4.17 (0.62)	2.47 (0.82)	3.92 (0.43)	3.36 (1.10)	1.75 (0.91)	3.96 (0.88)	4.08 (0.93)	2.18 (0.90)	3.64 (1.05)	4.69 (0.45)
Brazil	165	22.5	3.0	56.4	43.0	0.6	3.39 (0.70)	3.90 (0.54)	3.75 (0.63)	2.83 (0.69)	3.56 (0.52)	2.63 (0.89)	1.65 (1.03)	3.70 (0.70)	3.66 (0.80)	2.33 (0.87)	3.51 (0.87)	4.10 (0.72)
Canada	217	25.0	6.0	50.7	48.8	0.5	3.44 (0.70)	3.85 (0.61)	3.84 (0.57)	2.69 (0.74)	3.41 (0.58)	2.76 (1.01)	1.85 (1.01)	3.46 (0.88)	3.71 (0.78)	2.31 (0.81)	3.17 (0.96)	4.08 (0.73)
China	268	22.6	3.2	61.9	34.4	3.7	3.41 (0.61)	3.91 (0.57)	3.74 (0.61)	2.53 (0.63)	3.48 (0.51)	2.80 (0.99)	2.29 (1.00)	3.69 (0.76)	3.59 (0.75)	2.44 (0.91)	3.60 (0.87)	4.14 (0.66)
Colombia	622	21.7	2.7	61.1	37.0	1.9	3.52 (0.66)	3.89 (0.56)	3.83 (0.59)	2.55 (0.62)	3.65 (0.55)	2.92 (0.91)	1.87 (0.97)	3.67 (0.79)	3.62 (0.80)	2.53 (0.81)	3.60 (0.89)	4.16 (0.68)
Ecuador	77	24.9	6.3	48.1	50.6	1.3	3.48 (0.57)	3.93 (0.52)	3.91 (0.50)	2.55 (0.57)	3.57 (0.49)	3.09 (1.02)	2.28 (1.11)	3.83 (0.84)	3.79 (0.77)	2.60 (0.94)	3.80 (0.90)	4.35 (0.64)
Finland	34	22.2	2.2	50.0	44.1	5.9	3.79 (0.66)	4.32 (0.43)	3.92 (0.55)	2.13 (0.58)	3.75 (0.52)	2.55 (0.99)	1.86 (1.03)	3.74 (0.77)	3.60 (0.77)	2.43 (0.76)	3.82 (0.74)	4.02 (0.66)
France	307	22.3	1.8	54.7	45.0	0.3	3.58 (0.67)	3.78 (0.58)	3.65 (0.56)	2.61 (0.70)	3.54 (0.50)	2.62 (0.92)	1.87 (0.90)	3.57 (0.72)	3.52 (0.73)	2.31 (0.75)	3.41 (0.87)	4.04 (0.69)
Germany	142	23.4	3.4	64.8	35.2		3.73 (0.72)	3.88 (0.52)	3.99 (0.59)	2.50 (0.63)	3.64 (0.48)	2.65 (0.93)	1.67 (0.89)	3.42 (0.74)	3.47 (0.74)	2.20 (0.71)	3.16 (0.89)	3.75 (0.68)
Ghana	65	34.1	7.7	35.4	64.6		3.67 (0.63)	4.58 (0.41)	4.51 (0.43)	1.87 (0.59)	3.91 (0.47)	3.39 (1.21)	1.85 (0.87)	4.19 (0.72)	4.58 (0.60)	2.19 (0.75)	4.37 (0.78)	4.65 (0.54)
Grenada	87	25.8	5.2	75.9	24.1		3.36 (0.76)	4.30 (0.61)	4.19 (0.64)	2.61 (0.77)	3.69 (0.51)	2.54 (1.06)	1.88 (0.91)	3.57 (0.99)	4.07 (0.80)	2.18 (0.74)	3.39 (0.99)	4.44 (0.60)
India	618	22.3	3.6	42.6	57.3	0.2	3.48 (0.68)	3.99 (0.55)	3.80 (0.59)	2.53 (0.69)	3.60 (0.50)	2.90 (0.97)	2.08 (1.00)	3.67 (0.81)	3.69 (0.74)	2.50 (0.87)	3.60 (0.92)	4.13 (0.72)
Indonesia	91	21.1	1.9	53.8	46.2		3.35 (0.59)	3.81 (0.53)	3.53 (0.55)	2.95 (0.67)	3.47 (0.45)	3.06 (0.99)	2.55 (0.96)	3.74 (0.74)	3.81 (0.69)	2.49 (0.83)	3.61 (0.79)	4.19 (0.63)
