Big Five Personality Traits of Adolescents aged 11–19 Years from the Czech and Slovak Republics: Age, Sex and Nationality Specifications

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ABSTRACT: The article explores basic personality characteristics in accordance with the Big Five inventory; it concerns the age category of adolescence, i.e. the ages 11–19. Particular attention is paid to the variables of age, sex, and nationality as factors contributing to the establishment of these personality characteristics. The research involved 2,830 adolescents aged 11–19. The average age was 14.89 (SD = 2.23). Participants attended lower or higher secondary education (ISCED 2 and 3) in the Czech Republic or the Slovak Republic. The research employed the Big Five Inventory BFI-10. While investigating relations between individual variables, we used the method of linear regression and three models where age, sex, and nationality were used as predictors. Our results support the evidence that these are important predictors of basic personality characteristics in adolescence. Their predictive power is, however, not equal.

Keywords | Big Five - Age – Sex – Nationality – BFI – 10 - Adolescence

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1 INTRODUCTION

The effort for characterization of people and their personalities with the lowest possible number of characteristics has been present in psychology since the beginning of its modern history. A clear evidence-based research attempt can be identified in Allport and Odbert's 1936 work. Their research involved lexical analysis of the English-language vocabulary, particularly adjectives, used for description of a person's characteristics and behaviour. At present, this effort has been accomplished in the Big Five personality model.

What is remarkable is the fact that throughout the twentieth century, researchers often identified key personality characteristics whose substance is similar to the characteristics we know from the Big Five personality model, although there were not always five of them. The well-known concepts include, for instance, the ones described below.

Norman (1963) created the so-called "adequate taxonomy" with five dimensions that are remarkably similar to the Big Five factors. He called them surgency, agreeableness, neuroticism, culture and conscientiousness.

Eysenck and Eysenck (1968) worked with three personality dimensions: extraversion–introversion, emotional stability – neuroticism, and psychoticism, representing the EPI model.

Comrey (1970) worked with eight bi-polar personality dimensions known under the acronym TOCASEMP: trust vs. defensiveness, orderliness vs. lack of compulsion, social conformity vs. rebelliousness, activity vs. lack of energy, emotional stability vs. neuroticism, extraversion vs. introversion, and masculinity vs. femininity.

Cattell (1973) presents eight personality dimensions and labels them exvia, anxiety, corteria, independence, discreetness, subjectivity, intelligence and good upbringing. His model was later developed into the well-known 16 personality factors.

Of all the various approaches and research projects, the most important fundamentals for the Big Five model were Cattell's (post-war) works and various versions of the 16 PF model, as well as Norman's taxonomies. These directly influenced Goldberg (1981), who labelled the big factors as we know them today: extraversion (E), agreeableness (A), conscientiousness (C), neuroticism (N) and openness (O).

In the 1980s and 1990s, awareness of Big Five spread thanks to Costa and McCrae, who published NEO-PI (NEO Personality Inventory, 1992). Various language mutations emerged quickly, such as the Italian version BFQ (Big-Five Questionnaire) published in 1993 (Caprara, Barbaranelli, Borgogni, & Perugini), the Dutch version FFPI (Five Factor Personality Inventory) published in 1995 (Hendriks, Hofstee, De Raad, & Angleitner), the Czech version NEO-FFI (Hřebíčková, & Čermák) published in 1996, or the Slovak version NEO-FFI from the year 2007 (Ruisel, & Halama).

It needs to be noted that since the 1990s, there have been 'competing' theories: Hofstee, DeRaad and Goldberg (1992) created the AB5C model (Abridged Big 5 Circumplex). Their model is based on the concept of a circular structure of personality characteristics and presupposes the existence of bidimensional sections of a circle representing mixed (positive and negative) personality characteristics. In this way, they reject the concept of pure psychological types. Digman (1997) identified two basic personality factors – α and β, which integrate Big Five factors of agreeableness, conscientiousness, neuroticism, respectively extraversion and openness. Ashton et al. (2004) promote the HEXACO model, where the Big Five factors are complemented with another factor: honesty–humility.

There has been extremely intensive research in the field of factor-analytical theories and the Big Five. For instance, as of June 2023, the database Science Direct listed almost 400,000 articles concerning the key expression "Big Five". There are various versions of research methods, from 240-item one, which can capture the facets of the robust factors in detail, through a 60-item version, suitable for research purposes, to a 10-item version (BFI-10). The latter was employed in our research. The internal consistency of research tools, particularly in the non-shortened form, is sufficient. For instance, McCrae and Costa (2004) state the values of Cronbach α 0.72-0.82, Hřebíčková and Jelínek (2019) state, for the newest version NEO-PI 3, the values of Cronbach α 0.90–0.94.

