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University of Groningen

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# On the Relation Between Social Dominance Orientation and Environmentalism: A 25-Nation Study

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## Abstract

Approval of hierarchy and inequality in society indexed by social dominance orientation (SDO) extends to support for human dominance over the natural world. We tested this negative association between SDO and environmentalism and the validity of the new Short Social Dominance Orientation Scale in two cross-cultural samples of students ( $N = 4,163$ ,  $k = 25$ ) and the general

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population ( $N = 1,237$ ,  $k = 10$ ). As expected, the higher people were on SDO, the less likely they were to engage in environmental citizenship actions, pro-environmental behaviors and to donate to an environmental organization. Multilevel moderation results showed that the SDO–environmentalism relation was stronger in societies with marked societal inequality, lack of societal development, and environmental standards. The results highlight the interplay between individual psychological orientations and social context, as well as the view of nature subscribed to by those high in SDO.

## Keywords

social dominance orientation, environmentalism, social context, cross-cultural research

Psychological science has been contributing to the quest of solving environmental problems by identifying key contextual and individual factors that promote pro-environmental actions (for reviews, see Clayton, 2012; Gifford, 2014). These have included normative aspects of the local and the societal context (e.g., Milfont & Markowitz, 2016; Schultz, Bator, Tabanico, Bruni, & Large, 2013) as well as individual differences in personality and values (e.g., Evans et al., 2013; Milfont & Sibley, 2012). One barrier in attempts to promote pro-environmental actions is the pervading belief in human dominance over nature (Pirages & Ehrlich, 1974; White, 1967). The present article investigates this issue and contributes to an emerging line of research examining whether our acceptance of hierarchy and inequality in the social world extends to acceptance of hierarchy in the natural world, with humans placed above non-humans (e.g., Milfont, Richter, Sibley, Wilson, & Fischer, 2013).

One of the most commonly used ways of conceptualizing the need to dominate is social dominance orientation (SDO) which assesses the degree to which an individual approves group-based hierarchies and inequalities (Pratto, Sidanius, Stallworth, & Malle, 1994; Sidanius & Pratto, 1999). SDO is one of the most widely used variables in social and personality psychology, and it has been shown to predict a wide variety of intergroup attitudes and behaviors (see Kteily, Ho, & Sidanius, 2012; Lee, Pratto, & Johnson, 2011). Notably, research indicates that this enduring preference toward hierarchy and inequality not only predicts group-relevant variables but also relates to environmentalism. In one of the first articles describing SDO, Pratto et al. (1994) showed across three samples that individuals scoring higher on SDO were less supportive of environmental policies than individuals scoring lower on SDO, and this negative association remained strong after controlling for political-economic conservatism.

The negative association between SDO and environment-relevant variables has been confirmed in several more recent publications. SDO has been shown to relate to priority given to business gains over environmental protection (Son Hing, Bobocel, Zanna, & McBride, 2007), support for utilitarian attitudes toward nature (Milfont & Duckitt, 2010), opposition to protecting nature (Milfont et al., 2013), support for environmental inequality (Jackson, Bitacola, Janes, & Esses, 2013), denial of anthropogenic climate change (Häkkinen & Akrami, 2014; Milfont et al., 2013), greater beliefs that humans are distinct from and superior to animals (Dhont, Hodson, Costello, & MacInnis, 2014), and more meat consumption (Allen, Wilson,

Ng, & Dunne, 2000). In conjunction, these findings indicate that preference for group-based hierarchies and inequalities translates into preference for hierarchy in the natural world, with humans dominating nonhumans.

We note, however, that despite the robustness of the negative association between SDO and environmentalism, most previous research relied on largely Western, single-country studies with single (and often broad) environmentalism measures. Only two previous studies have examined the SDO–environmentalism relation across cultural groups—one examining data from Brazil and Sweden (Jylhä, Cantal, Akrami, & Milfont, 2016) and the other examining the SDO–environmentalism relation at the country level of analysis (Milfont et al., 2013, Study 2). This highlights a need for a better understanding of how our relationship with nature is influenced by the interplay between the personal desire to dominate and the societal context within which the individual resides, especially because SDO varies within cultural and institutional contexts (Fischer, Hanke, & Sibley, 2012). In this article, we expand on this research by conducting the first large-scale study examining the association between SDO and three distinct behaviors related to climate change mitigation across 25 countries. We use multilevel analysis that allows the proper examination of the correlation between SDO and environmentalism at the individual-level of analysis while also examining whether country-level indicators may influence that correlation.

Particularly, we test robustness and moderation hypotheses following Pratto et al. (2013). According to the robustness hypothesis, we expect that SDO will correlate negatively with environmentalism for participants in all 25 countries included in our study. At the same time, societal contexts may reinforce or weaken the belief in human dominance over nature. Even if the negative association between SDO and environmentalism is observed consistently across nations, this association may be strongest where contextual factors reinforce the dominating role of humans as the master of nature. We thus expand the individual-level analysis by examining whether nation-level variables influence the SDO–environmentalism relation (i.e., cross-level interactions). According to the moderation hypothesis, we expect the strength of the negative association between SDO and environmentalism to be moderated by contextual factors that vary across countries.