Italy	154	23.0	1.7	55.2	44.2	0.6	3.58 (0.67)	3.92 (0.57)	3.93 (0.56)	2.57 (0.62)	3.67 (0.53)	2.86 (0.97)	1.83 (0.88)	3.77 (0.69)	3.67 (0.74)	2.21 (0.76)	3.65 (0.79)	4.20 (0.60)
Kenya	103	27.4	5.5	55.3	34.0	10.7	3.67 (0.72)	4.24 (0.56)	4.23 (0.64)	2.25 (0.76)	3.77 (0.55)	2.98 (1.06)	1.75 (0.91)	3.55 (0.98)	4.13 (0.73)	2.28 (0.76)	3.83 (0.97)	4.40 (0.70)
Macau	31	20.9	1.2	48.4	51.6		3.08 (0.51)	3.81 (0.61)	3.60 (0.62)	2.81 (0.50)	3.34 (0.43)	2.80 (0.75)	2.59 (1.06)	4.09 (0.62)	3.68 (0.75)	2.90 (0.82)	4.06 (0.63)	4.13 (0.59)
Malaysia	219	22.3	1.3	76.3	23.3	0.5	3.36 (0.52)	3.96 (0.50)	3.67 (0.56)	2.60 (0.60)	3.39 (0.45)	3.01 (0.93)	2.88 (0.89)	3.72 (0.68)	3.99 (0.69)	2.80 (0.72)	3.72 (0.78)	4.17 (0.61)
Mexico	230	21.1	3.9	56.1	43.5	0.4	3.70 (0.71)	3.97 (0.52)	3.86 (0.59)	2.51 (0.69)	3.73 (0.55)	2.98 (1.06)	1.89 (1.06)	3.68 (0.83)	3.76 (0.86)	2.53 (0.97)	3.64 (0.93)	4.22 (0.71)
Netherlands	129	22.5	1.7	38.8	60.5	0.8	3.61 (0.63)	3.73 (0.49)	3.84 (0.51)	2.47 (0.64)	3.56 (0.45)	2.81 (1.02)	1.94 (1.03)	3.40 (0.76)	3.46 (0.85)	2.18 (0.86)	3.30 (0.78)	3.64 (0.78)
Oman	36	21.8	1.3	66.7	33.3		3.41 (0.51)	4.08 (0.60)	3.81 (0.60)	2.58 (0.61)	3.51 (0.49)	3.11 (0.95)	2.69 (1.02)	3.85 (0.64)	3.61 (0.65)	2.44 (0.88)	3.86 (0.80)	4.09 (0.82)
Pakistan	204	23.0	3.6	24.5	63.2	12.3	3.53 (0.72)	4.07 (0.59)	3.81 (0.66)	2.56 (0.69)	3.66 (0.48)	2.92 (1.18)	2.77 (1.20)	3.82 (0.80)	3.82 (0.80)	2.81 (1.02)	3.97 (0.85)	4.21 (0.78)
Peru	178	22.4	3.1	57.9	41.6	0.6	3.57 (0.62)	3.83 (0.52)	3.76 (0.56)	2.52 (0.56)	3.64 (0.51)	2.81 (0.88)	1.99 (0.98)	3.50 (0.71)	3.69 (0.75)	2.40 (0.77)	3.65 (0.88)	4.11 (0.67)
Philippines	56	22.7	2.1	53.6	46.4		3.50 (0.59)	3.91 (0.56)	3.77 (0.61)	2.68 (0.65)	3.44 (0.48)	2.93 (0.97)	2.08 (0.98)	3.65 (0.73)	3.64 (0.71)	2.64 (0.77)	3.35 (0.86)	4.17 (0.63)
Poland	41	22.9	2.2	61.0	39.0		3.32 (0.73)	3.77 (0.50)	3.68 (0.58)	2.73 (0.73)	3.45 (0.47)	2.85 (0.86)	2.16 (0.96)	3.48 (0.60)	3.73 (0.65)	2.43 (0.65)	2.85 (0.94)	4.20 (0.55)
Russia	43	21.3	2.4	72.1	25.6	2.3	3.41 (0.60)	3.79 (0.55)	3.87 (0.46)	2.83 (0.68)	3.54 (0.47)	2.80 (1.05)	2.51 (0.95)	3.29 (0.83)	3.46 (0.71)	2.47 (0.66)	3.33 (0.85)	4.05 (0.80)
