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Psychometric properties of the New Ecological Paradigm Scale (NEP)[1]

Milica Vdović[2]
Singidunum University, Faculty of Media and Communication

Mina Hagen
Singidunum University, Faculty of Media and Communication

Anja Simonović
Singidunum University, Faculty of Media and Communication

Nađa Avramović
Clarivate

Jasna Milošević Đorđević
Singidunum University, Faculty of Media and Communication

Climate change is a growing threat to humanity. Coping with its potentially disastrous effects will require a widespread behavioural change at both the societal and individual levels. Theory and empirical research have emphasised the role of pro-environmental attitudes as antecedents of pro-environmental behaviour. Using a large community Serbian sample (N=871 of adult population), assessed with face-to-face interviews, we searched for the psychometric characteristics of the New Ecological Paradigm scale (NEP), a widely used instrument for assessing the pro-environmental attitudes worldwide. The dimensionality of Dunlap's NEP scale has been called into question frequently, because previous studies revealed three, four, or only one dimension. Hence, there is an ongoing call for the scale's further validation. This has been the first time that the psychometric characteristics of the NEP scale were tested on a large adult sample in Serbia. Further, we tested its predictive power to explain environmental behaviour (using the Environmental Behaviour Questionnaire).

1 Link to the preprint: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4022218

2 milica.vdovic@fmk.edu.rs

The results of parallel analysis on the Serbian sample pointed to the following three-factor structure: Human is (not) above nature, Ecological crisis and Human's (non-)exception from nature, which is similar to the previous findings from the region. The three-factor solution explained about one half of variance. The factor Ecological crisis emerged as the only significant predictor for the pro-environmental behaviour. Further analysis of the pro-environmental attitudes and behaviour is needed in order to better understand and communicate the importance and urgency for the protection of planet Earth.

Key words: NEP scale, psychometric analysis, pro-ecological attitudes, pro-environmental behaviour.

Introduction

1.1. The Serbian environmental issues context

Climate change is a growing threat to humanity. Coping with its potentially disastrous effects will require a widespread behavioural change at both the societal and individual levels (Hornsey, Harris, Bain, & Fielding, 2016). Environmental issues in Serbia are no different than those found globally. It is important to include the individual level change, consisting of individuals who would take responsibility for their role in the environmental crisis, along with the social and political changes. In this study, we aim to investigate the pro-environmental attitudes and behaviour by measuring the level of environmental awareness and, additionally, by testing the psychometric characteristics of a widely used scale for measuring the pro-environmental attitudes.

Nowadays, there is a lot of concern about various issues related to the environment in Serbia. Air pollution is six times above the permitted levels, which may be classified as an extreme case of pollution that has been far from allowed in recent years (Ministry of Environmental Protection, 2019). Care about the environment was integrated as part of the Constitution, pointing out that every citizen has the right to a healthy environment and the right to know the state of the environment at any time (Madzkal, Gasić, Ivanović, 2018).

However, even if wider national laws and policies get accepted by communities, it is still important to encourage the individual level pro-environmental behaviour as a means for change. One of the first individual level policies that was implemented in Serbia was the introduction of a fixed tax for those individuals who used solid fuels as their heat source during the winter, as well as for the companies who pollute the environment (Ministry of Environmental Protection, 2019). A more recently introduced behavioural policy, the plastic bag ban, has had positive effects across the world (Convery, McDonnell, & Ferreira, 2007; Ruggeri, et al. 2018). When it comes to recycling, one of the central green policies in the world, Serbia is among the countries with the lowest recycling rate in the EU (GIZ, 2019). There is a wide range

of problems with institutionalised recycling, one of them being the lack of resources to make it possible for all households to recycle. The cities in Serbia offer its citizens the option to recycle, but the number of places where they can do so are limited; even the households that would be willing to separate their garbage often fall short. Besides country policies, some environmentally conscious companies take actions to increase pro-environmental behaviours (e.g. the company "Globaltel" with its *Reciklomat* – a machine that collects recyclable packaging).

Since every policy is based on the attitudes and behaviour of individuals, in this paper, we attempt to describe the endorsement of pro-environmental attitudes in Serbia, but also to explore the characteristics of the scale that is most often used to examine this type of attitudes in the world. Additionally, we aim at examining the scale's predictive value for predicting pro-environmental behaviours.

1.2. Measuring the pro-environmental attitudes – the New Ecological Paradigm (NEP) scale

The New Ecological Paradigm (NEP) Scale is a tool used to measure individuals' attitudes towards the environment, specifically focusing on their beliefs about human-environment interactions. It was developed to capture a shift in the worldviews towards recognising the interconnectedness of human societies and the environment, reflecting a more ecologically conscious perspective (Hart, 2020). The NEP scale is mostly used to assess pro-environmental attitudes worldwide. The original primary scale was called the **New Environmental Paradigm Scale** and it consisted of 12 items, which were claimed to have a unidimensional structure (Dunlap, Van Liere, 1978). Dunlap and Van Liere's New Environmental Paradigm Scale, published in 1978, has become a widely used measure of pro-environmental orientation. More recently, the **New Ecological Paradigm (NEP)** has been created as a response to the Dominant Social Paradigm (DSP) (Dunlap, 2008); it consists of 15 items, claiming multi-dimensionality. This NEP brought a different view of nature and human behaviour related to it through highlighting human beliefs about the possibility of affecting the balance of nature, the limitations of nature and the rights that humans have to rule the rest of the system (Dunlap, Van Liere, Merig, & Jones, 2000). In the original NEP scale, five factors of an ecological worldview were hypothesised, each consisting of three items. Likewise, the predictive validity and wide usage of the NEP scale showed scientific grounding. However, the dimensionality of Dunlap's NEP scale has been frequently called into question, because different researchers found three, four, or only one dimension. In line with inconsistent findings, the authors of the scale considers that dimensionality of the NEP scale should be based on the aim and the results of each particular study (Dunlap et al., 2000).

Three research streams are important for our analysis in Serbia: the endorsement of the pro-environmental attitudes and behaviour, the analysis of the psychometric characteristics of the NEP scale and the interplay between attitudes and pro-environmental behaviour. Research on pro-environmental attitudes and behaviour in the Balkan region is rare. One of the studies, conducted on Croatian citizens, showed that more than half of the participants had low environmental conscientiousness (Karajić, 1999). Serbian citizens proved to be amongst the most "eco-centric" out of 25 countries included in the research (IPSOS, 2018). However, the assumptions made in the afore-mentioned study were based only on several questions. The study conducted in Serbia in 2023 set out to determine if there were any significant sociodemographic differences (such as gender, age, and level of education) that could predict pro-environmental behaviour and ecological activism. The results of this study indicated that older individuals, as well as those with higher levels of education, were more likely to engage in both pro-ecological behaviour and ecological activism (Popov, Zorić & Bodroža, 2023). Interestingly, this research found no significant gender differences in either pro-ecological behaviour or ecological activism, suggesting that both men and women were equally likely to engage in these behaviours (Popov, et al., 2023). Furthermore, several studies were conducted in Serbia using the NEP scale, investigating the endorsement of pro-environmental attitudes amongst secondary school and university students and prospective teachers (Stanišić, 2021; Srbinovski & Stanišić, 2020; Petrović & Škrbić, 2016). Research conducted on primary and secondary school students indicated that respondents had a slight tendency towards a pro-ecological view, with a total NEP score of 45 (Stanišić, 2021). These tendencies were also shown in the sample of future teachers and educators, with the average value of the total level of pro-environmental attitudes of 3.28 (SD=0.57) (Miščević Kadijević & Vasilijević, 2019). In another study, with the average values on the NEP scale individual items ranging from 2.15 to 4.13, the authors concluded that the respondents, students from three different groups of faculty (social studies, geological studies and geographical studies) had well-developed environmental values, which is a prerequisite for pro-environmental behaviour and the activities to protect the environment (Petrović & Škrbić, 2016). On the other hand, a cross-cultural study conducted on the sample of Serbian and Macedonian children (Srbinovski & Stanišić, 2020) found that there was no widespread adoption of the NEP orientation among them, with Macedonian pupils displaying more pro-ecological conceptions (2.83) than their Serbian peers (2.50) (Hart, 2020). Additionally, this study also revealed that the sense of responsibility towards the environment significantly predicted ecological activism but not pro-ecological behaviour, indicating a difference in what motivates activism versus everyday environmental actions (Popov i sar., 2023).

