**Personality Traits and Perception of Parenting:**

**The Comparative Twin Study from Germany and Serbia**

**Abstract**

This study examines the etiology of the relationship between personality traits and perceived parenting in light of cross-cultural differences. The sample consisted of 188 Serbian and 394 German twin pairs. Personality traits were measured using the NEO-personality inventory. A Blocks Environmental Questionnaire (BEQ) was applied to measure two dimensions of perceived parenting: support and organization. Genetic factors account for 63% - 79% of the variance for BEQ dimensions in both samples, while around 50% - 60% of the variance in Big Five personality scores could be attributed to genetic factors. The exception was Neuroticism in the Serbian sample, where the genetic effect was somewhat smaller. The results indicated similar etiological pathways of the relationship between personality traits and perceived parenting, with some cultural differences related to Neuroticism and Extraversion. Negative Neuroticism-Support and positive Extraversion-Organization environmental relationships were stronger in the Serbian sample. Genetic overlaps were more significant in the German sample, except for the relationship of Organization with Conscientiousness and Extraversion. This indicates that the relationship between personality and perceived parenting is largely genetically mediated, but that the environmental effect may play an important role in individual adaptation to the family setting.

**Keywords**: cross-cultural study; perceived parenting; personality traits; twin study

**Introduction**

Parents' rearing of children is a basic family function (e.g., Britto et al., 2018). However, children are not only passive recipients of environmental influences (Meunier et al., 2010) since genotype also predisposes children to modify their family environment and to perceive it in certain ways. Moreover, low correlations between observed parenting measures and the subjective children’s perceptions of parenting suggest that these two constructs are distinct, although related phenomena (Finkel & McGue, 1993).

Perceptions of the environment are also shaped, in part, by genetic factors (see Vinkhuyzen et al., 2010). Therefore, children’s perception of parenting may be influenced by their genetically predisposed characteristics, or mediated through genetically influenced personality traits (Plomin et al., 2008). In addition to having influence on the perception and memory of certain experiences, genetic and environmental factors also influence the social cognition that arises as a product of social interactions. Therefore, genotype may influence the environment in different ways in which experience is perceived and stored in memory (Manuck & McCaferry, 2014). Also, some genetically based characteristics make a person more prone to exposure to certain types of environment (Plomin et al., 2008), e.g., specific actions of parents. Thus, environment-related characteristics could be influenced by genes due to the passive genotype-environment correlation (Plomin et al., 2008). This type of correlation only exists in biological families, and can be understood as the effect of the parents’ genotype on the parents’ behavior, which is a factor of the child’s environment. However, the parents’ genotype could also correlate with the child’s genotype due to the genes shared by parents and children (Scarr & McCartney, 1983). A genetic effect on family environment may also exist due to evocative and active gene-environment correlations, as a person’s genetic dispositions can shape the environment. Therefore, it is very important to identify the inheritance and acquisition of personality traits and the characteristics of perceived parenting in order to implement psychological interventions in an appropriate manner. Personal traits that are more environmentally determined, and at the same time related to parenting, are potential targets for psychological support, in order to strengthen adaptation to the family environment.

The genetic basis of personality has been well documented in previous twin studies. For example, cross-cultural twin studies have found that approximately 50% of the variance in the Big Five personality traits is attributable to genetic factors. These findings have also been suggested in a meta-analysis by Vukasović and Bratko (2015) and some individual studies from different cultures, e.g., Croatia (Bratko et al., 2017) and Serbia (Sadiković et al., 2018).

According to some authors (e.g., Shikishima et al., 2018), the environment shared by family members does not play a significant role in shaping personality traits directly. However, this view seems somewhat inconsistent with findings that specific parenting styles (e.g., Caspi et al., 2010) contribute to the development of personality traits. Yet, observed and perceived parenting styles are distinct phenomena (Finkel & McGue, 1993). Namely, a parenting style could be seen as part of the common environment for all children in the family, but the perception of parenting seems to depend more on the individual experience of each child. Therefore, perceived parenting may be partly determined by the genetic bases of the child’s personality traits.

