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Personality and environmental outcomes: The role of moral anger in channeling climate change action and pro-environmental behavior

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Abstract

The overarching aim of the present research is to investigate whether and how HEXACO personality traits relate to climate change action, pro-environmental behavior, and moral anger. A sample of 268 community participants provided responses for measures of the HEXACO model, moral anger, intention to engage in climate change action, and pro-environmental behavior. Hierarchical tests indicated that (1) Openness to Experience outperformed the other HEXACO personality traits in predicting climate change action, whereas (2) both Openness to Experience and Honesty–Humility outperformed the other HEXACO personality traits in predicting pro-environmental behavior, controlling for participants' gender, age, education, and employment status. Specifically, mediation analyses showed that (3) Openness to Experience was related to climate change action both directly and indirectly via moral anger. Furthermore, (4) Openness to Experience and Honesty–Humility were independently related to pro-environmental behavior both directly and indirectly via moral anger.

INTRODUCTION

The Earth's climate has changed throughout history: The planet's average surface temperature and carbon dioxide levels in the air have risen greatly since the late 19th century, the Arctic sea ice summers are shortening, and the Earth's polar ice sheets are losing masses. Importantly for the purposes of the present article, climate-warming trends over the past century are thought to be extremely likely due to human activities (Cook et al., 2013). Given that most people do little to alter these trends, what is it that motivates some people to engage in climate change action and pro-environmental behavior? The present research aims to address this question by investigating the role of personality traits and emotion in environmental outcomes.<COMP: Please set reference citations and reference list as per the latest JSLD guidelines.>

Previous research in environmental psychology provided evidence for various and different individual and sociocultural factors that are implicated in an environmental stance. Concerning individual factors, cognitive dimensions, such as knowledge about climate change, would seem to be involved in environmental attitudes (Hidalgo & Pisano, 2010; Reser et al., 2012). Moreover, one's affect heuristic (Leiserowitz, 2006; Smith & Leiserowitz, 2012) and personal experience of adverse climatic events are involved in engendering one's pro-environmental stance (Masson-Delmotte et al., 2006). Also, people's sociodemographics like gender and age were found to be related to environmental concerns (Fransson & Garling, 1999; Hoffarth & Hodson, 2016; Panno et al., 2015) with women and older people being more environmentally oriented. Sociocultural factors, cultural values, norms, and worldviews have additionally been found to affect people's environmental behaviors (Kaiser et al., 1999; Smith & Leiserowitz, 2012; Stern, 2000).

Despite the highlighted role of different individual and sociocultural factors, the attention paid to the role of personality is still scant. In more detail, although some models of environmental behaviors (Kaiser et al., 1999; Stern, 2000) consider personality characteristics as more antecedent predictors with respect to values, ideology and attitudes, studies that have investigated factors associated with environmentalism have paid relatively little attention to the role of personality. Nevertheless, personality, as a core driver of people's motivations, beliefs, values, and consequently attitudes and behavioral choices, may constitute a powerful antecedent of pro-environmental attitudes and behavior (Karbalaei et al., 2014). In this vein, a recent meta-analysis conducted by Soutter et al. (2020) provided evidence for the associations of the Big Five and HEXACO personality traits with pro-environmental attitudes and behavior, showing Openness to Experience and Honesty–Humility as the stronger correlates.

Extending this line of research, the current article is aimed at testing the personality bases of an environmental stance. Applying a framework of HEXACO model of personality structure, we examine the extent to which the six HEXACO personality factors (i.e., Honesty–Humility, Emotionality, Extraversion, Agreeableness, Conscientiousness, and Openness to Experience) are related to both (a) an intention to engage in climate change action and (b) pro-environmental behavior. Moreover, we intend to advance our understanding by testing whether people's moral anger (i.e., anger toward individuals who do not respect the environment) mediates these links.

THE HEXACO PERSONALITY MODEL

The HEXACO model (Ashton & Lee, 2008; Ashton et al., 2014; Lee & Ashton, 2004) identifies six core traits of personality—that is, Honesty–Humility, Emotionality, Extraversion, Agreeableness, Conscientiousness, and Openness to Experience. The first trait refers to concerns about sincerity, fairness (Honesty), modesty and lack of greed (Humility). The second trait (Emotionality) reflects people's tendency to experience anxiety, fearfulness, sentimentality, and dependence. The third trait (Extraversion) comprises components as social self-esteem, social boldness, and liveliness. Indeed, people high in Extraversion are usually defined as talkative, sociable, and cheerful. The fourth trait (Agreeableness) includes facets of forgiveness, gentleness, flexibility, and patience so that agreeable people tend to favor social harmony and tolerance. The fifth trait (Conscientiousness) is indicated by high levels of organization, diligence, perfectionism, and prudence. Finally, the sixth trait (Openness to Experience) leads people to adopt unusual and abstract thinking; this trait pertains to facets as aesthetic appreciation, originality, and creativity.

Literature on the personality bases of environmentalism is currently reporting some results on whether and how individual differences in the six HEXACO personality traits are related to pro-environmental behavior. Specifically, moderate evidence exists for Extraversion (Hilbig et al., 2012; Hirsch & Dolderman, 2007; Markowitz et al., 2012), Agreeableness (Hilbig et al., 2012; Markowitz et al., 2012; see also Hirsch & Dolderman, 2007 and Milfont & Sibley, 2012 for Big Five Agreeableness), and Conscientiousness (Brick & Lewis, 2016; Hilbig et al., 2012; Markowitz et al., 2012; Milfont & Sibley, 2012), suggesting positive—but only weak—associations with pro-environmentalism for all three personality factors. Concerning the role of Honesty–Humility, there are conflicting findings in the available literature. Indeed, in some studies, Honesty–Humility has been found to positively correlate with environmental concern and climate change beliefs (Hilbig et al., 2012; Sibley et al., 2011). In their meta-analysis, Soutter et al. (2020) found that Honesty–Humility ($r = .20$), together with Openness to Experience ($r = .22$), are the stronger correlates of pro-environmental attitudes. Conversely, other studies (especially those in the United States) have provided evidence for no associations between Honesty–Humility and environmental responsible behaviors (e.g., Markowitz et al., 2012). In this regard, it has been argued that the interpretive difficulty of these discordant findings could depend on the different types of environmental goals investigated, as well as on the fact that some previous studies did not control for participants' sociodemographic characteristics like gender or age (see Brick & Lewis, 2016 for a detailed discussion). To sum up, of the HEXACO personality traits, Openness to Experience has shown the most robust association with an environmental stance. Because of their intellect and alternative thinking, people high in Openness to Experience are more inclined to imagine long-term environmental consequences (e.g., climate and atmospheric changes' consequences; see Brick & Lewis, 2016). Across a variety of studies and samples, Openness to Experience has been found to be a robust predictor of diverse environmental-related intentions, goals, and behaviors (Hilbig et al., 2012; Hirsch & Dolderman, 2007; Markowitz et al., 2012; Milfont & Sibley, 2012; Puech et al., 2019), finding that a heightened openness tendency is associated with an enhanced inclination to an environmental stance. Nevertheless, little is known about factors that could play a relevant role in the relationship between personality traits and environmental outcomes.