More recent research projects directly related to the application of the BFI-10 method have a varied topical focus, which documents that the method is widely applicable. The following are several examples.

Aichholzer and Zandonella (2016) investigated the relationship between the support of radical political parties and personality characteristics measured by BFI-10. They found that the choice of a radical political party has a link to lower openness and conscientiousness in relation to the support of a Radical right party, lower openness, conscientiousness, and agreeability in relation to perceived immigrant threat, lower openness and emotional stability and higher agreeableness in relation to right-wing authoritarianism, and lower openness in relation to social dominance orientation.

Biolcati and Passini (2019) investigated the relationship between use of psychoactive substances (alcohol and marijuana) and the BFI-10 factors. As concerns alcohol use, they proved a negative relationship between agreeableness and conformity, between agreeableness and boredom coping, between conscientiousness and boredom coping, and a positive relationship between neuroticism and conformity. As to use of marijuana, they proved a negative relationship between agreeableness and boredom coping, and between conscientiousness and boredom coping, and a positive relationship between conscientiousness and social activities, between neuroticism and anxiety and depression coping, between neuroticism and self-expansion, and between neuroticism and increase in personal performance.

Nikčević and Spada (2020) pointed out a relationship between coping with COVID-19 anxiety and factors of BFI-10, particularly a negative relationship between the Coronavirus Anxiety Scale (CAS) and extraversion, agreeableness, conscientiousness, and

openness to experience, and a positive relationship between CAS and neuroticism. Identical relationships were also identified concerning the Work and Social Adjustment Scale (WSAS).

Nießen et al. (2022) investigated the difference between desired and achieved work status (aspiration–attainment gap, AAG) in relation to BFI-10 factors. Their results show that low agreeableness is a direct factor increasing the likelihood of AAG risk, while neuroticism and openness to experience are indirect factors contributing to the same.

In their intercultural study, Park et al. (2022) pointed out the specifics of the psychometric characteristics of the BFI-10 questionnaire, particularly when comparing countries of the western culture and the eastern culture.

Görlich (2023) developed the Creative Process Assessment Scale (CPAS) and found that the creative process is related particularly to the factor openness to experience. It applies particularly in the stage of core creativity, i.e. the stage of idea generation, and during the stage of development of a solution approach.

Li et al. (2023) diagnosed patients with schizophrenia spectrum disorder and identified high conscientiousness as a factor that increases the likelihood of recovery and decreases the likelihood of occurrence of the disease.

In relation to the variables addressed in our research, i.e. sex, age, and nationality, there are other research projects whose findings are important.

Donnellan and Lucas (2008) investigated age differences in the basic personality structure according to the Big Five. The range of the age of the participants was 16–85. The authors found that neuroticism, extraversion, and openness to experience decrease with age, while agreeableness and conscientiousness increase with age.

The same result was obtained by Gonzatti et al. (2017). The research team compared the age categories 30–59 and 60–85. Within their analysis of sex-based differences, they determined a significant difference between men and women concerning openness to experience and agreeableness.

Different findings were presented by Soto et al. (2011), who used a sample group of more than 1,250,000 English-speaking participants aged 10–65. They confirmed the increasing tendency of agreeableness and conscientiousness and the decreasing trend of neuroticism in relation to age. In their research, however, extraversion reached the same levels across age categories, and openness increased with age. These findings apply to the age categories 20+. In the age category 10–20, the tendencies were opposite to the rest of the age categories.

Socio-cultural specifics, in relation to the development of structures of the Big Five, were addressed by McCrae et al. (2004). Based on an investigation in various countries, the curvilinear effect, i.e. a gradual decline represented by the invested "J" shape, was be identified in all characteristics except neuroticism only in Croatia; in the Czech Republic, the effect was confirmed for neuroticism, extraversion and openness. In Russia and Germany, it was confirmed only for neuroticism, while in the USA, the effect was confirmed for conscientiousness, and in Italy, it only applied to extraversion.

A meta-analysis of 92 studies (Roberts, Walton, & Viechtbauer, 2006), which included participants aged 10–101, proved an increase in the score of agreeableness, conscientiousness and neuroticism in relation to age. Openness to experience had relatively stable scores in relation to age. Extraversion was divided into social vitality and social dominance. The former had a slowly decreasing trend, while the latter showed a rapid increase after the age of 14 and subsequently stabilization of scores after the age of 35.

Weisberg, Deyoung and Hirsh (2011) supported the existence of sex-based differences on the level of aspects of basic structures identified by DeYoung, Quilty, Peterson, (2007): enthusiasm, assertiveness, compassion, politeness, industriousness, orderliness, volatility, withdrawal, intellect and openness. The only aspect where they found no difference was industriousness. Men reached higher scores only in assertiveness and intellect. The results of compassion and volatility were significantly influenced by the variable of ethnicity; in the research, the matter was addressed as a difference between the White versus the Asian race.

