

International Student Research on Sustainability

**Research report on the factor structures and psychometric characteristics of
the applied scales**

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Introduction

In order to strengthen the international cooperation of the research, a representative sample survey was conducted in October 2022 among, 17-year-old, 11th grade secondary school students in Hungary, Slovakia and Czech Republic. The main aim of the research is to reveal students' views on sustainability issues. This report summarizes the basic psychometric characteristics of the scales used in the research.

I. Demographic variables

I/1. Number of respondents

The total sample consists of 6477 respondents, 3434 from Hungary, 1656 from the Czech Republic and 1387 from Slovakia.

I/2. Gender

In the joint (Hungarian, Czech and Slovakian) sample there were more boys (52%, N=3365) than girls (48%, N=3112). A similar gender rate was found in each national sample (see Table 1)

	Hungary	Czechia	Slovakia
Boy	1806	844	711
Girl	1628	812	676

I/3. Age

Students could choose from a list of 15 to 19 to mark their ages. In the joint sample, the mean age was (M=) 16.73 years (SD=0.706). The mean age in the country samples did not deviate significantly from each other, with the Hungarian sample's mean being (M=) 16.89 (SD=0.644), the Czech sample's being (M=) 16.53 (SD=0.779) and the Slovakian sample's being (M=) 16.56 (SD=0.659).

I/4. Number of people living together

Students could choose from a list of 1 to 10 to mark how many people live in their households. According to the joint sample, the mean size of a household was (M=) 4.02 people (SD=1.201) – 40.6% of all students stated that they live in a household of four people. This is quite similar to each national sample’s means, as on the Hungarian sample this number was (M=)3.99 (SD=1.151), on the Czech sample it was (M=)3.98 (SD=1.22) and on the Slovakian sample it was (M=)4.14 (SD=1.289).

I/5. Number of rooms of residence in the household

Students could indicate that their household contains 0, 1, 2, 3 or more rooms. According to our findings, most students reported more than three (46.8%) rooms or three rooms (36%) in their household. This was also true for the Czech and Slovakian sample. Hungarian students of our sample mostly lived in three-roomed households (see Table 2).

	Hungary	Czechia	Slovakia
no room	8	10	4
1 room	38	28	17
2 rooms	725	141	133
3 rooms	1486	402	429
More than three rooms	1157	1062	794

I/6. Number of IT devices in the households

We’ve also examined the number of IT devices (smartphones, notebooks, tablets, personal computers, gaming consoles) in their households. In the joint sample, most students answered that there are between 6 and 10 of such devices (49.4%) in their households, while 21.7% reported between one and five and 19.2% of all students indicated between eleven and fifteen devices. These ratios were also similar in each national sample (see Table 3).

	Hungary	Czechia	Slovakia
Have no such device	14	12	2
Between 1-5	815	286	295
Between 6-10	1657	805	713
Between 11-15	639	362	235
More than 15	282	178	128

II. Environmental worldviews: NEP

II/1. NEP scores

The New Environmental Paradigm (NEP) scales for Children (Manoli et al., 2007) was used in the research to measure the environmental worldviews of the students. Worldviews are an important facet of studying environmentalism since they form a basis for one's attitudes.

First of all, we checked the mean scores of each of the ten NEP items on the joint and the national samples (see Table 4 – the items marked with an “R” are reversed items).

	Joint sample M (SD)	Hungarian sample M (SD)	Czech sample M (SD)	Slovakian sample M (SD)
1 st item	3.96 (1.208)	4.09 (1,144)	3.71 (1.265)	3.96 (1.233)
2 nd item	3.90 (1.105)	3.95 (1,066)	3.95 (1.077)	3.75 (1.207)
3 rd item (R)	3.39 (1.301)	3.36 (1.261)	3.56 (1.302)	3.28 (1.381)
4 th item	4.20 (0.988)	4.37 (0,881)	4 (1.065)	4.03 (1.083)
5 th item	3.86 (1.049)	3.79 (1.032)	4.05 (1.035)	3.83 (1.074)
6 th item (R)	3.56 (1.183)	3.56 (1.161)	3.52 (1.245)	3.64 (1.138)
7 th item (R)	3.78 (1.200)	3.79 (1.196)	3.78 (1.194)	3.79 (1.189)
8 th item	4.13 (0.975)	4.20 (0.927)	4.08 (0.978)	4.03 (1.046)
9 th item (R)	3.05 (1.199)	3.06 (1.206)	3.18 (1.198)	2.87 (1.155)
10 th item	4.22 (0.998)	4.31 (0.937)	4.07 (1.059)	4.22 (1.020)

II/2. Factor analysis

We've conducted an Exploratory Factor Analysis (EFA) on the NEP items on the joint sample and each national sample. In all cases, we ran the same statistical analyses, both the correlational matrixes, the Kaiser-Meyer-Olkin (KMO) and Bartlett tests showed that the items were adequate for factor analysis on each sample (for the exact KMO values and the results of the Bartlett test see Table 5).

	KMO test	Bartlett test
Joint sample	0.737	$\chi^2(45)=7000.923, p<0.001$
Hungarian Sample	0.713	$\chi^2(45)=3617.843, p<0.001$
Czech Sample	0,765	$\chi^2(45)=2017.7, p<0.001$
Slovakian Sample	0,740	$\chi^2(45)=1640.286, p<0.001$

For the EFA we used Principal Component Analysis (PCA) with varimax rotation – we chose it since the factor structure of this measurement tool has been originally examined by Manoli et al (2007) also with this method. In all four cases, both according to the eigenvalues (see Table 6) and the scree-plots, the NEP consists of three factors. In the following, we present the factor structure of NEP in each sample.

	Joint Sample		Hungarian Sample		Czech Sample		Slovakian Sample	
	Total initial eigenvalue	Explained variance (%)	Total initial eigenvalue	Explained variance (%)	Total initial eigenvalue	Explained variance (%)	Total initial eigenvalue	Explained variance (%)
1 st factor	2.458	24.58	2.345	23.45	2.667	26.67	2.543	25.43
2 nd factor	1.456	14.56	1.533	15.33	1.346	13.46	1.460	14.60
3 rd factor	1.147	11.47	1.195	11.95	1.112	11.12	1.135	11.35
Cumulative explained variance (%)	-	50.61	-	50.73	-	51.25	-	51.38

II/2A. Joint NEP Sample

In the joint sample, our NEP items (see Table 7) showed a factor structure similar to the results found by Berze et al. (2022) in their examination of the questionnaire on a large sample of Hungarian students.

	NEP 1 st Factor	NEP 2 nd Factor	NEP 3 rd Factor
1 st item	0.719		
2 nd item		0.648	
3 rd item (R)	-0.359	0.335	0.517
4 th item	0.675		
5 th item	0.547	0.356	
6 th item (R)			0.549
7 th item (R)	0.388		0.661
8 th item		0.687	
9 th item (R)			0.729
10 th item		0.689	

II/2B. Hungarian NEP Sample

The factor structure resulting on the Hungarian sample was the same as found on the joint sample and by Berze et al. (2022) (see Table 8).

	NEP 1 st Factor Rights of Nature	NEP 2 nd Factor Eco-Crisis	NEP 3 rd Factor Questioning of Human Intervention
1 st item	0.713		
2 nd item		0.686	
3 rd item (R)	-0.326		0.512
4 th item	0.688		
5 th item	0.586	0.306	
6 th item (R)	-0.250	0.253	0.556
7 th item (R)	0.327		0.691
8 th item		0.661	
9 th item (R)			0.710
10 th item		0.717	

II/2C. Czech NEP Sample

The factor structure found on the Czech sample deviated from the joint sample's and the Hungarian sample's structure: the 7th item had higher loading on the 1st factor than on the 3rd one and the 5th, 7th and 9th items showed strong cross-loadings (see Table 9).

	NEP 1 st Factor	NEP 2 nd Factor	NEP 3 rd Factor
1 st item	0.708		
2 nd item		0.573	
3 rd item (R)			0.647
4 th item	0.604		
5 th item	0.569	0.441	
6 th item (R)			0.615
7 th item (R)	0.603		0.431
8 th item		0.753	
9 th item (R)	0.472		0.599
10 th item		0.708	

II/2D. Slovakian NEP Sample

Just like in the case of the Czech sample, the NEP factor structure found on the Slovakian sample also deviated from the joint and Hungarian samples: the 5th item had a bit higher loading on the 2nd factor than on the 1st factor, and the 3rd factor also showed strong cross-loadings (see Table 10).

	NEP 1 st Factor	NEP 2 nd Factor	NEP 3 rd Factor
1 st item	0.735		
2 nd item		0.591	
3 rd item (R)	-0.440	0.400	0.477
4 th item	0.662		
5 th item	0.463	0.490	
6 th item (R)			0.534
7 th item (R)	0.362		0.685
8 th item		0.696	
9 th item (R)			0.752
10 th item		0.667	

III. Climate Change Attitudes (CCA)

Attitudes of the students toward climate change were investigated by the Climate Change Attitudes Scale (Christensen, 2015). The examination of students' attitudes is important considering the scope of the crisis that Climate Change presents.

III/1. CCA scores

First, we checked the mean scores of each of the ten CCA items and their sum on the joint and the national samples (see Table 11).

	Joint sample M (SD)	Hungarian sample M (SD)	Czech sample M (SD)	Slovakian sample M (SD)
1 st item	4.42 (0.929)	4.40 (0.943)	4.52 (0.831)	4.47 (0.884)
2 nd item	3.87 (1.171)	3.89 (1.153)	3.88 (1.217)	3.87 (1.154)
3 rd item	4.24 (0.996)	4.29 (0.978)	4.21 (1.001)	4.24 (0.985)
4 th item	4.07 (1.080)	4.13 (1.063)	3.92 (1.083)	4.16 (1.025)
5 th item	4.30 (0.984)	4.31 (0.971)	4.33 (0.976)	4.32 (0.980)
6 th item	3.93 (1.150)	3.91 (1.152)	3.94 (1.142)	4.02 (1.146)
7 th item	4.12 (1.040)	4.13 (1.026)	4.12 (1.065)	4.15 (0.999)
8 th item	4.13 (1.028)	4.18 (1.015)	4.08 (1.049)	4.17 (0.993)
Sum scores	33.22 (6.398)	33.25 (6.465)	33.00 (6.375)	33.40 (6.256)

We've conducted an Exploratory Factor Analysis (EFA) on the CCA items on the joint sample and each national sample. In all cases, we ran the same statistical analyses, both the correlational matrixes, the Kaiser-Meyer-Olkin (KMO) and Bartlett tests showed that the items were adequate for factor analysis on each sample (for the exact KMO values and the results of the Bartlett test see Table 12).