Previous results from twin studies show a high heritability (about 40%, or even higher) of the perception of family support (e.g., Hur & Bouchard, 1995). Nevertheless, the same studies suggest a significant role that the environment plays in shaping the perception of family organization. Theories of the perception of parenting seek to reveal the mechanisms through which genes contribute to this phenotype. The results of Kander et al. (2008) indicate the importance of personality traits as moderators of the relationship between genes and the perception of parenting. Thus, 28% of the perception of family support was explained by the genetic effect of personality traits, especially in cases of Neuroticism (13%) and Extraversion (7%). The remainder of the variance was explained mainly by specific genetic and shared environmental effects. In the perception of family organization genetics explained 9% of the variance of personality traits, and environmental factors explained about 2% (Kandler et al., 2008). The most important role (34%) in shaping the perception of family organization was played by the non-shared environmental factor.

It is known that the cultural environment affects both personality (Hofstede & McCrae, 2004) and family processes (Kagitcibasi, 2005). For that reason, cross-cultural studies in behavioral genetics aim to examine the degree and type of genetic and environmental effects on phenotype in relation to culture. Different findings have suggested that genetic and environmental factors have similar effects on personality traits in both Canadian and German twin samples (Jang et al., 2006). However, other results (Jang et al., 2002) suggest that the cultural environment has been important for more specific personality traits, but not for traits in general.

The assessment of family characteristics through biometrical genetic modeling is still very rare. An extensive literature search suggests that only one cross-cultural twin study has so far examined the genetic and environmental etiology of parenting. In this study (Shikishima et al., 2012) parenting was found to have more genetic effect in the Japanese sample and more environmental effect in the Swedish sample. The authors explained their results with cultural differences between Eastern and Western cultures. Namely, parenting in Eastern societies was more interdependent and child-centered, while in Western societies it was parent-centered and individualistic, which was consistent with some defining studies in cultural psychology (e.g., Markus & Kitayama, 1991). In contrast to this conclusion, German results (Kandler et al., 2008) suggest more genetic effects on the dimensions of parenting perception compared to Eastern cultures (e.g., Russian: Barsky et al., 2010) and there is no clear research evidence from Serbia.

According to Savić (2014), Serbia could not be labeled either as an Eastern or a Western culture because it has a lower Cultural Globalization Index (74.63) compared to Germany (89.38) but higher than Russia (67.39) (Gygli et al. (2019). Some differences in the daily life in Serbia and Germany can also be associated with different levels of economic development and personal freedom. Firstly, in 2018, GDP per capita in Germany was $47,603, and in Serbia $7,246 (World Bank, 2015). Secondly, the personal freedom index for Germany and Serbia was 9.42 and 7.85, respectively (Vásquez & Porčnik, 2018). Finally, German and Serbian cultures differ on the dimensions of national culture such as individualism, with values of 67 and 25, respectively (Podrug et al., 2014). These differences could affect family life and personality, as well as the perceived family environment. Therefore, we assumed that, besides similarities, some subtle differences can be observed between German and Serbian cultures in terms of genetic and environmental contributions to the family environment and personality.

Taking into account all of the above, in the context of the adaptation of parenting, it is necessary to study common genetic and environmental factors of personality traits and perceived parenting in order to respond in a timely manner to the child’s personal needs, so as to eliminate potential undesirable products of the interaction of child’s personality and parenting. On the one hand, we can gain knowledge about how correct and adaptive parenting can be in different environmental conditions. On the other hand, we can obtain information regarding which individual differences make people suitable for changing the perception of parenting and to what extent, in the context of a better quality of life in different cultures. This study aims to examine whether there are cross-cultural specificities in genetic and environmental effects on personality traits and the perception of parenting in German and Serbian samples of twins. An additional aim is to investigate and compare the genetic and environmental overlaps between personality traits and perception of parenting across these two cultures.

**Method**

**Sample and Procedure**

The Serbian sample consisted of 188 twin pairs (average age 24.48 years), 123 (65.4%) monozygotic and 65 (34.6%) dizygotic. In total, there were 95 male (25.3%) and 281 female (74.7%) monozygotic participants, while 29 dizygotic pairs were of mixed sex. The twins were recruited as part of a wider national project (details in Smederevac et al., 2020) during the period 2011-2018. The German sample consisted of 394 twin pairs (average age 34.08 years), among which there were 226 monozygotic pairs (57.4%) and 168 dizygotic pairs (43.6%) recruited through the national project. There were 68 pairs of mixed-sex twins. In general, there were 203 male participants and 585 (74.6%) female participants. There were about 75% of female twins in both samples.