The aim of the present research study is twofold. First, based on past findings reviewed above, we intend to deepen our knowledge about whether Openness to Experience is the strongest personality predictor of (a) intention to engage in climate change action and (b) pro-environmental behavior, controlling for participants' sociodemographics (i.e., gender, age, edu-

cation, and employment status). In pursuing this aim, besides contributing to our understanding of the association between personality and pro-environmental behavior, we also extend the literature by investigating people's climate change action. In addressing personality predictors of environmental behavior, few studies have directly focused on individual intentions to engage in action toward climate change (see Yu & Yu, 2017; see also Jessani & Harris, 2018). Second, we want to take a step forward by examining whether participants' moral anger for people not respecting the environment is a suitable mediator in the relationships between Openness to Experience and two environmental outcomes: (a) intention to engage in climate change action, as well as (b) pro-environmental behavior.

MORAL ANGER

Emotions have a crucial role in how people think and behave. When people experience emotions, they regulate their conduct to respond adaptively to the stimuli in their social environments (Smith & Lazarus, 1990). Many theories and empirical studies indicated that anger is an action-oriented emotion (Carver & Harmon-Jones, 2009) and an important antecedent of people's willingness to engage in action for a given cause (Martin et al., 1990; van Zomeren et al., 2008; van Zomeren et al., 2011; Yzerbyt et al., 2003). For example, in their *Social Identity Model of Collective Action*, van Zomeren, Postmes, and Spears (2008) suggested that anger is one of the strongest predictors of collective action participation. The authors showed that anger in response to felt injustice about collective disadvantage exerts a powerful force on people's willingness to mobilize against the source of such disadvantage (see also van Zomeren, 2013; van Zomeren, Spears, Fischer et al., 2004; van Zomeren et al., 2008). In line with this argument, anger has been defined as a specific emotion resulting from injustice appraisals (Goldberg et al., 1999; see also Russell & Giner-Sorolla, 2011) and fairness violations (Gutierrez & Giner-Sorolla, 2007).

Of present relevance for the theme of the present research, the construct of moral anger has received considerable attention in the context of environmentalism, and it has been found to be a key predictor of pro-environmental behavior (see Bamberg & Moser, 2007 for a meta-analysis). Specifically, Kals and Russell (2001) developed the *Model of Environmental Justice*, in which they posit that indignation or anger about environmental protection strongly affects people's willingness to act pro-environmentally (see also Syme et al., 2000). More recently, in a study conducted on a representative sample of German citizens, Reese and Jacob (2015) found that beliefs about environmental justice elicit people's moral anger toward environmental damage that, consequently, promotes their pro-environmental intentions and actions. Thus, in the current work, we have taken such an emotion (i.e., moral anger) into account.

Based on previous findings (e.g., Clayton et al., 2013; Krosnick et al., 2000), we propose that moral anger for people not respecting the environment may play an important role in the relationship between personality traits (e.g., Openness to Experience) and pro-environmentalism. In agreement with the previous work by Ackerman and Heggestad (1997), because Openness to Experience is positively correlated with cognitive ability and being generally informed, this personality trait may play a key role in increasing people's awareness of the consequences of humans' actions on the environment, and hence it may promote environmentalism (see also Soutter et al., 2020). Accordingly, the present study aims at investigating whether Openness to Experience may be positively related with anger against people not respecting the environment and then with environmentalism (i.e., climate change action and pro-environmental behavior). More specifically, what we aim to investigate is whether people's moral anger is positively related to their (a) intention to

engage in climate change action and (b) pro-environmental behavior, following the Openness to Experience factor of personality.

THE PRESENT STUDY

In this article, we present a study testing the relationship between the HEXACO personality traits, moral anger, people's intention to engage in climate change action, and pro-environmental behavior. Drawing on existing environmental and personality studies (see Brick & Lewis, 2016; Sibley et al., 2011, for some instances), we have proposed that people's (a) intention to engage in climate change action and (b) pro-environmental behavior should be mainly based on the Openness to Experience personality factor. Furthermore, we have proposed that people's moral anger should mediate the relationship between Openness to Experience, and both outcomes: (a) intention to engage in climate change action, (b) pro-environmental behavior. Specifically, we have formulated our hypotheses as follows:

Hypothesis 1 (H1): Of the six HEXACO personality traits, Openness to Experience would be positively associated with (a) intention to engage in climate change action and (b) pro-environmental behavior. These associations should hold even when potential confounds, such as sociodemographics (i.e., gender, age, education, and employment status), are controlled for;

Hypothesis 2 (H2): Openness to Experience would be positively related to people's (a) intention to engage in climate change action, and (b) pro-environmental behavior directly, as well as indirectly through their increased moral anger toward others not respecting the environment.

Because previous studies showed conflicting findings concerning the relationship between Honesty–Humility and an environmental stance, we then approached such a relationship in an explorative way.

METHOD

Participants and procedure

A community sample comprised of 268 Italian-native adults participated in the study on a voluntary basis. The sample covered a wide age range (19–87 years; $M_{age} = 41.25$, $SD = 16.58$). The gender composition was also balanced (49.5% women). The education level of participants varied from primary school to postgraduate degree as follows: 0.6% primary school, 9.4% secondary school, 38.7% high school, 37.7% graduate degree, 13.5% postgraduate degree. The employment status varied as follows: 3.5% unemployed, 6.8% retired, 15.8% students, 4.2% housewife, 69.8% employed. To be confident in the soundness of the results we found, we performed a post hoc power analysis using the R application written by Schoemann et al. (2017). We set medium correlation (i.e., 0.25) among the independent variable and the mediator and large correlation (i.e., 0.40) among the independent variable and the dependent variable. Also, we chose values of 5000 for the total number of power analysis replications and values of 20,000 for the number of coefficients draws per replication (Schoemann et al., 2017). The analysis revealed a statistical power of 0.80 with a sample size of 268 participants. Data were collected through paper and pencil questionnaires administered by trained research assistants in public areas and waiting rooms in Rome's main train station. Participants individually filled in the questionnaire. They were assured anonymity about their responses and were not given any financial compensation.

Measures

The HEXACO personality traits

The 60-item HEXACO-PI-R was administered (Ashton & Lee, 2009). The six personality factors are tapped by 10 items each. An example of an item for the Honesty–Humility factor ($M = 3.72$, $SD = 0.67$, $\alpha = .75$) is: "I wouldn't pretend to like someone just to get that person to do favors for me." An example of an item for the Emotionality factor ($M = 3.16$, $SD = 0.59$, $\alpha = .68$) is: "When I suffer from a painful experience, I need someone to make me feel comfortable." An example of an item for the Extraversion factor ($M = 3.48$, $SD = 0.53$, $\alpha = .70$) is: "In social situations, I'm usually the one who makes the first move." An example of an item for the Agreeableness factor ($M = 2.92$, $SD = 0.46$, $\alpha = .47$) is: "I tend to be lenient in judging other people." An example of an item for the Conscientiousness factor ($M = 3.75$, $SD = 0.58$, $\alpha = .72$) is: "I always try to be accurate in my work, even at the expense of time." Finally, an example of an item for the Openness to Experience factor ($M = 3.66$, $SD = 0.61$, $\alpha = .72$) is: "I like people who have unconventional views." This measure employed 5-point response scales ranging from 1 = *completely disagree* to 5 = *completely agree*. For each factor, a composite score of the items was computed so that high values indicate high levels of Honesty–Humility, Emotionality, Extraversion, Agreeableness, Conscientiousness, and Openness to Experience, respectively.