On the other hand, Cao and Ji (2024) identified no relation or predictive potential of the adolescent participants sex on the Big Five structures. According to their data analysis based on data of nearly 8000 adolescents they concluded that Big Five factors are relatively stable in short-time perspective and not influenced by sex. The similar stability of Big Five factors in the time and in the relation to sex was confirmed by Tivari and Ojha (2024). These are the studies connected with the Eastern culture. European studies show the higher levels of neuroticism of females in standard. Also the latest study of Kajonius et al. (2025) confirmed that finding in the mirror of the worse mental health.

Socio-cultural (involving 26 countries) and sex-based specifics are addressed in a meta-analysis by Costa, Terracciano and McCrae (2001). It points out especially the difference between men and women concerning the factors of neuroticism and agreeableness. While the difference is significant, for instance, in France, Belgium, Croatia, and Italy, it is negligible in countries such as Zimbabwe (N and A), Japan (N), India (N) and Malaysia (A).

The study of Kajonius and Giolla (2017) executed with more than 130,602 participants from 22 countries showed the highest score of the neuroticism is in the English speaking countries with the UK on the first place, the highest score of the extraversion in the countries with high number of sunny and hot days, the highest score of the openness to experience in the countries with strong social security and more egalitarian values, the highest score of the agreeableness in the countries opened to immigration, the highest score of the conscientiousness in the countries where people have strong desire for social rise.

In classic study of Schmitt et al. (2007) there were compared 56 nations in Big Five factors. The authors used standardized T-score 50 with the standard deviation 10. The mean values in Slovak, resp. Czech Republic were following: extraversion

49.05, resp. 50.22; agreeableness 47.38, resp. 44.09; conscientiousness 42.44, resp. 42.87; neuroticism 51.57, resp. 51.02; openness to experience 52.53, resp. 50.59. The top scorers were Serbia (extraversion, 51.95), Congo (agreeableness, 54.82), Congo (conscientiousness, 55.71), Japan (neuroticism, 57.87), Chile (openness to experience, 54.69).

The findings, presented in the selected research projects, document that sex, age, and nationality as predictors of basic structures defined by the Big Five personality model have great research potential. Their characteristics in the period of adolescence, which is the focus of the present research, are not entirely clear.

2 METHODS

The population

The study population contained 955,173 adolescents from the Czech Republic (Czech Statistical Office, 2023) and 481,057 adolescents from the Slovak Republic (Slovak Statistical Office, 2023) aged 11–19. The research team followed the legal regulations of the Czech and Slovak Republic related to this issue. For respondents under 15 years of age, written informed consent was obtained from legal guardians prior to the administration of the test battery, as well as verbal consent from the respondents themselves at the beginning of the test battery administration. Written informed consent from legal guardians was secured by either the research team or the participating school. Respondents aged 16 and over were informed of their rights and options prior to the actual administration of the test battery and gave informed consent to the processing of the data they provided in the test battery by completing the test battery.

Research sample

The research sample contained 2,830 adolescents aged 11–19 (M = 14.89, SD = 2.23). They attended schools providing lower (ISCED 2) and higher (ISCED 3) secondary education in the Czech Republic or the Slovak Republic. The proportion of Slovak adolescents was 31.7 %; the proportion of girls was 60.4 %; the proportion of adolescents living in urban areas was 57.6 %; and the proportion of adolescents attending secondary grammar school was 62.8 %. A detailed overview of characteristics of the research sample is presented in Table 1.

Table 1 | Characteristics of the research sample

		N	%
nationality	Czech	1934	68.3
	Slovak	896	31.7
sex	males	1122	39.6
	females	1708	60.4
age	11	137	4.8
	12	319	11.3
	13	430	15.2
	14	455	16.1
	15	375	13.3
	16	339	12.0
	17	327	11.6
	18	277	9.8
	19	171	6.0
residence	urban	1630	57.6
	rural	1145	40.5
	missing	55	1.9
type of school	elementary	658	23.3
	secondary grammar school	1778	62.8
	vocational school	323	11.4
	missing	71	2.5
total		2830	100

According to the recommendations presented by Krejcie and Morgan (1970), the ratio of the population and the research sample corresponds to 99 % of the confidence level and 2.5 % of the accuracy level. From the perspective of quantification indicators, the research sample is representative. The research population fulfils the conditions of representativeness also by its characteristics, size and representation of respondents from all regions of the Czech and Slovak Republic. 0.19% of boys and girls from the whole Czech Republic and 0.16% of adolescents from the whole Slovak Republic participated in the research.