Saudi Arabia	43	23.2	3.4	55.8	34.9	9.3	3.46 (0.61)	3.95 (0.61)	3.83 (0.60)	2.59 (0.66)	3.47 (0.46)	2.91 (0.93)	2.24 (1.08)	3.66 (0.68)	3.68 (0.78)	2.62 (0.63)	3.60 (0.85)	4.03 (0.61)
Singapore	56	23.6	1.6	62.5	37.5		3.28 (0.91)	3.84 (0.60)	3.73 (0.56)	2.92 (0.78)	3.43 (0.55)	2.95 (1.13)	1.81 (0.94)	3.74 (0.87)	3.99 (0.69)	2.02 (0.72)	3.26 (0.93)	4.00 (0.78)
South Africa	56	23.8	3.4	71.4	28.6		3.74 (0.74)	4.56 (0.50)	4.35 (0.52)	2.21 (0.66)	3.69 (0.48)	3.77 (1.03)	1.47 (0.79)	4.09 (0.89)	4.13 (0.75)	2.25 (0.97)	3.88 (0.77)	4.72 (0.49)
Spain	50	22.6	3.8	56.0	42.0	2.0	3.70 (0.78)	3.90 (0.46)	3.84 (0.58)	2.61 (0.70)	3.55 (0.51)	2.69 (0.89)	1.73 (0.86)	3.78 (0.83)	3.54 (0.71)	2.34 (0.78)	3.37 (0.88)	4.05 (0.66)
Taiwan	73	23.2	4.1	72.6	27.4		3.34 (0.47)	3.72 (0.44)	3.55 (0.58)	2.78 (0.55)	3.34 (0.43)	2.56 (0.84)	2.26 (0.86)	3.39 (0.61)	3.47 (0.57)	2.43 (0.65)	3.29 (0.79)	3.79 (0.66)
Thailand	146	22.3	2.7	66.4	24.7	8.9	3.38 (0.56)	3.90 (0.55)	3.73 (0.56)	2.63 (0.64)	3.46 (0.47)	2.93 (1.04)	2.51 (1.03)	3.80 (0.74)	3.87 (0.76)	2.57 (0.94)	3.65 (0.79)	4.22 (0.66)
Turkey	42	23.1	3.4	57.0	40.5	2.4	3.68 (0.64)	3.80 (0.59)	3.81 (0.59)	2.50 (0.69)	3.59 (0.52)	2.89 (0.92)	2.14 (1.01)	3.72 (0.88)	3.65 (0.89)	2.27 (0.92)	3.22 (1.13)	3.99 (0.79)
Ukraine	41	22.1	3.1	73.2	24.4	2.4	3.44 (0.61)	3.90 (0.45)	3.81 (0.57)	2.70 (0.68)	3.71 (0.45)	2.96 (1.10)	2.25 (1.19)	3.23 (0.82)	3.67 (0.73)	2.48 (1.01)	3.46 (0.92)	4.05 (0.85)
U.A.E.	35	21.7	2.0	48.6	51.4		3.50 (0.64)	4.05 (0.62)	4.16 (0.50)	2.52 (0.74)	3.64 (0.64)	2.84 (1.01)	2.19 (0.86)	3.56 (0.74)	3.81 (0.81)	2.53 (0.62)	3.70 (0.87)	4.24 (0.75)
U.K.	49	22.0	2.5	34.7	61.2	4.1	3.57 (0.60)	3.92 (0.61)	3.82 (0.58)	2.48 (0.57)	3.45 (0.58)	2.84 (1.07)	2.00 (0.99)	3.53 (0.73)	3.55 (0.85)	2.33 (0.75)	3.20 (0.81)	4.06 (0.66)
U.S.	2564	23.2	5.0	44.3	48.4	8.0	3.45 (0.74)	4.00 (0.57)	3.91 (0.60)	2.57 (0.70)	3.51 (0.54)	2.86 (0.98)	1.93 (1.02)	3.59 (0.78)	3.81 (0.76)	2.54 (0.80)	3.21 (0.94)	4.18 (0.70)
Vietnam	55	22.5	1.9	74.5	25.5		3.40 (0.73)	3.89 (0.58)	3.77 (0.60)	2.81 (0.70)	3.49 (0.57)	2.66 (0.98)	2.30 (1.02)	3.55 (0.83)	3.71 (0.86)	2.44 (0.94)	3.41 (0.91)	4.15 (0.76)
Totals/means	7489	22.9	4.2	51.7	44.4	4.0	3.49 (0.69)	3.96 (0.57)	3.85 (0.60)	2.57 (0.69)	3.56 (0.54)	2.88 (0.99)	2.02 (1.03)	3.64 (0.79)	3.74 (0.78)	2.48 (0.83)	3.44 (0.95)	4.15 (0.71)