Moral anger

Participants' moral anger was measured with one item borrowed from Reese and Jacob (2015): "I feel angry when I see people who do not respect the environment" ($M = 4.28$, $SD = 1.02$). This measure employed 5-point response scales ranging from 1 = *completely disagree* to 5 = *completely agree*. High values indicate high moral anger.

Climate change action

To assess people's intention to engage in climate change action, we used a two-item self-report measure: "I will make some efforts to mitigate the negative effects of global warming" and "I intend to take concrete steps to counter the negative effects of global warming." Such a measure has been used through several studies (e.g., Heath & Gifford, 2006). This measure employed 7-point response scales ranging from 1 = *completely disagree* to 7 = *completely agree*. A composite score of the items was computed ($M = 5.32$, $SD = 1.27$, $\alpha = .83$), thus that high values indicate high intention to engage in climate change action.

Pro-environmental behavior

To assess pro-environmental behavior, we used a six-item self-report measure assessing environmentally responsible behavior that people adopt in order to reduce their ecological footprint. The items are: "I do separate waste collection," "I participate in activities in favor of the environment," "I am attentive to water consumption," "I buy energy-efficient lamps," "I use public transport

more than a private vehicle (car, scooter)," and "I consume organic food." This measure employed 5-point response scales ranging from 1 = *completely disagree* to 5 = *completely agree*. A composite score of the items was computed ($M = 3.43$, $SD = 0.76$, $\alpha = .62$) so that high values indicate high pro-environmental behavior. This measure is based on previous research on pro-environmental behavior (see for instance Panno et al., 2018).

Analysis plan

To test our hypotheses, as a first step, we performed two hierarchical regression models separately for climate change action (see Table 2) and pro-environmental behavior (see Table 3). Specifically, (a) climate change action and (b) pro-environmental behavior were entered as dependent variables respectively, participants' sociodemographics (i.e., gender, age, education, and employment status) were entered in the first step, and the six HEXACO personality traits were entered in the second step. Based on these results, we then examined two mediation models separately for climate change action and pro-environmental behavior, through two mediation analyses using Hayes's (2013) PROCESS macro (Model 4) with 5000 bootstrap samples and 95% confidence intervals. In the models, Openness to Experience was the independent variable (X), moral anger was the mediator (M), and climate change action and pro-environmental behavior were the dependent variables, respectively (Y). Finally, we also computed zero-order correlations in order to provide useful data points for potential future meta-analyses (see Table 1).

RESULTS

Hierarchical regression analysis with climate change action as a dependent variable

Before analyzing the relationships between the sociodemographic characteristics and the HEX-ACO personality traits with climate change action through regression analysis, we preliminarily investigated assumptions for the regression. First, we verified that all the independent quantitative variables used in the regression models and the dependent variable were normally distributed (asymmetry and kurtosis values ranged from –1.11 to 1.20). Then, we excluded problems related to collinearity among the predictors through the analysis of Tolerance and Variance Inflation Factor (VIF) values, which resulted, respectively, between 0.685 and 0.962 and between 1.040 and 1.960. Finally, through the Durbin–Watson test, we excluded a problem concerning serial correlation of residuals, as it resulted in 2.14.

    After the preliminary analyses about regression assumptions, we conducted a linear hierarchical regression analysis considering climate change action as the dependent variable and the sociodemographic characteristics with the HEXACO personality traits as the predictors. As can be seen in Table 2, in Step 1, sociodemographic characteristics were unrelated to climate change action (all $p > .10$). At the second step, when the six HEXACO personality traits were entered in the regression model, 8% of the variability of data was explained, increasing significantly the explained variance (R^2 change = 0.10; $p < .001$). Openness to Experience, of the six HEXACO personality traits, was the only personality factor that was associated with climate change action. Specifically, and according to our hypothesis H1, we found that people with high levels of Openness to Experience reported greater willingness to engage in action toward climate change.

TABLE 1 Correlation analysis in the study

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) Gender	1												
(2) Age	-0.19**	1											
(3) Education	0.01	-0.14*	1										
(4) Employment Status	-0.14*	-0.03	0.18**	1									
(5) Hon–Hum	0.15**	0.30***	0.09	0.11	1								
(6) Emotionality	0.45***	0.04	-0.03	-0.09	0.17**	1							
(7) Extraversion	0.07	-0.08	0.07	0.05	0.00	-0.09	1						
(8) Agreeableness	-0.13*	0.23***	0.03	0.02	0.21***	0.01	-0.23***	1					
(9) Conscientiousness	0.01	0.07	0.18**	0.14*	0.26***	-0.04	0.19**	0.08	1				
(10) Openness to Exp	0.03	0.09	0.20**	0.06	0.22***	0.07	0.12*	0.18**	0.09	1			
(11) Moral Anger	0.01	0.03	0.06	0.08	0.22***	0.13*	-0.01	0.16**	0.11	0.20**	1		
(12) CCA	0.04	-0.01	0.07	0.10	0.18**	0.07	0.05	-0.03	0.14*	0.27***	0.30***	1	
(13) PEB	0.04	0.27***	0.09	0.09	0.30***	0.15**	-0.02	0.21***	0.06	0.30***	0.39***	0.40***	1

Note. Gender (M = 1, F = 2); education (primary school = 1, secondary school = 2, high school = 3, graduate degree = 4, postgraduate's degree = 5); employment status (unemployed = 1, retired = 2, students = 3, housewife = 4, employed = 5).

*p < .05.

**p < .01.

***p < .001.

CCA = climate change action; PEB = pro-environmental behavior.

TABLE 2 Hierarchical linear regression analyses with climate change action as dependent variable

| Model	Predictors	B	β	p	B [95% CI]	Squared semipartial correlations	R̃²	Adj. R̃²	Model comparison	ΔR̃²	p
Model 1*	Gender	0.29	0.06	.374	−0.35 to 0.94	0.003	0.01	0.01	–	–	–
	Age	0.004	0.03	.693	−0.02 to 0.02	0.001					
	Education	0.18	0.06	.318	−0.17 to 0.53	0.004					
	Employment status	−0.10	−0.08	.190	−0.24 to 0.05	0.006					
Model 2*	Gender	0.01	0.001	.984	−0.70 to 0.72	0.000	0.12	0.08	Model 2–Model 1	0.10	<.001
	Age	−0.01	−0.04	.506	−0.03 to 0.01	0.002					
	Education	−0.06	−0.02	.723	−0.41 to 0.29	0.000					
	Employment status	−0.08	−0.07	.254	−0.22 to 0.06	0.005					
	Honesty–Humility	0.04	0.12	.083	−0.01 to 0.09	0.011					
	Emotionality	0.01	0.02	.731	−0.05 to 0.07	0.000					
	Extraversion	−0.002	−0.005	.938	−0.06 to 0.06	0.000					
	Agreeableness	−0.06	−0.10	.103	−0.13 to 0.01	0.01					
	Conscientiousness	0.05	0.11	.086	−0.01 to 0.10	0.011					
	Openness to Experience	0.11	0.26	<.001	0.06 to 0.16	0.063					