The employed research method was the Big Five Inventory (BFI–10) (Rammstedt, & John, 2007). It is a short questionnaire-based method focused on measuring five personality dimensions – extraversion, agreeableness, conscientiousness, neuroticism and openness to experience. The questionnaire consists of ten items the participant is supposed to respond to using the 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Each dimension is covered with two items. The method is a screening method. A Czech study (Hřebíčková et al., 2016) provided the values of internal consistency using the Spearman-Brown coefficient with the following levels: extraversion (0.12–0.64), agreeableness (0.02–0.21), conscientiousness (0.38-0.49), neuroticism (0.57–0.74) and openness (0.21–0.40). Our research resulted in the following values: extraversion (0.40), agreeableness (0.14), conscientiousness (0.43), neuroticism (0.67) and openness (0.28).

The research method was administered in two ways. One part of the data was obtained through online collection. The online collection was advertised on social networks, inviting Czech and Slovak adolescents in the system of lower (ISCED 2) and higher (ISCED 3) secondary education to participate. The other part of the data was obtained through quota random sampling at the level of primary and secondary schools (ISCED 2 and 3). Individual institutions were randomly selected from a list of Czech and Slovak schools and invited to participate. From the total number of over 100 schools invited, cooperation was actually established with 28. Schools could also refuse to participate in the research. At the same time, we also launched the research through online platforms, which allowed us to reach an even wider range of potential

respondents. This maintained the random selection of schools and thus of respondents, while at the same time such a extensive collection allowed us to achieve a representative research population. Data collection took place in the school years 2020/2021 and 2021/2022. Statistical analyses did not show any difference in the two methods of data collection - school-based and online.

Statistical processing

Statistical analyses were done in the program SPSS 25.0. The accepted standard level of significance was $\alpha < 0.05$. We also used the t-test for two independent sets, ANOVA and linear regression.

3 RESULTS

A basic description in relation to nationality, sex, and age is presented in Table 2.

When testing the difference between Czech and Slovak adolescents, we found a difference in agreeableness ($t(2828) = 2.854$, $\alpha < 0.01$) and neuroticism ($t(2828) = 2.075$, $\alpha < 0.05$). In both cases, Czech adolescents reached a higher score ($_{\Delta}M = 0.18$ points for both variables). A substantive significance reached values corresponding to no or little effect (values of Cohen's d = 0.115, and 0.084). The differences between the two groups may be considered negligible.

When testing the difference between boys and girls, we found a difference in extraversion ($t(2828) = 2.524$, $p < 0.05$), conscientiousness ($t(2828) = 3.852$, $p < 0.001$), neuroticism ($t(2828) = 14.150$, $p < 0.001$), and openness ($t(2828) = 10.844$, $p < 0.001$). As concerns extraversion, boys reached a higher score ($_{\Delta}M = 0.17$). In contrast, girls' scores were higher concerning conscientiousness ($_{\Delta}M = 0.24$), neuroticism ($_{\Delta}M = 1.12$) and openness ($_{\Delta}M = 0.73$). A substantive significance reached values corresponding to no or little effect for the variables extraversion and conscientiousness (Cohen's d = 0.098, resp. 0.143). Regarding neuroticism and openness, we identified a medium effect (Cohen's d = 0.550, and 0.415).

Sex-based differences are considered significant. For this reason, an age comparison was done for girls and boys separately.

Concerning boys, the research identified a difference between age categories (11–19 years) concerning extraversion ($F(8) = 5.136$, $p < 0.001$) and a medium effect of substantive significance (Cohen's d = 0.704). The difference between the group with the highest score (aged 12) and the lowest score (aged 18) was $_{\Delta}M = 1.21$.

Concerning girls, we found significant differences in all the variables except openness: extraversion ($F(8) = 3.399$, $p < 0.001$), agreeableness ($F(8) = 5.834$, $p < 0.001$), conscientiousness ($F(8) = 2.803$, $p < 0.001$) and neuroticism ($F(8) = 3.184$, $p < 0.001$). We identified a medium effect of substantive significance through Cohen's d: extraversion (0.397), agreeableness (0.602), conscientiousness (0.416) and neuroticism (0.400). The difference between the group with the higher score and the one with the lower score was as follows: extraversion ($_{\Delta}M(12y;19y) = 0.71$), agreeableness ($_{\Delta}M(11y,19y) = 0.97$), conscientiousness ($_{\Delta}M(19y,15y) = 0.69$) and neuroticism ($_{\Delta}M(17y,12y) = 0.69$).

We subsequently conducted a series of linear regression analyses. The dependent variables were always the scales of the BFI–10 questionnaire: extraversion, agreeableness, conscientiousness, neuroticism and openness. The predictors were changed based on the particular model of regression analysis. For model 1, the predictor was age; for model 2, the predictors were age and sex; and for model 3, the predictors were age, sex and nationality.