We focus on three national moderators that may reinforce individual views of human dominance over nature. First, the association between SDO and environment-relevant variables

seems to express issues of inequality in the relations between humans and the natural environment. Moreover, unequal access to resources at the national level may reinforce a competitive, dog-eat-dog mentality that in return legitimizes the exploitation of resources and unequal relations between humans and the natural environment. We therefore expect that levels of inequality in a given nation could strengthen the SDO–environmentalism relation, and selected the Gini index as a measure of equality at the level of nations. Second, prior work has shown that national affluence is associated with greater concern for the environment (e.g., Frazin & Vogl, 2013) and that a nation’s wealth strengthens the relationship between a person’s beliefs in climate change and their environmental actions (e.g., Bain et al., 2016). We therefore expect that levels of affluence in a given nation could strengthen the SDO–environmentalism relation. We selected the Human Development Index (HDI) as it serves as a parsimonious indicator of affluence and standard of living in a country—including life expectancy, educational attainment, and income per capita indicators—and because HDI has been shown to moderate associations between environment-relevant variables (Liu & Sibley, 2012; Milfont & Markowitz, 2016). Finally, in countries that perform poorly in protecting the environment institutions may work to maintain the current system by justifying a status quo in which the environment is degrading, which in turn may lead to greater internalization of a belief in human dominance over nature. We therefore expect that levels of environmental performance in a given nation could strengthen the SDO–environmentalism relation and selected the Environmental Performance Index (EPI) as a measure of how well nations perform on environmental issues.

To provide a stronger test for these hypotheses, we considered three conceptually distinct environmentalism measures (Stern, 2000) related to climate change mitigation: public and political actions, personal domestic actions, and an economic action (donation to a pro-environmental organization). Moreover, we considered two distinct cross-cultural samples: students ( $N = 4,163$ ,  $k = 25$ ) and the general population ( $N = 1,237$ ,  $k = 10$ ). We also used the opportunity to provide further empirical evidence for the psychometric properties of the 4-item Short Social Dominance Orientation (SSDO) Scale, which previously showed good internal reliability and predictive validity across 20 countries and 15 languages (see Pratto et al., 2013). We tested the psychometric properties and measurement invariance of the SSDO in both samples, across 25 countries and 16 languages, of which 13 countries and 9 languages were not studied by Pratto et al. (2013).

## Method

### Country and Participants

Data were collected as part of the *Collective Futures and Climate Change* research project (see Bain et al., 2016). The project coordinators (first three authors) developed the project and recruited an international research team. The countries were selected a priori based on a combination of environmental indicators and

geographic region. The goal was to employ convenience sampling to obtain student and nonstudent samples from each country where viable (target  $N = 200$  for each sample). Data were obtained from university students across 25 countries spanning all inhabited continents, plus community samples in 10 countries to establish the generalizability and robustness of findings.

Participants completed surveys online in most countries, using a template developed by the authors to maximize consistency in data collection. In Sweden and Israel, contributors developed their own online versions using the same survey template. Where online administration was impractical (Ghana, Japan, Mexico, Poland, South Africa, South Korea, Venezuela), participants completed a paper-based version of the survey that matched the format of the online survey.

All participants first indicated their beliefs about the reality and importance of climate change. The analyses reported in the present study considered only participants who believed climate change is real to have a more homogenous sample and due to low sample sizes of participants unconvinced that climate change is real in many countries. Table 1 provides an overview of the student and community samples in each country.

### Questionnaire Translation

For non-English languages, translation-back-translation was completed by competent bilingual speakers or parallel translation where multiple bilingual speakers independently translated the survey. Research coordinators worked with translators until an acceptable translation was agreed upon. All surveys were completed in the major local language. In Ghana and South Africa, the common language of student instruction was used (i.e., English in Ghana; English or Afrikaans in South Africa), and in Switzerland, participants could choose to complete the survey in either German or French.

### Measures

The larger *Collective Futures and Climate Change* study included several validated measures (see Supplemental Material). The relevant measures for the present study are described below.

**SDO.** We used the SSDO Scale (Pratto et al., 2013). This is a 4-item SDO measure with the following instruction: “There are many kinds of groups in the world: men and women, ethnic and religious groups, nationalities, political factions. How much do you support or oppose these ideas about groups in general?” This is followed by the four items: “In setting priorities, we must consider all groups” (reversed), “We should not push for group equality,” “Group equality should be our ideal” (reversed), and “Superior groups should dominate inferior groups.” Items were rated on a 10-point scale ranging from 1 (*extremely oppose*) to 10 (*extremely favor*). The SSDO score was computed by averaging over items after reverse coding relevant items. We used the SSDO translations reported by Pratto et al. (2013), and created new versions in nine additional languages (see Appendix A in Supplemental Material).