	KMO test	Bartlett test
Joint sample	0.928	$\chi^2(28)=25818.544, p<0.001$
Hungarian Sample	0.931	$\chi^2(28)=14515.671, p<0.001$
Czech Sample	0.922	$\chi^2(28)=6208.474, p<0.001$
Slovakian Sample	0.916	$\chi^2(28)=5400.917, p<0.001$

For the EFA we used Principal Component Analysis (PCA) with varimax rotation – we chose it since the factor structure of this measurement tool has been originally examined also with this method during its development and further testing (Christensen & Knezek, 2018). In all four cases, both according to the eigenvalues (see Table 13) and the scree-plots, the CCA consists of only one factor – the original CCA has two factors but for this study we only used the first eight

items of the measurement tool, which all load on a single factor. In the followings, we present the factor structures for each sample.

	Joint Sample		Hungarian Sample		Czech Sample		Slovakian Sample	
	Total initial eigenvalue	Explained variance (%)	Total initial eigenvalue	Explained variance (%)	Total initial eigenvalue	Explained variance (%)	Total initial eigenvalue	Explained variance (%)
1 st factor	4.795	59.94	4.904	61.30	4.665	58.32	4.722	59.03
Cumulative explained variance (%)	-	59.94	-	61.30	-	58.32	-	59.03

III/2. Factor analyses

Both in the joint and each national sample, the PCA revealed one component with an eigenvalue greater than 1, i.e., all items loaded only on a single factor explaining the 58.32-61.30% of the variance (see Table 14 for the loadings and the previous Table 13 for the explained variance).

	Joint sample	Hungarian sample	Czech sample	Slovakian sample
1 st item	0.766	0.787	0.735	0.757
2 nd item	0.740	0.733	0.771	0.719
3 rd item	0.817	0.833	0.797	0.803
4 th item	0.765	0.767	0.761	0.775
5 th item	0.827	0.840	0.807	0.818
6 th item	0.675	0.671	0.660	0.706
7 th item	0.783	0.794	0.775	0.765
8 th item	0.810	0.823	0.793	0.797

IV. Pro-environmental behaviours (PEB)

To assess pro-environmental behaviours, we used 14 items based on the research of Mónus (2022). This questionnaire was a crucial part of our research since the aim of environmental education is precisely to achieve changes in pro-environmental behaviours of children.

IV/1. PEB scores

The following table presents the mean scores of each of the 14 PEB items on the joint and on the national samples (see Table 15 – the items marked with an “R” are reversed items).

	Joint Sample	Hungarian Sample	Czech Sample	Slovakian Sample
1 st item	3.68 (1.285)	3.59 (1.312)	3.95 (1.231)	3.58 (1.224)
2 nd item	4.28 (1.014)	4.32 (0.992)	4.35 (0.969)	4.26 (1.014)
3 rd item	2.95 (1.168)	2.98 (1.156)	2.81 (1.182)	3.06 (1.126)
4 th item	2.27 (1.209)	2.21 (1.174)	2.20 (1.163)	2.35 (1.266)
5 th item	2.28 (1.224)	2.36 (1.215)	2.02 (1.155)	2.19 (1.213)
6 th item	3.82 (1.196)	3.71 (1.230)	4.03 (1.127)	3.99 (1.092)
7 th item	1.96 (1.120)	1.98 (1.118)	1.74 (0.997)	2.03 (1.161)
8 th item	2.29 (1.216)	2.35 (1.213)	2.01 (1.139)	2.33 (1.237)
9 th item	2.64 (1.367)	2.67 (1.360)	2.52 (1.373)	2.67 (1.405)
10 th item	2.51 (1.388)	2.43 (1.342)	2.40 (1.385)	2.75 (1.461)
11 th item	2.13 (1.166)	2.17 (1.167)	1.91 (1.079)	2.16 (1.198)
12 th item	3.58 (1.338)	3.64 (1.331)	3.60 (1.368)	3.48 (1.346)
13 th item	3.29 (1.371)	3.29 (1.363)	3.15 (1.442)	3.51 (1.308)
14 th item (R)	2.81 (1.186)	2.87 (1.166)	2.85 (1.230)	2.71 (1.188)

IV/2. Factor analyses

We’ve conducted an Exploratory Factor Analysis (EFA) on PEB items on the joint sample and each national sample. In all cases, we ran the same statistical analyses, both the correlational matrixes, the Kaiser-Meyer-Olkin (KMO) and Bartlett tests showed that the items were adequate for factor analysis on each sample (for the exact KMO values and the results of the Bartlett test see Table 16).

	KMO test	Bartlett test
Joint sample	0.884	$\chi^2(91)=22660.868, p<0,001$
Hungarian Sample	0.889	$\chi^2(91)=13195.359, p<0,001$
Czech Sample	0.864	$\chi^2(91)=4917.277, p<0,001$
Slovakian Sample	0.865	$\chi^2(91)=5004.090, p<0,001$

For the EFA we used Principal Axis Factoring (PAF) with direct oblimin rotation. The scale has not been examined with factor analysis yet, since it was developed for this research. In all cases, the factor analyses revealed three factors with eigenvalues greater than 1. The cumulative explained variance was found above 50% in every sample except the Czech sample (see Table 17). In the followings we will show the factor structure.

	Joint Sample		Hungarian Sample		Czech Sample		Slovakian Sample	
	Total initial eigenvalue	Explained variance (%)	Total initial eigenvalue	Explained variance (%)	Total initial eigenvalue	Explained variance (%)	Total initial eigenvalue	Explained variance (%)
1 st factor	4.327	30.907	4.604	32.886	3.959	28.278	4.186	29.901
2 nd factor	1.823	13.021	1.765	12.608	1.742	12.439	2.051	14.652
3 rd factor	1.051	7.508	1.060	7.569	1.096	7.828	1.055	7.533
Cumulative explained variance (%)	-	51.437	-	53.063	-	48.546	-	52.086

IV/2A. Joint sample

The factor structure of the Pro-Environmental Behaviour items was found not to be clear and stable on the joint sample. The 3rd, 9th, 10th, 12th, 13th, and 14th items' loadings were shown (well) under the desired 0.5 value (the 14th item can be considered not to load on any of the 3 factors) and the 3rd, 10th, 12th and 13th items also had cross-loadings (see Table 18).

	1 st Factor	2 nd Factor	3 rd Factor
1 st item		0.547	
2 nd item		0.546	
3 rd item	0.425	0.251	
4 th item	0.687		
5 th item	0.738		
6 th item		0.720	
7 th item	0.801		
8 th item	0.778		
9 th item	0.347		
10 th item	0.358	0.135	0.236
11 th item	0.805		
12 th item		0.271	0.366
13 th item		0.249	0.430
14 th item (R)			0.174

Regarding the correlation between the factors, it should be noted that all the correlation coefficients are small and significant¹, but not negligible, suggesting an existing, however, moderate relationship between them (see Table 19).

	1 st Factor	2 nd Factor	3 rd Factor
1 st Factor	1		
2 nd Factor	0.261	1	
3 rd Factor	0.356	0.235	1

¹ In this study we used a significance level of 0.05.

IV/2B. Hungarian PEB sample

Like on the joint sample, the factor structure of the Pro-Environmental Behaviour items were found not to be clear and stable also in the Hungarian sample. The 3rd, 9th, 10th, 12th, 13th, and 14th items' loadings were under the desired 0.5 value (the 14th item can be considered not to load on any of the 3 factors) and the 3rd and 12th items also had cross-loading problems (see Table 20).

	1 st Factor	2 nd Factor	3 rd Factor
1 st item		0.602	
2 nd item		0.513	
3 rd item	0.416	0.251	0.121
4 th item	0.730		
5 th item	0.737		
6 th item		0.775	
7 th item	0.814		
8 th item	0.763		
9 th item	0.359	0.126	0.161
10 th item	0.397		0.126
11 th item	0.804		
12 th item		0.217	0.435
13 th item		0.179	0.450
14 th item (R)			0.148

Regarding the correlation between the factors, it should be noted that all the correlation coefficients are small and significant, but not negligible, suggesting an existing, however, moderate relationship between them (see Table 21).

	1 st Factor	2 nd Factor	3 rd Factor
1 st Factor	1		
2 nd Factor	0.316	1	
3 rd Factor	0.337	0.303	1

IV/2C. Czech PEB Sample

An unclear and unstable factor structure of the Pro-Environmental Behaviour items has emerged also in the case of the Czech sample. The 3rd, 9th, 10th, 12th, 13th and 14th items' loadings were shown under the desired 0.5 value and the 3rd, 9th, 12th and 13th items also had cross-loading problems. (see Table 22).

	1 st Factor	2 nd Factor	3 rd Factor
1 st item		0.531	
2 nd item		0.594	
3 rd item	0.396	0.211	
4 th item	0.625		
5 th item	0.745		
6 th item		0.567	
7 th item	0.733		
8 th item	0.775		
9 th item	0.273		-0.154
10 th item	0.300		
11 th item	0.800		
12 th item		0.300	-0.263
13 th item		0.213	-0.444
14 th item (R)			-0.377

Regarding the correlation between the factors, it should be noted that all the correlation coefficients are small yet significant, but not negligible, suggesting an existing, however, moderate relationship between them (see Table 23).

	1 st Factor	2 nd Factor	3 rd Factor
1 st Factor	1		
2 nd Factor	0.297	1	
3 rd Factor	0.324	0.289	1

IV/2D. Slovakian PEB sample

The Pro-Environmental Behaviour items have not formed a stable and clear factor structure also in the Slovakian sample. The 3rd, 9th, 10th, 12th, 13th and 14th items' loadings were under the desired 0.5 value (the 10th and 14th items can be considered not to load on any of the 3 factors) and the 1st, 3rd and 10th items also had cross-loading problems. (see Table 24).

	1 st Factor	2 nd Factor	3 rd Factor
1 st item		0.503	0.268
2 nd item		0.578	
3 rd item	0.403	0.325	
4 th item	0.754		
5 th item	0.641		
6 th item		0.700	
7 th item	0.766		
8 th item	0.812		
9 th item			0.439
10 th item	0.211	0.135	0.236
11 th item	0.723		
12 th item		0.367	
13 th item		0.470	
14 th item			0.257

Regarding the correlation between the factors, the coefficients show moderate correlation between the 1st and the 2nd, and relatively strong correlation between the 1st and 3rd factors – all of them were significant (see Table 25).

	1 st Factor	2 nd Factor	3 rd Factor
1 st Factor	1		
2 nd Factor	0.246	1	
3 rd Factor	0.405	-0.013	1

V. Environmental attitudes

We also included an environmental attitude scale which was developed previously by the Czech partner of the research team on the basis of the 2-MEV (2-Main Environmental Values, Bogner, 2018) scale – in addition to the NEP – to examine environmental attitudes in greater detail.

V/1. Environmental attitudes scores

First of all, we checked the mean scores of each of the ten Environmental attitudes items on the joint and on the national samples (see Table 26 – the items marked with an “R” are reversed items).