The regression model 1 (Table 3) seems most efficient in relation to extraversion ($F = 45.779$, $t(age) = -6.766$, standardized $\beta = -0.126$) and agreeableness ($F = 32.211$, $t(age) = -6.766$, standardized $\beta = -0.126$). Determination coefficients R2 are low, accounting for 1.6 and 1.1 % variability.

The regression model 2 (Table 4) seems most efficient in relation to conscientiousness ($F = 9.771$, $t(age) = 2.165$, standardized $\beta = 0.041$, $t(sex) = 3.530$, standardized $\beta = 0.067$) and openness ($F = 59.646$, $t(age) = 1.296$, standardized $\beta = 0.024$, $t(sex) = 10.574$, standardized $\beta = 0.197$). Determination coefficients R2 are low, accounting for 0.7 and 4.0 % variability.

The regression model 3 (Table 5) seems most efficient in relation to neuroticism ($F = 76.108$, $t(age) = 3.975$, standardized $\beta = 0.073$, $t(sex) = 13.816$, standardized $\beta = 0.253$, $t(nationality) = -3.810$, standardized $\beta = -0.070$). Determination coefficient R2 is low, accounting for 7.5 % variability.

4 DISCUSSION

The results of our analysis show that age, sex, and nationality are important predictors of the personality dimensions of the Big Five in the period of adolescence.

Age is a sufficient predictor for extraversion and agreeableness. Adolescents of a younger age demonstrate higher extraversion and agreeableness.

Sex is a sufficient predictor for openness. Girls show higher openness to experience than boys. Age and sex are predictors for conscientiousness. Higher conscientiousness is linked with higher age and female sex.

Age, sex and nationality are predictors for neuroticism. Higher neuroticism is linked to higher age, female sex and the Czech nationality (when comparing the Czech and the Slovak part of the research sample).

Vavrysová (2014) presents the results of research implemented with pupils of the second stage of primary schools (lower secondary education) in the Czech Republic, aged 11–15, which mapped sex-based differences in four out of the Big Five factors (NEO-FFI): neuroticism, extraversion, openness and agreeability. As in our study, her results confirm the sex-based difference