Note: E = Extraversion; A = Agreeableness; C = Conscientiousness; N = Neuroticism; O = Openness to Experience; A = Achievement and Assertiveness; GE = Gender Egalitarianism; IC = Individualism-Collectivism; LTO = Long-Term Orientation; PD = Power Distance; TP = Teamwork Preference; UA = Uncertainty Avoidance.

Supplemental Analysis

Within and Between Analysis (WABA)

Cultural Value	Big 5	Raw Corr	EtaBx	EtaBy	CorrB	EtaWx	EtaWy	CorrW
Achievement and assertiveness	E	0.08	0.14	0.15	0.15	0.99	0.99	0.07
	A	−0.14	0.14	0.23	0.41	0.99	0.97	−0.16
	C	−0.02	0.14	0.24	0.20	0.99	0.97	−0.03
	N	−0.07	0.14	0.18	−0.38	0.99	0.98	−0.06
	O	0.01	0.14	0.18	0.27	0.99	0.98	0.00
Gender egalitarianism	E	−0.08	0.27	0.15	−0.44	0.96	0.99	−0.06
	A	−0.22	0.27	0.23	−0.12	0.96	0.97	−0.23
	C	−0.21	0.27	0.24	−0.49	0.96	0.97	−0.19
	N	0.02	0.27	0.18	0.24	0.96	0.98	0.01
	O	−0.11	0.27	0.18	−0.34	0.96	0.98	−0.10
Individualism-collectivism	E	0.08	0.17	0.15	0.06	0.98	0.99	0.08
	A	0.15	0.17	0.23	0.49	0.98	0.97	0.13
	C	0.06	0.17	0.24	0.16	0.98	0.97	0.06
	N	−0.13	0.17	0.18	−0.28	0.98	0.98	−0.12
	O	0.09	0.17	0.18	0.27	0.98	0.98	0.08
Long-term orientation	E	0.03	0.21	0.15	−0.20	0.98	0.99	0.04
	A	0.13	0.21	0.23	0.75	0.98	0.97	0.10
	C	0.18	0.21	0.24	0.53	0.98	0.97	0.16
	N	−0.06	0.21	0.18	−0.33	0.98	0.98	−0.05
	O	0.14	0.21	0.18	0.14	0.98	0.98	0.14
Power distance	E	−0.03	0.18	0.15	−0.41	0.98	0.99	−0.02
	A	−0.12	0.18	0.23	0.02	0.98	0.97	−0.13
	C	−0.12	0.18	0.24	−0.30	0.98	0.97	−0.11
	N	0.01	0.18	0.18	0.14	0.98	0.98	0.00
	O	−0.10	0.18	0.18	−0.30	0.98	0.98	−0.09
Teamwork preference	E	0.19	0.27	0.15	0.15	0.96	0.99	0.20
	A	0.20	0.27	0.23	0.27	0.96	0.97	0.19
	C	0.05	0.27	0.24	−0.03	0.96	0.97	0.05
	N	−0.19	0.27	0.18	−0.31	0.96	0.98	−0.19
	O	0.14	0.27	0.18	0.47	0.96	0.98	0.12
Uncertainty avoidance	E	0.05	0.20	0.15	−0.03	0.98	0.99	0.06
	A	0.28	0.20	0.23	0.77	0.98	0.97	0.25
	C	0.21	0.20	0.24	0.53	0.98	0.97	0.19
	N	−0.04	0.20	0.18	−0.35	0.98	0.98	−0.03
	O	0.11	0.20	0.18	0.35	0.98	0.98	0.10