$*F(4, 272) = 0.86, p = .489.$
$**F(10, 266) = 3.49, p < .001.$

TABLE 3 Hierarchical linear regression analyses with pro-environmental behavior as dependent variable

Model	Predictors	B	β	p	B [95% CI]	Squared semipartial correlations	Rš	Adj. Rš	Model comparison	ΔRš	p
Model 1	*Gender	0.75	0.08	.183	−0.36 to 1.86	0.006	0.09	0.08	–	–	–
	Age	0.08	0.29	<.001	0.05 to 0.11	0.077					
	Education	0.63	0.12	.040	0.03 to 1.24	0.016					
	Employment status	−0.13	−0.06	.299	−0.38 to 0.12	0.005					
Model 2	*Gender	−0.15	−0.02	.812	−1.36 to 1.06	0.000	0.20	0.17	Model 2–Model 1	0.11	<.001
	Age	0.05	0.17	.008	0.01 to 0.08	0.026					
	Education	0.30	0.06	.317	−0.29 to 0.90	0.004					
	Employment status	−0.14	−0.07	.267	−0.37 to 0.10	0.005					
	Honesty–Humility	0.11	0.17	.009	−0.03 to 0.20	0.025					
	Emotionality	0.09	0.12	.058	−0.00 to 0.19	0.013					
	Extraversion	0.02	0.02	.759	−0.08 to 0.12	0.000					
	Agreeableness	0.07	0.07	.230	−0.05 to 0.19	0.005					
	Conscientiousness	−0.03	−0.04	.525	−0.12 to 0.06	0.002					
	Openness to Experience	0.16	0.22	<.001	0.07 to 0.25	0.047					

*$F_{(4, 270)} = 6.55$, $p < .001$.
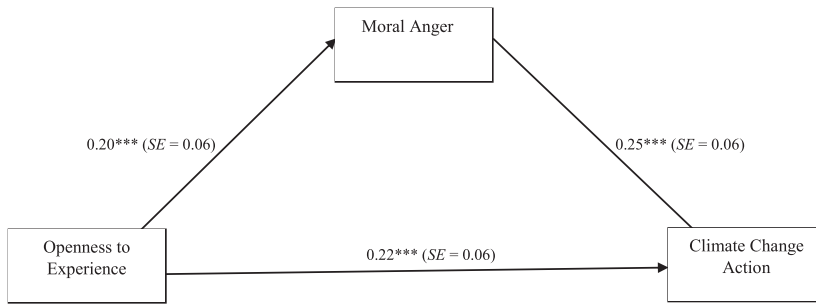
**$F_{(10, 264)} = 6.60$, $p < .001$.

FIGURE 1 Mediation analysis with Openness to Experience as an independent variable, Moral Anger as mediator, and Climate Change Action as a dependent variable.
Note. *** $p < .001$

## Mediation analysis with climate change action as a dependent variable

We further tested whether moral anger was a suitable mediator of the relationship between Openness to Experience and climate change action. The results of the mediation analysis are illustrated in Figure 1.

The total effect attained statistical significance, $\beta = 0.27$, $SE = 0.06$, $t = 4.79$, $p < .001$, 95% CI [0.1617, 0.3876]. Openness to Experience was positively related to moral anger, $\beta = 0.20$, $SE = 0.06$, $t = 3.48$, $p < .001$, 95% CI [0.0876, 0.3151], meaning that people who possessed high levels of Openness to Experience felt angrier when others did not respect the environment. Also, moral anger showed a significant and positive association with climate change action, $\beta = 0.25$, $SE = 0.06$, $t = 4.36$, $p < .001$, 95% CI [0.1372, 0.3632]. This means that people who experienced greater anger showed greater climate change action.

As expected, the association of Openness to Experience with climate change action was significant and positive, $\beta = 0.22$, $SE = 0.06$, $t = 3.94$, $p < .001$, 95% CI [0.1124, 0.3361]. Importantly, there was an indirect effect of Openness to Experience on climate change action through moral anger, $\beta = 0.05$, $SE = 0.02$, 95% CI [0.0181, 0.0859]. This corroborated our hypothesis H2 that high levels of Openness to Experience are positively associated with people's willingness to act toward climate change directly, as well as indirectly through increased moral anger for others not respecting the environment.

Hierarchical regression analysis with pro-environmental behavior as a dependent variable

Before analyzing the relationships between the sociodemographic characteristics and the HEX-ACO personality traits with pro-environmental behavior through regression analysis, we preliminarily investigated assumptions for the regression. First, we verified that all the independent quantitative variables used in the regression models and the dependent variable were normally distributed (asymmetry and kurtosis values ranged from –1.11 to 0.57). Then, we excluded problems related to collinearity among the predictors through the analysis of Tolerance and Variance
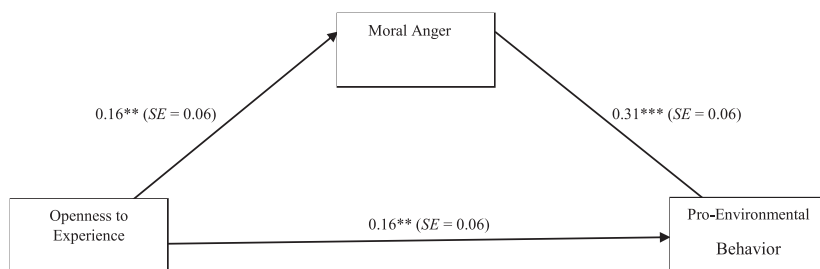
Note. Honesty-Humility was added as covariate in the analysis; ** $p < .01$, *** $p < .001$

FIGURE 2 Mediation analysis with Openness to Experience as an independent variable, Moral Anger as mediator, and Pro-Environmental Behavior as a dependent variable.
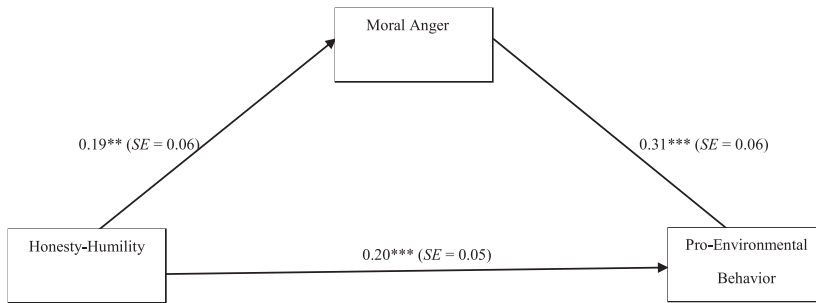*Note.* Honesty–Humility was added as covariate in the analysis; **$p < .01$, ***$p < .001$

Inflaction Factor (VIF) values, which resulted, respectively, between 0.672 and 0.956 and between 1.046 and 1.487. Finally, through the Durbin–Watson test, we excluded a problem concerning serial correlation of residuals, as it resulted in 1.94.

