PSICHOLOGIJA

Psichologija
ISSN: 1392-0359
ISSN: 2345-0061
antanas.kairys@fsf.vu.lt
Vilniaus Universitetas
Lituania

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Psichologija, vol. 62, pp. 25-37, 2020
Vilniaus Universitetas
Disponible en: https://www.redalyc.org/articulo.oa?id=692974441002
DOI: https://doi.org/10.15388/Psichol.2020.18

Articles

Why do intelligent people care more about the environment?

Kodėl aukšto intelekto žmonės labiau rūpinasi aplinka?

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Psichologija, vol. 62, pp. 25-37, 2020

Vilniaus Universitetas

Recepción: 02 Marzo 2020
Aprobación: 18 Noviembre 2020

DOI: https://doi.org/10.15388/Psichol.2020.18

Abstract: The present study investigates and provides support for the Savanna-IQ interaction hypothesis regarding pro-environmental values. Study 1 showed that the highest attained education level is a significant predictor of pro-environmental concern, while Study 2 showed that the trait of openness to experience plays a unique role in predicting biospheric values, but not other values, lending support for the Savanna-IQ interaction hypothesis. Acting to preserve the natural environment is an evolutionarily novel challenge, and therefore, is more actively addressed by individuals who more readily adopt novel ideas and seek out new ways of behaving.

Keywords: Pro-environmental behavior, values, personality, openness to experience, intelligence.

Summary: Šis tyrimas nagrinėja ir pateikia empirinį pagrindimą Savanos ir intelekto sąveikos hipotezei gamtai draugiško elgesio vertybių atžvilgiu. Pirmasis tyrimas parodė, kad aukščiausias įgyto išsilavinimo lygis yra reikšmingas susirūpinimo aplinkos problemomis prognostinis kintamasis. Antrame tyrime buvo atskleista, kad atvirumo bruožas turi unikalų vaidmenį prognozuojant biosferos vertybes, bet ne kitokias vertybes, taip suteikiant empirinį pagrindą Savanos ir intelekto sąveikos hipotezei. Gamtai draugiškas elgesys yra evoliuciškai naujas iššūkis, kurį noriau priima asmenys, linkę į naujoves, patirti naujų dalykų, priimti naujas idėjas ir atrasti naujų būdų elgtis.

Keywords: Gamtai draugiškas elgesys, vertybės, asmenybė, atvirumas patyrimui, intelektas.

1. Introduction

Why do some people care more for the natural environment than others? Much research has been done in trying to answer this question. Researchers have focused their attention toward various cognitive and situational factors related to pro-environmental behavior, such as beliefs (Aguilar-Luzón et al., 2012; Han, 2015; Kaiser et al., 2005; Poškus, 2018), social norms (Bamberg et al., 2007; Dwyer et al., 2015; Terrier & Marfaing, 2015), moral norms (Chan & Bishop, 2013; Rossen et al., 2015), or values (Jakovcevic & Steg, 2013; Perlaviciute et al., 2016; Steg et al., 2014). As evidenced by the ample research that has been and continues to be published, increasingly more attention is being focused on environmental problems and human-induced climate change. There is no doubt that problems such as pollution, climate change, and depletion of natural resources need to be addressed efficiently and without hesitation.

However, there have been only a few attempts to ground pro-environmental behavior in terms of evolutionary psychology. An evolutionary approach toward pro-environmental behavior can only be seen in studies discussing various persuasion-based approaches toward pro-environmental behavior (Bator & Cialdini, 2000; Goldstein et al., 2007; Griskevicius et al., 2008, 2012; Sundie et al., 2012). The aforementioned studies, albeit extremely practical and useful, only provide insight into how to elicit behaviors by targeting innate biases, not why pro-environmental behaviors emerge naturally. Thus, an evolutionary explanation of why some people behave more pro-environmentally than others would add to a more precise understanding of pro-environmental behavior.

2. Evolutionary novelty of pro-environmental (biospheric) values and behavior

Our behavior is shaped by the environment we live in; we (as all living beings) adapt to environmental pressures and find fitness-maximizing ways of dealing with the environment (Cosmides & Tooby, 1994; Tooby & Cosmides, 1990). The various mechanisms that ensure fitness-maximizing behavior of humans evolved in the ancestral evolutionary environment of the African savanna and have remained substantially unchanged for the last 10 000 years (Kanazawa, 2004b). For example, we like sweet food because food was scarce for our ancestors and sweetness is indicative of high caloric content. Based on the Savanna principle, we are likely to behave in ways that are most suited to deal with the typical situations and problems of our ancestors (Kanazawa, 2004b). Thus, the innate motivation for eating sweet food, persists to this day, even though we have learned (or at least try) to limit our intake of calories, because food is no longer scarce.