**Table 1.** Description of Country Samples.

Country	N	Language	$M_{age}$ ( $SD_{age}$ )	Female %
<b>Student sample</b>				
Australia	177	English	20.5 (3.6)	57
Brazil	160	Portuguese	25.4 (6.7)	68
Canada	118	English	21.2 (3.5)	55
Chile	180	Spanish	19.9 (3.0)	61
China	221	Chinese (simplified)	24.2 (4.4)	55
France	114	French	27.7 (9.8)	81
Germany	196	German	23.3 (4.1)	77
Ghana	154	English	21.7 (2.0)	52
Iceland	246	Icelandic	28.6 (10.1)	76
Israel	142	Hebrew	27.2 (5.4)	55
Japan	127	Japanese	19.1 (1.9)	62
Mexico	203	Spanish	20.5 (1.7)	84
Netherlands	134	Nederland	19.5 (2.6)	70
New Zealand	169	English	19.0 (1.7)	72
Norway	184	Norwegian	25.2 (5.2)	78
Poland	112	Polish	22.8 (3.3)	96
Russia	77	Russian	21.4 (3.1)	83
South Africa	186	English (77%) Afrikaans (23%)	21.6 (4.6)	83
South Korea	128	Korean	21.9 (2.1)	53
Spain	254	Spanish	22.1 (5.5)	68
Sweden	267	Swedish	27.2 (8.7)	64
Switzerland	154	German (98%) French (2%)	24.5 (6.4)	69
United Kingdom	152	English	20.4 (3.5)	58
USA	123	English	23.2 (4.8)	78
Venezuela	185	Spanish	19.9 (2.2)	51
<b>Community sample</b>				
Australia	129	English	45.1 (14.5)	62
Brazil	179	Portuguese	35.0 (11.7)	73
China	122	Chinese (simplified)	33.1 (7.8)	49
Iceland	38	Icelandic	44.1 (14.0)	53
Israel	119	Hebrew	43.2 (12.9)	53
New Zealand	82	English	50.1 (15.9)	48
Poland	143	Polish	26.4 (9.0)	95
Sweden	95	Swedish	33.8 (13.1)	71
USA	151	English	37.3 (12.2)	58
Venezuela	179	Spanish	41.9 (12.9)	64

**Environmental citizenship intentions.** A 12-item measure was used to access participants' intentions regarding environmental citizenship, adapted from Stern, Dietz, Abel, Guagnano, and Kalof (1999). Example items are: "Sign a petition in support of protecting the environment," "Join or renew membership of an environmental group," and "Post pro-environmental messages or links on social media (e.g., Facebook, Twitter)." Items were rated on a 5-point scale ranging from 1 (*not at all likely*) to 5 (*very likely*), as well as "na" (*not applicable*) option. Missing and "not applicable" responses were excluded, and the mean of all remaining items was computed.

**Private sphere behavioral intentions.** A 12-item measure was used to access participants' intentions to engage in pro-environmental behaviors. Examples of the behaviors included: "Buy environmentally friendly products," "Install products to save energy

(e.g., low-energy light bulbs)," "Reduce car travel (e.g., walk, cycle, use public transport)," and "Avoid or reduce eating meat." Items were rated on a 5-points scale ranging from 1 (*not at all likely*) to 5 (*very likely*), as well as "na" (*not applicable*), with missing and "not applicable" responses excluded before computing the scale mean score.

**Donation behavior.** In addition to the behavioral intention measures, one question examined participants' donation behavior. Participants were given the instruction:

Each person participating in this survey is eligible to enter a draw for [*local currency equivalent of USD150, adjusted to nearest round number*] Amazon Gift Card. If you win the prize draw, we would like to know if you would commit to donating some or all of this prize to an environmental organization. If you wish to nominate an environmental organization for your donation, please do so here: [*space to enter name of environmental organization*]. If you do not nominate an environmental organization, we will send the donation amount you nominated to an international not-for-profit environmental organization.

We used the proportion of the amount participants indicated authorizing the researchers to donate on their behalf if they won.

### Nation Variables

We examined whether three nation-level variables would moderate the SDO–environmentalism relation. The figures for the Gini index and HDI were taken from the 2015 United Nations Human Development Report (see Tables 1 and 3 in the statistical annex of that report). The Gini data were not available for New Zealand and South Korea, so we used the most recent Gini data available for these countries from The World Factbook published by the Central Intelligence Agency of the United States. The 2010 EPI was obtained from the website of the Center for International Earth Science Information Network at Columbia University. Greater values for the Gini index, HDI, and EPI indicate more inequality, more human development, and greater environmental performance in the country, respectively.

## Results

### Rejection of Dominance and Reliability of the SSDO Scale

The mean scores on the SSDO were below the scale middle point of 5.5 across all student and community samples (see Tables 2 and 3), but all samples had participants with ratings above the midpoint (except for the Icelandic community sample). Most distributions were positively skewed, apart from four student samples (China, Germany, Japan, and the Netherlands) and two community samples (Australia and China). Finally, the mean scores on the SSDO were comparable for the student ( $M = 3.17$ ,  $SD = 1.65$ ;  $N = 4163$ ) and community ( $M = 3.17$ ,  $SD = 1.68$ ;  $N = 1237$ ) samples. These results parallel

**Table 2.** Short Social Dominance Orientation (SSDO) Mean, Standard Deviation, Range, Internal Reliability Statistics, Tucker's Phi, and Correlations by National Sample for the Student Samples.