	Joint Sample	Hungarian Sample	Czech Sample	Slovakian Sample
1 st item	2.48 (1.225)	2.23 (1.139)	2.68 (1.220)	2.82 (1.260)
2 nd item	3.04 (1.218)	2.86 (1.196)	3.20 (1.180)	3.28 (1.222)
3 rd item	3.12 (1.183)	3.17 (1.183)	2.98 (1.175)	3.15 (1.179)
4 th item	3.66 (1.429)	3.54 (1.456)	3.91 (1.381)	3.66 (1.392)
5 th item	2.75 (1.238)	2.74 (1.214)	2.64 (1.230)	2.84 (1.273)
6 th item	3.51 (1.226)	3.49 (1.231)	3.52 (1.232)	3.57 (1.204)
7 th item	2.84 (1.228)	2.77 (1.224)	2.86 (1.201)	2.93 (1.250)
8 th item	2.28 (1.167)	2.34 (1.143)	2.21 (1.183)	2.12 (1.148)
9 th item	2.58 (1.312)	2.66 (1.284)	2.38 (1.339)	2.54 (1.305)
10 th item	2.30 (1.124)	2.31 (1.089)	2.20 (1.115)	2.26 (1.157)
11 th item	3.34 (1.237)	3.49 (1.192)	3.14 (1.269)	3.23 (1.256)
12 th item	2.69 (1.351)	2.87 (1.349)	2.28 (1.252)	2.66 (1.379)
13 th item	3.50 (1.268)	3.69 (1.203)	3.26 (1.304)	3.34 (1.319)
14 th item	3.63 (1.273)	3.55 (1.293)	3.93 (1.144)	3.45 (1.326)
15 th item	3.93 (1.202)	3.88 (1.208)	4.12 (1.141)	3.86 (1.233)
16 th item	2.94 (1.422)	2.87 (1.411)	2.98 (1.448)	3.01 (1.426)
17 th item	3.52 (1.280)	3.52 (1.280)	3.45 (1.305)	3.62 (1.254)

V/2. Factor analyses

We've conducted an Exploratory Factor Analysis (EFA) on the Environmental attitudes items on the joint sample and on each national sample. In all cases, we ran the same statistical analyses, both the correlational matrixes, the Kaiser-Meyer-Olkin (KMO) and Bartlett tests showed that the items were adequate for factor analysis on each sample (for the exact eigenvalues and explained variance percentages in addition to the KMO values and the results of the Bartlett test see Table 27).

	KMO test		Bartlett test	
Joint sample	0.877		$\chi^2(136)=32395.453$, p<0.001	
Hungarian Sample	0.881		$\chi^2(136)=18085.729$, p<0.001	
Czech Sample	0.884		$\chi^2(136)=8645.036$, p<0.001	
Slovakian Sample	0.858		$\chi^2(136)=6781.543$, p<0.001	

Eigenvalues and explained variance								
	Joint Sample		Hungarian Sample		Czech Sample		Slovakian Sample	
	Total initial eigenvalue	Explained variance (%)	Total initial eigenvalue	Explained variance (%)	Total initial eigenvalue	Explained variance (%)	Total initial eigenvalue	Explained variance (%)
1 st factor	5.006	27.812	4.992	27.735	5.402	30.010	4.901	27.228
2 nd factor	2.423	13.461	2.607	14.482	2.211	12.284	2.266	12.590
3 rd factor	1.558	8.656	1.628	9.045	1.439	7.995	1.572	8.732
4 th factor	1.049	5.827	1.047	5.818	1.022	5.677	1.126	6.257
Cumulative explained variance (%)	-	55.756	-	52.774	-	55.966	-	54.807

For the EFA we used Principal Component Analysis (PCA) with varimax rotation – we chose it since the factor structure of this measurement tool's original version has been examined also with this method during its development and further testing (Bogner, 2018). In all four cases, both according to the eigenvalues and the scree-plots, the Environmental attitudes consisted of three factors. In the followings, we will show the factor structures in each condition. When compiling the questionnaire pack, we omitted one item concerning humanity's rule over nature.

V/2B. Joint Environmental attitudes Sample

The Environmental attitudes items are structured as they did in their analysis in the original publication (Bogner, 2018). Despite this, the 4th item's loading was found under the desired 0.5 value (Table 28).

Table 28			
	1 st Factor	2 nd Factor	3 rd Factor
1 st item	0.750		
2 nd item	0.806		
3 rd item	0.707		
4 th item	0.442		
5 th item	0.764		
6 th item	0.635		
7 th item		0.524	
8 th item		0.626	
9 th item		0.709	
10 th item		0.752	
11 th item		0.575	
12 th item		0.584	
13 th item			0.728
14 th item			0.820
15 th item			0.790
16 th item			0.686
17 th item			0.727

V/2D. Hungarian Environmental attitudes Sample

The Environmental attitudes items are structured as they did in their analysis in the original publication (Bogner, 2018). Despite this, the 4th item's loading was found under the desired 0.5 value (see Table 29).

Table 29			
	1 st Factor	2 nd Factor	3 rd Factor
1 st item	0.739		
2 nd item	0.810		
3 rd item	0.708		
4 th item	0.481		
5 th item	0.803		
6 th item	0.626		
7 th item		0.577	
8 th item		0.628	
9 th item		0.684	
10 th item		0.739	
11 th item		0.565	
12 th item		0.611	
13 th item			0.740
14 th item			0.835
15 th item			0.816
16 th item			0.665
17 th item			0.747

V/2F. Czech Environmental attitudes Sample

The Environmental attitudes items are structured as they did in their analysis in the original publication (Bogner, 2018). Despite this, the 4th item's loading was under the desired value of 0.5 (Table 30).

	1 st Factor	2 nd Factor	3 rd Factor
1 st item	0.780		
2 nd item	0.793		
3 rd item	0.728		
4 th item	0.362		
5 th item	0.742		
6 th item	0.646		
7 th item		0.510	
8 th item		0.614	
9 th item		0.729	
10 th item		0.764	
11 th item		0.621	
12 th item		0.563	
13 th item			0.691
14 th item			0.825
15 th item			0.774
16 th item			0.678
17 th item			0.681

V/2H. Slovakian Environmental attitudes Sample

The Environmental attitudes items are structured as they did in their analysis in the original publication (Bogner, 2018) – but it is questionable whether a 4th factor should be added here too since a 4th factor's eigenvalue is exactly 1 (see Table 27). Despite this, the 4th, 7th and 11th items' loadings were under the desired value of 0.5 (see Table 31).

	1 st Factor	2 nd Factor	3 rd Factor
1 st item	0.719		
2 nd item	0.791		
3 rd item	0.723		
4 th item	0.398		
5 th item	0.712		
6 th item	0.630		
7 th item		0.474	
8 th item		0.626	
9 th item		0.728	
10 th item		0.761	
11 th item		0.498	
12 th item		0.502	
13 th item			0.737
14 th item			0.802
15 th item			0.757
16 th item			0.744
17 th item			0.728

VI. Environmental Hope (EH)

We investigated environmental hope with the Environmental Hope scale (Kerret et al., 2020). Environmental hope is a complex construct measuring individuals' beliefs of being able to generate plans and execute them with the goal of environmental protection, thus helping us to understand the cognitive pathways and level of agency thinking that students possess.

VI/1. EH scores

The table below presents the mean scores of each of the ten EH items and their sum on the joint and on the national samples (see Table 32).

	Joint Sample	Hungarian Sample	Czech Sample	Slovakian Sample
1 st item	2.90 (1.076)	2.83 (1.079)	3.04 (1.060)	2.87 (1.072)
2 nd item	3.23 (1.118)	3.36 (1.089)	2.92 (1.163)	3.28 (1.059)
3 rd item	3.07 (1.133)	3.15 (1.141)	2.93 (1.125)	3.02 (1.108)
4 th item	2.85 (1.172)	3.06 (1.146)	2.53 (1.145)	2.67 (1.139)
5 th item	2.93 (1.145)	2.94 (1.137)	2.83 (1.162)	2.98 (1.124)
6 th item	3.70 (1.171)	3.88 (1.124)	3.48 (1.190)	3.58 (1.183)
7 th item	2.81 (1.264)	2.81 (1.273)	2.96 (1.285)	2.61 (1.211)
8 th item	3.22 (1.181)	3.32 (1.151)	3.07 (1.247)	3.13 (1.158)
9 th item	2.81 (1.128)	2.76 (1.145)	2.83 (1.132)	2.87 (1.089)
10 th item	2.55 (1.170)	2.63 (1.170)	2.29 (1.131)	2.58 (1.158)
EH score's SUM	30.01 (6.890)	30.73 (6.837)	28.88 (6.865)	29.59 (6.837)

VI/2. Factor analyses

We've conducted an Exploratory Factor Analysis (EFA) on the EH items on the joint sample and on each national samples. In all cases, we ran the same statistical analyses, both the

	KMO test				Bartlett test			
Joint sample	0.853				$\chi^2(45)=14823.374, p<0.001$			
Hungarian Sample	0.850				$\chi^2(45)=8132.750, p<0.001$			
Czech Sample	0.845				$\chi^2(45)=3912.613, p<0.001$			
Slovakian Sample	0.848				$\chi^2(45)=3456.491, p<0.001$			
Eigenvalues and explained variance								
	Joint Sample		Hungarian Sample		Czech Sample		Slovakian Sample	
	Total initial eigenvalue	Explained variance (%)	Total initial eigenvalue	Explained variance (%)	Total initial eigenvalue	Explained variance (%)	Total initial eigenvalue	Explained variance (%)
1 st factor	3.665	26.653	3.694	36.942	3.619	36.187	3.757	37.567
2 nd factor	1.251	12.509	1.207	12.073	1.403	14.027	1.409	14.087
3 rd factor	-	-	1.070	10.698	-	-	-	-
Cumulative explained variance (%)	-	49.163	-	59.714	-	50.214	-	51.654

correlational matrixes, the Kaiser-Meyer-Olkin (KMO) and Bartlett tests showed that the items are adequate for factor analysis on each sample (for the exact eigenvalues and explained variance in addition to the KMO values and the results of the Bartlett test see Table 33).

For the EFA we used Principal Axis Factoring (PAF) with direct oblimin rotation. The measurement tool has not been examined with factor analysis yet. According to the eigenvalues, two or three factors were found in the examined samples.

VI/2A. Joint EH Sample

The EFA of the items of the Environmental Hope scale resulted in, as indicated by the eigenvalue, two factors explaining only 49.16% of the variance. The 3rd, 6th and 9th items' loadings were under the desired 0.5 value (the 3rd item can be considered not to load on any of the 2 factors) and the 3rd item also had cross-loading problem (see Table 34).

	1 st factor	2 nd factor
1 st item	0.648	
2 nd item	0.690	
3 rd item	<i>0.275</i>	0.175
4 th item	0.786	
5 th item	0.720	
6 th item		<i>0.441</i>
7 th item		0.644
8 th item		0.579
9 th item		<i>0.426</i>
10 th item	0.590	

The correlation between the two factors is adequately strong and significant, meaning that while they are different constructs they also might be interconnected (see Table 35).