Concerning the dimensionality of the NEP scale, after several conducted analyses, Stanišić (2021) decided to suggest keeping three factors: Environmental Crisis, (Anti)anthropocentrism and (Anti)exemptionalism. Likewise, in the study conducted by Petrović and Škrbić (2016), principal components analysis (PCA) showed the existence of three factors: Human negligence for nature, Nature resistance and the right to exploitation and the Impact of science and technology. On the other hand, PCA and the examination of the scree plot in another cross-cultural study supported four dimensions of the NEP scale, named the Balance of nature, Humans over nature, Limits to growth and Environmental Philosophy (Srbinovski & Stanišić, 2020).

Although the mentioned studies are quite informative concerning the pro-environmental attitudes and the factor structure of the NEP scale, the generalisability of the findings is limited due to the size and the nature of the sample leading to issues with the gained conclusions.

1.3. Relationship between pro-environmental attitudes and pro-environmental behaviour

In order to change certain behaviour, we need to change attitudes. This is regularity that can also be applied to environmental issues. Theory and research have emphasised the role of pro-environmental attitudes as antecedents of pro-environmental behaviour. A meta-analysis of more than 100 environmental behaviour studies showed a moderate positive correlation ($r = .49$) between pro-environmental attitudes and pro-environmental behaviours (Hines, Hungerford and Tomera, 1986), while subsequent studies found more uncertainties in this association (Hini, Gendall, & Kearns, 1995; Bronfman, Cisternas, López-Vázquez, de la Maza, Oyanedel, 2015; Casey & Scott, 2006). High pro-environmental attitudes are also associated with the support for willingness to participate in pro-environmental activities for changes (Ek, 2005). A study done by Kennedy, Beckley, McFarlane, and Nadeau (2009) showed that 72% of respondents self-reported a gap between their intentions and their actions. This seems to be common in literature, suggesting that there are other factors at play when predicting pro-environmental behaviour (Hini, Gendall, & Kaerns, 1995; Steg & Vlek, 2009). Some factors are motivational (such as moral and normative concerns, affects, weighing costs and benefits), and others can be labelled as contextual (availability of recycling facilities, the quality of public transport, the market supply of goods), and/or habitual behaviour (such as automated cognitive processes) (Steg & Vlek, 2009).

There is a well-established theory of planned behaviour that can provide a useful psychological framework to explain (the lack of) pro-ecological

behaviour. This theory argues that, besides attitudes, subjective norms and perceived behavioural control are shown to be related to a set of behavioural answers (Ajzen, 1991). The study conducted by De Groot and Steg (2007) has shown that pro-environmental intentions are strongly related to positive attitudes, positive subjective norms, and high perceived behaviour control, while environmental concerns have no direct relationship with pro-environmental intentions. The research by IPSOS Serbia has confirmed that environmentally friendly norms exist, and also showed high endorsement of pro-ecological thinking (IPSOS, 2018). On the other hand, even though pro-environmental attitudes and assumed positive norms are high, behavioural control and unclear relationships between attitudes and behaviour are lacking in order to predict pro-environmental behaviour. That is the reason why the aim of this study is to expand from the NEP scale validation to its relationship with pro-ecological behaviour.

1.4. Cross-cultural assessment of pro-environmental attitudes and pro-environmental behaviour

Attitudes, behaviours and support for pro-environmental changes do not exist in a vacuum, but rather depend on a broader cultural context. For example, Schultz and Zelezny (1998) found that although the norm-activation model efficiently predicted environmental behaviour in a US sample, it did not work on the samples from other countries. The variable pro-environmental behaviour involves action intended to lower the negative effects of human activities on the environment. People and cultures differ in their willingness to engage in these behaviours in order to protect the environment; however, there is also intercultural variation in respect to their behaviour. Several factors have been marked as important in cross-cultural studies in terms of their connection with pro-environmental behaviour (traditional values, economic development).

In the Netherlands, the respondents who are more traditional engage in individual level pro-environmental behaviours, such as energy saving (Aoyagi-Usui, Vinkeni Kuribayashi, 2003). On the other hand, Japanese people with traditional values engage in both individual pro-environmental behaviour and in taking part in the activities for implementing pro-environmental policies (Aoyagi-Usui, Vinkeni Kuribayashi, 2003).

Similar results have been obtained in other studies – in the less developed countries, traditional values predict high environmental concern, while in the more developed countries traditional values lead to lower regard for the environment (Nawrotzki, 2012). Trying to explain those differences, older studies argue that developing countries cannot afford to be concerned with the environment since they struggle with more basic human needs; however,

more recent studies have shown that it is not necessarily the case everywhere (Rauwal and Moore, 2002). A study comparing the United States of America with the Hispanic countries showed that the latter, although poorer, had a higher score on the pro-environmental attitudes scale (Rauwal and Moore, 2002). Research conducted in Nigeria found very low scores on the environmental attitudes (Ogunbode, 2013), while the studies from Turkey, one of the most polluted countries in Europe, established high polarisation concerning the environment, with only around half of the sample endorsing pro-environmental attitudes. Finally, a study comparing multiple countries on the environmental concern showed different patterns within different countries (Schultz, et al., 2005).

It is clear that it is necessary to conduct more studies that would investigate not only pro-environmental behaviour, but also the attitudes, as the obtained results are country dependent. Our study follows this call. We need better pro-environmental measures and the collected publicly available data about environmental attitudes and behaviour of the citizens in Serbia at this moment. This is of vital importance, since Serbian citizens are currently exposed to various types of systematic environmental disregard. In this study, we measure the pro-environmental attitudes and behaviour on a large community sample of the Serbian citizens for the first time, trying to understand the interplay between them.

Hence, the aims of the current study are the following: a) to provide data about environmental issues collected from the citizens of Serbia (on both their attitudes and behaviour), b) to explore the psychometric characteristics of the Serbian version of the NEP scale, and c) to investigate the NEP scale predictive relationship with pro-environmental behaviour. In order to include the perceived behaviour control, we measure pro-environmental behaviour in the form of different individual level behaviours that are easily implemented and do not depend on the outside factors, such as policy or availability of communal resources.

2. Method

2.1 Sample

A total of 871 participants formed the sample and were included in the analysis (the sample's demographic parameters are shown in Table 1). Initially, 1182 adult citizens of Serbia (aged 18+) were recruited for the study. Although the number of missing values in the Environmental Behaviour scale was not high (2.5%), in line with the recommendations of Jakobsen, Gluud, Wetterslev and Winkel (2017), since the MNAR assumption was plausible, we opted for the list-wise deletion. List-wise deletion of all missing values was implemented, and we ended up with 871 sample size, in total.

In our sample, 60.1% participants were employed (full-time or part time), 12% unemployed, 7.7% were students and 18.7% retired. The participants were recruited for face-to-face interviewing in a stratified three-stage probability sampling procedure in September 2019. Statistical analysis was performed on the secondary data from the survey and database, primarily conducted to provide information on different issues than environmental.

The sampling frame was based on the data from the 2011 Census. Sampling was performed in three stages. The first stage sampling was done by the polling station territory. The second stage included households selected by the random route technique, starting from the randomly selected addresses (seven households by sampling points). The third stage included the respondents randomly selected within households. The average length of the interview was approximately 30 minutes. Research procedures adhered to the APA (American Psychological Association) ethical guidelines. The research was first approved by the Ethical Board of the Institute of Political Studies.

Table 1
Demographic characteristics of the sample

		Percent %
Gender	Male	53.3
	Female	46.7
Education	Primary school and lower	8.3
	Secondary school	51.9
	University and higher	23.6
Average age	44.6 (16.56)	
Average number of years spent in education	12.97 (2.67)	
Average financial situation (1–5 scale)	2.83 (.88)	
Total number of respondents	871	

2.2 Measures

The New Ecological Paradigm Scale: The New Environmental Paradigm was firstly introduced with a 12-item scale, which was later revised into the New Ecological Paradigm scale. This scale has 15 items with joined five-point Likert scales (1 – I do not agree at all; 5 – I completely agree). It is organised into five facets: 1) the reality of limits to growth; 2) anti-anthropocentrism; 3) the fragility of nature's balance; 4) rejection of exemptionalism; 5) the possibility of an ecocrisis.

Both scales were cited in the academic literature more than any other environmental attitude scale: the New Environmental Paradigm scale has 3365 citations and the New Ecological Paradigm scale 4314 (Cruz & Manata,

2020). Some typical NEP scale items include: "We are approaching the limit of the number of people the Earth can support", which defines the eco-limit; "Plants and animals have as much right as humans to exist'", which defines anti-anthropocentrism; "The balance of nature is very delicate and easily upset", which defines eco-balance; "Humans will eventually learn enough about how nature works to be able to control it", which defines eco-domination; "If things continue on their present course, we will soon experience a major ecological catastrophe", defining the factor called eco-crisis (Dunlap et al., 2000) (Table 1 in the Supplementary material).