Country	M	SD	Range	Skewness	$\alpha$	MIC	Tucker's Phi	Correlations With SSDO			
								Sex (0 male, 1 female)	Citizenship	Personal	Donation
Australia	2.70	1.53	1–10	1.25	.76	.44	1.00	-.14	-.16*	-.17*	-.20**
Brazil	3.50	1.67	1–7.75	.23	.57	.25	.98	-.22**	-.10	-.18*	-.10
Canada	2.76	1.65	1–8.50	.85	.84	.57	1.00	-.16	-.24***	-.13	-.22*
Chile	2.78	1.39	1–6.75	.42	.53	.21	.98	-.06	-.17*	-.01	-.12
China	3.79	1.54	1–9.75	-.09	.58	.26	.98	-.17*	.05	-.06	-.25***
France	2.24	1.29	1–5.75	.91	.58	.31	.99	-.12	-.09	-.07	-.08
Germany	4.09	1.62	1–9.25	-.04	.67	.33	1.00	.01	-.24***	-.17*	-.21**
Ghana	2.94	1.63	1–7.25	.53	.64	.31	.99	-.32***	.16*	.01	-.15
Iceland	2.03	1.31	1–7.75	1.51	.81	.51	1.00	-.19**	-.28***	-.27***	-.15*
Israel	3.56	1.74	1–9	.25	.69	.35	1.00	-.28**	-.20*	-.23**	-.12
Japan	4.97	1.17	2.25–8.25	-.03	.33	.11	.92	-.11	-.14	-.19*	-.14
Mexico	3.13	1.49	1–7	.27	.42	.18	.95	-.08	-.09	-.05	-.07
the Netherlands	3.63	1.43	1–6.25	-.08	.75	.44	1.00	-.20*	-.15	-.11	-.04
New Zealand	3.15	1.54	1–7.75	.50	.78	.47	1.00	-.03	-.24**	-.21**	-.20*
Norway	3.02	1.55	1–7.75	.42	.68	.35	1.00	-.07	-.20**	-.26***	-.16*
Poland	3.48	1.38	1–7.50	.07	.54	.23	.99	.21	-.19*	-.19*	-.03
Russia	3.87	1.89	1–10	.34	.72	.39	1.00	-.20	-.24*	-.36**	-.11
South Africa	2.37	1.37	1–6	.83	.57	.28	.99	-.02	-.04	-.15*	-.10
South Korea	4.62	1.18	1–9	.07	.49	.20	.97	-.02	-.07	-.07	-.12
Spain	2.98	1.44	1–7.25	.37	.62	.33	.98	-.25***	-.27***	-.26***	-.12
Sweden	2.55	1.57	1–9.75	1.18	.72	.40	1.00	-.23***	-.35***	-.34***	-.24**
Switzerland	3.71	1.63	1–10	.35	.73	.38	.99	-.12	-.16	-.05	-.09
United Kingdom	2.84	1.59	1–8	.54	.76	.45	1.00	-.23**	-.15	-.11	-.02
USA	2.99	1.81	1–6.25	.38	.75	.44	.99	-.21*	.13	-.16	-.14
Venezuela	3.32	1.50	1–8	.44	.52	.23	.97	-.16*	-.19*	-.18*	-.02
Average correlations based on random-effects weighted mean (weighted by N and uncorrecting for reliability)								-.14	-.15	-.16	-.14
Average correlations based on random-effects weighted mean (weighted by N and correcting for reliability)								[-.18,-.10] Q(24) = 39.07*	[-.20,-.10] Q(24) = 64.49***	[-.20,-.12] Q(24) = 40.59*	[-.16,-.11] Q(24) = 19.05
								-.19	-.21	-.22	-.17
								[-.23,-.13] Q(24) = 34.64	[-.27,-.14] Q(24) = 66.65***	[-.27,-.17] Q(24) = 41.01*	[-.20,-.14] Q(24) = 17.16

Note. MIC = mean inter-item correlation. Citizenship refers to public/political behaviors, personal to domestic behaviors, and donation to financial behavior. The SSDO Scale was rated from 1 to 10. Item 2 for Poland had to be recoded as the Polish translation of this item was anti-SSDO.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

those reported by Pratto et al. (2013), and overall suggest that participants tended to reject a dominance orientation and that the normativity of this dominance rejection was similar across our student and community samples, but with substantial variability within and across countries.

We conducted a meta-analysis of the Cronbach's  $\alpha$  reported in Table 2 using the approach developed by Rodriguez and Maeda (2006). The weighted average  $\alpha$  for the student sample was .68 (95% confidence interval [CI] = [.66, .70]), with significant heterogeneity in internal reliability across countries,  $Q(24) = 212.81, p < .001$ . Similar results were observed for the community sample, with a weighted average  $\alpha$  of .67 (95% CI [.64, .70]) and significant heterogeneity across countries,  $Q(9) = 74.89, p < .001$ . These results are comparable to those reported by Pratto et al. (2013) and indicate good internal reliability for the SSDO despite the low number of items in the scale.

### Measurement Invariance

As an initial indication of the comparability of the one-factor structure of the SSDO scale in each country, we ran factorial procrustean target rotation using values taken from a principal-components analysis of the overall sample as the norm. As shown in Tables 2 and 3, Tucker's Phi—an index of similarity between factor structures across samples—were above the recommended value of .95 (van de Vijver & Leung, 1997), except for one student sample (Japan) and one community sample (China). This supports the conclusion that the one-factor structure was similar across almost all samples.

Besides factor structure comparability, measurement invariance is a prerequisite when comparing groups on a measured construct. When measurement invariance is demonstrated, we can be certain that participants across all groups interpret the items and the underlying construct in the same way, and group comparisons are then meaningful. We assessed the

**Table 3.** Short Social Dominance Orientation (SSDO) Mean, Standard Deviation, Range, Internal Reliability Statistics, Tucker's Phi, and Correlations by National Sample for the Community Samples.