	1 st factor	2 nd factor
1 st factor	1	
2 nd factor	0.593	1

VI/2B. Hungarian EH Sample

The EFA of the Environmental Hope scale items resulted in, as indicated by the eigenvalue, three factors which explain 59.71% of the variance. The 3rd and 8th items' loadings were (well) under the desired 0.5 value (the 3rd item can be considered not to load on any of the 3 factors) and the 3rd and 8th items also have cross-loading problems. On the 3rd factor the only item with loading above 0.5 is the 6th item, thus making the need for this factor questionable (Table 36).

	1 st factor	2 nd factor	3 rd factor
1 st item	0.703		
2 nd item	0.613		
3 rd item		0.165	-0.233
4 th item	0.726		
5 th item	0.703		
6 th item			-0.621
7 th item		0.604	
8 th item		0.375	-0.397
9 th item		0.500	
10 th item	0.618		

The correlations between the factors are varying in strength, however, they are not too weak and all of them are significant. The 3rd factor correlates negatively with both other factors, and only the coefficient between this and the 2nd factor might be considered small (see Table 37).

	1 st Factor	2 nd Factor	3 rd Factor
1 st Factor	1		
2 nd Factor	0.468	1	
3 rd Factor	-0.402	-0.270	1

VI/2C. Czech EH Sample

The results of the EFA of the Environmental Hope scale items showed, as indicated by the eigenvalue, two factors explaining only 50.21% of the variance. The 3rd, 8th and 9th items' loadings were under the desired 0.5 value, but unlike the previous sample's factor analyses, we found no cross-loadings (see Table 38).

	1 st factor	2 nd factor
1 st item	0.648	
2 nd item	0.713	
3 rd item	0.373	
4 th item	0.753	
5 th item	0.681	
6 th item		0.675
7 th item		0.658
8 th item		0.430
9 th item		0.358
10 th item	0.698	

The correlation between the two factors is adequately strong and significant, meaning that while they are different constructs they also might be interconnected (see Table 39).

Table 39		
	1 st factor	2 nd factor
1 st factor	1	
2 nd factor	0.503	1

VI/2D. Slovakian EH Sample

The EFA of the items of the Environmental Hope scale resulted in, as indicated by the eigenvalue, two factors explaining only 51.65% of the variance. The 6th item's loading was under the desired 0.5 value, and we found no cross-loadings (see Table 40).

Table 40		
	1 st factor	2 nd factor
1 st item	0.653	
2 nd item	0.683	
3 rd item	0.523	
4 th item	0.805	
5 th item	0.704	
6 th item		<i>0.483</i>
7 th item		0.596
8 th item		0.590
9 th item		0.551
10 th item	0.510	

The correlation between the two factors is adequately strong and significant, meaning that while they are different constructs they also might be interconnected (see Table 41).

Table 41		
	1 st factor	2 nd factor
1 st factor	1	
2 nd factor	0.514	1

VII. School Culture (Pluralistic and Holistic)

We examined school culture using a scale inspecting the holistic and pluralistic approach of education for sustainable development (Boeve-de Pauw et al., 2015). This measurement tool helps researchers in evaluating the quality of education for sustainable development according to UNESCO guidelines. These guidelines most importantly concentrate on learning and analysing sustainable development in a cultural, social and economical context (holistic perspective) and helping students create agency to form action competencies (pluralistic perspective).

VII/1. School Culture scores

The table below presents the mean scores of each of the 7 School Culture items and their sum on the joint and on the national samples (see Table 42 – the items marked with an “R” are reversed items).

	Joint Sample	Hungarian Sample	Czech Sample	Slovakian Sample
Holistic 1 st item	2.72 (1.029)	2.74 (1.017)	2.69 (1.056)	2.72 (1.014)
Holistic 2 nd item	2.61 (1.006)	2.62 (1.001)	2.53 (1.037)	2.65 (0.974)
Holistic 3 rd item	2.67 (1.030)	2.68 (1.018)	2.61 (1.066)	2.69 (1.011)
Pluralistic 1 st item	3.35 (1.142)	3.26 (1.150)	3.58 (1.125)	3.30 (1.104)
Pluralistic 2 nd item	2.86 (1.056)	2.94 (1.062)	2.75 (1.070)	2.78 (1.014)
Pluralistic 3 rd item	3.10 (1.182)	3.12 (1.196)	2.98 (1.172)	3.22 (1.154)
Pluralistic 4 th item	2.34 (1.213)	2.17 (1.150)	2.78 (1.309)	2.21 (1.114)

VII/2. Factor analyses

We’ve conducted an Exploratory Factor Analysis (EFA) on the School Culture items four times altogether (once on the joint sample and on each national samples). In all cases, we ran the same statistical analyses, both the correlational matrixes, the Kaiser-Meyer-Olkin (KMO) and Bartlett tests showed that the items are adequate for factor analysis on each sample (for the exact KMO values and the results of the Bartlett test see Table 43).

	KMO test	Bartlett test
Joint sample	0.828	$\chi^2(21)=12465.830, p<0,001$
Hungarian Sample	0.831	$\chi^2(21)=7643.916, p<0,001$
Czech Sample	0.828	$\chi^2(21)=2938.835, p<0,001$
Slovakian Sample	0.791	$\chi^2(21)=2488.651, p<0,001$

For the EFA we used Principal Axis Factoring (PAF) with direct oblimin rotation. The measurement tool has not been examined with factor analysis yet. In most cases, according to the eigenvalues (see Table 44) and scree plots, two factors were emerged, while in case of the Czech sample, the items of the Holistic and Pluralistic subscales loaded on a single factor.

	Joint Sample		Hungarian Sample		Czech Sample		Slovakian Sample	
	Total initial eigenvalue	Explained variance (%)	Total initial eigenvalue	Explained variance (%)	Total initial eigenvalue	Explained variance (%)	Total initial eigenvalue	Explained variance (%)
1 st factor	3.233	46.19	3.398	46.54	3.177	45.39	3.035	43.35
2 nd factor	1.007	14.39	1.044	14.91	-	-	1.139	16.27
Cumulative explained variance (%)	-	60.58	-	63.45	-	45.39	-	59.63

VII/2A. Joint Sample School Culture (Pluralistic and Holistic)

The items of the School Culture scale had clear loadings on one of the two factors with one exception. These two factors were similar to the intended ones presented in their original article. Only the 4th Pluralistic item had an inadequate loading and cross-loading problems (see Table 45).

Table 45		
	Holistic	Pluralistic
Holistic 1 st item	0.678	
Holistic 2 nd item	0.974	
Holistic 3 rd item	0.609	
Pluralistic 1 st item		0.653
Pluralistic 2 nd item		0.606
Pluralistic 3 rd item		0.694
Pluralistic 4 th item	0.262	0.216

The correlation between the two factors is moderately strong and significant, meaning that they are not independent of each other statistically and perhaps empirically (see Table 46).

Table 46	
	Holistic
Pluralistic	0.647

VII/2B. Hungarian Sample School Culture (Pluralistic and Holistic)

The items of the School Culture scale had clear loadings on one of the two factors in the Hungarian sample. These two factors are similar to the intended ones presented in their original article. Only the 4th Pluralistic item had a loading below 0.5, namely on the Holistic subscale instead on the Pluralistic subscale (see Table 47).

Table 47		
	Holistic	Pluralistic
Holistic 1 st item	0.714	
Holistic 2 nd item	0.973	
Holistic 3 rd item	0.674	
Pluralistic 1 st item		0.745
Pluralistic 2 nd item		0.601
Pluralistic 3 rd item		0.710
Pluralistic 4 th item	0.396	

The correlation between the two factors is moderately strong and significant, meaning that they are not independent of each other (see Table 48).

Table 48	
	Holistic
Pluralistic	0.650

VII/2C. Czech Sample School Culture (Pluralistic and Holistic)

The items of the School Culture scale had clear loadings on a single factor in the Czech sample. This factor seemed to unify the two original factor. The 1st and 4th items of the original Pluralistic subscale had loadings under the desired value of 0.5 (see Table 49).

	1 st Factor
Holistic 1 st item	0.639
Holistic 2 nd item	0.725
Holistic 3 rd item	0.624
Pluralistic 1 st item	0.436
Pluralistic 2 nd item	0.605
Pluralistic 3 rd item	0.695
Pluralistic 4 th item	0.464

VII/2D. Slovakian Sample School Culture (Pluralistic and Holistic)

The items of the School Culture scale had clear loadings on one of the two factors in the Slovakian sample. These two factors are similar to the intended ones presented in their original article. Only the 4th Pluralistic item had a loading below 0.5, namely on the Holistic subscale instead of on the Pluralistic subscale (see Table 50).

	Holistic	Pluralistic
Holistic 1 st item	0.688	
Holistic 2 nd item	0.914	
Holistic 3 rd item	0.631	
Pluralistic 1 st item		0.624
Pluralistic 2 nd item		0.688
Pluralistic 3 rd item		0.513
Pluralistic 4 th item	0.378	

The correlation between the two factors is moderately strong and significant, meaning that they are not independent of each other statistically and perhaps empirically (see Table 51).

	Holistic
Pluralistic	0.556

VIII. Place attachment and Place identity

We examined place attachment and place identity of the students regarding their neighbourhood with items developed by one of the Hungarian researchers and partially given by Jan Činčera. According to the literature, the latent relationship between a person and their

environment, such as place attachment and place identity, is associated with the environmental behaviour defined broadly.

VIII/1. Place attachment and Place identity scores

The table below presents the mean scores of each of the 11 Place attachment and Place identity items on the joint and on the national samples (see Table 52).

	Joint sample	Hungarian sample	Czech sample	Slovakian sample
Attachment 1 st item	3.45 (1.220)	3.38 (1.218)	3.56 (1.213)	3.48 (1.223)
Attachment 2 nd item	3.11 (1.331)	3.09 (1.315)	3.18 (1.353)	3.10 (1.343)
Attachment 3 rd item	3.91 (1.206)	3.89 (1.201)	3.97 (1.222)	3.91 (1.197)
Attachment 4 th item	3.48 (1.247)	3.47 (1.235)	3.57 (1.241)	3.40 (1.278)
Attachment 5 th item	3.33 (1.302)	3.26 (1.286)	3.40 (1.324)	3.41 (1.303)
Attachment 6 th item	3.76 (1.256)	3.69 (1.251)	3.85 (1.261)	3.82 (1.253)
Attachment 7 th item	3.87 (1.189)	3.81 (1.184)	3.94 (1.203)	3.92 (1.179)
Identity 1 st item	2.97 (1.304)	2.82 (1.260)	3.39 (1.335)	2.81 (1.260)
Identity 2 nd item	3.14 (1.321)	3.23 (1.327)	2.75 (1.264)	3.36 (1.283)
Identity 3 rd item	3.25 (1.391)	3.18 (1.415)	3.31 (1.388)	3.37 (1.325)
Identity 4 th item	3.62 (1.252)	3.57 (1.272)	3.68 (1.251)	3.67 (1.198)

VIII/2. Factor analyses

Since the factor structure of Place attachment and Place identity was unknown, we conducted two different analyses: the first one with a combined structure including both the items of Place attachment and Place identity, and a second one with investigating them independently.