Reliability of the total NEP score was α = .83 in the study of Dunlap and colleagues (Dunlap et al., 2000). In other studies, the average alpha was α = .71, while it was higher in the developing nations (its value was .900) (Dunlap, 2008). Regarding the number of dimensions, Dunlap and colleagues (Dunlap et al., 2000) suggested using a single NEP scale, stating that all 15 items loaded heavily (from .40 to.73) on the first unrotated factor, but encouraged different factor structures to be tested in other populations, believing that NEP views might be multidimensional.

The translation process for the NEP scale: The NEP scale whose psychometric characteristics we tested was taken from a publicly available journal article (Dunlap, Van Liere, Mertig, & Jones, 2005). The NEP was translated using the back translation technique (Maneesriwongul & Dixon, 2004). It was first translated from English into Serbian by two researchers separately. Another expert and a researcher reviewed the Serbian translations together with the original English form for inconsistencies and meaning, taking the context and culture into account. Subsequently, the questionnaire was translated back from Serbian to English by a bilingual language expert. All translations were reviewed, and the Serbian version was developed by a selected team of specialists.

The Environmental Behaviour Questionnaire (shortened): The Ecological Behaviour Questionnaire was constructed using the ecological behaviours recommended by Greenpeace Australia (2001) as desirable. The items in this scale were designed to cover a range of recycling, consuming, and conserving behaviours. Also, the behaviours included in the revised scale used in Serbia were only those deemed to be easily performed by everybody in everyday life. The original questionnaire consisted of 17 items, but we excluded two items that were not applicable to the Serbian context. The questionnaire consists of 15 items assessing different levels of environmental behaviour. These are illustrative examples of items of this scale: "Where possible, I buy products made from recycled materials as opposed to those items not made from recycled materials"; "I reuse plastic shopping bags for future shopping and/or other purposes"; "I avoid using aerosol sprays"; "I turn the television off when it is not in use"; "I take short

showers to limit water use"; "I recycle newspapers"; "I use the washing machine only when it has a full load"; "When writing, I use both sides of the paper"; "When cleaning my teeth, I turn the tap off rather than leaving it run". Responses were given on a four-point Likert scale, ranging from 1 – never to 4 – always, with the scores ranging from 15 to 60; the first factor accounting for 21.567% of the variance (Casey, & Scott, 2006). In our sample, reliability was α = .88, with the scores ranging from 15 to 60 (M = 36.5; SD = 9.42). The results of principal component analysis in our sample showed that the first component explained 37.47% of variance. All 15 items had substantial loadings on the first component, ranging from .73 ("I buy products with minimal packaging") to .44 ("When travelling short distances (approx. 1–2 kilometres) I walk as opposed to driving or taking a bus"). The scale with item means, standard deviations and loadings from the component matrix on the first component is shown in Table 2 in the Supplementary material.

3. Results

3.1. Reliability analysis of the NEP scale

The 15-item New Ecological Paradigm Scale has shown a different factorial structure from the multi-faceted structure of five interrelated facets corresponding to an ecological worldview to one-dimension factor structure. Table 1 in the Supplementary material shows descriptive measures for each item from the NEP scale that we validated in this study.

Before calculating the total NEP score, we assessed the internal consistency of the scale, following the notion that, in different cultures and samples, some items were not understood well and hence were removed from further analysis. In a couple of previous studies, NEP6 was removed, and in some studies, NEP1 and NEP11 were removed (Erdogan, 2009; Rideout et al., 2005; Srbinovski, 2016; Srbinovski & Stanišić, 2020; Van Petegem & Blieck, 2006).

Fifteen selected items showed marginal internal consistency (Cronbach Alpha = .70). Inspecting the corrected item-total correlations, they ranged from .16 (NEP1) to .45 (NEP8). The only exception was item NEP6 with a negative corrected item-total correlation (-.037). We agreed with other researchers that the item "The Earth has plenty of natural resources if we just learn how to develop them" was probably misunderstood (Dunlap et al., 2000; Rideout et al., 2005; Van Petegem & Blieck, 2006; Stanisic, 2006); therefore, we decided to remove it from the total score calculation. The Cronbach Alpha calculated on the retained 14 items was .72. This level of internal consistency was similar to the one obtained in the samples from Eastern European/

transitional countries (Shultz et al., 2005), such as the Czech Republic (α = .74) and Russia (α = .68).

3.2. The ecological worldview in Serbia

The total mean score (n = 871) on fourteen NEP items (without NEP6) was 3.55 (SD = .54), ranging from 1.86 to 5.00. To determine the worldview in our sample, we calculated a pro-NEP score. This score is a mean percentage of the positive answers (agree and strongly agree) after reverse items were recoded. A boundary pro-NEP total score between a pro-ecological perspective and a human-dominance one equals 45 (Rideout et al., 2005). In our sample, the mean pro-NEP total score was 53.39, which suggests the NEP worldview (less in favour of the DSP worldview). The percentage distribution for the NEP items (N = 871) and the mean pro-NEP score are shown in Table 2. We calculated the positive answers for NEP6 after recoding and the sum was 9.5%. This is another reason to believe that this item was misinterpreted since the sum of positive answers was much smaller compared to the other items (the sum of negative scores was also unusually high – 73.7%).

Table 2
Percentage distribution for the 14 New Ecological Paradigm (NEP) items (N = 871), without the item NEP6

Item	SD (strongly disagree) %	D (disagree) %	U (undecided) %	A (agree) %	SA (strongly agree) %	pro-NEP score
NEP1	14.1	12.6	20.3	26.9	26.1	53
NEP2	29.3	24.5	18.3	15	13	53.8
NEP3	4.4	9.9	27.3	28.4	30.1	58.5
NEP4	19.5	20.7	29.9	20.3	9.6	40.2
NEP5	1.5	4.2	16.5	27.4	50.3	77.7
NEP7	1.7	4.2	16.8	21.7	55.6	77.3
NEP8	20.7	21.6	34	15.8	7.9	42.3
NEP9	4.8	6.4	31.8	28.6	28.4	57
NEP10	18.4	26.2	30.9	16.8	7.8	44.6
NEP11	9.5	10	35.2	26.4	18.8	45.2
NEP12	25	21.8	30.1	16.2	6.9	46.8
NEP13	1.7	7	27.6	29.2	34.6	63.8
NEP14	11	16.1	37	22.5	13.4	27.1
NEP15	4.7	7.2	28	27.8	32.3	60.1
Mean pro-NEP						53.39

Note: The NEP score was calculated as the sum of the positive response frequencies for each item: strongly agree plus agree for the ecological items (1, 3, 5, 7, 9, 11, 13, 15), disagree plus strongly disagree for the anthropocentric items (2, 4, 8, 10, 12, 14).

3.3. Content validity

In order to assess content validity of the scale, the questionnaire was reviewed by the authors of the study and four environmental activists were interviewed. We provided the definitions of relevance, comprehensiveness and clarity to the activists in order to equalise their conceptions. The content of each item was rated using three four-point Likert scales (from 1 = low level of relevance/comprehensiveness/clarity to 4 = high level of relevance/comprehensiveness/clarity). Content validity was calculated by considering the ratio of three or four points of all items, and the ratio higher than .80 was interpreted as high content validity (Polit & Hunglar, 1999). There was a dispute about the meaning of the content of the NEP6 item, "The Earth has plenty of natural resources if we just learn how to develop them", and this item had the lowest validity score. We did not rewrite the question, being afraid that we could completely change the meaning and the distribution of items across the facets. In total, the whole inventory had a score higher than 0.80; hence, we decided to keep the original item and eventually proposed the change of the content of the item after the empirical evidence in the Serbian sample.

3.4. Dimensionality of the scale

The dimensionality of the NEP scales has been called into question and assessed many times, resulting in one– (Dunlap, 2008), two– (Nooney, Woodrum, Hoban & Clifford, 2003; Wu et al., 2012), three– (Manoli, Johnson & Dunlap, 2007; Van Petegem & Blieck, 2006), four– (Erdogan, 2009) and five-factor structure (Amburgey & Thoman, 2012).

Our analyses were conducted in three steps. First, we conducted exploratory factor analysis (principal component analysis; PCA) with varimax rotation on 15 items, without the number of factors being constrained. The measure of sample adequacy (KMO =.748) and significant Bartlett's Test of Sphericity ($p<.01$) indicated suitability of these data for factor analytic procedures. Three items failed to have significant loading on their first unrotated principal component. Twelve items had loadings higher than .30, ranging from .34 (NEP9) to .64 (NEP5). Based on eigenvalues higher than one, there were five factors extracted, explaining 62.2% of variance. The first factor explained 21.57% of variance. The rotated factor solution is presented in Table 3.