Table 2 | Descriptives of BFI-10 scales according to nationality, sex and age

		Czech males					Czech females					Slovak males					Slovak females				
		E	**A**	**C**	**N**	**O**	**E**	**A**	**C**	**N**	**O**	**E**	**A**	**C**	**N**	**O**	**E**	**A**	**C**	**N**	**O**
11y	N	54	54	54	54	54	51	51	51	51	51	12	12	12	12	12	20	20	20	20	20
	M	6.50	7.11	6.54	6.13	6.72	6.29	7.33	6.25	7.16	7.90	7.00	6.50	5.17	5.50	6.58	6.10	7.95	6.20	6.60	7.80
	SD	1.27	1.40	1.70	1.96	1.55	1.50	1.45	1.53	1.94	1.54	1.54	1.00	1.40	1.98	2.19	1.92	1.32	1.15	1.50	1.24
	Kurt	2.01	-0.32	-0.58	-0.53	-0.04	-0.21	-0.48	-0.54	0.28	-1.05	-0.25	-0.76	1.18	-1.01	-0.50	0.58	-1.01	-0.38	0.03	-0.59
	Skw	-0.80	0.23	-0.11	-0.09	0.17	0.06	0.00	0.35	-0.50	-0.17	-0.18	0.00	-0.82	-0.34	-0.35	0.09	0.10	-0.43	-0.58	0.05
12y	N	98	98	98	98	98	137	137	137	137	137	39	39	39	39	39	45	45	45	45	45
	M	6.73	6.90	5.95	6.01	6.80	6.62	7.31	6.39	6.85	7.50	6.90	6.69	5.92	6.51	6.46	6.91	7.07	6.00	6.42	7.44
	SD	1.48	1.56	1.70	2.01	1.72	1.73	1.46	1.82	2.17	1.70	1.50	1.52	1.72	2.08	1.85	1.43	1.19	1.78	1.91	1.45
	Kurt	-0.31	0.62	-0.35	-0.77	-0.64	-0.18	0.51	-0.61	-0.65	-0.31	-0.49	-0.36	0.19	-0.08	-0.09	0.07	-0.17	-0.32	-0.31	-1.14
	Skw	-0.13	-0.48	-0.19	-0.22	0.05	-0.36	-0.48	0.20	-0.32	-0.33	-0.21	0.37	0.42	-0.70	0.12	-0.43	-0.47	-0.05	-0.09	0.23
13y	N	166	166	166	166	166	179	179	179	179	179	43	43	43	43	43	42	42	42	42	42
	M	6.73	6.75	6.00	6.17	6.87	6.56	7.18	6.05	7.29	7.36	6.88	6.91	6.00	5.65	6.63	6.86	6.57	5.95	7.40	8.05
	SD	1.62	1.47	1.65	2.16	1.59	1.89	1.58	1.66	2.06	1.70	1.78	1.48	1.43	2.09	2.15	1.47	1.68	1.82	2.21	1.46
	Kurt	-0.26	0.20	-0.31	-0.80	0.21	-0.65	-0.55	-0.69	-0.60	-0.06	0.04	0.19	0.87	-0.57	-0.58	-0.06	-0.66	-0.10	-0.28	-0.68
	Skw	-0.28	-0.38	0.09	-0.07	-0.24	-0.17	-0.20	0.07	-0.47	-0.46	-0.32	-0.48	0.05	0.11	-0.15	0.11	-0.24	0.35	-0.53	-0.23
14y	N	151	151	151	151	151	187	187	187	187	187	34	34	34	34	34	83	83	83	83	83
	M	6.49	6.92	5.81	6.37	6.81	6.40	6.98	6.03	7.68	7.61	6.71	6.26	5.76	6.06	6.68	6.58	6.93	6.14	7.12	7.72
	SD	1.80	1.53	1.84	2.07	1.94	1.74	1.67	1.71	2.00	1.78	1.45	1.38	1.42	2.00	1.82	1.54	1.63	1.56	2.14	1.68
	Kurt	-0.27	-0.21	-0.38	-0.64	-0.58	-0.40	-0.11	-0.36	-0.23	-0.29	0.24	1.31	-0.66	-0.61	0.19	0.16	-0.53	-0.45	-0.24	-0.81
	Skw	-0.22	-0.34	0.20	-0.15	-0.19	-0.10	-0.39	0.13	-0.70	-0.48	-0.60	-0.95	-0.24	0.28	-0.38	-0.08	-0.14	0.21	-0.61	-0.37
15y	N	131	131	131	131	131	126	126	126	126	126	45	45	45	45	45	73	73	73	73	73
	M	6.66	6.95	6.05	6.11	6.67	6.17	6.63	6.16	7.58	7.56	6.44	6.69	6.18	6.00	6.69	6.41	6.89	5.68	7.41	8.03
	SD	1.73	1.33	1.65	2.03	1.84	1.86	1.77	1.89	2.08	1.69	1.82	1.43	1.53	2.12	1.82	1.67	1.73	1.40	2.04	1.48
	Kurt	-0.08	0.22	-0.20	-0.45	-0.69	-0.51	-0.62	-0.72	-0.11	-0.38	0.27	-0.30	0.14	-0.86	-0.88	-0.19	0.01	0.28	-0.26	-0.37
	Skw	-0.41	-0.30	0.11	-0.01	-0.04	0.05	-0.34	0.02	-0.78	-0.53	-0.59	-0.45	0.09	-0.18	0.01	-0.09	-0.29	0.28	-0.63	-0.55
16y	N	87	87	87	87	87	104	104	104	104	104	39	39	39	39	39	109	109	109	109	109
	M	6.02	6.67	5.80	6.37	6.87	6.11	6.75	6.21	7.64	7.52	6.49	6.31	5.74	6.28	7.44	6.11	6.51	6.45	7.41	7.54
	SD	1.71	1.70	1.84	2.24	1.78	1.95	1.51	1.64	2.02	1.81	1.83	1.34	1.46	1.76	1.59	1.83	1.63	1.53	2.06	1.71
	Kurt	-0.29	0.12	-0.54	-0.81	-0.32	-0.72	0.04	-0.27	-0.49	-0.15	-0.55	1.71	-0.37	-0.77	-1.18	-0.87	0.48	-0.25	-0.59	-0.18
	Skw	0.15	-0.53	0.26	-0.13	-0.17	-0.21	-0.29	-0.04	-0.69	-0.63	-0.21	-0.74	-0.06	-0.12	-0.15	-0.16	-0.56	-0.13	-0.49	-0.32
17y	N	69	69	69	69	69	133	133	133	133	133	30	30	30	30	30	95	95	95	95	95
	M	6.29	6.77	5.88	6.90	7.00	6.20	6.59	6.44	7.60	7.60	6.70	6.87	6.23	5.67	7.57	6.16	6.47	5.99	7.49	7.48
	SD	1.66	1.45	1.66	1.95	1.89	1.95	1.61	1.59	1.93	1.65	1.82	1.89	1.79	2.12	1.83	1.89	1.79	1.55	2.10	1.85
	Kurt	-0.36	0.45	-0.06	-0.19	0.03	-0.49	-0.58	-0.76	-0.52	0.02	-0.60	-0.62	-0.07	-1.01	-1.16	-0.47	-0.52	-0.02	0.01	-0.18
	Skw	-0.28	-0.63	0.13	-0.34	-0.60	-0.07	-0.02	-0.06	-0.56	-0.51	-0.03	-0.35	0.24	0.10	-0.38	0.03	-0.31	-0.21	-0.86	-0.54
18y	N	43	43	43	43	43	121	121	121	121	121	36	36	36	36	36	77	77	77	77	77
	M	5.53	6.30	6.23	7.05	7.35	6.30	6.85	6.50	7.58	7.40	5.61	6.58	5.97	6.22	7.17	5.88	6.84	6.21	7.10	7.78
	SD	1.72	1.79	1.85	2.13	1.60	1.83	1.45	1.68	2.03	1.88	1.74	1.52	2.01	2.33	1.98	1.76	1.43	1.50	2.14	1.62
	Kurt	-0.57	-0.28	-0.66	-0.95	-0.27	-1.14	-0.39	-0.11	-0.17	-0.73	-0.59	-0.87	-0.74	-1.28	-1.00	-0.35	-0.71	-0.02	-0.91	-0.77
	Skw	-0.52	-0.61	-0.19	-0.28	-0.28	-0.23	-0.14	-0.08	-0.77	-0.36	-0.18	-0.17	-0.27	0.10	-0.15	-0.35	-0.24	0.31	-0.30	-0.24
19y	N	17	17	17	17	17	80	80	80	80	80	28	28	28	28	28	46	46	46	46	46
	M	6.12	6.47	6.29	6.88	7.94	6.13	6.69	6.80	7.51	7.78	6.29	6.71	5.93	5.75	6.11	5.74	6.39	6.46	6.85	7.28
	SD	1.96	1.46	1.99	2.50	1.68	1.70	1.61	1.50	1.94	1.81	1.46	1.67	1.54	1.78	1.97	1.51	1.44	1.60	1.93	1.70
	Kurt	0.44	-1.22	-1.37	-0.86	-1.22	-0.45	0.08	-0.07	-0.51	-0.56	-0.47	-1.16	-0.38	-0.59	0.50	-0.04	-0.01	-0.82	-0.94	-0.93
	Skw	0.43	-0.27	-0.03	-0.23	-0.08	-0.25	-0.27	-0.02	-0.57	-0.54	-0.69	-0.02	-0.07	-0.15	-0.66	-0.30	0.02	-0.09	-0.16	0.11