After the preliminary analyses about regression assumptions, we conducted a linear hierarchical regression analysis considering pro-environmental behavior as the dependent variable and the sociodemographic characteristics with the HEXACO personality traits as the predictors. As can be seen in Table 3, at the first step, participants' age and education were positively related to pro-environmental behavior, indicating that older and more educated people were more likely to behave pro-environmentally. At the second step, when the six HEXACO personality traits were entered in the model, 20% of the variability of data was explained, increasing the explained variance significantly (R^2 Change $= 0.11$; $p < .001$). We again found a significant and positive relation of participants' age with pro-environmental behavior, whereas the relation between education and pro-environmental behavior was not significant ($p > .10$). Of the six HEXACO personality traits, Openness to Experience and Honesty–Humility were significantly associated with pro-environmental behavior. Specifically, and according to our hypothesis H1, we found that people with high levels of Openness to Experience reported greater willingness to behave pro-environmentally. We also found that people with high levels of Honesty–Humility reported greater willingness to behave pro-environmentally.

Mediation analyses with pro-environmental behavior as a dependent variable

We further tested whether moral anger was a suitable mediator for the relationship between Openness to Experience and pro-environmental behavior. Because we found Honesty–Humility being significantly related to pro-environmental behavior, we added this personality trait as a covariate in testing the proposed mediation model as suggested by Hayes (2013). The results of the mediation analysis are illustrated in Figure 2.

The total effect attained statistical significance, $\beta = 0.21$, $SE = 0.06$, $t = 3.71$, $p < .001$, 95% CI [0.1002, 0.3270]. Openness to Experience showed a significant and positive association with moral anger, $\beta = 0.16$, $SE = 0.06$, $t = 2.67$, $p = .01$, 95% CI [0.0417, 0.2766], meaning that people who

Note. Openness to Experience was added as covariate in the analysis; ** *p* < .01, *** *p* < .001

FIGURE 3   Mediation analysis with Honesty–Humility as an independent variable, Moral Anger as mediator, and Pro-Environmental Behavior as a dependent variable.
Note. Openness to Experience was added as covariate in the analysis; ** *p* < .01, *** *p* < .001.

possessed high levels of Openness to Experience felt angrier when others did not respect the environment. Also, moral anger showed a significant and positive association with pro-environmental behavior, $\beta = 0.31$, $SE = 0.06$, $t = 5.68$, $p < .001$, 95% CI [0.2057, 0.4237]. This means that people who experienced greater anger showed greater tendencies to behave pro-environmentally.

As predicted, the association of Openness to Experience with pro-environmental behavior was significant and positive, $\beta = 0.16$, $SE = 0.06$, $t = 2.96$, $p = .003$, 95% CI [0.0547, 0.2724], indicating that people with high levels of Openness to Experience were more likely to behave pro-environmentally. Importantly, there was an indirect effect of Openness to Experience on pro-environmental behavior through moral anger, $\beta = 0.05$, $SE = 0.02$, 95% CI [0.0136, 0.0955]. This supported our hypothesis H2 that high levels of Openness to Experience were positively associated with people's pro-environmental behavior and that this association was mediated by increased moral anger for others not respecting the environment.

It should be noted, however, that of the six HEXACO personality factors, Honesty–Humility was also found to be significantly related to pro-environmental behavior. Thus, we decided to test the mediation of moral anger on the relationship between Honesty–Humility and pro-environmental behavior, controlling for the Openness to Experience factor. As suggested by Hayes (2013), such an analysis allowed us to test the independent effect of Honesty–Humility on pro-environmental behavior through moral anger. The results of the mediation analysis are illustrated in Figure 3.

The total effect attained statistical significance, $\beta = 0.26$, $SE = 0.06$, $t = 4.61$, $p < .001$, 95% CI [0.1489, 0.3705]. Honesty–Humility showed a significant and positive association with moral anger, $\beta = 0.19$, $SE = 0.06$, $t = 3.19$, $p = .002$, 95% CI [0.0714, 0.3009], meaning that people who possessed high levels of Honesty–Humility felt angrier when others did not respect the environment. Once again, moral anger showed a significant and positive association with pro-environmental behavior, $\beta = 0.31$, $SE = 0.06$, $t = 5.68$, $p < .001$, 95% CI [0.2057, 0.4237].

In line with past findings (Hilbig et al., 2012; Sibley et al., 2011; Soutter et al., 2020), the association of Honesty–Humility with pro-environmental behavior was significant and positive, $\beta = 0.20$, $SE = 0.05$, $t = 3.70$, $p < .001$, 95% CI [0.0942, 0.3080], indicating that people who possessed high levels of Honesty–Humility were more likely to behave pro-environmentally. Importantly, there was an indirect effect of Honesty–Humility on pro-environmental behavior through moral

anger, $\beta = 0.06$, $SE = 0.02$, 95% CI [0.0231, 0.1060]. Thus, high levels of Honesty–Humility were not only directly (and positively) but also indirectly associated with people's tendencies to behave pro-environmentally, through increased moral anger for others not respecting the environment.

GENERAL DISCUSSION

On the one hand, past studies on environmental concern have documented that the Openness to Experience personality factor was strongly and positively related to pro-environmental behavior (Hilbig et al., 2012; Hirsch & Dolderman, 2007; Markowitz et al., 2012; Milfont & Sibley, 2012; Puech et al., 2019). On the other hand, evidence from Kals and Russell (2001) has pointed out that moral anger was a key predictor of pro-environmental behavior (see also Reese & Jacob, 2015; Syme et al., 2000). The overarching aim of the present study was to integrate these parallel, but thus far, separate lines of research to provide a better knowledge about whether and how specific traits of personality may predict an environmental stance and shed light on which emotional mechanisms occur in this relationship. Specifically, our intention was to demonstrate that Openness to Experience was strongly and positively associated with (a) an intention to engage in climate change action and (b) pro-environmental behavior, and that moral anger for people not respecting the environment mediated these associations.

For climate change action, our hypotheses were supported. Specifically, and as expected by H1, the hierarchical test indicated that Openness to Experience outperformed the other HEXACO personality traits in predicting climate change action, after controlling for participants' gender, age, education, and employment status. Also, mediation analysis showed that people's moral anger significantly channeled the relationship between Openness to Experience and climate change action, as expected by H2.