**Instruments**

*The Questionnaire of Twins’ Physical Resemblance*

This questionnaire (Oniszczenko et al., 1993) is a self-report measure consisting of 31 sets of items, which refer to multiple biological and physical indicators of similarity or dissimilarity between twins (e.g., weight, height, hair color, eye color), mixing the twins by parents, family members, peers and strangers. The assessment of zygosity with this questionnaire has been shown to be highly reliable in several studies, with an accuracy rate reaching 95% (Reed et al., 2005).

*Block Environmental Questionnaire (BEQ)*

BEQ (Block, 1971)is a five-point Likert-type measure of retrospective perception of the family environment in twin families (perception of parenting). It consists of 6 scales: (1) Mother’s acceptance/rejection (MA/R), (2) Father’s acceptance/rejection (FA/R), (3) Family cohesion (FC), (4) Mother’s intellectual orientation (MIO), (5) Father’s intellectual orientation (FIO) and (6) Family organization (FO). The former three scales form a higher-order factor called Support, while the latter three scales form a factor called Organization (Hur & Bouchard, 1995). The reliabilities of the BEQ dimensions in the Serbian sample were: MA/R: α = .86, FA/R: α = .89, FC: α = .88, MIO: α = .67, FIO: α = .72, FO: α = .64, SUPP: α = .88, ORG: α = .68. The reliabilities in the German sample were: MA/R: α = .90, FA/R: α = .96, FC: α = .90, MIO: α = .80, FIO: α = .91, FO: α = .74, SUPP: α = .92, ORG: α = .82.

*NEO-PI-R*

The NEO-PI-R (Costa & McCrae 1992; Knežević et al., 2009, Serbian version, and Ostendorf & Angleitner, 2004, German Version) is a 240-item questionnaire that measures the Big Five personality traits: Neuroticism (N), Extraversion (E), Conscientiousness (C), Openness to experience (O) and Agreeableness (A). The reliabilities of the Big Five dimensions in the Serbian sample were: N: α = .83, E: α = .85, O: α = .77, A: α = .72, C: α = .85. The reliabilities in the German sample were: N: α = .92, E: α = .89, O: α = .88, A: α = .85, C: α = .89.