References

Aarts, E., Verhage, M., Veenvliet, J. V., Dolan, C. V., & van der Sluis, S. (2014). A solution to dependency: Using multilevel analysis to accommodate nested data. *Nature Neuroscience, 7*(4), 491–496.

Allik, J., Church, A. T., Ortiz, F. A., Rossier, J., Hrebickova, M., De Fruyt, F., … McCrae, R. R. (2017). Mean profiles of the NEO personality inventory. *Journal of Cross-Cultural Psychology, 48*(3), 402–420.

Allik, J., & Realo, A. (2019). Culture and personality. In D. Matsumoto, & D. C. Hwang (Eds.), *The handbook of culture and psychology*. Oxford University Press.

Allik, J., Realo, A., & McCrae, R. R. (2023). Conceptual and methodological issues in the study of the personality-and-culture relationship. *Frontiers in Psychology, 14*, 1077851.

Arpaci, I., Baloglu, M., & Kesici, S. (2018). The relationship among individual differences in individualism-collectivism, extraversion, and self-presentation. *Personality and Individual Differences, 121*, 89–92.

Bleidorn, W., Hopwood, C. J., Back, M. D., Denissen, J., Hennecke, M., Hill, P. L., … Zimmermann, J. (2021). Personality trait stability and change. *Personality Science, 2*, Article e6009.

Blevins, D. P., Stackhouse, M. R., & Dionne, S. D. (2021). Righting the balance: Understanding introverts (and extraverts) in the workplace. *International Journal of Management Reviews, 24*(1), 78–98.

Bliese, P. D. (2000). Within-group agreement, non-independence, and reliability: Implications for data aggregation and analysis. In K. J. Klein, & S. W. J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions* (pp. 349–381). Jossey-Bass.

Brewer, P., & Venaik, S. (2014). The ecological fallacy in national culture research. *Organization Studies, 35*(7), 1063–1086.

Browaeys, M.-J., & Price, R. (2015). *Understanding cross-cultural management* (3rd ed.). Pearson Education.

Burton, L., Delvecchio, E., Germani, A., & Mazzeschi, C. (2021). Individualism/collectivism and personality in Italian and American groups. *Current Psychology, 40*, 29–34.

Chakrabarty, S. (2009). The influence of national culture and institutional voids on family ownership of large firms: A country level empirical study. *Journal of International Management, 15*(1), 32–45.

Chopik, W. J., & Kitayama, S. (2018). Personality change across the life span: Insights from a cross-cultural, longitudinal study. *Journal of Personality, 86*, 508–521.

Chowdhury, R., Chun, W., Choi, S., & Friend, K. (2020). Brand and firm values in distinct national cultures. *Asia Pacific Journal of Marketing and Logistics, 32*(8), 1737–1758.