Country	M	SD	Range	Skewness	$\alpha$	MIC	Tucker's Phi	Correlations with SSDO			
								Sex (0 male, 1 female)	Citizenship	Personal	Donation
Australia	3.78	1.68	1-8.25	-.18	.67	.35	.99	-.07	-.11	-.31***	-.12
Brazil	3.37	1.64	1-7.25	.08	.53	.20	.96	-.12	-.18*	-.20**	-.09
China	4.65	1.50	1-6.25	-1.40	.49	.17	.56	-.20*	.20*	-.19*	-.17
Iceland	1.87	1.01	1-5.50	1.78	.64	.33	.99	-.58***	-.25	-.01	-.07
Israel	3.22	1.44	1-6.25	.05	.54	.24	1.00	-.10	-.30**	-.16	-.21*
New Zealand	2.89	1.63	1-7.75	.88	.77	.45	1.00	-.20	-.36**	-.21	-.19
Poland	3.16	1.55	1-7	.36	.64	.31	1.00	.16	-.07	-.14	-.18
Sweden	2.51	1.55	1-7.75	1.14	.72	.41	.99	-.15	-.19	-.37***	-.37***
USA	2.58	1.73	1-7.50	.91	.84	.58	1.00	-.16*	-.21*	-.15	-.21**
Venezuela	2.77	1.40	1-7	.31	.48	.22	.98	-.09	-.15*	-.10	-.11
Average correlations based on random-effects weighted mean (weighted by N and uncorrecting for reliability)								-.11	-.15	-.19	-.17
Average correlations based on random-effects weighted mean (weighted by N and correcting for reliability)								[-.20,-.02] Q(9) = 23.53**	[-.24,-.06] Q(9) = 24.24**	[-.24,-.13] Q(9) = 9.04	[-.22,-.12] Q(9) = 7.34
Average correlations based on random-effects weighted mean (weighted by N and uncorrecting for reliability)								-.14	-.21	-.26	-.22
Average correlations based on random-effects weighted mean (weighted by N and correcting for reliability)								[-.25,-.03] Q(9) = 25.78**	[-.32,-.08] Q(9) = 25.97**	[-.33,-.18] Q(9) = 9.32	[-.28,-.15] Q(9) = 6.61

Note. MIC = mean inter-item correlation. Citizenship refers to public/political behaviors, Personal to domestic behaviors, and Donation to financial behavior. The SSDO Scale was rated from 1 to 10.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

measurement invariance of SSDO using the alignment approach in Mplus (Asparouhov & Muthén, 2014; see Supplemental Material for details).

The alignment results indicated convergence issues for three countries from the student samples (Brazil, China and Japan) and two countries from the community samples (China and Iceland). These countries were removed from the final alignment model, and results for these countries should be interpreted with caution. Importantly, the alignment results indicated that all items of the SSDO showed invariant measurement loadings for all the remaining countries, and that the SSDO items also showed invariant measurement intercepts in most countries. Given that all four items loaded on the SSDO factor and that the measurement loadings of all items show no indication of measurement noninvariance (except for item SSDO4 for the community sample in Brazil), the results support configural and metric invariance of the SSDO across countries.<sup>1</sup>

### Testing Robustness and Moderation Hypotheses

We expected that people with higher levels of SDO would be less willing to engage in pro-environmental actions (robustness hypothesis), but this effect was not expected to occur to the same extent across all countries (moderation hypothesis). We calculated the correlations between SSDO and the three environmentalism measures for each country, and then calculated a meta-analytical summary of the correlations. The meta-analyses were performed using an Excel program developed by Piers Steel (University of Calgary) that runs the Schmidt-Hunter method with a random-effects model. It computes the average correlation across all samples weighted by sample size,

with a 95% CI indicating the likely range of this correlation, and a *Q*-statistic indicating whether the magnitude of the correlations varies substantially across samples. We report the random-effects weighted means when correcting or not for measurement error.

Tables 2 and 3 present the correlations for each country and sample, with the meta-analytical results at the bottom of each table. The results show that, overall, SDO was negatively correlated with all three climate change mitigation measures across both student and community samples, with corrected weighted correlations in the  $-.17$  to  $-.26$  range. Additional analyses confirmed the linear assumption in the SDO-environmentalism relation (see Supplemental Material). Correlations between SDO and environmental citizenship varied significantly across countries for student and community samples; however, correlations between SDO and private sphere behaviors varied significantly across countries only for the student samples, and correlations with donation behavior did not vary significantly across countries (see significance of *Q*-statistic in these tables and Supplemental Material).

For the measures that showed significant variation across countries (environmental citizenship and private sphere behavior), we used multilevel modeling to explore the reasons for variation. We first analyzed data from the student samples and ran multilevel models examining the extent to which the selected country-level indicators (Gini, HDI, and EPI) would account for the variability in the associations between SSDO and environmental citizenship and private sphere behavior. Multilevel models were run in HLM (student version 7) with restricted maximum likelihood estimation, allowing the slopes to vary across countries, and robust standard errors for



**Table 4.** Multilevel Random Coefficient Models Predicting Two Environmentalism Measures for the Student Sample With the Gini Index as the Level-2 Predictor.

Predictors/dependent variables	Fixed Part			Random Part	
	$\gamma$	SE	t	$\sigma^2_u$	$\chi^2$
<b>Environmental citizenship</b>					
Intercept	2.976	.077	38.849***	.155	772.442***
Gini index	.018	.009	2.066†		
Age	.018	.003	5.759***	<.001	25.666
Age × Gini	<.001	<.001	-1.187		
Sex (0 male, 1 female)	.112	.027	4.091***	.002	20.332
Sex × Gini	.002	.002	0.661		
Conservative political orientation	-.068	.015	-4.444***	.003	40.888*
Conservative political orientation × Gini	.001	.001	.810		
SDO	-.072	.012	-6.129***	.002	35.596*
SDO × Gini	.003	.001	3.087**		
<b>Private sphere behavior</b>					
Intercept	3.870	.057	68.324***	.084	612.202***
Gini index	.002	.006	.354		
Age	.025	.003	8.781***	<.001	36.991*
Age × Gini	<.001	<.001	.295		
Sex (0 male, 1 female)	.208	.023	9.044***	.003	25.749
Sex × Gini	-.003	.002	-1.094		
Conservative political orientation	-.014	.011	-1.189	.001	38.326*
Conservative Political Orientation × Gini	.001	.001	.652		
SDO	-.063	.008	-7.627***	.001	30.056
SDO × Gini	.002	.001	2.243*		

Note. SDO = social dominance orientation.  $N = 3,752$ ,  $k = 25$ . Political orientation was measured with a 7-point scale ranging from 1 (*very liberal*) to 7 (*very conservative*). Reported results are for the final estimation of fixed effects with robust standard errors ( $df = 23$ ).