While liking sweet food is an old adaptation that is no longer solving a problem, pro-environmental behavior is targeted at a novel

problem to which we had not had time to adapt. Our ancestors did not have as significant of an impact on the environment as we do now, and our ancestors had no need to be concerned with the depletion of natural resources; they could just move on when local resources became scarce. Thus, we evolved without any evolutionary pressures to act pro-environmentally. Furthermore, our ancestors lived in small groups of no more than 200 individuals (Kanazawa, 2004b), and it would have been hard for our ancestors to see how individual actions impact the environment on a large scale.

The novelty and the scale of pro-environmental problems make them hard to understand. We are not equipped to understand our impact on the environment intuitively, nor are we generally inclined to care about things that we find hard to comprehend (Dawkins, 2006). Nonetheless, humans differ from other animals in a way that lets us react to our environment not only through simple innate behavioral tendencies, but also through learning and conscious effort to understand the effects of our actions (Cosmides & Tooby, 2002). This ability to find creative ways of solving our problems and overcoming obstacles is the most recent and the most human characteristic of our species (Cosmides & Tooby, 2002; Kanazawa, 2004a).

3. Intelligence as a domain-specific adaptation

Evolutionary psychology regards all cognitive functions as modular (Cosmides & Tooby, 2002; Kanazawa, 2004a). This modular approach introduced a problem in explaining general intelligence (Cosmides & Tooby, 2002; Kanazawa, 2004a, 2010a). General intelligence is regarded as a means of dealing with unfamiliar situations, and the emergence of general intelligence was previously considered a holistic interaction among other problem-specific cognitive adaptations (Cosmides & Tooby, 2002). Kanazawa (2004a) has proposed a compelling argument that general intelligence is actually not an emergent function (or an exaptation) out of other cognitive functions, but a domain-specific adaptation which evolved as a mechanism of dealing with evolutionarily unfamiliar situations (but see Borsboom & Dolan, 2006 for a critique of this view).

Having legs has zero heritability – all healthy humans have legs, but some can run faster than others do. The same is true of intelligence: while all people possess intelligence (and therefore intelligence has zero heritability), people differ in their intellectual capabilities. Bearing in mind the variation in intelligence among individuals, intelligence can be considered as an individual difference variable as well (Kanazawa, 2010a). If we regard intelligence as an individual difference variable, we must concede that it must be somehow adaptive at all levels of expression, i.e. there must be a reason why there is variation in intelligence among individuals.

When we consider the scarce need for novel solutions in the ancestral environment, intelligence can be considered as a high-risk and high-reward trait. Our ancestors that were dull behaved in a way

that was common and therefore – tried and true, while the more intelligent and open to experience individuals might have invested their time and resources in novel ways of behaving, which often might have led to resources wasted and advantage lost. Thus, in the Savanna, general intelligence did not play as significant of a role as it does today, where virtually everything in our lives is evolutionarily novel (Kanazawa, 2010a). While a certain level of intelligence is undoubtedly necessary in the modern environment, the ancestral evolutionary environment did not provide as strong of a pressure to be smart. As a matter of fact, intelligence does not always maximize the reproductive fitness of individuals (Kanazawa, 2014) and, what is more, the average intelligence seems to be declining (Shayer & Ginsburg, 2009), which indicates that intelligence is not universally selected for in the modern world.

4. Openness to experience as a means of dealing with novel issues

Openness to experience is a complex trait in the sense that it is characteristic of people who enjoy both – sky-diving and classical music. However, when we consider the trait of openness as an expression of a mechanism that is evolved to deal with evolutionarily novel situations (Nettle, 2006) – it makes perfect sense. The common thing between enjoying seemingly unrelated things, such as sky-diving and classical music is that those things are novel and, therefore, they pique the interest of more intelligent people, who, based on the Savanna-IQ interaction hypothesis, would be more likely to engage in evolutionarily novel behaviors (Kanazawa, 2010a, 2014; Kanazawa & Perina, 2012).