We've conducted an Exploratory Factor Analysis (EFA) on the Place attachment and Place identity items, in the unified and separated conditions too, on the joint sample and on each national sample. In all cases, we ran the same statistical analyses, both the correlational matrixes, the Kaiser-Meyer-Olkin (KMO) and Bartlett tests showed that the items are adequate for factor analysis on each sample (for the exact KMO values and the results of the Bartlett test see Table 53, Table 54 and Table 55).

	KMO test	Bartlett test
Joint sample	0.916	$\chi^2(55)=36919.916, p<0.001$
Hungarian Sample	0.923	$\chi^2(55)=20857.465, p<0.001$
Czech Sample	0.903	$\chi^2(55)=9122.775, p<0.001$
Slovakian Sample	0.904	$\chi^2(55)=7517.058, p<0.001$

	KMO test	Bartlett test
Joint sample	0.858	$\chi^2(21)=21134.909, p<0.001$
Hungarian Sample	0.854	$\chi^2(21)=10830.205, p<0.001$
Czech Sample	0.843	$\chi^2(21)=5513.957, p<0.001$
Slovakian Sample	0.870	$\chi^2(21)=4953.571, p<0.001$

	KMO test	Bartlett test
Joint sample	0.772	$\chi^2(6)=9529.846, p<0.001$
Hungarian Sample	0.791	$\chi^2(6)=6321.409, p<0.001$
Czech Sample	0.742	$\chi^2(6)=1946.077, p<0.001$
Slovakian Sample	0.738	$\chi^2(6)=1508.103, p<0.001$

For the EFA we used Principal Axis Factoring (PAF) with direct oblimin rotation (for the eigenvalues see Table 56, 57 and 58). The measurement tool has not been examined with factor analysis yet.

	Joint Sample		Hungarian Sample		Czech Sample		Slovakian Sample	
	Total initial eigenvalue	Explained variance (%)	Total initial eigenvalue	Explained variance (%)	Total initial eigenvalue	Explained variance (%)	Total initial eigenvalue	Explained variance (%)
1 st Factor	5.696	51.79	5.906	53.69	5.439	49.45	5.526	50.24
2 nd Factor	1.16	10.57	1.154	10.49	1.289	11.72	1.121	10.19
3 rd Factor	-	-	-	-	-	-	1.015	9.22
Cumulative explained variance (%)	-	62.35	-	71.13	-	61.17	-	69.65

	Joint Sample		Hungarian Sample		Czech Sample		Slovakian Sample	
	Total initial eigenvalue	Explained variance (%)	Total initial eigenvalue	Explained variance (%)	Total initial eigenvalue	Explained variance (%)	Total initial eigenvalue	Explained variance (%)
1 st Factor	3.894	55.63	3.83	54.715	3.827	54.68	4.133	59.04
2 nd Factor	1.060	15.14	1.068	15.26	-	-	-	-
Cumulative explained variance (%)	-	70.77	-	69.98	-	54.68	-	59.04

	Joint Sample		Hungarian Sample		Czech Sample		Slovakian Sample	
	Total initial eigenvalue	Explained variance (%)	Total initial eigenvalue	Explained variance (%)	Total initial eigenvalue	Explained variance (%)	Total initial eigenvalue	Explained variance (%)
1 st factor	2.628	65.71	2.803	70.08	2.443	61.06	2.407	60.18
Cumulative explained variance (%)	-	65.71	-	70.08	-	61.06	-	60.18

VIII/2A. Joint sample – Unified items

The unified items on the joint sample did not formed the expected structure: three of the place attachment items loaded on one factor together with the place identity items. In the case of the 4th attachment and the 3rd identity items, the loadings were under the value of 0.5, and the cross-loadings between the 1st and 2nd factors were too strong in the case of the 4th attachment item (see Table 59).

Table 59 – Unified items		
	1 st factor	2 nd factor
Attachment 1 st item		0.711
Attachment 2 nd item		0.834
Attachment 3 rd item	0.714	
Attachment 4 th item	0.375	0.427
Attachment 5 th item		0.506
Attachment 6 th item	0.891	
Attachment 7 th item	0.878	
Identity 1 st item	0.502	
Identity 2 nd item	0.742	
Identity 3 rd item	0.466	
Identity 4 th item	0.862	

The correlation between the two factors is moderately strong and significant, meaning that they are not independent of each other. (see Table 60).

Table 60	
	1 st factor
2 nd factor	0.656

VIII/2B. Joint sample – Place attachment

In case of the Place attachment items on the joint sample, the analysis resulted in two factors. The only problematic item, similarly to the unified condition, was the 4th item, which had strong cross-loading between the 1st and 2nd factors (see Table 61).

Table 61		
	1 st factor	2 nd factor
Attachment 1 st item		0.734
Attachment 2 nd item		0.826
Attachment 3 rd item	0.648	
Attachment 4 th item	0.349	0.483
Attachment 5 th item		0.537
Attachment 6 th item	0.914	
Attachment 7 th item	0.895	

The correlation between the two factors is moderately strong and significant, meaning that they are not independent of each other (see Table 62).

Table 62	
	1 st factor
2 nd factor	0.611

VIII/2C. Joint sample – Place identity

As expected, the items of Place identity on the joint sample only loaded on a single factor (see Table 63).

Table 63	
	1 st factor
Identity 1 st item	0.687
Identity 2 nd item	0.821
Identity 3 rd item	0.635
Identity 4 th item	0.803

VIII/2D. Hungarian sample – Unified items

The unified items on the Hungarian sample did not show the expected structure: four of the place attachment items loaded on one factor together with the place identity items. In the case of the 4th attachment and the 3rd identity items, the loadings were under the value of 0.5, and in the case of the 4th attachment item, the cross-loadings between the 1st and 2nd factors were too strong (see Table 64).

Table 64		
	1 st factor	2 nd factor
Attachment 1 st item		0.717
Attachment 2 nd item		0.808
Attachment 3 rd item	0.739	
Attachment 4 th item	0.397	0.385
Attachment 5 th item		0.518
Attachment 6 th item	0.897	
Attachment 7 th item	0.889	
Identity 1 st item	0.562	
Identity 2 nd item	0.788	
Identity 3 rd item	0.492	
Identity 4 th item	0.858	

The correlation between the two factors is moderately strong and significant, meaning that they are not independent of each other (see Table 65).

Table 65	
	1 st factor
2 nd factor	0.661

VIII/2E. Hungarian sample – Place attachment

In case of the Place attachment items on the Hungarian sample, the results of the analysis showed two factors. The only problematic item, similarly to the unified condition, is the 4th item, which had strong cross-loading between the 1st and 2nd factors, while also being under the desired 0.5 value (see Table 66).

Table 66		
	1 st factor	2 nd factor
Attachment 1 st item		0.723
Attachment 2 nd item		0.818
Attachment 3 rd item	0.674	
Attachment 4 th item	0.367	0.443
Attachment 5 th item		0.538
Attachment 6 th item	0.918	
Attachment 7 th item	0.887	

The correlation between the two factors is moderately strong and significant, meaning that they are not independent of each other (see Table 67).

Table 67	
	1 st factor
2 nd factor	0.617

VIII/2F. Hungarian sample – Place identity items

As expected, the items of Place identity on the Hungarian sample only loaded on a single factor (see Table 68).

Table 68	
	1 st factor
Identity 1 st item	0.724
Identity 2 nd item	0.875
Identity 3 rd item	0.680
Identity 4 th item	0.823

VIII/2G. Czech sample – Unified items

The unified items on the Czech sample also did not form the expected structure: four of the place attachment items loaded on one factor together with the place identity items. In the case of the 4th attachment, the 1st and 3rd identity items the loadings were under the value of 0.5, and the cross-loadings between the 1st and 2nd factors were too strong in the case of the 4th attachment item (see Table 69).

Table 69		
	1 st factor	2 nd factor
Attachment 1 st item		0.704
Attachment 2 nd item		0.841
Attachment 3 rd item	0.717	
Attachment 4 th item	0.428	0.396
Attachment 5 th item		0.529
Attachment 6 th item	0.923	
Attachment 7 th item	0.902	
Identity 1 st item	0.474	
Identity 2 nd item	0.711	
Identity 3 rd item	0.341	
Identity 4 th item	0.807	

The correlation between the two factors is moderately strong and significant, meaning that they are not independent of each other (see Table 70).

Table 70	
	1 st factor
2 nd factor	0.586

VIII/2H. Czech sample – Place attachment items

In case of the Place attachment items on the Czech sample, the analysis revealed two factors. The only problematic item, similarly to the unified condition, was the 4th item, which had strong cross-loadings between the 1st and 2nd factors, while also being under the desired 0.5 value (see Table 71).

Table 71		
	1 st factor	2 nd factor
Attachment 1 st item		0.753
Attachment 2 nd item		0.816
Attachment 3 rd item	0.654	
Attachment 4 th item	0.406	0.461
Attachment 5 th item		0.552
Attachment 6 th item	0.898	
Attachment 7 th item	0.921	

VIII/2I. Czech sample – Place identity

As expected, the items of Place identity on the Czech sample only loaded on a single factor (see Table 72).

Table 72	
	1 st factor
Identity 1 st item	0.687
Identity 2 nd item	0.759
Identity 3 rd item	0.537
Identity 4 th item	0.788

VIII/2J. Slovakian – Unified items

Unlike in the case of the previous samples, the unified items formed three factors in the Slovakian sample. Here the 5th attachment item showed a loading below 0.5 and the 4th identity item showed cross-loading problem between the 1st and 3rd factor (see Table 73).

	1 st factor	2 nd factor	3 rd factor
Attachment 1 st item		0.701	
Attachment 2 nd item		0.795	
Attachment 3 rd item	0.606		
Attachment 4 th item		0.609	
Attachment 5 th item		0.442	
Attachment 6 th item	0.830		
Attachment 7 th item	0.769		
Identity 1 st item			0.687
Identity 2 nd item			0.662
Identity 3 rd item			0.562
Identity 4 th item	0.475		0.516

The correlations between the three factors are moderately strong and significant, meaning that they are not independent of each other (see Table 74).

	1 st factor	2 nd factor
2 nd factor	0.544	1
3 rd factor	0.544	0.544

VIII/2K. Slovakian sample – Place attachment

As expected, the items (but unlike the previous sample's results) of Place attachment on the Slovakian sample only loaded on a single factor (see Table 75).

	1 st factor
Attachment 1 st item	0.737
Attachment 2 nd item	0.591
Attachment 3 rd item	0.740
Attachment 4 th item	0.781
Attachment 5 th item	0.621
Attachment 6 th item	0.804
Attachment 7 th item	0.772

VIII/2L. Slovakian sample – Place identity

As expected, the items of Place identity on the Slovakian sample only loaded on a single factor (see Table 76).