Church, A. T. (2000). Culture and personality: Toward an integrated cultural trait psychology. *Journal of Personality, 68*(4), 651–703.

Costa, P. T., & McCrae, R. R. (1992). The five-factor model of personality and its relevance to personality disorders. *Journal of Personality Disorders, 6*(4), 343–359.

Czerniawska, M., & Szydlo, J. (2021). Do values relate to personality traits, and if so, in what way? - Analysis of relationships. *Psychology Research and Behavior Management, 14*, 511–527.

Daniels, M. A., & Greguras, G. J. (2014). Exploring the nature of power distance: Implications for micro-and macro-level theories, processes, and outcomes. *Journal of Management, 40*(5), 1202–1229.

Dansereau, F., Alutto, J. A., & Yammarino, F. (1984). *Theory-testing in organizational behavior: The "variant" approach*. Prentice Hall.

Deresky, H., & Christopher, E. (2015). *International management: Managing cultural diversity*. Pearson Australia.

Digman, J. M. (1990). Personality structure: Emergence of the five-factor model. *Annual Review of Psychology, 41*(February), 417–440.

Erikson, E. H. (1959). *Identity and the life cycle: Selected papers*. International Universities Press.

Eysenck, H. J. (1990). Genetic and environmental contributions to individual differences: The three dimensions of personality. *Journal of Personality, 58*, 245–261.

Fischer, P. M., & Zeugner-Roth, K. P. (2017). Disentangling country-of-origin effects: The interplay of product ethnicity, national identity, and consumer ethnocentrism. *Marketing Letters, 28*, 189–204.

Fischer, R., & Boer, D. (2015). Motivational basis of personality traits: A meta-analysis of value-personality correlations. *Journal of Personality, 83*(5), 491–510.

Fischer, R., & Schwartz, S. H. (2011). Whence differences in value priorities? Individual, cultural, and artifactual sources. *Journal of Cross-Cultural Psychology, 42*(7), 1127–1144.

Gil, A., Brouthers, L. E., & Keig, D. L. (2019). Top management team diversity, individualism–collectivism, and MNE performance. *International Journal of Cross Cultural Management, 19*(3), 273–290.

Haas, B. W., Abney, D. H., Eriksson, K., Potter, J., & Gosling, S. D. (2023). Person-culture personality fit: Dispositional traits and cultural context explain country-level personality profile conformity. *Social Psychological and Personality Science, 14*(3), 275–285.

Harzing, A.-W. (2005). Does the use of English-language questionnaires in cross-national research obscure national differences? *International Journal of Cross Cultural Management, 5*(2), 213–224.

Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world? *Behavioral and Brain Sciences, 33*(2–3), 61–83.

Hofstede, G. (1980). *Culture's consequences*. Sage.

Hofstede, G. (1984). National cultures and corporate cultures. In L. A. Samovar, & R. E. Porter (Eds.), *Communication between cultures*. Wadsworth.

Hofstede, G. (2019). *Compare countries*. Hofstede Insights.

Hofstede, G. (2020). Understanding culture: The unwritten rules of the game. *Psychology Review Magazine, 25*(3), 12–15.

Hofstede, G., & McCrae, R. R. (2004). Personality and culture revisited: Linking traits and dimensions of culture. *Cross-Cultural Research, 38*(1), 52–88.

House, R. J., Hanges, P. J., Javidan, M., Dorfman, P. W., & Gupta, V. (2004). *Culture, leadership, and organizations: The GLOBE study of 62 societies*. Sage.

House, R. J., Javidan, M., Hanges, P. J., & Dorfman, P. W. (2002). Understanding cultures and implicit leadership theories across the globe: An introduction to project GLOBE. *Journal of World Business, 37*(1), 3–10.

Humphrey, S. E., & LeBreton, J. M. (2019). *The handbook of multilevel theory, measurement, and analysis*. American Psychological Association.