Table 3
Principal component analysis of the NEP items with Varimax Rotation – a five-factor solution

		Factors				
Item	facet	1	2	3	4	5
NEP4	anti-exempt	.72			.13	-.17
NEP12	anti-anthro	**.71**	-.12	.19	-.25	.25
NEP2	anti-anthro	.67		.13		
NEP8	balance	.67		-.16	.33	
NEP10	eco-crisis	**.61**	.15			
NEP14	anti-exempt	**.57**	.16	-.21	**-.51**	.19
NEP5	eco-crisis	.30	**.54**	**.41**	.21	
NEP1	limits	-.17	**.71**	-.20		.26
NEP3	balance		**.77**	.21		
NEP7	anti-anthro	.17		**.67**	.17	**.42**
NEP6	limits	.16		**-.83**	-.11	
NEP13	balance	.13		.21	**.70**	.29
NEP15	eco-crisis	.18	.32		.70	
NEP11	limits		**.42**	-.30	.33	**.52**
NEP9	anti-exempt			.14	.10	**.82**
Eigenvalue		3.235	2.384	1.556	1.091	1.064
Percentage of variance		21.6	15.9	10.4	7.3	7.1

Note: The loadings above .40 are given in bold.

The results show that two anti-anthro, two anti-exempt, one balance and one eco-crisis item have primary loadings on the first factor. One limits, one balance and one eco-crisis item load most heavily on the second factor. Inspecting the content of the third factor, we can notice that only one item (anti-anthro) had a primary positive loading, and the eco-crisis (NEP5) that loads primarily on Factor 2 had secondary loadings. The reason for the NEP6 negative loading is most certainly the misinterpretation of the items, which has already been mentioned. Another reverse coded limits item (NEP11) had a small and negative loading on the third factor. One balance and one eco-crisis had prominent loadings on the fourth. The fifth factor comprised two items – one from balance, and one from the eco-crisis facet, while one anti-anthro item had a secondary loading. The limits item from the fifth factor had a secondary loading on Factor 2. This factor structure did not match the facet level order of the inventory. Of note, each factor consisted of the items measuring the construct in the same direction (either positive or reversed items). In order to compare this structure, we checked the findings of previous studies, but none of them had obtained the five factor solution – they revealed four factors or fewer (Dunlap et al., 2000). Aiming to interpret the results, we mostly struggled with the third factor, given the fact that, when we excluded the NEP6 item due to its lack of clarity, it left the factor with solely one item loading primarily on it (NEP7). Given the following assumptions: 1) the five factors encompassed items from multiple facets that loaded heavily on them; 2) the number of items

per factor varied from six to two; and 3) the fourth and fifth factors exhibited marginal importance (with eigenvalues scarcely exceeding 1.0), we were disinclined to develop five new NEP subscales corresponding to the factors identified through principal-components analysis and varimax rotation.

Further, we compared our results to the ones obtained by Stanišić (2021),where the scale dimensionality was tested on the Serbian sample of primary and secondary school students. Their results of principal component analysis without the fixed number of factors demonstrated a four-factor structure, explaining 47.86% of variance. In this paper, Factor 4 had only one item with a strong loading, and the authors proceeded with parallel analysis, which suggested a three-factor solution. These authors decided to retain it for further analysis. Following the same logic, we aimed to test whether a different number of factors might better fit the data, result in more balanced scales in terms of item numbers, and provide more meaningful interpretations.

In the second step, in order to determine the appropriate number of factors to retain, we relied on previous studies and interpretability, but also followed empirical guidance. Since the Kaiser-Guttman rule ("eigenvalue> 1"; Kaiser, 1960) tends to overextract, we conducted a parallel analysis (Horn, 1965), one of the most recommended methods for determining the number of factors (O'Connor, 2000; Velicer et al., 2000; Zwick & Velicer, 1986). The results of the parallel analysis and the comparison between the eigenvalues are presented in Table 4. The logic of the parallel analysis is to keep only the factors where initial eigenvalue is larger than the one obtained in the parallel analysis, since the factors in parallel analysis are obtained from random numbers (Hayton et al., 2004; Montanelli & Humphreys, 1976; Turner, 1998). Thus, we should discard the factors that do not account for more variance than the parallel factor.

Table 4
Actual and random eigenvalues (the mean and 95th percentile) from the parallel analysis

Factor	Actual eigenvalue	Mean eigenvalue	The 95th percentile eigenvalue	Decision
1	3.23	1.22	1.26	keep
2	2.38	1.17	1.21	keep
3	1.55	1.14	1.17	keep
4	1.09	1.10	1.13	discard
5	1.06	1.07	1.10	discard

The results of the parallel analysis pointed to a three-factor structure. In the next step, we conducted the EFA PCA with varimax rotation and the number of factors fixed to three. The three-factor solution explained 47.84% of variance, a bit less than the five-factor solution. All variables had positive loadings on the first unrotated factor, except for the NEP6 item (-.133), but only twelve had loadings larger than .30, ranging from .34 (NEP9) to .64 (NEP5). The rotated factor solution is presented in Table 5, with the new names and old initial dimensions (Dunlap, 2008).

Table 5
Principal component analysis of the NEP items with Varimax Rotation – the three-factor solution, with the representation of items and dimensions

		Factors		
		Human is (not) above nature	Ecological crisis	Human's (non-) exception from nature
Item	Original Dimensions (Dunlap, 2008)	1	2	3
NEP 4 – Human ingenuity will insure that we do not make the Earth unliveable. (R)	Human's (non-) exception from nature	.71		
NEP 12 – Humans were meant to rule over the rest of nature. (R)	Human is (not) above nature	.71		
NEP 8 – The balance of nature is strong enough to cope with the impacts of modern industrial nations. (R)	Natural balance	.67		
NEP 2 – Humans have the right to modify the natural environment to suit their needs. (R)	Human is (not) above nature	.66		
NEP 10 – The so-called "ecological crisis" facing humankind has been greatly exaggerated. (R)	The possibility of ecological crisis	.61		
NEP 14 – Humans will eventually learn enough about how nature works to be able to control it. (R)	Human's (non-) exception from nature	.60		-.36
NEP 11 – The Earth has plenty of natural resources if we just learn how to develop them. (R)	Growth limits		.76	
NEP 1 – We are approaching the limit of the number of people the Earth can support.	Growth limits		.74	
NEP 3 – When humans interfere with nature, it often produces disastrous consequences.	Natural balance		.54	
NEP 15 – If things continue on their present course, we will soon experience a major ecological catastrophe.	The possibility of ecological crisis		**.52**	.37
NEP 9 – Despite our abilities, humans are still subject to the laws of nature.	Human's (non-) exception from nature		.44	
NEP 5 – Humans are severely abusing the environment.	The possibility of ecological crisis		.43	.46
NEP 13 – The balance of nature is very delicate and easily upset.	Natural balance		.36	**.53**
NEP 7 – Plants and animals have as much right as humans to exist.	Human is (not) above nature			.72
NEP 6 – The Earth is like a spaceship with very limited room and resources.	Growth limits			-.77
Eigenvalue		3.23	2.38	1.56
Percentage of variance		21.6	15.9	10.4

Note: Loadings above .40 are given in bold.

Our results revealed three factors: 1) Human is (not) above nature, 2) Ecological crisis, and 3) Human's (non-)exception from nature (Table 5). This factorial structure is similar to the previous research conducted in Serbia on smaller samples. However, there are some differences in the items representation of the factors (Table 5), which can still be a tolerable difference in psychometric characteristics from the previous studies (Stanišić, 2021).

When it comes to the factor Human is (not) above nature, the items with the highest loading were the following: "Human ingenuity will insure that we do not make the Earth unliveable." (R), and "Humans were meant to rule over the rest of nature". The Ecological crisis factor was best represented by the following items: "The Earth has plenty of natural resources if we just learn how to develop them." (R), and "We are approaching the limit of the number of people the Earth can support". The Human's (non-)exception from nature factor was best represented with the item "Plants and animals have as much right as humans to exist".