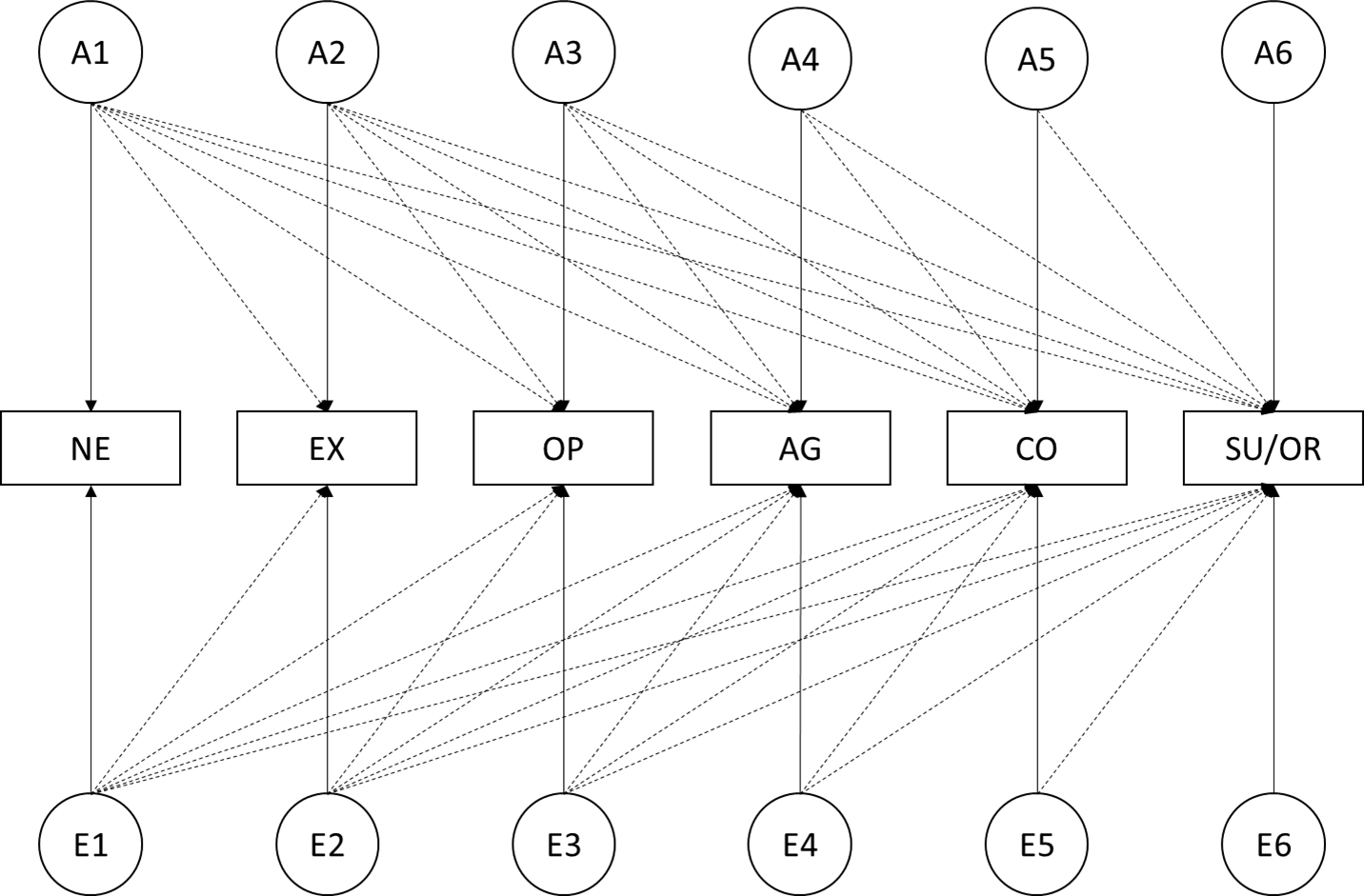
Given that the model has invariance of latent factor covariances (Appendix), it is justified to test intercultural differences on BEQ and NEO-PI-R measures (Little, 1997).

**Data Analysis**

In order to minimize a potential effect of age and gender, the raw scores of the five personality domains and the BEQ scales were adjusted for gender and age effects using a regression procedure. Standardized residuals from these scales were used in all further analyses.

Behavioral genetics analyses were performed in the R environment using custom functions, which estimated structural equation twin models as an adaptation of multivariate SEM modeling in the “lavaan” R package (Rosseel, 2012). R scripts for quantitative behavioral genetic analyses are deposited in Zenodo (Čolović, 2019). The functions were used to calculate univariate twin models and multivariate Cholesky decomposition models, with personality traits as the first variables, given that they are of a higher conceptual level of generality compared to dimensions of parenting perception. The overall model fit was assessed using the Comparative Fit Index (CFI), Tucker Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR), while Bayesian information criterion (BIC) was used in addition to these fit indices to compare models. Index values were interpreted in accordance with the recommendations of Hu and Bentler (1999).

Univariate models were used to assess effects of additive genetic (A), shared environmental (C) and non-shared environmental effects (E) for each personality trait and family environmental factor. The fit indices of ACE, CE, AE and E models were compared and the best model for each of the modeled variables was presented. Multivariate Cholesky decomposition models allowed the multiple covariations of traits to be decomposed into sources of genetic and environmental effects (Posthuma, 2009). The Cholesky decomposition also assumed that each trait was influenced by additive genetic (A) and environmental (C, E) influences (Figure 1). This model was used to assess the degree of genetic and environmental effect on phenotypic correlations between personality dimensions and family environment factors. Both quantitative behavioral genetic data sets and data instructions are deposited in the OSF (<https://osf.io/tg9v5/>).

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*Figure 1.* Cholesky decomposition model of the relationship between FFM personality traits and family environmental factors. The model shown is the AE model, while the ACE model has also been tested.

**Results**

**Univariate Behavioral Genetic Analyses**

For each of the variables in both samples, the lowest BIC value was (the best model) for the AE models, containing only genetic and non-shared environmental effects (Table 1).