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ . † $p < .08$ .

the final estimation. We used group-mean centering for level-1 variables and grand-mean centering for level-2 variables. Since age, sex, and conservative political orientation are related to SDO, environmentalism or both, we included these variables as covariates at level-1.

We first ran separate multilevel (random-intercepts) models with each of the two environmentalism measures regressed onto SDO. Replicating the meta-analytical findings, SDO was reliably related to environmental citizenship,  $\gamma = -.090$ ,  $SE = .014$ ,  $t(24) = 6.55$ ,  $p < .001$  and private sphere behavior,  $\gamma = -.080$ ,  $SE = .010$ ,  $t(24) = 7.62$ ,  $p < .001$ . In line with the moderation hypothesis, the strength of the associations varied across countries for environmental citizenship,  $u = .0030$ ,  $\chi^2(24) = 54.92$ ,  $p < .001$ , and private sphere behavior,  $u = .0011$ ,  $\chi^2(24) = 41.61$ ,  $p = .014$ .

We then added the level-1 covariates in conjunction with the level-2 predictors (Gini, HDI, and EPI, one at a time) to test for cross-level interactions (random-intercepts-and-slopes models). The models were run for each pro-environmental measure separately and comprised the level-1 predictors (SDO, age, sex, and political orientation) plus the interaction terms between these level-1 predictors and the targeted level-2 moderator. The results in Tables 4 to 6 revealed independent main effects for age and sex for both measures, indicating that older people and women were more likely to act pro-environmentally. The main effect for conservative political orientation was only statistically significant for environmental citizenship, but the

direction of the coefficients for both measures indicate that liberals were more likely to act pro-environmentally.

More importantly, the results showed that the level-2 predictors reliably moderated the associations between SDO and the environmentalism measures. Cross-national differences in inequality (indexed by the Gini coefficient) influenced the association between SDO and environmental citizenship ( $\gamma = .0030$ ,  $t = 3.09$ ,  $p = .046$ ) and private sphere behavior ( $\gamma = .0022$ ,  $t = 2.24$ ,  $p = .035$ ). Cross-national differences in human development influenced the association between SDO and environmental citizenship ( $\gamma = -.288$ ,  $t = 2.88$ ,  $p = .008$ ) and private sphere behavior ( $\gamma = -.170$ ,  $t = 2.50$ ,  $p = .020$ ). Cross-national differences in environmental performance influenced the association between SDO and environmental citizenship ( $\gamma = -.0035$ ,  $t = 4.34$ ,  $p < .001$ ) and private sphere behavior (albeit marginally:  $\gamma = -.0020$ ,  $t = 1.79$ ,  $p = .086$ ). The results were statistically nonsignificant for the community samples (perhaps because there were too few countries), but the cross-level interactions showed the same pattern of associations (see Table S5).

Overall, and framing the moderating results on a positive way, the *lower* participants' SDO, the *more* they engage in pro-environmental actions, and this association was stronger in societies that are more equal, with better human development indicators, and with better performance on environmental issues. Although the level-2 predictors are correlated,<sup>2</sup> the results indicate that HDI has a stronger moderating effect on the

**Table 5.** Multilevel Random Coefficient Models Predicting Two Environmentalism Measures for the Student Sample with the Human Development Index (HDI) as the Level-2 Predictor.

Predictors/dependent variables	Fixed Part			Random Part	
	$\gamma$	SE	$t$	$\sigma^2_u$	$\chi^2$
<b>Environmental citizenship</b>					
Intercept	2.976	.068	43.467***	.122	592.229***
HDI	-2.610	.671	-3.890***		
Age	.018	.003	6.259***	<.001	24.036
Age $\times$ HDI	.044	.022	1.998†		
Sex (0 male, 1 female)	.105	.027	3.846***	.002	20.033
Sex $\times$ HDI	.399	.381	1.049		
Conservative political orientation	-.067	.015	-4.532***	.003	38.756*
Conservative Political Orientation $\times$ HDI	-.185	.081	-2.299*		
SDO	-.071	.012	-6.039***	.002	37.750*
SDO $\times$ HDI	-.288	.100	-2.879*		
<b>Private sphere behavior</b>					
Intercept	3.870	.057	68.485***	.084	602.179***
HDI	-.288	.534	-.540		
Age	.024	.003	8.529***	<.001	39.374*
Age $\times$ HDI	.023	.027	.846		
Sex (0 male, 1 female)	.204	.022	9.360***	.002	23.083
Sex $\times$ HDI	.537	.271	1.980†		
Conservative political orientation	-.013	.011	-1.125	.001	38.304*
Conservative Political Orientation $\times$ HDI	-.006	.086	-.066		
SDO	-.063	.009	-7.242***	.001	33.230†
SDO $\times$ HDI	-.170	.068	-2.498*		

Note. SDO = social dominance orientation.  $N = 3,752$ ,  $k = 25$ . Political orientation was measured with a 7-point scale ranging from 1 (*very liberal*) to 7 (*very conservative*). Reported results are for the final estimation of fixed effects with robust standard errors ( $df = 23$ ).