John, O. P., & Srivastava, S. (1999). The Big Five Trait taxonomy: History, measurement, and theoretical perspectives. In L. A. Pervin, & O. P. John (Eds.), *Handbook of personality: Theory and research* (pp. 102–138). Guilford Press.

Jonason, P. K., Zemojtel-Piotrowska, M., Piotrowski, J., Sedikides, C., Campbell, W. K., Gebauer, J. E., … Yahiiaev, I. (2020). Country-level correlates of the Dark Triad in 49 countries. *Journal of Personality, 88*, 1252–1267.

Kievit, R. A., Frankenhuis, W. E., Waldorp, L. J., & Borsboom, D. (2013). Simpson's paradox in psychological science: A practical guide. *Frontiers in Psychology, 4*(1–14), 513.

Klimstra, T. A., Bleidorn, W., Asendorpf, J. B., van Aken, M. A. G., & Denissen, J. (2013). Correlated change of Big Five personality traits across the lifespan: A search for determinants. *Journal of Research in Personality, 47*(6), 768–777.

Lu, J. G., Benet-Martinez, V., & Wang, L. C. (2023). A socioecological-genetic framework of culture and personality: Their roots, trends, and interplay. *Annual Review of Psychology, 74*, 363–390.

Makowski, D., Ben-Shachar, M. S., Patil, I., & Lüdecke, D. (2020). Methods and algorithms for correlation analysis in R. *Journal of Open Source Software, 5*(51), 2306.

McAdams, D. P., & Olson, B. D. (2010). Personality development: Continuity and change over the life course. *Annual Review of Psychology, 61*, 517–542.

McCrae, R. R. (2001). Trait psychology and culture: Exploring intercultural comparisons. *Journal of Personality, 69*(6), 819–846.

McCrae, R. R., & Costa, P. T. (1987). Validation of the five-factor model of personality across instruments and observers. *Journal of Personality and Social Psychology, 52*, 81–90.

McCrae, R. R., & Costa, P. T. (1997). Personality trait structure as a human universal. *American Psychologist, 52*, 509–516.

McCrae, R. R., & Terracciano, A. (2005a). Personality profiles of cultures: Aggregate personality traits. *Journal of Personality and Social Psychology, 89*(3), 407–425.

McCrae, R. R., & Terracciano, A. (2005b). Universal features of personality traits from the observer's perspective: Data from 50 cultures. *Journal of Personality and Social Psychology, 88*(3), 547–561.

McDonald, R. P. (1999). *Test theory: A unified treatment*. L. Erlbaum Associates.

Mehta, S., Marathe, R. R., Ravindran, B., & Ramesh, R. (2023). Systematic literature review - unpacking values. How values change over time and link with personality traits and behaviours. *Journal of Beliefs & Values* (July, 1-14) https://www.tandfonline.com/doi/full/10.1080/13617672.2023.2228156.

Migliore, L. A. (2011). Relation between big five personality traits and Hofstede's cultural dimensions: Samples from USA and India. *Cross Cultural Management: An International Journal, 18*(1), 38–54.

Milfont, T. L., & Fischer, R. (2010). Testing measurement invariance across groups: Applications in cross-cultural research. *International Journal of Psychological Research, 3*(1), 111–121.

Minkov, M., & Hofstede, G. (2012). Is national culture a meaningful concept? Cultural values delineate homogeneous national clusters of in-country regions. *Cross-Cultural Research, 46*(2), 133–159.

Moerbeek, M. (2004). The consequence of ignoring a level of nesting in multilevel analysis. *Multivariate Behavioral Research, 39*(1), 129–149.

Nezlek, J. B. (2001). Multilevel random coefficient analyses of event-and interval-contingent data in social and personality psychology research. *Personality and Social Psychology Bulletin, 27*(7), 771–785.

Nezlek, J. B. (2012). Multilevel modeling for psychologists. In H. Cooper, P. M. Camic, D. L. Long, A. T. Panter, D. Rindskopf, & K. J. Sher (Eds.), *Vol. 3. APA handbook of research methods in psychology* (pp. 219–241). American Psychological Association.