It must be stressed that even though the trait of openness was originally called "intellect" (Goldberg, 1993; Goldberg & Goldberg, 1990; McCrae & Costa, 1997) and is indeed strongly correlated with measures of general intelligence (Ashton et al., 2000), it should not be regarded as only a reflection of a person's intelligence. Openness encompasses a wide range of facets such as fantasy, aesthetics, and feelings (McCrae, 1987; McCrae & Costa, 1997), which have little to do with general intelligence and have everything to do with seeking out experientially novel things (Kanazawa, 2010a; Nettle, 2006). Thus, the trait of openness does not necessarily lead to smart behavior, but it leads to novel behavior both on the individual experiential level (Goldberg & Goldberg, 1990; McCrae, 1987; Nettle, 2006), and on the broader evolutionary level (Kanazawa, 2004a, 2010a). This is consistent with the fact that very open people tend to score highly on measures of schizotypy (Nettle, 2006), which means that very open individuals tend to believe unusual things and have unusual thoughts.

The facets and correlates of openness illustrate the high-risk and high-reward nature of the trait. On the one hand, there are individuals who lack creativity, but are grounded and behave in reliable and tested ways, which restrict the potential outcomes of

their behaviors, while on the other hand, there are individuals who seek out novelty and risk perceiving reality incorrectly and basing their actions on incorrect assumptions.

5. Hypotheses of the present study

The present study is aimed at testing the Savanna-IQ interaction hypothesis regarding pro-environmental values. Since our ancestors did not have to solve such problems as pollution or the depletion of natural resources in the ancestral evolutionary environment, pro-environmental values and behaviors are evolutionarily novel. Thus, the first hypothesis is that more intelligent people will be more concerned about the environment. The second hypothesis is that the Big Five trait of openness to experience will be the strongest predictor of biospheric values (compared to other Big Five traits), but not of other values.

6. Data analysis strategy

Hierarchical regression analyses were used for testing the proposed hypotheses. SPSS v19 was used for all analyses. Prior to all analyses, the data were examined for multicollinearity and residuals of the models were inspected. For both studies, the data were found to be suitable for use in linear models.

7. Study 1

7.1. Data

Data from the European Values Study (EVS, 2016) are used in this study. The EVS is a large-scale representative study investigating various values and attitudes of European nations; EVS is considered to be representative of the diverse nations, cultures, and socio-economic backgrounds of Europe. The participants of the EVS were persons 18 and older who were residents in private households, regardless of nationality and citizenship or language (in Armenia persons 15 years or older and in Finland persons from 18 to 74 years were interviewed). The data were collected from 2008 to 2009. The dataset used in the present study has 44 962 valid observations that were used in the analysis.

7.2. Measures

Independent variable.

The highest education level attained by the respondent in the EVS dataset (EVS, 2016) is grouped into either 8 or 13 categories. Here we use the 13-category variable for a fuller representation. Its categories are: (1a) Inadequately completed general education; (1b) General elementary education; (1c) Basic vocational qualification or general elementary education and vocational qualification; (2a) Intermediate vocational qualification or intermediate general qualification and

vocational qualification; (2b) Intermediate general qualification; (2c_gen) General maturity certificate; (2c_voc) Vocational maturity certificate/General maturity certificate and vocational qualification; (3a_gen) Lower tertiary education general diplomas; (3a_voc) Lower tertiary education diplomas with vocational emphasis; (3b_low) Higher tertiary education lower level; (3b_high) Higher tertiary education higher level. These categories logically progress in difficulty and can be considered as an indirect measure of intellectual capabilities. While the highest attained education cannot be regarded as a perfect representation of general intellectual ability, the relationship of these variables is substantial (Colom & Flores-Mendoza, 2007) and thus it is suitable for initial explorations intended in the present study.

Dependent variable.

Pro-environmental concern was assessed with the item "I would give part of my income if I were certain that the money would be used to prevent environmental pollution." Answers ranged from 1 – agree strongly to 4 disagree strongly.

Control variables.

Spirituality was assessed by asking the question, "Whether or not you think of yourself as a religious person, how spiritual would you say you are, that is how strongly are you interested in the sacred or the supernatural?" Answers were rated from 1 – very interested to 4 – not at all interested.

Belief in God was assessed with the question, "Which, if any, of the following do you believe in? God." Answers were coded 1 for "yes" and 0 for "no."