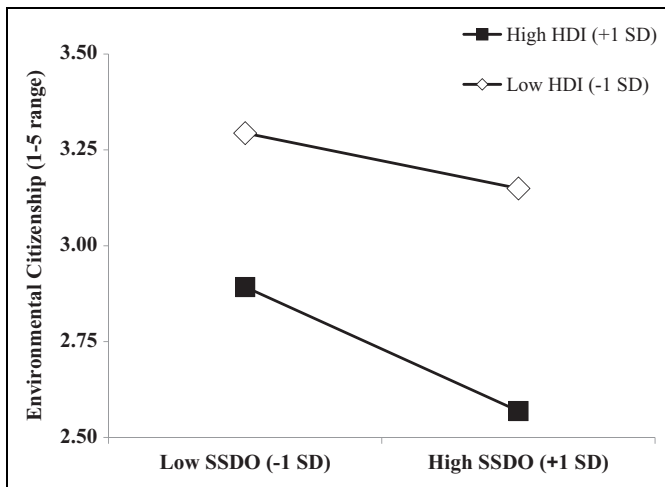
\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ . † $p < .08$ .

**Table 6.** Multilevel Random Coefficient Models Predicting Two Environmentalism Measures for the Student Sample with the Environmental Performance Index (EPI) as the Level-2 Predictor.

Predictors/dependent variables	Fixed Part			Random Part	
	$\gamma$	SE	$t$	$\sigma^2_u$	$\chi^2$
<b>Environmental citizenship</b>					
Intercept	2.976	.082	36.094***	.179	845.553***
EPI	-.006	.006	-1.075		
Age	.017	.003	5.502***	<.001	23.047
Age $\times$ EPI	<.001	<.001	-.180		
Sex (0 male, 1 female)	.110	.026	4.184***	.001	18.440
Sex $\times$ EPI	.004	.002	2.455*		
Conservative political orientation	-.067	.015	-4.645***	.003	35.391*
Conservative Political Orientation $\times$ EPI	-.003	.001	-2.561*		
SDO	-.071	.010	-6.915***	.001	26.417
SDO $\times$ EPI	-.003	.001	-4.342***		
<b>Private sphere behavior</b>					
Intercept	3.869	.055	69.791***	.080	593.550***
EPI	.006	.004	1.383		
Age	.025	.003	9.158***	<.001	30.221
Age $\times$ EPI	<.001	<.001	-1.303		
Sex (0 male, 1 female)	.208	.023	9.161***	.002	24.714
Sex $\times$ EPI	.003	.002	1.597		
Conservative political orientation	-.013	.011	-1.124	.001	38.301*
Conservative Political Orientation $\times$ EPI	-.001	.001	-.834		
SDO	-.063	.008	-7.583***	.001	31.031
SDO $\times$ EPI	-.002	.001	-1.794†		

Note. SDO = social dominance orientation.  $N = 3,752$ ,  $k = 25$ . Political orientation was measured with a 7-point scale ranging from 1 (*very liberal*) to 7 (*very conservative*). Reported results are for the final estimation of fixed effects with robust standard errors ( $df = 23$ ).

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ . † $p < .09$ .



**Figure 1.** Slopes for the association between social dominance orientation (SDO) and environmental citizenship for the student samples ( $N = 3,752$ ,  $k = 25$ ) at difference levels of country-level standard of living as indexed by the 2015 Human Development Index (HDI). Simple slopes analysis confirmed that the association between SDO and environmental citizenship is stronger (steeper slope) at higher levels of HDI ( $\gamma = -.10$ ,  $t = 5.52$ ,  $p < .001$ ) than at lower levels ( $\gamma = -.04$ ,  $t = 2.39$ ,  $p = .025$ ). The lowest levels of environmental citizenship occur in individuals who reported high SDO and live in countries with high levels of HDI. Portraying the moderation on a positive light, the *lower* participants' scores on the short social dominance orientation (SSDO) scale, the *more* they engage in environmental citizenship actions, and this effect is *stronger* in nations with better human development indicators.

SDO–environmentalism relation. Figure 1 illustrates such moderating effect (see Supplemental Material for further information).

## Discussion

SDO indexes an individual's preference for group-based inequality and hierarchy, which has been shown to predict a range of intergroup attitudes and behavior as well as environment-relevant variables. We use multilevel modeling to present the first large scale cross-nation study examining the extent to which the SDO–environmentalism relation is robust across individuals from 25 countries (robustness hypothesis), and whether country-level factors would strengthen or weaken this relation (moderation hypothesis). We tested these hypotheses with the 4-item SSDO Scale, which showed good psychometric properties and measurement invariance in our samples.

### Robustness of the SDO–Environmentalism Relation

Our results confirmed that SDO is a reliable negative predictor of environment-relevant variables. Individuals with higher levels of SDO were less likely to engage in environmental citizenship actions, such as signing a petition in support of protecting the environment, boycotting companies that are not environmentally friendly, or communicating pro-environmental messages to others. Likewise, high-SDO individuals were less likely to engage in private sphere behaviors aimed to reduce energy

consumption and negative environmental impacts, and were less likely to donate to an environmental organization.