Table 1

*BIC values of ae, ce, ace and e models for personality scales and BEQ factors in both samples*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | N | E | O | A | C | Support | Organization |
| German sample | |  |  |  |  |  |  |
| AE | **2114.4** | **2100.4** | **2088.2** | **2125.1** | **2082.3** | **1843.3** | **1964.7** |
| CE | 2144.8 | 2115.4 | 2102.8 | 2135.0 | 2100.1 | 1872.6 | 1968.3 |
| ACE | 2120.3 | 2106.3 | 2094.2 | 2131.1 | 2088.2 | 1845.0 | 1966.2 |
| E | 2199.8 | 2189.5 | 2188.0 | 2187.4 | 2179.8 | 2083.4 | 2102.6 |
| Serbian sample | |  |  |  |  |  |  |
| AE | **1068.2** | **1018.1** | **1047.0** | **1048.8** | **1023.5** | **1010.7** | **1023.5** |
| CE | 1069.4 | 1027.0 | 1055.2 | 1053.0 | 1025.1 | 1013.8 | 1033.2 |
| ACE | 1073.4 | 1023.2 | 1052.2 | 1054.0 | 1027.5 | 1014.5 | 1028.7 |
| E | 1086.2 | 1081.0 | 1088.9 | 1087.2 | 1085.5 | 1089.1 | 1091.8 |

*Note.* N – Neuroticism, E – Extraversion, O – Openness, A – Agreeableness, C – Conscientiousness.

The fit indices (Table 2) indicated a satisfactory fit of the AE model for each variable. Additionally, while assuming that all genetic effects were additive (AE), the restricted model for the German sample fit the data equally as the full twin model (ACE) (Δχ2 = 53.49, *p* > .05). The most appropriate fit indices for the Serbian sample were also found in the restricted AE model, which has similar fit indices as the ACE model (Δχ2 = 26.56, *p* > .05). CFI was lower than .95 only for Neuroticism in the German sample, RMSEA was higher than .08 for Neuroticism and Organization in the German sample, and SRMR values were above .08 for Conscientiousness in the German sample and Extraversion in the Serbian sample. As expected, genetic and environmental effects were similar in both samples. For BEQ factors in both samples, genetic factors accounted for 63% - 79% of the variance. For the personality scales in both samples about 50% - 60% of the variance could be attributed to genetic factors except for Neuroticism in the Serbian sample, where the genetic effect was somewhat smaller than the environmental effect (38.5% : 61.5%). Cross-twin correlations between monozygotic twins were higher for all measured variables in both samples.

Table 2

*AE model fit and genetic and environmental effects for personality scales and BEQ factors in German and Serbian samples*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | CFI | TLI | RMSEA | SRMR | A% | E% | rMz | rDz |
| German sample |  |  |  |  |  |  |  |  |
| Neuroticism | 0.936 | 0.968 | 0.090 | 0.077 | 58.1 | 41.9 | .59 | .13 |
| Extraversion | 1.000 | 1.001 | 0.000 | 0.051 | 56.2 | 43.8 | .56 | .27 |
| Openness | 0.986 | 0.993 | 0.044 | 0.065 | 57.5 | 42.5 | .59 | .27 |
| Agreeableness | 0.962 | 0.981 | 0.058 | 0.080 | 49.2 | 50.8 | .48 | .25 |
| Conscientiousness | 0.980 | 0.990 | 0.052 | 0.095 | 59.9 | 40.1 | .56 | .32 |
| Support | 0.994 | 0.997 | 0.045 | 0.057 | 79.4 | 20.6 | .78 | .53 |
| Organization | 0.952 | 0.976 | 0.098 | 0.064 | 65.2 | 34.8 | .64 | .47 |
| Serbian sample |  |  |  |  |  |  |  |  |
| Neuroticism | 1.000 | 1.037 | 0.000 | 0.068 | 38.5 | 61.5 | .39 | .22 |
| Extraversion | 1.000 | 1.007 | 0.000 | 0.087 | 64.3 | 35.7 | .61 | .39 |
| Openness | 1.000 | 1.038 | 0.000 | 0.022 | 54.6 | 45.4 | .55 | .22 |
| Agreeableness | 1.000 | 1.009 | 0.000 | 0.075 | 51.8 | 48.2 | .52 | .27 |
| Conscientiousness | 1.000 | 1.001 | 0.000 | 0.073 | 60.1 | 39.9 | .62 | .38 |
| Support | 1.000 | 1.006 | 0.000 | 0.062 | 65.6 | 34.4 | .67 | .42 |
| Organization | 1.000 | 1.021 | 0.000 | 0.051 | 63.6 | 35.4 | .65 | .29 |

*Note.* A% - percent of additive genetic effect, E% - percent of non-shared environmental effect. rMz – Monozygotic cross-twin correlations, rDz – Dizygotic cross-twin correlations.