Concern for humankind (an expression of altruistic values) was assessed with the item "To what extent do you feel concerned about the living conditions of all humans all over the world?" Answers ranged from 1 – very much to 5 – not at all.

Other control variables used in this study include respondent age, sex, monthly income (corrected for purchasing power parity), and how many children they have.

7.3. Results

A regression analysis was run with pro environmental concern as the dependent variable and highest degree of education as the independent variable, controlling for spirituality, belief in god, concern for humankind, participant age, sex, monthly income and how many children participants have (Table 1). The control variables significantly predicted pro-environmental concern and predicted a total of 6.5% of variance $(F(7, 44954) = 445,968; p < .001)$ Highest level of education was found to significantly contribute to the equation and uniquely predicts 1% of pro-environmental concern $(F(8, 44953) = 454,304, p < .001)$.

Table 1.

Summary of hierarchical regression analysis predicting pro-environmental concern

Variables	β	*t*	R^2	ΔR^2
Step 1 (control variables)			.065*	
How spiritual are you?	.130	25.880*		
Do you believe in God?	–.050	–9.895*		
Are you concerned with humankind?	.161	35.039*		
Age	.085	16.588*		
Sex	.036	7.708*		
Monthly household income	.050	10.705*		
How many children do you have?	–.017	–3.363*		
Step 2			.075*	.010*
How spiritual are you?	.126	25.217*		
Do you believe in God?	–.056	–11.127*		
Are you concerned with humankind?	.161	35.050*		
Age	.070	13.640*		
Sex	.036	7.944*		
Monthly household income	.072	15.235*		
How many children do you have?	–.032	–6.196*		
Highest education level attained	–.106	–21.896*		

Notes. * $p < .01$. The variable names of the used items in the EVS dataset are as follows (in the order they are presented in Step 2): Q34; Q30A; Q83F; age: respondent (constructed); Q86; monthly household income (x1000), corrected for ppp in Euros; Q105; Q110. The dependent variable of pro-environmental concern is Q85A in the dataset.

7.4. Discussion

Assuming that the highest attained education is highly related to intellectual capabilities, the results provide support for the proposed hypothesis. Intelligent people are more likely to be concerned with the environment, even when controlling for their spirituality, belief in God, concern for humankind, age, sex, income, and how many children they have. Admittedly, the amount of pro-environmental concern explained by education alone is quite small, but nonetheless significant and is consistent with the Savanna-IQ interaction hypothesis.

8. Study 2

8.1. Participants

A total of 869 adolescents from five high-schools in Klaipėda (Lithuania) participated in the study, 405 were male, 464 were female. The mean participant age was 15.71 (SD = 1.1) years. Participant age ranged from 14 to 18 years of age (10.8% were 14 years old, 38.7% were 15 years old, 26.6% were 16 years old, 16.2% were 17 years old, and 7.7% were 18 years old). The present dataset was taken from the first-wave of a larger interventional study (Poškus, 2017).

8.2. Measures

Value orientations were assessed with a scale developed by Steg, Perlaviciute, van der Werf, and Lurvink (2014). The scale assesses altruistic, hedonistic, egoistic, and biospheric value orientations. The scale consists of 16 items rated on a 9-point Likert scale from −1 (completely opposed to the value) to 7 (this value is the most important to me). A CFA of the measure in the present study was run using the maximum-likelihood method determined that the measure had reasonable fit $(CFI = 0.94; TLI = 0.93; RMSEA = 0.07, 90\% CI[0.07, 0.08], pclose 0.01)$, all item loadings were greater than .5.

Personality traits were assessed with the Big Five Inventory (BFI) consisting of 44 items (John & Srivastava, 1999). The Lithuanian version of the measure has previously been used with adolescents (Poškus, 2017; Poškus & Žukauskienė, 2017). The inventory assesses five personality traits: extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience. Items were scored on a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). In the present study, the scales of extraversion (**α = .71**), agreeableness (**α = .63**), conscientiousness (**α = .74**), neuroticism (**α = .75**), and openness to experience (**α = .80**) showed sufficient internal consistency.

8.3. Results

The descriptive statistics of all variables used in the study are presented in Table 2. As predicted, openness to experience has a stronger correlation with biospheric values than other personality traits do. Openness is correlated with all four measured value orientations, but the effect is largest in the case of biospheric values. This lends preliminary support for the hypothesis and the relationships among the variables were further investigated in hierarchical regression analyses (Table 3).