Parks-Leduc, L., Feldman, G., & Bardi, A. (2015). Personality traits and personal values: A meta-analysis. *Personality and Social Psychology Review, 19*(1), 3–29.

Poortinga, Y., van de Vijver, F. J. R., & van Hemert, D. A. (2002). Cross-cultural equivalence of the Big Five: A tentative interpretation of the evidence. In R. R. McCrae, & J. Allik (Eds.), *The five-factor model of personality across cultures* (pp. 281–302). Kluwer Academic.

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods* (Vol. 1). Sage.

Roccas, S., Sagiv, L., Schwartz, S. H., & Knafo, A. (2002). The Big Five personality factors and personal values. *Personality and Social Psychology Bulletin, 28*(6), 789–801.

Saucier, G., Kenner, J., Iurino, K., Bou Malham, P., Chen, Z., Thalmayer, A. G., … Wu, R. (2015). Cross-cultural differences in a global "survey of world views". *Journal of Cross-Cultural Psychology, 46*(1), 53–70.

Schwartz, S. H. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (pp. 1–65). Academic Press.

Simpson, E. H. (1951). The interpretation of interaction in contingency tables. *Journal of the Royal Statistical Society: Series B: Methodological, 13*(2), 238–241.

Specht, J., Egloff, B., & Schmukle, S. C. (2011). Stability and change of personality across the life course: The impact of age and major life events on mean-level and rank-order stability of the Big Five. *Journal of Personality and Social Psychology, 101*(4), 862–882.

Steel, P., & Taras, V. (2010). Culture as a consequence: A multi-level multivariate meta-analysis of the effects of individual and country characteristics on work-related cultural values. *Journal of International Management, 16*(3), 211–233.

Syed, M., & Fish, J. (2018). Revisiting Erik Erikson's legacy on culture, race, and ethnicity. *Identity, 18*(4), 274–283.

Taras, V., Bryla, P., Gupta, S. F., Jimenez, A., Minor, M. S., Muth, T., … Zdravkovic, S. (2012a). Changing the face of international business education: The X-culture project. *Academy of International Business Insights, 12*(4), 10–15.

Taras, V., Caprar, D. V., Rottig, D., Sarala, R. M., Zakaria, N., Zhao, F., … Huang, V. Z. (2013a). A global classroom? Evaluating the effectiveness of global virtual collaboration as a teaching tool in management education. *Academy of Management Learning & Education, 12*(3), 414–435.

Taras, V., Rowney, J., & Steel, P. (2013b). Work-related acculturation: Change in individual work-related cultural values following immigration. *International Journal of Human Resource Management, 24*(1), 130–151.

Taras, V., Steel, P., & Kirkman, B. L. (2010). Negative practice-value correlations in the GLOBE data: Unexpected findings, questionnaire limitations and research directions. *Journal of International Business Studies, 41*(8), 1339–1346.

Taras, V., Steel, P., & Kirkman, B. L. (2012b). Improving national culture indices using a longitudinal meta-analysis of Hofstede's dimensions. *Journal of World Business, 47*(3), 329–341.

Taras, V., Steel, P., & Kirkman, B. L. (2016). Does country equate with culture? Beyond geography in the search for cultural boundaries. *Management International Review, 56*, 455–487.

Taras, V., Steel, P., & Stackhouse, M. R. (2023). A comparative evaluation of seven instruments for measuring values comprising Hofstede's model of culture. *Journal of World Business, 58*(1), Article 101386.

Vecchione, M., Alessandri, G., Roccas, S., & Caprara, G. V. (2019). A look into the relationship between personality traits and basic values: A longitudinal investigation. *Journal of Personality, 87*, 413–427.

Winkelmann, R. (2023). Neglected heterogeneity, Simpson's paradox, and the anatomy of least squares. *Journal of Econometric Methods*, 1–14.

Yanagida, T. (2020). *Miscellaneous functions 'T. Yanagida'* (Version 0.3.2) [Package].