**Multivariate Cholesky Genetic Analyses Model**

In all cases (Table 3), models including only genetic and non-shared environmental effects fit the data better. These results are in line with univariate behavioral genetic analyses, indicating that personality traits, family environment and their relations are not significantly influenced by the shared environment.

Table 3

*Model fit of Cholesky decomposition models for personality and BEQ factors*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | BIC | CFI | TLI | RMSEA | SRMR |
| German Sample | |  |  |  |  |
| **AE model, personality and Support** | **11288.0** | **0.98** | **0.97** | **0.04** | **0.07** |
| ACE model, personality and Support | 11394.0 | 0.97 | 0.96 | 0.05 | 0.07 |
| **AE model, personality and Organization** | **11445.0** | **0.97** | **0.96** | **0.04** | **0.07** |
| ACE model, personality and Organization | 11550.0 | 0.97 | 0.95 | 0.05 | 0.07 |
| Serbian Sample | |  |  |  |  |
| **AE model, personality and Support** | **6090.7** | **0.94** | **0.93** | **0.06** | **0.09** |
| ACE model, personality and Support | 6184.3 | 0.93 | 0.90 | 0.07 | 0.09 |
| **AE model, personality and Organization** | **6147.1** | **0.93** | **0.91** | **0.06** | **0.09** |
| ACE model, personality and Organization | 6241.8 | 0.92 | 0.88 | 0.08 | 0.08 |

Cholesky decomposition models allow genetic and environmental effect on covariance to be separated and genetic and environmental correlations to be calculated (Table 4). The pattern of phenotypic correlations is practically identical across samples for both family environment factors. In the case of Support, there are significant negative correlations with Neuroticism and positive correlations with Extraversion, Agreeableness, and Conscientiousness. Family organization is significantly correlated with Extraversion, Openness, and Conscientiousness.

Table 4

*Correlations between BEQ factors and personality traits*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Support | | | Organization | | |
|  | *r* | *rA* | *rE* | *r* | *rA* | *rE* |
| German Sample |  |  |  |  |  |  |
| Neuroticism | -.32\*\* | -.40\*\* | -.14\*\* | .03 | .05 | .01 |
| Extraversion | .24\*\* | .26\*\* | .16\*\* | .15\*\* | .14\*\* | .15\*\* |
| Openness | -.05 | -.09 | .01 | .23\*\* | .28\*\* | .18\*\* |
| Agreeableness | .18\*\* | .23\*\* | .09 | .03 | -.02 | .09 |
| Conscientiousness | .28\*\* | .35\*\* | .05 | .14\*\* | .15\*\* | .13\*\* |
| Serbian Sample |  |  |  |  |  |  |
| Neuroticism | -.38\*\* | -.37\*\* | -.42\*\* | -.07 | -.17\*\* | .05 |
| Extraversion | .20\*\* | .18\*\* | .21\*\* | .22\*\* | .27\*\* | .19\*\* |
| Openness | -.05 | -.12\* | .02 | .16\*\* | .14\*\* | .22\*\* |
| Agreeableness | .14\*\* | .11\* | .19\*\* | -.04 | -.06 | -.02 |
| Conscientiousness | .27\*\* | .25\*\* | .25\*\* | .24\*\* | .35\*\* | .05 |

*Note. r* – phenotypic Pearson correlations, *rA* – genetic correlations, *rE* – non-shared environment correlations. \* *p* < .05, \*\* *p* < .01.