Table 3 | Regression model 1 – predictor: age

dependent	Regression model 1	
variable	**Predictor: Age**	
Extraversion	**F = 45.779*** **	
	R^2 = .016	
	t(age) = -6.766* **	**Stand. β = -0.126**
Agreeableness	**F = 32.211*** **	
	R^2 = .011	
	t(age) = -5.675* **	**Stand. β = -0.106**
Conscientiousness	F = 7.054**	
	R^2 = .002	
	t(age) = 2.656**	Stand. β = 0.050
Neuroticism	F = 26.394***	
	R^2 = .009	
	t(age) = 5.138***	Stand. β = 0.096
Openness	F = 7.206**	
	R^2 = .003	
	t(age) = 2.684**	Stand. β = 0.050

legend: **p < 0.01; ***p < 0.001

concerning neuroticism. Girls show a higher rate of neuroticism, which is manifested in adolescence especially through higher anxiety, emotional instability, and more intense perception of negative emotions. Concerning this age group, we also identified a significant difference in agreeableness (as to the average value of raw scores of agreeableness for boys and girls aged 11–15,

Table 4 | Regression model 2 – predictors: age and sex

dependent	Model	
variable	**Predictors: Age x Sex**	
Extraversion	F = 24.267***	
	R^2 = .016	
	t(age) = -6.486***	Stand. β = -0.122
	t(sex) = -1.651	Stand. β = -0.031
Agreeableness	F = 19.031***	
	R^2 = .013	
	t(age) = -5.951***	Stand. β = -0.112
	t(sex) = 2.408*	Stand. β = 0.045
Conscientiousness	**F = 9.771*** **	
	R^2 = .007	
	t(age) = 2.165*	**Stand. β = 0.041**
	t(sex) = 3.530* **	**Stand. β = 0.067**
Neuroticism	F = 106.397***	
	R^2 = .070	
	t(age) = 3.435***	Stand. β = 0.063
	t(sex) = 13.590***	Stand. β = 0.249
Openness	**F = 59.646*** **	
	R^2 = .040	
	t(age) = 1.296	**Stand. β = 0.024**
	t(sex) = 10.574* **	**Stand. β = 0.197**