Our study has confirmed the three-factor structure of the NEP scale, obtained in earlier research conducted in Serbia (Stanišić, 2021). However, the belonging of items to different factors is not identical. The representation of the comparison of the three factors solution with all the items between our study and the other study conducted in Serbia (Stanišić, 2021) is shown in Table 6. As can be seen, most of the items, with their dimensions, fit into the three-factor structure, supporting the previous study (Stanišić, 2021). However, out of fifteen items, only three of them are placed differently. In our study, the item "Human ingenuity will insure that we do not make the Earth unliveable" found its place in a factor called Human is (not) above nature, while the item "Despite our abilities, humans are still subject to the laws of nature" belongs to the Ecological crisis factor. Both items belong to the factor called Human's (non-)exception from nature in the other study (Stanišić, 2021). The third item, "The balance of nature is very delicate and easily upset", belongs to Human's (non-)exception from nature factor in our study, while in the other study it belonged to Ecological crisis factor.

According to Stanišić (2021), five dimensions can all be found in three factors: human's (non-)exception from nature, the possibility of ecological crisis, natural balance, growth limits and human is (not) above nature. Therefore, the names given to the factors depend on the representation of these dimensions in the factors. In our study, two factors adhere to this principle: Human is (not) above nature and Ecological crisis. However, since our third factor consists of three items that belong to three different dimensions, but two of them match items from Stanišić's (2021) Human's (non-)exception from nature factor, we decided to follow the consistency of the studies conducted in Serbia and named it as Stanišić (2021) did: Human's (non-)exception from nature.

Table 6
Comparison of the three-factor solutions

Factors	Items	Original Dimensions (Dunlap, 2008)	Factors (Stanišić, 2021)
Human is (not) above nature	NEP 14 – Humans will eventually learn enough about how nature works to be able to control it. (R)	Human's (non-) exception from nature	Human is (not) above nature
	NEP 12 – Humans were meant to rule over the rest of nature. (R)	Human is (not) above nature	Human is (not) above nature
	NEP 8 – The balance of nature is strong enough to cope with the impacts of modern industrial nations. (R)	Natural balance	Human is (not) above nature
	NEP 2 – Humans have the right to modify the natural environment to suit their needs. (R)	Human is (not) above nature	Human is (not) above nature
	NEP 10 – The so-called "ecological crisis" facing humankind has been greatly exaggerated. (R)	The possibility of ecological crisis	Human is (not) above nature
	NEP 4 – Human ingenuity will insure that we do not make the Earth unliveable. (R)	Human's (non-) exception from nature	**Human's (non-) exception from nature**
Human's (non-) exception from nature	NEP 6 – The Earth is like a spaceship with very limited room and resources.	Growth limits	Human's (non-) exception from nature
	NEP 7 – Plants and animals have as much right as humans to exist.	Human is (not) above nature	Human's (non-) exception from nature
	NEP 13 – The balance of nature is very delicate and easily upset.	Natural balance	**Ecological crisis**
Ecological crisis	NEP 9 – Despite our abilities, humans are still subject to the laws of nature.	Human's (non-) exception from nature	**Human's (non-) exception from nature**
	NEP 11 – The Earth has plenty of natural resources if we just learn how to develop them. (R)	Growth limits	Ecological crisis
	NEP 1 – We are approaching the limit of the number of people the Earth can support.	Growth limits	Ecological crisis
	NEP 3 – When humans interfere with nature, it often produces disastrous consequences.	Natural balance	Ecological crisis
	NEP 15 – If things continue on their present course, we will soon experience a major ecological catastrophe.	The possibility of ecological crisis	Ecological crisis
	NEP 5 – Humans are severely abusing the environment.	The possibility of ecological crisis	Ecological crisis

3.5. Predictive validity of the scale

Table 2 in the Supplementary material represents each item means and standard deviations for the Environmental Behaviour Questionnaire; the average mean for the whole scale is 2.44 (on the scale from 1 to 4), with standard deviation for the whole scale being .62. These results show that environmental behaviour, when easy to exhibit, was performed by the adult population in Serbia with a slight tendency towards a pro-ecological behaviour.

In order to assess the predictive validity of the NEP, we ran a linear regression analysis with the Environmental Behaviour Questionnaire as a criterion, and three extracted NEP factor scores, Human is (not)above nature (α = .75), Ecological crisis (α = .62) and Human's (non-)exception from nature (α = .63), as predictors. The results presented in Table 7 reveal that the NEP is a weak, but significant predictor of environmental behaviour (F (3,732) = 2. 778; p <.50; R^2 = .01). Factor 2 (Ecological crisis) emerged as the sole significant predictor in the analysis (β = .08; *p* <.05).

Table 7
Regression analysis testing the NEP factors in predicting environmental behaviour

	F (3,732) = 2.778*; R^2 = .01	
	beta	sig
Human is (not) above nature	-.02	.66
Ecological crisis	.08	.04
Human's (non-)exception from nature	.07	.06

Note. * – p <.05.

4. Discussion

In this study, we assessed the ecological worldview of Serbian adult citizens on a large community sample and established the psychometric characteristics of the NEP scale, thus investigating its predictive power for environmental behaviour. Serbian citizens seem to endorse high pro-environmental attitudes. We suppose that the high pro-environmental attitude among the Serbian citizens is the first step to achieving ecological changes in the country.

Although widely used in various studies and literature, the NEP performed inconsistently in the cross-cultural factorial structure empirical checking (Cruz & Manata, 2020). Different authors called for the psychometric investigation of the NEP dimensionality to assure a validated measure of environmental worldviews that can further be used for cross-cultural studies (Cruz & Manata, 2020), also arguing that the empirical response to this

demand was slow. Initially, a one-dimension structure for the NEP scale was established (Fleury-Bahi, et al., 2015), but was later followed by a five-factor solution (Amburgey and Thoman, 2012). Nevertheless, additional reviews revealed a poor fit for the proposed NEP five-factor structure (Cruz & Manata, 2020), as well as the fact that factors were not differentiated (Ogunbode, 2013). Hence, researchers proposed a three-factor solution. Our study is thus in line with the call for further validation of the factor structure of the scale in Serbia.

The results of this research confirmed the three-factor structure of the NEP scale that had been previously determined in the studies from Serbia (on smaller samples, reported by Stanišić, 2021). Although the items describing the three factors were not exactly the same in all studies from Serbia, we can conclude that in our context it is best to accept the three-factor structure of the NEP scale. The environmental crisis factor has a significant predictive power for predicting pro-environmental behaviours (the items that saturate this factor to the greatest extent belong to the initial factor Limits to growth).

Some authors have criticised the NEP scale, and we can group these critical remarks into three broad categories: 1) varying dimensionalities, 2) inadequate inclusion of topics that measure the environmental paradigm, and 3) a weak correlation between the NEP and behavioural measures (Anderson, 2012). Varied dimensionality could be a product of cultural differences. It is worthy to explore whether the included topics in the NEP should be the same in every cultural context. Watson and Halse (2005) noted challenges in using the NEP questionnaire to measure environmental attitudes in non-Western cultures, as the scale's Western-centric framework may not accurately reflect attitudes in these contexts. For instance, a study in Mexico found that individuals held both pro-NEP and pro-Human Exception Paradigm attitudes simultaneously, contrary to the NEP's assumption of mutual exclusivity (Watson & Halse, 2005). In our study, three general topics (dimensions) were identified: 1) Human is (not) above nature; 2) Ecological crisis; and 3) Human's (non-) exception from nature, with only one item being identified as not being clear (NEP6: "Earth has plenty of natural resources if we just learn how to develop them"). Clearer understanding of this item could be a consequence associated with the Western capitalism, which views natural resources as abundant and exploitable through technological development. This perspective suggests that the Earth's resources are essentially limitless, and any scarcity can be overcome through human ingenuity and advancement. It implies a belief in the ability of technology and innovation to continually extract and exploit resources without significant consequences, aligning with a worldview that prioritises economic growth and development over environmental concerns.