The polygenic basis of Support is negatively related to the one of Neuroticism in both samples, while Conscientiousness, Extraversion, and Agreeableness are positively genetically related to Support. In the case of Organization, positive genetic correlations are obtained for Openness to Experience, Extraversion, and Conscientiousness, with higher correlations in the German sample. As for the environmental correlations, Support is negatively related to Neuroticism, with higher correlations in the Serbian sample. Extraversion, Agreeableness, and Conscientiousness are positively related to Support in the Serbian sample, while Extraversion has a significant positive, but somewhat weaker relationship with Support in the German sample. In the case of Organization, although there are statistically significant positive environmental correlations with Extraversion and Openness, they are of rather low magnitude in both samples.

The procedure for comparing correlation matrices is proposed and explained in detail by Gardiner et al. (2019). An inter-item correlation matrix was created for each country by correlating each measure with one other measure, resulting in a measure matrix for each country. In addition, each country’s cross-measure correlation matrix was correlated with the other country’s correlation matrix, resulting in a 2 x 2 correlation matrix. The resulting correlations between countries represent the degree of similarity between cultures, with higher numbers indicating a greater similarity between countries. In this case, the similarities between genetic (τ = .51, *p* < .05) and environmental (τ = .54, *p* < .05) correlation patterns for FFM and BEQ dimensions were calculated. These results indicated pronounced similarities between patterns of genetic correlations across cultures, as well as significant similarities between environmental correlation patterns.

**Discussion**

The aim of this study was to investigate the etiological mechanisms between perceived family environment and personality traits in light of cultural differences. It focused on the genetic and environmental overlap between personality traits and the perception of parenting in order to examine whether they share some common sources of variance. By comparing the results of behavioral genetic analyses on samples of twins from two cultures, possible cultural effects on genetic and environmental links between personality and perception of parenting were also examined.

The results regarding the genetic and environmental contribution to the variance of personality traits and perception of parenting in both samples are consistent with previous findings (e.g., Vukasović & Bratko, 2015). The two samples are very similar in this respect, with additive genetic and non-shared environmental effects best explaining the variance of all variables in both samples. The magnitudes of the effects are approximately the same in both samples for most variables, with the exception of Neuroticism in the Serbian sample, which shows a smaller contribution, and Extraversion, which shows a slightly higher contribution of genetic factors than in the German sample. These small differences between the samples could be related to some methodological issues such as the difference in sample size, but the effect of some cultural factors should not be excluded either. More precisely, living conditions in Serbia could be described as economically less stable than German ones, with lower personal and human freedoms (Vásquez & Porčnik, 2018). These factors have the potential to cause higher levels of tension in everyday life. Restrictive environmental conditions tend to attenuate the expression of hereditary dispositions that are more sensitive to such conditions (Tsuang et al., 2004), which could explain the smaller contribution of genetic factors to the variance of Neuroticism in the Serbian sample. This implies that in working with individuals, an emphasis can be placed on mitigating the effects of negative emotionality on outcomes in the form of adaptation to the family environment.

As for the dimensions of the family environment, the contribution of genetic factors is relatively high in both samples, although perceived Support is somewhat more environmentally determined in the Serbian than in the German sample. The relative contributions of genetic and environmental factors to perceived Organization are very similar across both samples. The finding that genetic factors are important in explaining family perception is consistent with previous results (e.g., Kandler et al., 2008). This supports the view that environmental measures in psychological research should not be considered entirely environmental (Plomin et al., 2008), especially when measures of the perceived (rather than observed) environment are applied (Finkel & McGue, 1993).

The next question is whether perceived family support and family organization are related to personality traits and what mechanisms are responsible for these presumed relationships. The results show that genetic and environmental overlaps of dimensions of perceived family environment with personality traits can be best explained by additive genetic and non-shared environmental factors. In this respect, the two samples do not differ and even the patterns of phenotypic, as well as genetic and environmental correlations, are very similar. The findings confirm the robustness of these relations.

Phenotypic correlations are virtually identical in both samples, which is consistent with the usual findings of a positive association of Extraversion, Agreeableness, and Conscientiousness and a negative association of Neuroticism with a supportive family environment at an early age (Meunier et al., 2010). It is reasonable to assume that the perception of the family of origin in adulthood is related to some genetically based dispositions such as personality traits, which have already been suggested by earlier findings (Kandler et al., 2008). The positive relationship of Extraversion, Openness and Conscientiousness with perceived Organization, is also largely consistent with previous results (Meunier et al., 2010).