Table 76	
	1 st factor
Identity 1 st item	0.601
Identity 2 nd item.	0.751
Identity 3 rd item.	0.627
Identity 4 th item	0.760

IX. Eco anxiety

We examined eco-anxiety of the students with selected items of the EAQ-22's (Ágoston et al., 2022) shortened version. Eco-anxiety represents a chronic fear of environmental doom. Since this fear might be paralyzing and thus form a barrier to executing environmental behaviours, it is important to measure it to get a more in-depth view of students' emotions.

IX/1. Eco anxiety scores

First of all, we checked the mean scores of each of the four Eco anxiety items and their sums on the joint and on the national samples (see Table 77).

Table 77				
	Joint sample	Hungarian sample	Czech sample	Slovakian sample
1 st item	3.59 (1.242)	3.63 (1.224)	3.61 (1.279)	3.45 (1.235)
2 nd item	3.74 (1.193)	3.75 (1.187)	3.68 (1.229)	3.82 (1.164)
3 rd item	3.65 (1.235)	3.73 (1.203)	3.57 (1.264)	3.56 (1.268)
4 th item	3.74 (1.211)	3.77 (1.192)	3.60 (1.287)	3.86 (1.148)
SUM score	14.75 (4.275)	14.91 (4.296)	14.47 (4.514)	14.74 (3.921)

IX/2. Factor analyses

We've conducted an Exploratory Factor Analysis (EFA) on the Eco-anxiety items on the joint sample and on each national sample too. In all cases, we ran the same statistical analyses, both the correlational matrixes, the Kaiser-Meyer-Olkin (KMO) and Bartlett tests showed that the items are adequate for factor analysis on each sample (for the exact KMO values and the results of the Bartlett test see Table 78).

Table 78		
	KMO test	Bartlett test
Joint sample	0.843	$\chi^2(6)=15307.374$, $p<0.001$
Hungarian Sample	0.848	$\chi^2(6)=9565.267$, $p<0.001$
Czech Sample	0.840	$\chi^2(6)=4471.473$, $p<0.001$
Slovakian Sample	0.779	$\chi^2(6)=2041.076$, $p<0.001$

We conducted an EFA by using Principal Axis Factoring (PAF) with direct oblimin rotation. As expected, the items only loaded on a single factor (see Table 79), just like in the original paper. Since on the Hungarian, Czech and Slovakian samples we had similar results with strong loadings on a single factor, it is unnecessary to write the same interpretations in every case, thus we included every sample in the following tables (see Table 79, Table 80, Table 81 and Table 82).

	Joint Sample		Hungarian Sample		Czech Sample		Slovakian Sample	
	Total initial eigenvalue	Explained variance (%)	Total initial eigenvalue	Explained variance (%)	Total initial eigenvalue	Explained variance (%)	Total initial eigenvalue	Explained variance (%)
1 st Factor	3.076	76.90	3.205	80.13	3.181	79.52	2.657	66.42
Cumulative explained variance (%)	-	76.90	-	80.13	-	79.52	-	66.42

	1 st factor
1 st item	0.806
2 nd item	0.867
3 rd item	0.845
4 th item	0.809

	1 st factor
1 st item	0.837
2 nd item	0.889
3 rd item	0.878
4 th item	0.826

	1 st factor
1 st item	0.834
2 nd item	0.884
3 rd item	0.860
4 th item	0.832

	1 st factor
1 st item	0.698
2 nd item	0.790
3 rd item	0.746
4 th item	0.738

X. Eco-guilt

We examined eco-guilt of the students with selected items of the EguiQ-11's (Ágoston et al., 2022) shortened version. Eco-guilt is a specific emotion that might be present when an individual believes their ecological footprint is larger than the average or what is sustainable. Measuring this special guilt is important since it might lead to higher intentions regarding pro-environmental behaviours or conversely, it might trigger reactance and denial.

X/1. Eco-guilt scores

The table below presents the mean scores of each of the four Eco-guilt items and their sums on the joint and on the national samples (see Table 84).

	Joint sample	Hungarian sample	Czech sample	Slovakian sample
1 st item	2.83 (1.262)	2.85 (1.261)	2.74 (1.266)	2.90 (1.255)
2 nd item	2.80 (1.289)	2.87 (1.306)	2.64 (1.268)	2.84 (1.255)
3 rd item	2.43 (1.300)	2.43 (1.307)	2.32 (1.269)	2.55 (1.307)
4 th item	2.91 (1.318)	2.82 (1.321)	2.99 (1.328)	3.07 (1.278)
SUM score	10.96 (4.390)	10.91 (4.448)	10.63 (4.322)	11.35 (4.306)

X/2. Factor analyses

We've conducted an Exploratory Factor Analysis (EFA) on the Eco-guilt items four times altogether (once on the joint sample and on each national sample too). In all cases, we ran the same statistical analyses, both the correlational matrixes, the Kaiser-Meyer-Olkin (KMO) and Bartlett tests showed that the items are adequate for factor analysis on each sample (for the exact KMO values and the results of the Bartlett test see Table 85).

	KMO test	Bartlett test
Joint sample	0.824	$\chi^2(6)=12438.991, p<0.001$
Hungarian Sample	0.822	$\chi^2(6)=6986.250, p<0.001$
Czech Sample	0.822	$\chi^2(6)=3080.552, p<0.001$
Slovakian Sample	0.826	$\chi^2(6)=2528.005, p<0.001$

We conducted an EFA by using Principal Axis Factoring (PAF) with direct oblimin rotation (for the eigenvalues see Table 86).

	Joint Sample		Hungarian Sample		Czech Sample		Slovakian Sample	
	Total initial eigenvalue	Explained variance (%)	Total initial eigenvalue	Explained variance (%)	Total initial eigenvalue	Explained variance (%)	Total initial eigenvalue	Explained variance (%)
1 st factor	2.895	72.37	2.936	73.40	2.858	71.46	2.861	71.53
Cumulative explained variance (%)	-	72.37	-	73.40	-	71.46	-	71.53

As expected, the items only loaded on a single factor, just like the original paper. Since on the Hungarian, Czech and Slovakian samples we had similar results with strong loadings on a single factor, it is unnecessary to write the same interpretations in every case, thus we included every sample in the following tables (see Table 87, Table 88, Table 89 and Table 90).

	1 st factor
1 st item	0.803
2 nd item	0.850
3 rd item	0.767
4 th item	0.758

	1 st factor
1 st item	0.792
2 nd item	0.859
3 rd item	0.756
4 th item	0.806

	1 st factor
1 st item	0.822
2 nd item	0.855
3 rd item	0.773
4 th item	0.698

	1 st factor
1 st item	0.806
2 nd item	0.826
3 rd item	0.784
4 th item	0.735

XI. Inspecting the factors

XI/1. The inspected factors and their reliabilities

After the factor analyses, we have found only four scales that have no problems regarding their structure, loadings or cross-loadings (see Table 91). For correlations and further inspections, we are going to use only these and their factors. In the case of the CCA, Eco-anxiety and Eco-guilt scales, the values of Cronbach's α would be higher in none of the samples if we deleted an item from the scale. The exception is the Place identity scale on the Czech sample, since there the 3rd item's deletion would minimally improve the value of Cronbach's α to 0.789 instead of 0.782.

Scale		Reliability analyses (Cronbach's α)
	Sample's nationality	1 st factor
CCA	Joint Sample	0.901
	Hungarian Sample	0.906
	Czech Sample	0.894
	Slovakian Sample	0.898
Place identity	Joint Sample	0.815
	Hungarian Sample	0.855
	Czech Sample	0.782
	Slovakian Sample	0.777
Eco-anxiety	Joint Sample	0.900
	Hungarian Sample	0.917
	Czech Sample	0.914
	Slovakian Sample	0.830
Eco-guilt	Joint Sample	0.872
	Hungarian Sample	0.879
	Czech Sample	0.865
	Slovakian Sample	0.867

We've also conducted reliability analyses on the different measurement tools which showed problems during the factor analyses. Many of them show inadequate reliability either on the level of samples or on the level of individual factors (see Table 92). The NEP subscales, correspondingly to the literature on this scale and its application, shows low reliability in every sample.

Table 92			
Scale	Sample's nationality	Number of factors	Reliability analyses (Cronbach's α)
NEP	Joint Sample (Cronbach α = 0.617)	1 st Factor	0.537
		2 nd Factor	0.561
		3 rd Factor	0.483
	Hungarian Sample (Cronbach α = 0.588)	1 st Factor	0.532
		2 nd Factor	0.573
		3 rd Factor	0.492
	Czech Sample (Cronbach α = 0.655)	1 st Factor	0.616
		2 nd Factor	0.563
		3 rd Factor	0.357
	Slovakian Sample (Cronbach α = 0.633)	1 st Factor	0.499
		2 nd Factor	0.604
		3 rd Factor	0.490
PEB	Joint Sample (Cronbach α =0.791)	1 st Factor	0.835
		2 nd Factor	0.624
		3 rd Factor	0.348
	Hungarian Sample (Cronbach α =0.820)	1 st Factor	0.850
		2 nd Factor	0.655
		3 rd Factor	0.361
	Czech Sample (Cronbach α =0.771)	1 st Factor	0.795
		2 nd Factor	0.571
		3 rd Factor	0.302
	Slovakian Sample (Cronbach α =0.780)	1 st Factor	0.856
		2 nd Factor	0.541
		3 rd Factor	0.314
Environmental attitudes	Joint Sample (Cronbach α =0.726)	1 st Factor	0.803
		2 nd Factor	0.704
		3 rd Factor	0.846
	Hungarian Sample (Cronbach α =0.763)	1 st Factor	0.803
		2 nd Factor	0.704
		3 rd Factor	0.846
	Czech Sample (Cronbach α =0.704)	1 st Factor	0.805
		2 nd Factor	0.722
		3 rd Factor	0.832
	Slovakian Sample (Cronbach α =0.738)	1 st Factor	0.789
		2 nd Factor	0.613
		3 rd Factor	0.852
EH	Joint Sample (Cronbach α =0.798)	1 st Factor	0.800
		2 nd Factor	0.606
	Hungarian Sample (Cronbach α =0.799)	1 st Factor	0.821
		2 nd Factor	0.478
		3 rd Factor	0.521
	Czech Sample (Cronbach α =0.791)	1 st Factor	0.825
		2 nd Factor	0.616
	Slovakian Sample (Cronbach α =0.807)	1 st Factor	0.808
2 nd Factor		0.649	

Scale	Sample's nationality	Number of factors	Reliability analyses (Cronbach's α)
School culture	Joint Sample (Cronbach α =0.797)	1 st Factor	0.746
		2 nd Factor	0.696
	Hungarian Sample (Cronbach α =0.816)	1 st Factor	0.781
		2 nd Factor	0.737
	Czech Sample (Cronbach α =0.790)	1 st Factor	0.790
	Slovakian Sample (Cronbach α =0.770)	1 st Factor	0.749
2 nd Factor		0.653	
Place identity and Place attachment	Joint Sample (Cronbach α =0.903)	1 st Factor	0.892
		2 nd Factor	0.789
	Hungarian Sample (Cronbach α =0.910)	1 st Factor	0.912
		2 nd Factor	0.729
	Czech Sample (Cronbach α =0.892)	1 st Factor	0.887
		2 nd Factor	0.745
Slovakian Sample (Cronbach α =0.897)	1 st Factor	0.868	
	2 nd Factor	0.916	
	3 rd Factor	0.777	
Place attachment	Joint Sample (Cronbach α =0.824)	1 st Factor	0.843
		2 nd Factor	0.789
	Hungarian Sample (Cronbach α =0.859)	1 st Factor	0.875
		2 nd Factor	0.776
	Czech Sample (Cronbach α =0.857)	1 st Factor	0.842
		2 nd Factor	0.790
Slovakian Sample (Cronbach α =0.881)	1 st Factor	0.881	

XI/2. The scales that require more attention

As it has been shown with the factor analyses, most of our scales, especially those that had more than one factors, showed some kind of problem (inadequate factor loadings, strong cross-loadings, different structure compared to the original scale's findings, see Table 93).