These results are in line with the previous work by Brick and Lewis (2016), finding that people characterized by high levels of Openness to Experience were more able to imagine long-term environmental consequences, such as the consequences of climate changes due to their abstract and alternative thinking. Thus, one could advance that risk judgments of climate change may vary from one individual to another depending on his or her levels of Openness to Experience. As climate change risk perception is a typical case of "distant psychological risk" (van der Linden, 2015, p. 114), in which people are prone to think that a risk may happen in the future to other people and places (Spence et al., 2012), it is plausible that this kind of risk perception can be explained by taking into account core personality traits, such as Openness to Experience. Even though the link between personality and risk perception has been widely documented, it has also been pointed out that risk perception varies across different domains (Weber et al., 2002), and at present, little evidence focusing on the phenomenon of climate change. Thus, future studies might choose to include risk judgments of climate change in testing the relationship between the HEXACO personality traits, moral anger, and climate change action. This is a very important issue because the lack of risk perception has been identified as a barrier to engage in climate change adaptation and mitigation efforts (Weber, 2011). Consistent with results obtained in the present research, a lot of studies indicated that the higher the climate change risk perception, the greater the behaviors put in place to practically reduce climate change through public actions and engagement (Leiserowitz, 2006; Semenza et al., 2008). It is worth noting that Lee and colleagues also showed a relationship between Openness to Experience and connectedness to nature (Lee et al., 2015). Thus, a further link by which Openness to Experience could influence people's environmental-

ism might be through their connectedness to nature. Future research would need to test such a relationship.

For pro-environmental behavior, results supported our hypotheses that, of the six HEXACO personality traits, Openness to Experience strongly predicts pro-environmental behavior (H1) not only directly but also indirectly through increased moral anger against people not respecting the environment (H2). However, the hierarchical test indicated that Openness to Experience was not the only personality predictor of pro-environmental behavior. Although the correlation of Openness to Experience with pro-environmental behavior appeared larger than that for Honesty–Humility, we found that the Honesty–Humility personality trait also remains positively related to pro-environmental behavior after controlling for participants' gender, age, education, and employment status. Mediation analysis showed that Openness to Experience and Honesty–Humility independently predicted moral anger as well as pro-environmental behavior.

These results demonstrated the predictive force of Openness to Experience on pro-environmental behavior and supported our argument that moral anger is a key channel through which Openness to Experience exerts its positive association within the context of environmentalism. Nevertheless, at the same time, these results call into question the Openness to Experience's sole role and agree with past reports showing the substantial and positive contribution of Honesty–Humility (Hilbig et al., 2012; Sibley et al., 2011; see also Soutter et al., 2020). As discussed previously in this article, and in line with Brick and Lewis (2016), the Honesty–Humility results may reflect the properties of pro-environmental behavior, conceptualized as behavior aimed at reducing the ecological footprint, among other environmental goals. These results may also be due to the specificity of the current sample (i.e., collected through a WEIRD country). Meta-analytic findings by Soutter et al. (2020) showed that there are differences in the strength of the relation between Honesty–Humility and pro-environmental behavior across the United States and Europe: this relation resulted weaker in the USA than in Europe. Future research could thus replicate this study across different as well as non-WEIRD countries or different societies to understand whether there are variations in the relationships between personality traits and environmental outcomes. Another limitation of the present study that needs to be addressed in future research concerns the moral anger measure. Indeed, this is a single item measure that involves moral anger directed toward persons who do not respect the environment. As such, future research should improve this emotional measure by using multiple items to assess moral anger, as well as by differently operationalizing moral anger. For instance, by investigating specific unethical actions (e.g., air pollution or not recycling plastic) directed toward different environmental domains. Moreover, we encourage future studies to investigate the potentially distinct pro-environmental behaviors that could be triggered by other types of moral emotions such as guilt and pride. These emotions are evoked by evaluations of oneself after (un)following personal or social standards which are based on moral conduct (Tracy & Robins, 2004). Importantly, it has been shown that experiences of guilt and pride are relevant to people's decisions to act in an environmentally friendly way (e.g., Bissing-Olson et al., 2016; Harth et al., 2013; Onwezen et al., 2013; Schneider et al., 2017). As previously reviewed, the discordant findings about the relation between Honesty–Humility and environmental behaviors could be due to the different types of environmental goals investigated in previous research (Brick & Lewis, 2016). It would be thus desirable to extend our predictions to different pro-environmental outcomes from those used in the present study.

Through this article, we follow calls directly for studies on factors and processes underlying environmental-related attitudes and behaviors. The cross-sectional nature of our study does not allow causal inferences, and future research is needed in order to strengthen the robustness of our results. Nevertheless, this study takes an additional step toward the understanding of envi-

ronmental phenomena and their links with personality, as well as emotional processes. Thus, environmental psychology and emotion science could benefit from these results. Moreover, these results provide useful implications for practice. As noted by Soutter et al. (2020), understanding factors and processes underlying environmental-related attitudes and behaviors may allow policymakers to design intervention strategies aimed at addressing environmental issues (see also Maki et al., 2018). Among these strategies, some may be directed toward more specific population subgroups, for example, people who seem to be dispositionally less likely to behave in an ecofriendly way. There is consensus that climate change and related environmental problems are public health issues associated with people's activities and lifestyle (Carlsson-Kanyama, 1998). The study of personality and emotions seems thus to be highly relevant for advancing our knowledge about reasons for which people are more encouraged to engage in behaviors that can protect the environment.

CONCLUSION

In this article, we have presented a study investigating how the HEXACO personality traits are related to people's (a) intention to engage in climate change action and (b) pro-environmental behavior, as well as whether moral anger against others not respecting the environment mediates such associations. Results showed that Openness to Experience outperformed the other HEXACO personality traits in predicting climate change action, and then moral anger channeled the link between Openness to Experience and climate change action. Also, Openness to Experience and Honesty–Humility were found to independently predict pro-environmental behavior with moral anger being a key channel through which both these personality traits related to pro-environmental behavior. Given the potentially harmful consequences of climate change and, more generally, environmental-related issues, we hope that future research will build upon these results so that determinants of pro-environmentalism receive the recognition that they deserve.

DECLARATIONS

We formally declare that the manuscript has not been previously published in any form. It is neither under consideration nor in press with another publication.

ETHICS APPROVAL

All procedures performed in studies involving human participants were conducted in accordance with the ethical standards of the institutional and national research committee and the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. The article does not refer to any studies with animals performed by any of the authors.

CONSENT TO PARTICIPATE

Informed consent was obtained from all individual participants included in the studies.

CONFLICT OF INTEREST

CONSENT FOR PUBLICATION

The manuscript has been seen and reviewed by all authors, and all authors agree to the submission of the manuscript in its current form.

FUNDING

AVAILABILITY OF DATA AND MATERIAL

The data are available at https://osf.io/sde8n/?view_only=6684d99d390e4f468579c2d1cd16dc15

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REFERENCES

Ackerman, P.L. & Heggestad, E.D. (1997) Intelligence, personality, and interests: Evidence for overlapping traits. *Psychological Bulletin*, 121, 219–245. https://doi.org/10.1037/0033-2909.121.2.219

Ashton, M.C. & Lee, K. (2008) The HEXACO model of personality structure and the importance of the H factor. *Social and Personality Psychology Compass*, 2(5), 1952–1962. https://doi.org/10.1111/j.1751-9004.2008.00134.x

Ashton, M.C. & Lee, K. (2009) The HEXACO–60: A short measure of the major dimensions of personality. *Journal of Personality Assessment*, 91(4), 340–345. https://doi.org/10.1080/00223890902935878

Ashton, M.C., Lee, K. & De Vries, R.E. (2014) The HEXACO honesty-humility, agreeableness, and emotionality factors: A review of research and theory. *Personality and Social Psychology Review*, 18(2), 139–152. https://doi.org/10.1177/1088868314523838