In the German sample, genetic correlations between personality traits and Support correspond to phenotypic ones, while environmental correlations are significantly lower, especially in the case of Agreeableness and Conscientiousness. The results obtained in the German sample suggest that the phenotypic correlations of Agreeableness and Conscientiousness with perceived Support are practically completely mediated by genes and in the case of other traits it is also mainly a consequence of common genetic factors. However, in the Serbian sample, genetic correlations of these two personality traits, as well as others, with perceived Support are similar in size to the environmental correlations, which suggests that both genes and environmental factors are responsible for the phenotypic links. These findings suggest a slightly greater environmental effect in the relationship between personality and perceived family support in the Serbian sample, compared to the German sample. Along with the finding that indicates a somewhat greater contribution of the non-shared environment to the variance of perceived family support in the Serbian sample, some possible explanations may include certain cultural mechanisms in addition to potential methodological reasons. It is assumed that a more interdependent family life and upbringing style, as well as prolonged economic dependence on parents, which is quite common in Serbia, can cause a somewhat greater focus on the relationship between parents and children, especially on the support that the child receives. Because non-shared environmental effects contribute to dissimilarities rather than similarities between siblings, it may be that this focus leads to slightly more pronounced dissimilarities between siblings (including MZ twins) in this regard, possibly implying a more nuanced perception of parental treatment and support. Therefore, it seems possible that the variance of perceived parental support in the less individualistic cultures (Podrug et al., 2014) could be somewhat less attributed to individual differences in personality in comparison to the more individualistic cultures.

Patterns of genetic correlations between personality traits and perceived Organization follow the patterns of phenotypic correlations in both samples and the same applies to environmental correlations. The exception is Conscientiousness in the Serbian sample, which achieves a significant genetic, but not environmental correlation with the Organization. The phenotypic correlation between Conscientiousness and Organization seems to be mediated by genetic factors in the Serbian sample, with more conscientious people tending to perceive their families as more organized. However, non-shared environmental factors mediate this relationship to a similar extent in the German sample. Apart from Conscientiousness in the Serbian sample, it seems that the relationship between personality and perceived restrictiveness, on the one hand and educational stimulation in the family of origin on the other, is mediated by both genetic and environmental factors. Some of the non-shared environmental factors may include different parental treatments or various factors outside the family.

In general, these findings point to several conclusions. Firstly, the striking similarities between the results obtained in the German and Serbian twin samples suggest that the genetic and environmental bases of personality traits and perception of parenting are robust as are the links between them. Secondly, the results indicate a relationship between some personality traits, specifically Agreeableness and Conscientiousness in the German sample, and perceived family support is almost entirely attributable to shared genetic factors. The same can be applied to the relationship between Conscientiousness and perceived family organization in the Serbian sample. This could be explained both by the effect of stable personality dispositions on the perception of parenting and by some types of genetic-environmental correlation, especially passive and evocative. Namely, some genetically based dispositions of the child may tend to make certain types of family feedback and overall treatment more likely, and this treatment could also be related to some genetic dispositions of the child’s parents. Relationships between other traits and perception of parenting can also be significantly attributed to shared genetic factors, with rather modest environmental correlations in most cases. Personality lifespan models posit that personality contributes to significant cognitive outcomes through multiple mechanisms, including perceptual and physiological pathways (e.g., Gomez et al., 2013). One plausible causal explanation for our results might address those processes, which might produce genetic and environmental correlations between personality and perception of parenting. Finally, the small differences between the Serbian and German twin samples regarding these links, which generally suggest more environmental contributions in the Serbian sample, can be explained by both methodological issues (e.g., a higher representation of women in the sample, a subjective measure of perception of parenting through the BEQ, a weak statistical power (especially in the Serbian sample due to the modest sample)), and other unexplored cultural effects. Also, it should be noted that this is a cross-sectional study and that the conclusions about the influences of genetic and environmental factors must be viewed more as effects, and not as specific influences. The plausible conclusion could not be offered at this point due to these limitations. Since the results of genetic comparisons of cross-cultural behavior may also be obscured by some other factors, such as language-related issues (e.g., Jang et al., 2006), more cross-cultural studies should be conducted in order to improve the understanding of the sources of the relationships between personality and perception of parenting.

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