legend: *p < 0.05; ***p < 0.001

Table 5 | Regression model 3 – predictors: age, sex and nationality

dependent	Regression model	
variable	**Predictors: Age x Sex x Nationality**	
Extraversion	F = 16.345***	
	R^2 = .017	
	t(age) = -6.519	Stand. β = -0.124
	t(sex) = -1.689	Stand. β = -0.032
	t(nation.) = 0.715	Stand. β = 0.014
Agreeableness	F = 14.223***	
	R^2 = .015	
	t(age) = -5.568***	Stand. β = -0.106
	t(sex) = 2.526*	Stand. β = 0.048
	t(nation.) = -2.135*	Stand. β = -0.040
Conscientiousness	F = 7.835***	
	R^2 = .008	
	t(age) = 2.439*	Stand. β = 0.047
	t(sex) = 3.638***	Stand. β = 0.069
	t(nation.) = -1.986*	Stand. β = -0.038
Neuroticism	**F = 76.108*** **	
	R^2 = .075	
	t(age) = 3.975* **	**Stand. β = 0.073**
	t(sex) = 13.816* **	**Stand. β = 0.253**
	t(nation.) = -3.810* **	**Stand. β = -0.070**
Openness	F = 39.927***	
	R^2 = .041	
	t(age) = 1.175	Stand. β = 0.022
	t(sex) = 10.516	Stand. β = 0.196
	t(nation.) = 0.714	Stand. β = 0.013

legend: *p < 0.05; ***p < 0.001

we identified a difference equalling 4.5 points). Concerning the whole research sample, we did not identify any significant difference between boys and girls, although our results suggest that in the first years of adolescence girls are more agreeable. Our results also point out significant differences in agreeableness concerning girls of various ages. In a lower age, girls are significantly more agreeable compared to a higher age.

The results of our study correspond to the research conducted by Soto et al. (2011). According to them, in the period of adolescence, neuroticism increases with age, while extraversion and agreeableness decrease with age. We identified a greater decrease in relation to increasing age in the group of girls. The difference may be illustrated with the group of Slovak girls. Those aged 11 reached the average score for agreeableness 7.95 (the highest of all groups under observation; see Table 2); the average score of those aged 19 was second lowest (6.39). As to the research sample of girls and the dimension of conscientiousness, our results correspond to findings reached by Donnellan and Lucas (2008), Gonzatti et al. (2017), according to whom conscientiousness increases with age. Similarly, our findings concerning sex-based differences in conscientiousness correspond to the findings of Weisberg, Deyoung and Hirsh (2011),

although the research team did not identify sex-based differences concerning the factor of conscientiousness, but rather a higher score of females concerning the aspect of orderliness. We can not support the findings of the Eastern cultures studies about missing sex differences in Big Five factors (e.g. Cao & Ji (2024); Tivari & Ojha (2024)).

Sex-based differences concerning openness to experience correspond to the findings of Gonzatti et al. (2017). We identified a higher rate of openness in the group of girls.

Our results also support the evidence of national specifics formulated by Weisberg, Deyoung and Hirsh (2011), McCrae et al. (2004), and Costa, Terracciano and McCrae (2001), Schmitt et al. (2007) or Kajonius and Giolla (2017). Significant differences between the Czech and the Slovak part of the research sample were identified in neuroticism, where higher scores were reached by Czech adolescents. We also identified a difference in agreeableness in favour of Czech adolescents.

In the context of adolescence, our findings may be beneficial in psychological counselling and prevention of risky behaviour. A study conducted by Mezquitu et al. (2019) confirms a relationship between the overall mental health of students in the period of early adolescence and the emerging adulthood and individual factors of the Big Five in an intercultural comparison. Higher neuroticism, lower extraversion, and lower agreeableness and conscientiousness are all related to the general condition of the individual's mental health. Depression, anxiety and somatic conditions are linked to high neuroticism. Anti-social behaviour is linked to low agreeability and low conscientiousness. Our research sample also indiated the trend of decreasing extraversion and agreeableness and increasing neuroticism in the period of adolescence. Increasing conscientiousness was identified for girls; this might serve as a protective factor against anti-social behaviour. Higher agreeableness and openness are, according to Ackermann and Ackermann (2015), related to a higher willingness to accept otherness and ethnic diversity. In the context of our findings concerning adolescence, it means that the beginning of the developmental stage is an ideal time for working with attitudes towards ethnic and national diversity.

Our research findings support the assumption that sex, age, and nationality are important predictors for the basic personality characteristics defined by the Big Five mode even in the relatively short ontogenetic period of adolescence. It is therefore worth considering their effect, particularly when comparing younger and older adolescents, and reflect on the findings that the development of personality characteristics in this period has the opposite trend compared to the following developmental stages of adulthood and seniority.

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