Previous literature shows that pro-environmental attitudes (including those measured by the NEP scale) are not highly correlated with pro-environmental behaviours (Hines, Hungerford and Tomera, 1987; Hini, Gendall, & Kearns,

1995; Bronfman, Cisternas, López-Vázquez, de la Maza, Oyanedel, 2015; Casey & Scott, 2006). The study's findings also indicate a weak but significant relationship between the NEP scale and pro-environmental behaviour, with Factor 2 (Ecological crisis) emerging as the sole significant predictor. This factor includes questions such as the belief that the Earth has abundant resources if developed properly, concerns about reaching the Earth's carrying capacity, the perception of disastrous consequences when humans interfere with nature, the anticipation of a major ecological catastrophe if the current trends persist, the acknowledgment of human limitations against the laws of nature, and the recognition of severe environmental abuse by humans. These results are in line with previous research that showed a weak, but existing relationship between attitudes (as measured by the NEP) and behaviour. The findings suggest that while attitudes towards the environment play a role in predicting certain behaviour, other factors may also be significant, thus highlighting the complex nature of the relationship between attitudes and actions in environmental contexts. The NEP scale seems to be a reasonable choice when measuring pro-environmental attitudes, with some predictive power in explaining pro-environmental behaviour. Our findings suggest that Serbian citizens align more with the New Ecological Paradigm (NEP) worldview than the Dominant Social Paradigm (DSP) worldview. As pointed by Erdogan (2009), the prevailing social paradigm in Serbia is anthropocentric, which implies viewing humans as superior to nature, and perceiving abundance of resources that do not require protection. This anthropocentric perspective has led to the global ecological crisis affecting the world and humanity as a whole. Relatively high NEP scores are accompanied by a slight positive skew in pro-environmental behaviour in the Serbian sample. This shows that Serbian citizens have a potential to help deal with the environmental crisis that exists on the local and international level. These positive regards towards the environment could stem from the fact that Serbia is facing significant environmental challenges, with the air pollution levels far exceeding the permitted limits. These attitudes could potentially be explained using the risk hypothesis, which is based on the assertion that higher risk makes people more future-focused (Rojas-Rivas, et al. 2020). Even though the measured behaviours can be easily achieved there may be a possibility that citizens would easily adapt to the environmental system changes, given their positive NEP worldview.

Despite the criticism, the NEP scale has been validated in Serbia and can be used as a valid measure of pro-environmental attitudes, even with its shortcomings. Studies have demonstrated that the NEP scale reliably captures the environmental worldview of Serbian citizens and correlates with their pro-environmental behaviours, albeit to a moderate extent. This validation underscores the scale's applicability in diverse cultural contexts, providing a valuable tool for researchers and policymakers who want to assess and promote environmental attitudes and behaviours in Serbia.

4.2 Limitations and further studies

The current research has its limitations. There are several variables that we thought might be useful to explore, but were not included in the study, such as support for policy, knowledge on environmental issues and a broader value context. Another thing that could be explored is the predictive potential of the NEP scale in support of different environmental policies, both the individual level policies, and broader, system level policies. In this study, we found low, but positive predictive power for easy personal actions, such as recycling and energy conservation. Nevertheless, the NEP scale should be tested for large scale initiatives, like regulatory measures, carbon pricing and sustainable development policies (Stern, 2000). This dual focus on individual and systemic levels could provide a comprehensive insight into the scale's effectiveness in fostering a more sustainable future. In further studies, different scales for pro-environmental behaviour should be used. Our study measured behaviour as frugal actions more than pro-environmental behaviour, since the motivation behind the behaviours was not taken into account. We assessed the environmental attitude gap, but it would also be interesting to assess the knowledge-action gap that has shown up as relevant in previous studies (Zak & Munson, 2008). Finally, it would be useful to include some questions concerning the broader value context in which these attitudes and behaviours are situated. Understanding the underlying values that shape the environmental perspectives, such as altruism, biospheric values, and social justice concerns, can provide a more nuanced view of the motivations driving pro-environmental actions (Schwartz, 1992; Stern, Dietz, & Kalof, 1993). This broader value context can help identify the foundational beliefs that support the environmental policies and behaviours and offer insights into framing environmental issues in such a way as to resonate with diverse value systems. For example, linking environmental sustainability with economic equity or public health can broaden the support across different demographic groups (Leiserowitz, Kates, & Parris, 2006).

4.3 Conclusion

Environmental challenges have become one of the greatest global concerns. Therefore, environmental movements around the world are on the rise and struggling to point out the importance of ecological issues, as well as to provide the general support of the broad public and policy makers to introduce green policies. Scientists explore the factors and mechanisms that could enhance pro-environmental behaviours and minimise the negative effects of human actions on the environment. Serbia is a vulnerable country when it comes to these issues for different reasons: the current state of pollution, poor endorsement of pro-environmental behaviour on an individual level and the green policies on the state level.

Our study is one attempt to validate the NEP scale and bring it to light by making it more accessible for academic research in this area. Hence, we attempted to respond to the academic demand for the improvement of the existing measurements of general environmental attitudes, especially the calls for testing them in different social contexts (on which our analysis was based) (Cruz & Manata, 2020). Psychometric analysis of the NEP scale on a large community sample in Serbia has revealed three factors: 1) Human is (not) above nature; 2) Ecological crisis; and 3) Human's (non-)exception from nature. Only the second factor significantly predicted environmental behaviour. Besides the descriptive importance of our data for a country that has been understudies in the context of environmental issues, the findings can be used for facilitaSting further academic and social communication. Opinion makers and official institutions should communicate environmental issues to the public by relying on three main clusters: humanity and humans are not above nature, they form an integral part of it, and great ecological crisis is the reality of our lives. It is of essential interest for future human generations to compromise with the nature and build sustainable societies by developing protective types of living styles, especially in disadvantaged underdeveloped countries.

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Data availability: Data available on request from the authors.

References

Anderson, M. (2012). The New Environmental Paradigm (NEP) Scale. In: Spellerberg, I. et al. (Eds.). *The Berkshire Encyclopedia of sustainability: measurements, indicators, and research methods for sustainability* (260–262). Massachusetts, US: Berkshire Publishing Group. Retrieved March 22, 2022. https://umaine.edu/%20soe/wp-content/uploads/sites/199/2013/01/NewEcologicalParadigmNEPScale1.pdf

Amburgey, J. W., &Thoman, D. B. (2012). Dimensionality of the new ecological paradigm: Issues of factor structure and measurement. *Environment and Behavior*, *44*(2), 235-256. https://doi.org/10.1177/0013916511402064

Aoyagi-Usui, M., Vinken, H., Kuribayashi, A., (2003). Pro-environmental attitudes and behaviors: an international comparison. *Human Ecology Review, 10(1*), 23-31. https://www.jstor.org/stable/24707084

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179-211. https://doi.org/10.1016/0749-5978(91)90020-T

Bronfman, N., Cisternas, C.P., López-Vázquez, E., de la Maza, C. &Oyanedel, C. (2015). Understanding Attitudes and Pro-Environmental Behaviors in a Chilean Community. *Sustainability, 7,* 14133-14152; https://doi.org/10.3390/su71014133

Casey, P. J., & Scott, K. (2006). Environmental concern and behaviour in an Australian sample within an ecocentric–anthropocentric framework. *Australian Journal of Psychology*, *58*(2), 57-67. https://doi.org/10.1080/00049530600730419

Convery, F., McDonnell, S., & Ferreira, S. (2007). The most popular tax in Europe? Lessons from the Irish plastic bags levy. *Environ Resource Econ.*, *38*, 1–11. https://doi.org/10.1007/s10640-006-9059-2

Cruz, S. M., & Manata, B. (2020). Measurement of environmental concern: A review and analysis. *Frontiers in Psychology*, *11*, 363. https://doi.org/10.3389/fpsyg.2020.00363

Dunlap, R.E. (2008). The New Environmental Paradigm Scale: From Marginality to Worldwide Use. *The Journal of Environmental Education, 40*(1), 3-18. https://doi.org/10.3200/JOEE.40.1.3-18

Dunlap, R. E., Van Liere, K. D., Mertig, A. G., & Jones, R. E. (2000). Measuring endorsement of the new ecological paradigm: a revised NEP scale. *Journal of social issues*, *56*(3), 425-442. https://doi.org/10.1111/0022-4537.00176

Dunlap, R. E., & Van Liere, K. D. (1978). The new environmental paradigm. *Journal of Environmental Education, 9,* 10-19. https://doi.org/10.1080/00958964.1978.10801875

De Groot, J. & Steg, L. (2007). General Beliefs and the Theory of Planned Behavior: The Role of Environmental Concerns in the TPB. *Journal of Applied Social Psychology. 37*. 1817 – 1836. https://doi.org/10.1111/j.1559-1816.2007.00239.x

Globaltel (2021). Retrieved from http://reciklomat.rs/, on 12.11.2021

Ek, K. (2005). Public and private attitudes towards "green" electricity: the case of Swedish wind power. *Energy policy, 33*(13), 1677-1689. https://doi.org/10.1016/j.enpol.2004.02.005

Erdogan, N. (2009). Testing the new ecological paradigm scale: Turkish case. African *Journal of Agricultural Research, 4*(10), 1023–1031. https://academicjournals.org/article/article1380883767_Erdogan%202.pdf

Fleury-Bahi, G., Marcouyeux, A., Renard, E., &Roussiau, N. (2015). Factorial structure of the New Ecological Paradigm scale in two French samples. *Environmental Education Research*, *21*(6), 821-831. https://doi.org/10.1080/13504622.2014.913127