Table 2

Descriptives and correlations of all study variables

	M (SD)	Skew	Kurt	1	2	3	4	5	6	7	8
1. E	3.35 (0.59)	–.154	.007								
2. A	3.41 (0.53)	–.208	.147	,195**							
3. C	3.38 (0.57)	–.004	–.157	,293**	,445**						
4. N	3.02 (0.65)	.012	–.024	–,317**	–,272**	–,222**					
5. O	3.47 (0.65)	–.248	.063	,296**	,166**	,266**	.026				
6. VB	4.29 (1.88)	–.535	–.221	,083*	,225**	,218**	–.051	,280**			
7. VE	3.73 (1.79)	–.215	–.386	,232**	–.019	,104**	–,075*	,146**	,467**		
8. VH	5.11 (1.78)	–1.035	.733	,188**	,121**	,138**	–.030	,243**	,542**	,567**	
9. VA	4.59 (1.82)	–.766	.154	,116**	,300**	,226**	.017	,248**	,691**	,468**	,579**

Notes. $N = 869$; *E*–extraversion, *A*–agreeableness, *C*–conscientiousness, *N*–neuroticism, *O*–openness, VB–biospheric values, VE–egoistic values, VH–hedonistic values, VA–altruistic va - lues; Skew–skewness, Kurt–kurtosis; * $p < .05$; ** $p < .01$.

The regressions analyses (see Table 3) indicated that the trait of openness significantly contributed to explaining all value orientations, but the effect was highest for biospheric values. The unique role of openness in explaining biospheric values was further tested by comparing the partial correlations of traits and value orientations. For simplicity, only the correlations that were closest in size were compared (see Table 3 for reference). For biospheric values, the partial correlation with agreeableness (.126) was compared with the partial correlation with openness (.218) and the difference was statistically significant (Z = 1.97, p = .048). No such significant differences were found in the case of other values, providing further proof for the hypothesis that openness plays a particularly important role in predicting the evolutionarily novel biospehric values.

8.4. Discussion

The results of this study provide strong support for the hypothesis that the evolutionarily novel bioshperic values will be significantly more related to the trait of openness to experience. The trait of openness as well as general intelligence enable people to deal with novel situations To the extent that openness to experience and general intelligence share an evolutionary function, the present study provides strong evidence for the hypothesis and shows that pro-environmental values are more readily adopted by more open people, while openness does not play such a role regarding other values.

9. General discussion

The Savanna-IQ interaction hypothesis proposes that more intelligent individuals will be more likely to engage in evolutionarily novel behaviors and have evolutionarily novel values (Kanazawa, 2014). Previous studies have shown that this is true for staying up late

Table 3

Summary of hierarchical regression analyses predicting value orientations

Variable	VB			VE			VH			VA		
	β	t	$r_{partial}$	β	t	$r_{partial}$	β	t	$r_{partial}$	β	t	$r_{partial}$
Step 1												
Age	–.026	–.785	–.027	.032	.974	.033	.027	.807	.027	–.010	–.304	–.010
Sex	.125	3.553**	.120	–.030	–.856	–.029	.085	2.388*	.081	.118	3.457**	.117
E	.003	.097	.003	.228	6.330**	.211	.164	4.542**	.153	.060	1.726	.059
A	.150	4.019**	.136	–.096	–2.540*	–.086	.068	1.781	.061	.260	7.137**	.236
C	.135	3.557**	.120	.082	2.141*	.073	.057	1.474	.050	.102	2.767**	.094
N	–.014	–.360	–.012	–.005	–.125	–.004	.025	.646	.022	.095	2.565*	.087
R^2	.077			.059			.049			.125		
F_{change}	13.064**			10.014**			8.511**			21.611**		
Step 2												
Age	–.027	–.834	–.028	.032	.965	.033	.026	.795	.027	–.010	–.328	–.011
Sex	.086	2.465*	.084	–.047	–1.305	–.044	.055	1.534	.052	.092	2.667**	.091
E	–.057	–1.583	–.054	.202	5.452**	.183	.117	3.175**	.108[c]	.018	.520	.018
A	.137	3.738**	.126[a]	–.102	–2.697**	–.092	.057	1.521	.052	.251	6.948**	.230[d]
C	.095	2.551*	.087	.065	1.693	.058[b]	.026	.682	.023	.075	2.036*	.069
N	–.040	–1.060	–.036	–.016	–.408	–.014	.005	.124	.004	.077	2.098*	.071
O	.230	6.552**	.218[a]	.097	2.684**	.091[b]	.179	4.978**	.167[c]	.158	4.555**	.153[d]
R^2	.120			.065			.075			.144		
F_{change}	42.922**			7.202**			24.777**			20.744**		