That SDO was reliably negatively related to all three environmentalism measures and across student and community samples provides strong support for the important role of this individual difference variable for understanding environmental problems. The basic motivation to achieve and maintain hierarchical social structures indexed by SDO helps explain hierarchical relations between humans and the natural environment. Theoretically, this confirms a link between support for social inequality among social groups and support for legitimizing myths justifying human dominance over nature, especially when environmental exploitation helps sustain and widen the gap between dominant and disadvantaged groups in society (Milfont & Sibley, 2014).

At the same time, it is important to note that the effect sizes for the associations between SDO and environment-relevant variables observed in the present study (as well as in others) were relatively small (in the range of  $-.17$  to  $-.26$  when correcting for reliabilities) when compared to meta-analytical correlations observed between SSDO and attitudes toward minorities—endorsing more women in leadership positions ( $-.31$ ), protecting ethnic/religious minorities ( $-.48$ ), and providing aid to the poor ( $-.43$ ; see Pratto et al., 2013). It is perhaps unsurprising that SDO scales correlate more strongly with intergroup measures since both measure group-based concepts. In fact, this demonstrates that the SDO–environmentalism relation is more notable because there is no obvious content overlap. We also note that Pratto et al. (1994) observed stronger correlations ( $-.38$  across three samples) between SDO and environmental policies in U.S. samples, including items such as “Drilling for oil off the California coast,” “Government-mandated recycling programs,” “Taxing environmental polluters to pay for superfund clean ups,” whereas the relationships we identified for U.S. samples were weaker. This comparison suggests that the strength of the associations between SDO and environmentalism is stronger for more specific (and policy-based) measures, which could be explored in future studies.

It is also worth noting that although negative correlations were observed in most samples and measures, nontrivial positive correlations between SSDO and the environmental citizenship measure were observed in both Ghana and the United States (student samples) and in China (community sample). Inspection of the correlations for individual items showed that the positive correlations were mainly driven by a single SSDO item (i.e., “Superior groups should dominate inferior groups”) in relation to more public behaviors in the environmental citizenship measure (e.g., “Write a letter or call your member of Parliament or another government official to support environmental protection,” “Write to newspaper in support of protecting the environment,” “Join public demonstrations or protests supporting environmental protection”). A speculative interpretation is that some who are convinced about the reality of climate change feel the need to take a superior group position to dominate an inferior group (those unconvinced climate change is real) by engaging in more public environmental

citizenship actions. Regardless of the explanation, this finding suggests a differential impact of SDO in relation to more visible environmental citizenship actions, which should be investigated in future research.

### *Moderators of the SDO–Environmentalism Relation*

Besides confirming a negative association between SDO and environmentalism, we also examined whether the strength of this association would differ depending on societal contexts. Comparing the meta-analytical results for each of the environmentalism measures, we observed that only the association between SSDO and the intention to donate to a pro-environmental organization was uniform: High-SDO individuals were less likely to donate to an environmental organization compared to low-SDO individuals, and this finding did not vary across sample type and countries in our study. This indicates that the impact of SDO will likely be uniform for simpler environmentalism measures that do not vary much in content or for measures indexing behaviors that are afforded similarly across cultural contexts.

Notably and supporting our predictions, the levels of inequality, achievement in key dimensions of human development, and performance on environmental issues in a given nation were shown to reinforce individuals' views of human dominance over nature. Pratto et al. (2013) noted that “[t]he more group power differentiation is made salient, the more people apply their orientation toward group inequality to their attitudes” (p. 593). Relating their observation to the environmental domain and our findings, the more group power differentiation is salient via societal inequality, lack of societal development and environmental standards, the more individuals who favor group inequality will tend to exploit the environment. This suggests that the social context of inequality, lack of societal development and environmental standards gives people who endorse social inequality themselves a stronger basis for not engaging in pro-environmental behaviors. Conversely, the *lower* participants' SSDO, the *more* they endorsed pro-environmental actions, and this association is stronger in societies that are more equal and with better environmental performance, and especially stronger in societies with better records on life expectancy, educational attainment, and per capita income. Our findings also provide further evidence for the interplay between individual psychological orientations and sociocultural context (see, e.g., Fischer, Milfont, & Gouveia, 2011; Milfont & Markowitz, 2016; Milfont & Schultz, 2016; Kunst, Fischer, Sidanius, & Thomsen, 2017; Pratto et al., 2013).

### **Concluding Remarks**

Our findings confirm that those who endorse social hierarchy and inequality are less likely to act on environmental issues but that the strength of this association is affected by the societal context in which people live. Factors that curtail the strength of this relationship include living in a more equal, wealthier, and environmentally oriented society. These factors could thus

ameliorate the pervading belief in human dominance over nature. However, our findings are correlational, and thus suggest rather than demonstrate a causal link. If it is true that culture can influence pro-environmental behaviors, then it places even more importance on efforts to address social issues like inequality and development around the world because these efforts will not only address social concerns, but reduce barriers to addressing environmental issues as well—these issues are interconnected as illustrated by the United Nations' Sustainable Development Goals.

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### **Supplemental Material**

The supplemental material is available in the online version of the article.

### **Notes**

1. We also note that the meta-analytical results in Tables 2 and 3 extend evidence for the validity of the SSDO scale by showing that overall men have higher levels of social dominance orientation than women, which confirms previous findings (e.g., Lee et al., 2011; Sidanius & Pratto, 1999).
2. Spearman's rank-order correlations showed the Gini index to be negatively associated with both Human Development Index and Environmental Performance Index ( $-.65, p < .001$  and  $-.54, p < .01$ , respectively), which are in turn positively associated ( $.58, p < .01; N = 25$  for both).

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