GIZ, (2019), *Assessment of the effects of the introduction of the circular economy – the plastic packaging sector*, Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ) project "Waste menagement in the context of climate change – DKTI". https://www.giz.de/en/downloads/plastic-packaging-sector-danijela-bobic.pdf

Hayton, J. C., Allen, D. G., & Scarpello, V. (2004). Factor Retention Decisions in Exploratory Factor Analysis: a Tutorial on Parallel Analysis. *Organizational Research Methods, 7*(2), 191-205. https://doi.org/10.1177/1094428104263675

Hornsey, M., Harris, E., Bain, P., & Fielding, K. (2016). Meta-analyses of the determinants and outcomes of belief in climate change. *Nature Climate Change, 6,* 622–626, https://doi.org/10.1038/NCLIMATE2943

Hines, J. M., Hungerford, H. R., & Tomera, A. N. (1987). *Analysis and Synthesis of Research on Responsible Environmental Behavior: A Meta-Analysis. The Journal of Environmental Education, 18*(2), 1–8. https://doi.org/10.1080/00958964.1987.9943

Hini, D., Gendall, P., & Kearns, Z. (1995). The Link between Environmental Attitudes and Behaviour. *Marketing Bulletin, 6,* 22-31. http://marketing-bulletin.massey.ac.nz/v6/mb_v6_a3_hini.pdf

IPSOS (2018). A throwaway world: the challenge of plastic packaging and waste. *An Ipsos survey. https://www.ipsos.com/en/throwaway-world-challenge-plastic-packaging-and-waste*

Jakobsen, J. C., Gluud, C., Wetterslev, J., & Winkel, P. (2017). When and how should multiple imputation be used for handling missing data in randomised clinical trials – a practical guide with flowcharts. *BMC Medical Research Methodology, 17*(1). https://doi.org/10.1186/s12874-017-0442-1

Kaiser, H. F. (1960). The application of electronic computers to factor analysis. *Educational and Psychological Measurement, 20,* 141–151. https://doi.org/10.1177/001316446002000116

Karajić, N. (1999). Vrijednosne preferencije kao determinante ekološkog ponašanja u Hrvatskoj. *Socijalna ekologija, 8*(1-2), 1-21. https://hrcak.srce.hr/141672

Kennedy, E. H., Beckley, T., Mcfarlane, B.L., Nadeau, S. (2009). Why We Don't "Walk the Talk": Understanding the Environmental Values/Behaviour Gap in Canada. *Human ecology review, 16*(2),151-160. /https://www.jstor.org/stable/pdf/24707539.pdf?casa_token=c8X_K7aT53AAAAAA:0id6F6XhNnvdV292LfnUb8cnztY4_7hkLSWRHgmvweJ027nPno6NHR9EhE2Cq7S_NB9b7i74JsyX8JlXQ83DygdB8rf2xOj8G8QnkGBbqx1c3BpNeiBg

Leiserowitz, A. A., Kates, R. W., & Parris, T. M. (2006). Sustainability Values, Attitudes, and Behaviors: A Review of Multinational and Global Trends. *Annual Review of Environment and Resources, 31,* 413-444. https://doi.org/10.1146/annurev.energy.31.102505.133552

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. https://doi.org/10.3200/JOEE.38.4.3-13

Madzkal, M., Gasic, M., & Ivanovic, I. (2018). *Ekološka politika Srbije i Evropske unije*. Istaknuti tematski zbornik radova vodećeg nacionalnog značaja Istočna evropa i postmoderni izazovi, Centar za strateška istraživanja nacionalne bezbednosti CESNA B, Beograd u saradnji sa Fakultetom za pravo, bezbednost i menadžment ''Konstantin Veliki" Niš Univerziteta Union Nikola Tesla u Beogradu, pp 241-257.

Maneesriwongul W, Dixon JK. Instrument translation process: a methods review. Journal of Advanced Nursing. 2004 Oct;48(2):175-86. https://doi.org/10.1111/j.1365-2648.2004.03185.x. PMID: 15369498.

Ministry of Environmental Protection. (2020). Ministarstvo zaštite životne sredine (2020). Ekotaksa. https://www.ekologija.gov.rs/saopstenja/vesti/eko-taksa

Miščević Kadijević, G., Vasilijević, D. (2019). Utvrđivanje proekoloških pogleda budućih vaspitača i učitelja. U: Pavlović Breneselović, D., Spasenović, V. i Alibabić, Š. (ur.). *Obrazovna politika i praksa: u skladu ili u raskoraku* (103–107). Zbornik radova sa nacionalnog skupa Susreti pedagoga, 25. i 26. januar 2019. Beograd: Filozofski fakultet Univerziteta u Beogradu i Pedagoško društvo Srbije. https://doi.org/10.5937/inovacije2301033V

Montanelli, R. G., & Humphreys, L. G. (1976). Latent roots of random data correlation matrices with squared multiple correlations on the diagonal: A Monte Carlo study. *Psychometrika, 41*(3), 341–348. https://doi.org/10.1007/BF02293559

Nawrotzki, R. J. (2012). The Politics of Environmental Concern: A Cross-National Analysis. *Organization & Environment, 25*(3), 286-307. https://doi.org/10.1177/1086026612456535

Nooney, J. G., Woodrum, E., Hoban, T. J., & Clifford, W. B. (2003). Environmental Worldview and Behavior: Consequences of Dimensionality in a Survey of North Carolinians. *Environment and Behavior, 35*(6), 763-783. https://doi.org/10.1177/0013916503256246

O'Connor, B. P. (2000). SPSS and SAS programs for determining the number of components using parallel analysis and Velicer's MAP test. *Behavior Research Methods, Instruments & Computers, 32*(3), 396–402. https://doi.org/10.3758/BF03200807

Ogunbode, C. A. (2013). The NEP scale: measuring ecological attitudes/worldviews in an African context. *Environment, Development and Sustainability, 15*(6), 1477–1494. https://doi.org/10.1007/s10668-013-9446-0

Petrović, N., Škrbić, B. (2016). Ekološke vrednosne orijentacije i spremnost na aktivizam u Srbiji. *Zbornik radova Geografskog fakulteta Univerziteta u Beogradu, 64*, 47–71. https://doi.org/10.5937/zrgfub1664047P

Popov, B., Zorić, J. i Bodroža, B. (2023). Ekološki aktivizam i proekološko ponašanje u Srbiji: determinante i relacije sa subjektivnim blagostanjem. *Psihološka istraživanja, 2,* 323–342. https://doi.org/10.5937/PSISTRA26-46307

Polit, D.F. and Hungler, B.P. (1999). Nursing Research: Principle and Method. Philadelphia: Lippincott Company, P.P. 416-417.

Rauwald, K. S., & Moore, C. F. (2002). *Environmental Attitudes as Predictors of Policy Support across Three Countries. Environment and Behavior, 34*(6), 709–739. https://doi.org/10.1177/001391602237243

Rideout, B. E. (2005). The Effect of a Brief Environmental Problems Module on Endorsement of the New Ecological Paradigm in College Students. *The Journal of Environmental Education*, *37*(1), 3–11. https://doi.org/10.3200/JOEE.37.1.3-12

Rojas-Rivas, E., Antúnez, L., Cuffia, F., Otterbring, T., Aschemann-Witzel, J., Giménez, A., Ares,G. (2020). Time orientation and risk perception moderate the influence of sodium warnings on food choice: Implications for the design of communication campaigns. *Appetite, 147. https://doi.org/10.1016/j.appet.2019.104562*

Ruggeri, K., Immonen, J., Benzerga, A., Kacha, O., & van der Linden, S. (2018). Energy and environment. In Rugerri, K. (Ed.), *Behavioral Insights for Public Policy*. Routledge: New York

Schultz, P. W., & Zelezny, L. C. (1998). Values and proenvironmentalbehavior: A five-country survey. *Journal of Cross-Cultural Psychology, 29*(4), 540-558. https://doi.org/10.1177/002202219829400

Schwartz, S. H. (1992). Universals in the Content and Structure of Values: Theoretical Advances and Empirical Tests in 20 Countries. *Advances in Experimental Social Psychology*, 25, 1-65. https://doi.org/10.1016/S0065-2601(08)60281-6

Srbinovski, M., & Stanišić, J. (2020). Environmental worldviews of Serbian and Macedonian school students. *Australian Journal of Environmental Education, 36*(1), 20–43. https://doi.org/10.1017/aee.2020.1