Notes. N = 869; E – extraversion, A – agreeableness, C – conscientiousness, N – neuroticism, O – openness, VB – biospheric values, VE – egoistic values, VH – hedonistic values, VA – altruistic values; *p < .05; **p < .01. Sex was coded: 0 – male, 1 – female. Comparisons of partial correlations: a (Z = 1.97, p = .048), b (Z = 0.69, p = .490), c (Z = 1.25, p = .211), d (Z = –1.66, p = .096).

at night (Kanazawa & Perina, 2009), holding liberal values (Kanazawa, 2010b), having fewer children (Kanazawa, 2014), and liking classical music (Kanazawa & Perina, 2012). In the present study, we propose that acting pro-environmentally and having strong biospheric values is evolutionarily novel, and we hypothesized that more intelligent people would hold stronger pro-environmental values. The present article lends support for the Savanna-IQ interaction hypothesis and provides an evolutionary explanation of pro-environmental behavior and values.

An evolutionary explanation of pro-environmental concern has substantial theoretical and practical implications. Many initiatives that aim to promote pro-environmental behaviors are either promoting pro-environmental values or are highlighting the extent of the problem and pleading people to take action. Most of the time, these types of approaches do not take into account innate individual differences and assume that the observer is a blank slate, which is definitely not true (Pinker, 2002). We need to acknowledge that some individuals are more likely to adopt novel ideas, and some – are less likely. If adopting pro-environmental values is biologically determined (as seems to be the case), trying to instill these novel values can be effective only up to a point. It is very likely that approaches that aim to instill pro-environmental values will ultimately reach a ceiling that is determined by an individual's innate capability to hold these novel values. This leads to the conclusion that alternative approaches in promoting pro-environmental behavior should be sought with traditional ones. It would be prudent to make

use of innate behavioral tendencies to promote pro-environmental behavior and this is being done to some extent (Griskevicius et al., 2012). However, in order to achieve lasting and universal change, we need to shift our efforts toward designing the environment for sustainability, by forming behavioral defaults and empowering pro-environmental behavior while disincentivizing environmentally-harmful behaviors. It is clear that our species is not quick in adapting to the pressing environmental issues of our time, and rather than trying to change ourselves, we should try to change our surroundings so that we are encouraged to behave pro-environmentally.

Limitations of the study. The two studies in the present article did not allow for a direct assessment of general intelligence; therefore we needed to resort to education and the trait of openness as proxies for intelligence. However, attained education is highly related to general intelligence and we can confidently assume that only the most intelligent individuals will have the highest levels of education (Colom & Flores-Mendoza, 2007). The trait of openness has a very similar evolutionary function to general intelligence (Kanazawa, 2004a) and is highly correlated with it (Ashton et al., 2000). However, the trait of openness encompasses a number of complex facets and cannot be wholly reduced to intelligence. Although the data presented in this article is compelling, future research should investigate the Savanna-IQ interaction hypothesis regarding pro-environmental values using a direct measure of intelligence.

An additional limitation of the studies presented in this article is that the two samples used for hypotheses testing cannot be considered comparable to one another. While personality traits do have an overwhelming genetic basis (Polderman et al., 2015) and are very stable over time (Anusic & Schimmack, 2016), with the trait of openness likely being the most stable (Furnham & Cheng, 2019), adolescents tend to still be in the process of their personality development, thus at least on the mean level their traits are subject to change (Elkins et al., 2017). While most change in personality occurs on the mean level, we cannot be sure that this does not affect the correlations between personality traits and pro-environmental values, thus the data presented in the present manuscript need to be taken as a preliminary investigation and a call to investigate the relationship between personality and pro-environmental values further in more varied samples.

Future directions. In order to completely understand how pro-environmental behaviors and values emerge, it is not enough to use cross-sectional data. In the present article we conclude that educating people and instilling pro-environmental values might only be effective up to a point and would only work for individuals with the capacity to hold these evolutionarily novel values. However, to test this definitively, a longitudinal person-oriented study directed at the development of pro-environmental values over time is needed.

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