Bamberg, S. & Moser, G., (2007) Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psychosocial determinants of pro-environmental behaviour. *Journal of Environmental Psychology*, 27(1), 14–25. doi: 10.1016/j.jenvp.2006.12.002

Bissing-Olson, M.J., Fielding, K.S. & Iyer, A. (2016) Experiences of pride, not guilt, predict pro-environmental behavior when pro-environmental descriptive norms are more positive. *Journal of Environmental Psychology*, 45, 145–153. doi: 10.1016/j.jenvp.2016.01.001

Brick, C. & Lewis, G.J. (2016) Unearthing the "green" personality: Core traits predict environmentally friendly behavior. *Environment and Behavior*, 48(5), 635–658. doi: 10.1177/0013916514554695

Carlsson-Kanyama, A. (1998) Climate change and dietary choices—How can emissions of greenhouse gases from food consumption be reduced? *Food Policy*, 23(3–4), 277–293. doi: 10.1016/S0306-9192(98)00037-2

Carver, C.S. & Harmon-Jones, E. (2009) Anger is an approach-related affect: Evidence and implications. *Psychological Bulletin*, 135(2), 183–204. doi: 10.1037/a0013965

Clayton, S., Koehn, A. & Grover, E. (2013) Making sense of the senseless: Identity, justice, and the framing of environmental crises. *Social Justice Research*, 26(3), 301–319.

Cook, E.R., Krusic, P.J., Anchukaitis, K.J., Buckley, B.M., Nakatsuka, T. & Sano, M. (2013) Tree-ring reconstructed summer temperature anomalies for temperate East Asia since 800 CE. *Climate Dynamics*, 41(11–12), 2957–2972. https://doi.org/10.1007/s00382-012-1611-x

Fransson, N. & Gärling, T. (1999) Environmental concern: Conceptual definitions, measurement methods, and research findings. *Journal of Environmental Psychology*, 19(4), 369–382.

Goldberg, J.H., Lerner, J.S. & Tetlock, P.E. (1999) Rage and reason: The psychology of the intuitive prosecutor. *European Journal of Social Psychology*, 29(5–6), 781–795. doi: 10.1002/(SICI)1099-0992(199908/09)29:5/6≤781::AID-EJSP960≥3.0.CO;2-3

Gutierrez, R. & Giner-Sorolla, R. (2007) Anger, disgust, and presumption of harm as reactions to taboo-breaking behaviors. *Emotion (Washington, D.C.)*, 7(4), 853–868. doi: 10.1037/1528-3542.7.4.853

Harth, N.S., Leach, C.W. & Kessler, T. (2013) Guilt, anger, and pride about in-group environmental behaviour: Different emotions predict distinct intentions. *Journal of Environmental Psychology*, 34, 18–26. doi: 10.1016/j.jenvp.2012.12.005

Hayes, A.F. (2013) *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York, NY: Guilford Press.

Heath, Y. & Gifford, R. (2006) Free-market ideology and environmental degradation: The case of belief in global climate change. *Environment and Behavior*, 38, 48–71. https://doi.org/10.1177/0013916505277998

Hidalgo, M.C. & Pisano, I. (2010) Determinants of risk perception and willingness to tackle climate change. A pilot study. *Psyecology*, 1(1), 105–112. doi: 10.1174/217119710790709595

Hilbig, B.E., Zettler, I., Moshagen, M. & Heydasch, T. (2012) Tracing the path from personality—via cooperativeness—to conservation. *European Journal of Personality*, 27, 319–327. https://doi.org/10.1002/per.1856

Hirsch, J.B. & Doderman, D. (2007) Personality predictors of consumerism and environmentalism: A preliminary study. *Personality and Individual Differences*, 43, 1538–1593. https://doi.org/10.1016/j.paid.2007.04.015

Hoffarth, M.R. & Hodson, G. (2016) Green on the outside, red on the inside: Perceived environmentalist threat as a factor explaining political polarization of climate change. *Journal of Environmental Psychology*, 45, 40–49. doi: 10.1016/j.jenvp.2015.11.002

Jessani, Z. & Harris, P.B. (2018) Personality, politics, and denial: Tolerance of ambiguity, political orientation and disbelief in climate change. *Personality and Individual Differences*, 131, 121–123. doi: 10.1016/j.paid.2018.04.033

Kaiser, F.G., Ranney, M., Hartig, T. & Bowler, P.A. (1999) Ecological behavior, environmental attitude, and feelings of responsibility for the environment. *European Psychologist*, 4(2), 59–74. doi: 10.1027//1016-9040.4.2.59

Kals, E. & Russell, Y. (2001) Individual conceptions of justice and their potential for explaining proenvironmental decision making. *Social Justice Research*, 14(4), 367–385.

Karbalaei, S., Abdollahi, A., Momtaz, V. & Talib, M. (2014) Locus of control, neuroticism, and spirituality as predictors of waste-prevention behaviors. *Ecopsychology*, 6, 252–259. https://doi.org/10.1089/eco.2014.0038

Krosnick, J.A., Holbrook, A.L. & Visser, P.S. (2000) The impact of the fall 1997 debate about global warming on American public opinion. *Public Understanding of Science*, 9(3), 239–260.

Lee, K. & Ashton, M.C. (2004) Psychometric properties of the HEXACO personality inventory. *Multivariate Behavioral Research*, 39(2), 329–358. doi: 10.1207/s15327906mbr3902_8

Lee, K., Ashton, M.C., Choi, J. & Zachariassen, K. (2015) Connectedness to nature and to humanity: Their association and personality correlates. *Frontiers in Psychology*, 6, 1003. https://doi.org/10.3389/fpsyg.2015.01003

Leiserowitz, A. (2006) Climate change risk perception and policy preferences: The role of affect, imagery, and values. *Climatic Change*, 77(1–2), 45–72. https://doi.org/10.1007/s10584-006-9059-9

Maki, A., Cohen, M.A. & Vandenbergh, M.P. (2018) Using meta-analysis in the social sciences to improve environmental policy. In W. Leal Filho, R. Marans, & J. Callewaert (Eds.), *Handbook of sustainability and social science research* (pp. 27–43). Cham, Switzerland: Springer.