	Joint	Hungarian	Czech	Slovakian
NEP	Red	Red	Red	Red
Environmental behaviours	Red	Red	Red	Red
Environmental attitudes	Orange	Orange	Orange	Orange
Environmental Hope	Red	Red	Red	Red
School Culture	Red	Orange	Orange	Red
Place attachment and Place identity	Red	Red	Red	Red
Place attachment	Red	Red	Red	Green

Green – good structure, without problem; Orange – Taking 0.4 loading as a cut off point it could be considered adequate; Red – Correction and further discussion is needed

Main issues with the scales' factor structures:

- NEP: the cross-loadings are too strong between factors in the case of the 3rd, 5th and 7th items
- Pro-Environmental Behaviour items: The loadings are weak on the 3rd, 9th, 10th, 12th, 13th and 14th items, at the same time the 3rd, 10th, 12th and 13th items show strong cross-loadings.
- Environmental attitudes: The main issue is that the 4th item shows weak loading on any factor.
- Environmental Hope: The 3rd and 10th items show weak loadings, despite that the 3rd item also has strong cross-loadings between two factors.
- School culture: The 4th item of the Pluralistic subscale shows both strong cross-loadings while also loads weakly on both subscales.
- Place attachment and Place identity: The 4th item on the Place attachment subscale shows both low loading and strong cross-loadings between the factors, while the 3rd item of the Place identity subscale shows weak loading.
- Place attachment: Just like in the case of the joint subscales of Place attachment and Place identity, the 4th item of the Place attachment subscale shows both strong cross-loadings and weak loading on any factors.

XI/3. Difference between countries

We have conducted analysis of variance (ANOVA) on scales, which had no problems with item loadings or cross-loadings and their structure. These scales are the Climate Change Attitudes, Eco-Anxiety, Eco-Guilt and Place identity.

XI/3A. CCA

The results of the one-way ANOVA on the Climate Change Attitudes scale, corrected with the Brown-Forsythe test, showed that there was no significant relationship between students' countries and their attitudes regarding climate change ($F(2,4641.861)=1.567$, $p=0.209$, $\eta_p^2=0$). According to the value of partial eta squared, the effect size is non-existent. The results of the Bonferroni post hoc test showed that every difference between national samples was not significant. The results of this statistical procedure are compiled in Table 94.

Table 94			
	Hungary	Czech Republic	Slovakia
Hungary (M=33.38, SD=6.433)	-	-	-
Czechia (M=33.03; SD=6.333)	p=0.551	-	-
Slovakia (M=33.56, SD=6.129)	p=1	p=0.272	-

XI/3B. Eco-anxiety

The results of the one-way ANOVA on the Eco-anxiety scale, corrected with the Brown-Forsythe test, showed that there was a significant relationship between students' countries and their ecological anxiety ($F(2,4693.824)=5.464$, $p=0.004$, $\eta_p^2=0.002$). According to the value of partial eta squared, the effect size is very small. The results of the Bonferroni post hoc test showed that the only significant difference was between the Hungarian and Czech samples, with the students of the latter sample showing less anxiety. The results of this statistical procedure are compiled in Table 95.

Table 95			
	Hungary	Czech Republic	Slovakia
Hungary (M=14.96, SD=4.311)	-	-	-
Czechia (M=14.50, SD=4.523)	p=0.003	-	-
Slovakia (M=14.78, SD=3.942)	p=0.642	p=0.329	-

XI/3C. Eco-guilt

The results of the one-way ANOVA on the Eco-guilt scale, corrected with the Brown-Forsythe test, showed that there was a significant relationship between students' countries and their ecological guilt ($F(2,4689.032)=8.860$, $p<0.001$, $\eta_p^2=0.003$). According to the value of partial eta squared, the effect size is very small. The results of the Bonferroni post hoc test showed that students of the Slovakian sample exercised more guilt than the Hungarian or Czech students. The results of this statistical procedure are compiled in Table 96.

Table 96			
	Hungary	Czech Republic	Slovakia
Hungary (M=10.85, SD=4.464)	-	-	-
Czechia (M=10.60, SD=4.329)	p=0.120	-	-
Slovakia (M=11.32, SD=4.324)	p=0.014	p<0.001	-

XI/3D. Place identity

The results of the one-way ANOVA on the Place identity scale, corrected with the Brown-Forsythe test, showed that there was a significant relationship between students' countries and their place identity regarding their neighbourhood ($F(2,4996.305)=6.078$, $p=0.002$, $\eta_p^2=0.002$). According to the value of partial eta squared, the effect size is very small. The results of the Bonferroni post hoc test showed that students of the Slovakian sample felt a stronger connection between their identity and neighbourhood than the Hungarian or Czech students, with the Czech students also reaching higher scores on this scale than the Hungarians. The results of this statistical procedure are compiled in Table 97.

	Hungary	Czech Republic	Slovakia
Hungary (M=12.82, SD=4.403)	-	-	-
Czechia (M=13.17; SD=4.06)	p=0.033	-	-
Slovakia (M=13.25; SD=3.912)	p=0.011	p=1	-

XII. Additional questions' descriptives and variance analyses

XII/1. "In your opinion, how concerned are others about the environment?"

On every sample including the joint, the overwhelming majority of students said that in their opinion others are not concerned enough about the environment (see Table 98).

	Joint	Hungary	Czechia	Slovakia
Not concerned at all	430, 6.6%	216, 6.3%	151, 9.2%	63, 4.5%
Not concerned enough	4898, 75.6%	2797, 81.6%	1174, 71.2%	926, 67%
Concerned enough	1029, 15.9%	386, 11.2%	281, 17.1%	363, 26.3%
Overly concerned	102, 1.6%	30, 0.9%	42, 2.5%	30, 2.2%

The results of the one-way ANOVA on students' perception of others' environmental concerns, conducted in the joint sample and corrected with the Brown-Forsythe test, showed that there was a significant relationship between students' perception of concern and the different scales

we have examined (CCA: $F(3,462.197)=61.291$, $p<0.001$, $\eta_p^2=0.046$; Eco-anxiety: $F(3,623.973)=53.013$, $p<0.001$, $\eta_p^2=0.031$, Eco-guilt: $F(3,651.832)=14.208$, $p<0.001$, $\eta_p^2=0.008$, Place identity: $F(3,550.769)=5.437$, $p=0.001$, $\eta_p^2=0.003$). According to the values of partial eta squared, the effect sizes were small in all cases. The results of the Bonferroni post hoc test (see Table 99) showed that:

- in the case of climate change attitudes, those who hold the opinion that others are not concerned enough about the environment showed significantly higher scores on the CCA scale – i.e., show more concern over climate change and associate greater responsibility with humanity regarding the reasons for it – than the groups of students thinking differently about others’ environmental concerns.
- in the case of ecological anxiety, those who hold the opinion that others are not concerned enough about the environment show significantly higher scores on the Eco-anxiety scale – i.e., had more negative fear-related thoughts and feelings about sustainability and climate change – than the groups of students thinking differently about others’ environmental concerns.
- in the case of ecological guilt, those who hold the opinion that others are not concerned enough about the environment show significantly higher scores on the Eco-guilt scale – i.e., felt the most amount of shame regarding their and humanity’s behaviour related to climate change – than the groups of students thinking differently about others’ environmental concerns, apart from the group who think that others are not concerned at all, since the difference was not significant in this case.
- in the case of place identity, those who hold the opinion that others are concerned enough about the environment show significantly higher scores on the Place identity scale – i.e., felt a stronger relationship between their self-identity and their neighbourhood – than the groups of students thinking others are not concerned at all or overly concerned about it.

	Not concerned at all	Not concerned enough	Concerned enough	Overly concerned
Not concerned at all CCA: M=31.65, SD=8.388 Eco-anxiety: M=14.05, SD=5.311 Eco-guilt: M=10.63, SD=5.063 Place identity: M=12.29, SD=4.959	1			
Not concerned enough CCA: M=33.99, SD=5.868 Eco-anxiety: M=15.19, SD=4.107 Eco-guilt: M=11.08, SD=4.323 Place identity: M=13.01, SD=4.138	CCA: p<0.001 Eco-anxiety: p<0.001 Eco-guilt: p=0.277 Place identity: p=0.009	1		
Concerned enough CCA: M=31.51, SD=6.34 Eco-anxiety: M=13.82, SD=4.221 Eco-guilt: M=10.31, SD=4.356 Place identity: M=13.38, SD=4.356	CCA: p=1 Eco-anxiety: p=0.518 Eco-guilt: p=1 Place identity: p<0.001	CCA: p<0.001 Eco-anxiety: p<0.001 Eco-guilt: p<0.001 Place identity: p=0.230	1	
Overly concerned CCA: M=25.90, SD=8.986 Eco-anxiety: M=11.09, SD=4.872 Eco-guilt: M=8.55, SD=4.702 Place identity: M=11.97, SD=5.053	CCA: p<0.001 Eco-anxiety: p<0.001 Eco-guilt: p<0.001 Place identity: p=1	CCA: p<0.001 Eco-anxiety: p<0.001 Eco-guilt: p<0.001 Place identity: p=0.234	CCA: p<0.001 Eco-anxiety: p<0.001 Eco-guilt: p=0.001 Place identity: p=0.046	1

XII/2. “How often do you deal with topics related to environmental protection and global environmental problems during school activities?”

On every sample including the joint, the majority of students said that during school activities they deal with environmental protection and global environmental problems rarer than multiple times a month (see Table 100).