Stanišić, J. M. (2021). Ekološki pogledi na svet učenika osnovne i srednje škole – primena NEP skale. *Inovacije u nastavi – časopis za savremenu nastavu, 34*(3), 76-94. https://doi.org/10.5937/inovacije2103076S

Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behavior: An integrative review and research agenda. *Journal of Environmental Psychology, 20,* 309-317. https://doi.org/10.1016/j.jenvp.2008.10.004

Stern, P. C. (2000). Toward a Coherent Theory of Environmentally Significant Behavior. *Journal of Social Issues, 56*(3), 407-424. https://doi.org/10.1111/0022-4537.00175

Stern, P. C., Dietz, T., & Kalof, L. (1993). Value Orientations, Gender, and Environmental Concern. *Environment and Behavior, 25(*5), 322-348. https://doi.org/10.1177/0013916593255002

Schultz, P. W., Gouveia, V. V., Cameron, L. D., Tankha, G., Schmuck, P., &Franěk, M. (2005). *Values and their Relationship to Environmental Concern and Conservation Behavior. Journal of Cross-Cultural Psychology, 36*(4), 457–475. https://doi.org/10.1177/0022022105275962

Srbinovski, M. S. (2016). Rodne razlike i ekološki pogled na svet – studija slučaja iz Makedonije. *Inovacije u nastavi – časopis za savremenu nastavu, 29*(4), 101-114. https://doi.org/10.5937/inovacije1604101S

Turner, N. E. (1998). The effect of common variance and structure pattern on random data eigenvalues: Implications for the accuracy of parallel analysis. *Educational and Psychological Measurement, 58*(4), 541–568. https://doi.org/10.1177/0013164498058004001

Van Petegem, P., & Blieck, A. (2006). The environmental worldview of children: a cross-cultural perspective. *Environmental Education Research, 12*(5), 625–635. https://doi.org/10.1080/13504620601053662

Velicer, W. F., Eaton, C. A., & Fava, J. L. (2000). Construct explication through factor or component analysis: A review and evaluation of alternative procedures for determining the number of factors or components. In R. D. Goffin & E. Helmes (Eds.), *Problems and solutions in human assessment: Honoring Douglas N. Jackson at seventy* (pp. 41–71). Kluwer Academic/Plenum Publishers. https://doi.org/10.1007/978-1-4615-4397-8_3

Watson, K., & Halse, C.M. (2005). Environmental attitudes of pre-service teachers: A conceptual and methodological dilemma in cross-cultural data collection. *Asia Pacific Education Review, 6,* 59–71. https://doi.org/10.1007/BF03024968

Wu, Y., He, Y., Jiang, X., Zhao, Y., Cui, Y., Wang, H. (2023). Assessing ecosystem health of floodplain lakes using an Integrated Bioassessment Index. *Ecological Indicators, 154*(1-2):110644. https://doi.org/10.1016/j.ecolind.2023.110644

Zak, K. & Munson, B. (2008). An exploratory study of elementary preservice teachers' understanding of ecology using concept maps. *Journal of Environmental Education, 39*(3), 32–46. http://dx.doi.org/10.3200/JOEE.39.3.32-46

Zwick, W. R., & Velicer, W. F. (1986). Comparison of five rules for determining the number of components to retain. *Psychological Bulletin, 99*(3), 432–442. https://doi.org/10.1037/0033-2909.99.3.432

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Psihometrijske karakteristike *Skale nove ekološke paradigme* na srpskom uzorku

Milica Vdović
Univerzitet Singidunum, Fakultet za medije i komunikacije

Mina Hagen
Univerzitet Singidunum, Fakultet za medije i komunikacije

Anja Simonović
Univerzitet Singidunum, Fakultet za medije i komunikacije

Nađa Avramović
Clarivate

Jasna Milošević Đorđević
Univerzitet Singidunum, Fakultet za medije i komunikacije

Klimatske promene predstavljaju sve veću pretnju čovečanstvu i suočavanje sa njihovim potencijalno katastrofalnim efektima zahtevaće promenu ponašanja na društvenom i individualnom nivou. Teorije i empirijska istraživanja naglašavaju ulogu proekoloških stavova kao prethodnika proekoloških ponašanja.

Koristeći veliki uzorak građana Srbije (N = 871 odrasle populacije), ispitanih intervjuisanjem licem u lice, pokušavali smo da utvrdimo psihometrijske karakteristike *Skale nove ekološke paradigme* (NEP skala), u svetu dominantnog instrumenta za merenje proekoloških stavova. Ovo je prvi put da su psihometrijske karakteristike NEP skale proveravane na velikom uzorku punoletnih građana Srbije, uz testiranje njene prediktivne moći za objašnjavanje proekološkog ponašanja (koristeći upitnik ekološkog ponašanja).

U skladu sa prethodnim istraživanjima u regionu, rezultati ukazuju na postojanje tri faktora: „ekološka kriza", „čovek (ni)je iznad prirode", „čovekova (ne)izuzetost iz prirode". Ovi faktori objašnjavaju oko polovinu varijanse. Faktor „ekološka kriza" je jedini značajan za predviđanje proekološkog ponašanja.

Potrebna je dalja analiza proekoloških stavova i ponašanja kako bi se bolje razumelo i s odgovornošću brzo i organizovano pristupilo zaštiti planete.

Ključne reči: NEP skala, psihometrija, proekološki stavovi, proekološko ponašanje

SUPPLEMENTARY MATERIAL

Table 1:
Item means and standard deviations for the New Ecological Paradigm Scale among the Serbian population

The New Ecological Paradigm (NEP) items and item numbers	M	SD
Balance of nature		
When humans interfere with nature, it often produces disastrous consequences. [NEP 3]	3.70	1.13
The balance of nature is strong enough to cope with the impacts of modern industrial nations. (R) [NEP 8]	3.31	1.19
The balance of nature is very delicate and easily upset. [NEP 13]	3.88	1.02
Ecocrisis		
Humans are severely abusing the environment. [NEP 5]	4.21	.96
The so-called "ecological crisis" facing humankind has been greatly exaggerated. (R) [NEP 10]	3.30	1.18
If things continue on their present course, we will soon experience a major ecological catastrophe. [NEP 15]	3.76	1.12
Anti-exceptionalism		
Human ingenuity will insure that we do not make the Earth unliveable. (R) [NEP 4]	3.20	1.24
Despite our abilities, humans are still subject to the laws of nature. [NEP 9]	3.69	1.09
Humans will eventually learn enough about how nature works to be able to control it. (R) [NEP 14]	2.89	1.16
Limits to growth		
We are approaching the limit of the number of people the Earth can support. [NEP 1]	3.38	1.36
The Earth is like a spaceship with very limited room and resources. [NEP 6]	4.11	1.10
The Earth has plenty of natural resources if we just learn how to develop them. (R) [NEP 11]	2.65	1.17
Anti-anthropocentrism (human domination)		
Humans have the right to modify the natural environment to suit their needs. (R) [NEP 2]	3.42	1.38
Plants and animals have as much right as humans to exist. [NEP 7]	4.25	.99
Humans were meant to rule over the rest of nature. (R) [NEP 12]	3.42	1.22

Table 2:
Item means and standard deviations and factor loadings on the first component for the Pro-ecological behaviour among the Serbian population

Environmental Behaviour Questionnaire (scale 1 to 4)	MEAN (SD)	loadings
Where possible, I buy products made from recycled materials as opposed to those items not made from recycled materials.	2.03 (.90)	.71
I re-use plastic shopping bags for future shopping and/or other purposes.	2.62 (1.03)	.55
I avoid using aerosol sprays.	2.30 (1.07)	.51
I turn the television off when it is not in use.	2.93 (1.10)	.57
I take short showers to limit water use.	2.33 (1.08)	.67
I recycle newspapers.	1.82 (1.02)	.70
I buy products with minimal packaging (e.g., products that are packaged in a minimal amount of plastic).	1.90 (.94)	.73
When inside, and if sufficient sun light is shining through the windows, I use sunlight as opposed to artificial light.	3.15 (1.08)	.54
I use the washing machine only when it has a full load.	3.01 (1.04)	.57
When writing, I use both sides of the paper.	2.95 (1.03)	.54
When travelling short distances (approx. 1–2 kilometres), I walk as opposed to driving or taking a bus.	2.89 (1.01)	.44
When cleaning my teeth, I turn the tap off rather than leaving it running.	2.64 (1.10)	.59
I recycle glass materials.	1.68 (.96)	.65
When I buy a few items at the store, I say no to plastic bags.	2.43 (1.06)	.68
When available, I half flush the toilet as opposed to full flush.	1.99 (1.04)	.67