Markowitz, E.M., Goldberg, L.R., Ashton, M.C. & Lee, K. (2012) Profiling the "pro-environmental individual": A personality perspective. *Journal of Personality*, 80(1), 81–111. doi: 10.1111/j.1467-6494.2011.00721.x

Martin, J., Scully, M. & Levitt, B. (1990) Injustice and the legitimation of revolution: Damning the past, excusing the present, and neglecting the future. *Journal of Personality and Social Psychology*, 59(2), 281–290. doi: 10.1037/0022-3514.59.2.281

Masson-Delmotte, V., Kageyama, M., Braconnot, P., Charbit, S., Krinner, G., Ritz, C., et al. (2006) Past and future polar amplification of climate change: Climate model intercomparisons and ice-core constraints. *Climate Dynamics*, 26(5), 513–529. https://doi.org/10.1007/s00382-005-0081-9

Milfont, T.L. & Sibley, C.G. (2012) The big five personality traits and environmental engagement: Associations at the individual and societal level. *Journal of Environmental Psychology*, 32(2), 187–195. doi: 10.1016/j.jenvp.2011.12.006

Onwezen, M.C., Antonides, G. & Bartels, J. (2013) The Norm Activation Model: An exploration of the functions of anticipated pride and guilt in pro-environmental behaviour. *Journal of Economic Psychology*, 39, 141–153. doi: 10.1016/j.joep.2013.07.005

Panno, A., Carrus, G., Maricchiolo, F. & Mannetti, L. (2015) Cognitive reappraisal and pro-environmental behavior: The role of global climate change perception. *European Journal of Social Psychology*, 45, 858–867. https://doi.org/10.1002/ejsp.2162

Panno, A., Giacomantonio, M., Carrus, G., Maricchiolo, F., Pirchio, S. & Mannetti, L. (2018) Mindfulness, pro-environmental behavior, and belief in climate change: The mediating role of social dominance. *Environment and Behavior*, 50(8), 864–888. doi: 10.1177/0013916517718887

Puech, C., Dougal, J., Deery, C., Waddell, C. & Mõttus, R. (2019) Openness is related to proenvironmental behavior both within and across families. *Environment and Behavior*, 1–6. doi: 10.1177/0013916519853294

Reese, G. & Jacob, L. (2015) Principles of environmental justice and pro-environmental action: A two-step process model of moral anger and responsibility to act. *Environmental Science & Policy*, 51, 88–94. doi: 10.1016/j.envsci.2015.03.011

Reser, J.P., Bradley, G.L., Glendon, A.I., Ellul, M.C. & Callaghan, R. (2012) Public risk perceptions, understandings, and responses to climate change and natural disasters in Australia and Great Britain. *National Climate Change Adaptation Research Facility, Gold Coast.*

Russell, P.S. & Giner-Sorolla, R. (2011) Moral anger, but not moral disgust, responds to intentionality. *Emotion (Washington, D.C.)*, 11(2), 233–240. doi: 10.1037/a0022598

Schoemann, A.M., Boulton, A.J. & Short, S.D. (2017) Determining power and sample size for simple and complex mediation models. *Social Psychological and Personality Science*, 8(4), 379–386. https://doi.org/10.1177/1948550617715068

Schneider, C.R., Zaval, L., Weber, E.U. & Markowitz, E.M. (2017) The influence of anticipated pride and guilt on pro-environmental decision making. *Plos One*, 12(11). doi: 10.1371/journal.pone.0188781

Semenza, J.C., Hall, D.E., Wilson, D.J., Bontempo, B.D., Sailor, D.J. & George, L.A. (2008) Public perception of climate change: Voluntary mitigation and barriers to behavior change. *American Journal of Preventive Medicine*, 35(5), 479–487. doi: 10.1016/j.amepre.2008.08.020

Sibley, C.G., Luyten, N., Purnomo, M., Mobberley, A., Wootton, L.W., Hammond, M.D., et al. (2011) The Mini-IPIP6: Validation and extension of a short measure of the Big-Six factors of personality in New Zealand. *New Zealand Journal of Psychology (Online)*, 40(3), 142–159.

Smith, C.A. & Lazarus, R.S. (1990) Emotion and adaption. In L. A. Pervin (Ed.), *Handbook of personality: Theory and research* (pp. 609–637). New York: Guilford.

Smith, N. & Leiserowitz, A. (2012) The rise of global warming skepticism: Exploring affective image associations in the United States over time. *Risk Analysis: An International Journal*, 32(6), 1021–1032. https://doi.org/10.1111/j.1539-6924.2012.01801.x

Soutter, A.R.B., Bates, T.C. & Mõttus, R. (2020) Big Five and HEXACO personality traits, proenvironmental attitudes, and behaviors: A meta-analysis. *Perspectives on Psychological Science*, 15(4), 913–941. doi: 10.1177/1745691620903019

Spence, A., Poortinga, W. & Pidgeon, N. (2012) The psychological distance of climate change. *Risk Analysis: An International Journal*, 32(6), 957–972. doi: 10.1111/j.1539-6924.2011.01695.x

Stern, P.C. (2000) New environmental theories: Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues*, 56(3), 407–424.

Syme, G.J., Kals, E., Nancarrow, B.E. & Montada, L. (2000) Ecological risks and community perceptions of fairness and justice: A cross-cultural model. *Risk Analysis*, 20(6), 905–916. doi: 10.1111/0272-4332.206083

Tracy, J.L. & Robins, R.W. (2004) Putting the self into self-conscious emotions: A theoretical model.. *Psychological Inquiry*, 15(2), 103–125. doi: 10.1207/s15327965pli1502_01

Van der Linden, S. (2015) The social-psychological determinants of climate change risk perceptions: Towards a comprehensive model. *Journal of Environmental Psychology*, 41, 112–124. doi: 10.1016/j.jenvp.2014.11.012

van Zomeren, M. (2013) Four core social-psychological motivations to undertake collective action. *Social and Personality Psychology Compass*, 7(6), 378–388. doi: 10.1111/spc3.12031

van Zomeren, M., Postmes, T. & Spears, R. (2008) Toward an integrative social identity model of collective action: A quantitative research synthesis of three socio-psychological perspectives. *Psychological Bulletin*, 134(4), 504–535. doi: 10.1037/0033-2909.134.4.504

van Zomeren, M., Postmes, T., Spears, R. & Bettache, K. (2011) Can moral convictions motivate the advantaged to challenge social inequality? Extending the social identity model of collective action. *Group Process & Intergroup Relations*, 14, 735–753. doi: 10.1177/1368430210395637

van Zomeren, M., Spears, R., Fischer, A.H. & Leach, C.W. (2004) Put your money where your mouth is! Explaining collective action tendencies through group-based anger and group efficacy. *Journal of Personality and Social Psychology*, 87(5), 649–664. doi: 10.1037/0022-3514.87.5.649

van Zomeren, M., Spears, R. & Leach, C.W. (2008) Exploring psychological mechanisms of collective action: Does relevance of group identity influence how people cope with collective disadvantage? *British Journal of Social Psychology*, 47, 535–372. doi: 10.1348/014466607X231091

Weber, E.U. (2011) Climate change hits home. *Nature Climate Change*, 1(1), 25–26. doi: 10.1038/nclimate1070

Weber, E.U., Blais, A.R. & Betz, N.E. (2002) A domain-specific risk-attitude scale: Measuring risk perceptions and risk behaviors. *Journal of Behavioral Decision Making*, 15(4), 263–290. https://doi.org/10.1002/bdm.414

Yu, T.Y. & Yu, T.K. (2017) The moderating effects of students' personality traits on pro-environmental behavioral intentions in response to climate change. *International Journal of Environmental Research and Public Health*, 14(12), 1472. doi: 10.3390/ijerph14121472

Yzerbyt, V., Dumont, M., Wigboldus, D. & Gordijn, E. (2003) I feel for us: The impact of categorization and identification on emotions and action tendencies. *British Journal of Social Psychology*, 42, 533–549. doi: 10.1348/014466603322595266

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