	Joint	Hungary	Czechia	Slovakia
Every day	135, 2.1%	73, 2.1%	22, 1.3%	40, 2.9%
Multiple times a week	584, 9%	320, 9.4%	127, 7.7%	136, 9.9%
Multiple times a month	1680, 25.9%	815, 23.8%	451, 27.5%	414, 30%
Rarer/Rarely	4044, 62.4%	2212, 64.7%	1044, 63.5%	788, 56.8%

The results of the one-way ANOVA on the frequency how often students discuss topics of environmental protection and global environmental problems, conducted in the joint sample and corrected with the Brown-Forsythe test, showed that there was a significant relationship between the aforementioned frequency and the different scales we have examined (CCA: $F(3,611.025)=6.771$, $p<0.001$, $\eta_p^2=0.004$; Eco-anxiety: $F(3,618.359)=11.298$, $p<0.001$, $\eta_p^2=0.006$; Eco-guilt: $F(3,638.126)=34.876$, $p<0.001$, $\eta_p^2=0.018$, Place identity: $F(3,647.739)=24.946$, $p<0.001$, $\eta_p^2=0.013$). According to the values of partial eta squared, the effect sizes are small in all cases. The results of the Bonferroni post hoc test (see Table 101) showed that

- in the case of climate change attitudes, those who discuss these problems multiple times a month showed significantly higher CCA scores, – i.e., showed more concern over climate change and associate greater responsibility with humanity regarding the reasons for it – than those who talk about it rarer or every day. The other differences between the groups were not significant.
- in the case of ecological anxiety, those who discuss these topics once a month or rarer showed significantly lower scores on the Eco-anxiety scale – i.e., had less negative fear-related thoughts and feelings about sustainability and climate change – than those who talk about it multiple times a month or multiple times a week.
- in the case of ecological guilt, those who discuss these topics once a month or rarer showed significantly lower scores on the Eco-guilt scale – i.e., felt the least amount of shame regarding their and humanity’s behaviour related to climate change – than those who talk about it multiple times a month, multiple times a week or every day.
- in the case of place identity, those who discuss these topics once a month or rarer showed significantly lower scores on this scale – i.e., felt a weaker relationship between their self-identity and their neighbourhood – than those who talk about it multiple times a month, multiple times a week or every day.

	Every day	Multiple times a week	Multiple times a month	Rarer/Rarely
Every day CCA: M=32.02, SD=7.830 Eco-anxiety: M=14.91, SD=5.033 Eco-guilt: M=12.25, SD=5.191 Place identity: M=14.163, SD=5.012	-	-	-	
Multiple times a week CCA: M=33.80, SD=6.229 Eco-anxiety: M=15.33, SD=3.839 Eco-guilt: M=11.74, SD=4.242 Place identity: M=13.51, SD=4.075	CCA: p=0.230 Eco-anxiety: p=1 Eco-guilt: p=0.54 Place identity: p=0.472	-	-	
Multiple times a month CCA: M=33.92, SD=5.657 Eco-anxiety: M=15.25, SD=3.946 Eco-guilt: M=11.51, SD=4.170 Place identity: M=13.58, SD=3.987	CCA: p=0.032 Eco-anxiety: p=1 Eco-guilt: p=0.080 Place identity: p=0.403	CCA: p=1 Eco-anxiety: p=1 Eco-guilt: p=1 Place identity: p=1	-	
Rarer/Rarely CCA: M=33.08, SD=6.537 Eco-anxiety: M=14.55, SD=4.443 Eco-guilt: M=10.48, SD=4.445 Place identity: M=12.66, SD=4.264	CCA: p=0.856 Eco-anxiety: p=0.728 Eco-guilt: p<0.001 Place identity: p<0.001	CCA: p=0.679 Eco-anxiety: p=0.003 Eco-guilt: p<0.001 Place identity: p<0.001	CCA: p<0.001 Eco-anxiety: p<0.001 Eco-guilt: p<0.001 Place identity: p<0.001	

XII/3. “How often do you part take in trips or other free air events, activities organized by your school?”

On every sample – including the joint one – the majority of students said that they take part in trips or open air activities and events organized by their school multiple times a year (see Table 102).

	Joint	Hungary	Czechia	Slovakia
Never	549, 8.5%	211, 6.2%	249, 15.1%	89, 6.4%
Rarely	1345, 20.8%	566, 16.5%	500, 30.4%	279, 20.2%
Once a year	1053, 16.3%	544, 15.9%	315, 19.2%	193, 14%
Multiple times a year	2607, 40.3%	1476, 43%	506, 30.7%	625, 45.1%
Once a month	483, 7.5%	350, 10.2%	43, 2.6%	90, 6.5%
Multiple times a month	415, 6.4%	278, 8.1%	33, 2%	105, 7.6%

The results of the one-way ANOVA on the frequency how often do students take part in trips or other free air events, activities organized by their respective schools, conducted in the joint sample and corrected with the Brown-Forsythe test, showed that there was a significant relationship between the aforementioned frequency and the different scales we have examined (CCA: $F(5,3157.919)=20.140$, $p<0.001$, $\eta_p^2=0.004$, $\eta_p^2=0.004$; Eco-anxiety: $F(5,3475.573)=17.761$, $p<0.001$, $\eta_p^2=0.006$; Eco-guilt: Guilt: $F(3,3470.074)=12.168$, $p<0.001$, $\eta_p^2=0.018$, Place identity: $F(3,3460.763)=19.168$, $p<0.001$, $\eta_p^2=0.013$). According to the values of partial eta squared, the effect sizes are small in all cases. The results of the Bonferroni post hoc test (see Table 103) show that:

- in the case of climate change attitudes, those who participate in free-air activities organized by their school once a month had the highest scores on the CCA scale – i.e., showed the most concern over climate change and associate the greatest responsibility with humanity regarding the reasons for it, significantly more than those who never or rarely take part. In addition to this, the students who never go on such trips had significantly the lowest score on the CCA.
- in the case of ecological anxiety, those who participate in free-air school activities once a month had the highest scores on the Eco-anxiety scale – i.e., reported the most negative fear-related thoughts and feelings about sustainability and climate change, significantly more than those who never, rarely or only once a year take part. In addition to this, the students who never go on such trips had significantly the lowest score on the Eco-anxiety scale.
- in the case of ecological guilt, those who participate in free-air school activities once a month had the highest scores on the Eco-guilt scale – i.e., felt the most amount of shame regarding their and humanity's behaviour related to climate change –, significantly more than those who never, rarely or only once a year take part.
- in the case of place identity, those who participate in free-air school activities multiple times monthly showed significantly higher scores on the place identity scale – i.e., felt a stronger relationship between their self-identity and their neighbourhood – than those who participate less frequently than that, except those who do this once a month since the difference between the two groups is not significant.

Table 103						
	Never	Rarely	Once a year	Multiple times a year	Once a month	Multiple times a month
Never CCA: M=31.34, SD=8.126 Eco-anxiety: M=13.45, SD=5.035 Eco-guilt: M=9.79, SD=4.649 Place identity: M=12.15, SD=4.739	-	-	-			
Rarely CCA: M=32.56, SD=6.530 Eco-anxiety: M=14.45, SD=4.439 Eco-guilt: M=10.56, SD=4.390 Place identity: M=12.59, SD=4.151	CCA: p=0.001 Eco-anxiety: p<0.001 Eco-guilt: p=0.51 Place identity: p=0.864	-	-			
Once a year CCA: M=33.40, SD=6.251 Eco-anxiety: M=14.74, SD=4.358 Eco-guilt: M=10.91, SD=4.488 Place identity: M=12.55, SD=4.148	CCA: p<0.001 Eco-anxiety: p<0.001 Eco-guilt: p<0.001 Place identity: p=1	CCA: p=0.019 Eco-anxiety: p=1 Eco-guilt: p=1 Place identity: p=1	-			
Multiple times a year CCA: M=33.89, SD=5.835 Eco-anxiety: M=15.07, SD=4.032 Eco-guilt: M=11.03, SD=4.293 Place identity: M=13.25, SD=4.088	CCA: p<0.001 Eco-anxiety: p<0.001 Eco-guilt: p<0.001 Place identity: p<0.001	CCA: p<0.001 Eco-anxiety: p<0.001 Eco-guilt: p=0.026 Place identity: p<0.001	CCA: p=0.424 Eco-anxiety: p<0.001 Eco-guilt: p=1 Place identity: p<0.001			
Once a month CCA: M=34.10, SD=5.633 Eco-anxiety: M=15.59, SD=3.880 Eco-guilt: M=11.65, SD=4.293 Place identity: M=13.72, SD=4.136	CCA: p<0.001 Eco-anxiety: p<0.001 Eco-guilt: p<0.001 Place identity: p<0.001	CCA: p<0.001 Eco-anxiety: p<0.001 Eco-guilt: p<0.001 Place identity: p<0.001	CCA: p=0.419 Eco-anxiety: p=0.007 Eco-guilt: p=0.027 Place identity: p<0.001	CCA: p=1 Eco-anxiety: p=0.196 Eco-guilt: p=0.060 Place identity: p=0.228		
Multiple times a month CCA: M=33.94, SD=6.305 Eco-anxiety: M=15.35, SD=4.214 Eco-guilt: M=11.58, SD=4.662 Place identity: M=14.24, SD=4.288	CCA: p<0.001 Eco-anxiety: p<0.001 Eco-guilt: p<0.001 Place identity: p<0.001	CCA: p=0.011 Eco-anxiety: p=0.005 Eco-guilt: p<0.001 Place identity: p<0.001	CCA: p=1 Eco-anxiety: p=0.365 Eco-guilt: p=0.076 Place identity: p<0.001	CCA: p=1 Eco-anxiety: p=1 Eco-guilt: p=0.176 Place identity: p=0.001	CCA: p=1 Eco-anxiety: p=1 Eco-guilt: p=1 Place identity: p=1	

Bibliography

- Ágoston, C., Urbán, R., Nagy, B., Csaba, B., Kőváry, Z., Kovács, K., ... & Demetrovics, Z. (2022). The psychological consequences of the ecological crisis: Three new questionnaires to assess eco-anxiety, eco-guilt, and ecological grief. *Climate Risk Management*, 100441.
- Berze, I. Z., Varga, A., Mónus, F., Néder, K., & Dúll, A. (2022). Measuring Environmental Worldviews: Investigating the Dimensionality of the New Environmental Paradigm Scale for Children in a Large Central European Sample. *Sustainability*, 14, 4595. <https://doi.org/10.3390/su14084595>
- Bogner, F. X. (2018). Environmental values (2-MEV) and appreciation of nature. *Sustainability*, 10(2), 350.
- Christensen, R., & Knezek, G. (2015). The climate change attitude survey: Measuring middle school student beliefs and intentions to enact positive environmental change. *International Journal of Environmental and Science Education*, 10(5), 773-788.
- Kerret, D., Orkibi, H., Bukchin, S., & Ronen, T. (2020). Two for one: Achieving both pro-environmental behavior and subjective well-being by implementing environmental-hope-enhancing programs in schools. *The Journal of Environmental Education*, 51(6), 434-448.
- Manoli, C. C., Johnson, B., & Dunlap, R. E. (2007). Assessing Children's Environmental Worldviews: Modifying and Validating the New Ecological Paradigm Scale for Use With Children. *The Journal of Environmental Education*, 38(4), 3-13.
Published online: 07 Aug 2010: DOI: 10.3200/JOEE.38.4.3-13
- Pauw, J. B. D., Gericke, N., Olsson, D., & Berglund, T. (2015). The effectiveness of education for sustainable development. *Sustainability*, 7(11), 15693-15717.