Mindfulness, Pro-environmental Behavior, and Belief in Climate Change: The Mediating Role of Social Dominance

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Abstract

In recent years mindfulness has been considered as a potential source of pro-environmental attitudes and behavior. Present research is aimed at consolidating and expanding previous knowledge by proposing that mindfulness is related to both pro-environmental behavior and belief in global climate change through social dominance orientation. A first study was conducted on undergraduate students (n = 279) and found, as expected, that trait mindfulness was related to pro-environmental behavior through SDO. A second study using a known groups approach compared practitioners (n = 44) and non-practitioners (n = 53) of Buddhist meditation, which is known to develop a mindful stance. Moreover, in Study 2 a measure of belief in global climate change was adopted as a further outcome. Again trait mindfulness was related to both pro-environmental outcomes through SDO. Theoretical and practical implications are discussed.

Keywords: Mindfulness; Social Dominance Orientation; Pro-environmental Behavior; Climate Change; Global Warming

Climate change is at the forefront of nearly all governments' agendas because its consequences, such as floods, sea level rise, or biodiversity loss are considered catastrophic and unavoidable in the absence of urgent and effective policy measures (e.g., Hansen, Sato, & Ruedy, 2012; Intergovernmental Panel on Climate Change, 2013; Palmer, 2014). Therefore, a great deal of effort has been recently devoted in scientific studies to understand what can be done to effectively tackle this issue and how this can be achieved. From the standpoint of psychological science, a key issue resides in understanding what intra and inter-personal psychological factors are associated with pro-environmental attitudes and behavior (e.g., Vesely & Klöckner, 2017). Such a human behavior has been defined in various ways. For example, Bamberg and Möser (2007) define it "as a mixture of self-interest (e.g., to pursue a strategy that minimizes one's own health risk) and of concern for other people, the next generation, other species, or whole ecosystems (e.g., preventing air pollution that may cause risks for others' health and/or the global climate). Previous research profitably showed that pro-environmental attitudes and behavior are related to a variety of factors including socio-demographics (e.g., age, gender, and residence), values, worldviews and political orientation. In particular, women, the young, urban residents having a liberal political orientation (e.g., Dunlap & McCright, 2008; Fransson & Gärling, 1999; Hoffarth & Hodson, 2016; Panno, Carrus, Maricchiolo, & Mannetti, 2015), people endorsing self-transcendence values (De Groot & Steg, 2009; Milfont & Gouveia, 2006) and people who believe in a post-materialistic worldview (Franzen & Meyer, 2010) or embrace a frugal lifestyle (Tapia-Fonllem, Corral-Verdugo, Fraijo-Sing, & Durón-Ramos, 2013) were all found to be more prone to engage in pro-environmental behavior.

In recent years it has been proposed and found that individual differences in trait mindfulness, that is the tendency to be aware of the present moment and accepting it in a non-

judgmental way, can play a role in shaping pro-environmental attitudes (Amel, Manning, & Scott, 2009; Barbaro & Pickett, 2015; Ericson, Kjønstad, & Barstad, 2014). Mindfulness can be more formally defined as an enhanced attention, awareness and acceptance of the present moment (Brown & Ryan, 2003). There is broad consensus on the distinction between two fundamental constituents of mindfulness (Bishop et al., 2004; Cardaciotto, Herbert, Forman, Moitra, & Farrow 2008; Holzel et al., 2011). The first component refers to the self-regulation of attention toward the present reality, while the second component concerns how one's experiences of the present moment are processed. More specifically, a curious, open and non-judgmental attitude toward one's own feelings and thoughts characterizes a mindful orientation.

As noted by Davidson and Kasziank (2015), in addition to self-reports, trait mindfulness can be studied comparing practitioners and non-practitioners of Buddhist meditation as it could be expected that this practice will produce enduring changes in psychological functioning even outside the context of meditation (see also Lutz, McFarlin, Perlman, Salomons, & Davidson, 2013). The purpose of the present paper is twofold. First, we wanted to replicate and extend, using different methods and outcome measures (e.g., belief in global climate change), the previous association found between trait mindfulness and pro-environmental behavior. Second, we sought to expand on previous research by examining one potential unexplored psychological factor that could play a relevant role in the association between mindfulness and pro-environmental behavior. More specifically, we think that trait mindfulness could be related to such an outcome through different adherence to a social dominance orientation (SDO). There is value to investigating whether (and how) these variables are related to each other. In fact, it is important to gather knowledge about the processes underlying a relationship that has been suggested by previous studies in this field. Of course, there are several other unexplored potential

mediators. However in the present work we argue that the positive association between mindfulness and pro-environmental behavior is rooted in a more egalitarian view of the world, that implies a more inclusive identification with other human beings and non-human species. Understanding those aspects of mindfulness that are capable of promoting egalitarianism (thus reducing SDO) could then be particularly interesting in addressing environmental issues from a psychological point of view.

Mindfulness and Pro-environmental Outcomes

Generally speaking, mindfulness could be conceived and studied as a transient mental state that can be reached using specific procedures or practices (see, Lutz, Dunne, & Davidson, 2007, for a review). Alternatively, as in the present study, we examine mindfulness as a relatively stable trait that can be measured using self-report scales, and that is expected to be more prominent among long-term meditation practitioners (see, Davidson & Kaszniak, 2015, for a review).

Previous studies show that some components of cognitive processes (e.g., attention regulation and the detachment from thoughts) are shared across these kinds of practices (e.g., Sperduti, Martinelli, & Piolino, 2011; Tomasino, Fregona, Skrap, & Fabbro 2012), although a recent and comprehensive meta-analysis by Fox et al. (2016) suggests that different meditation techniques are associated with different brain activity. However, evidence for the beneficial effects of mindfulness has been provided through a broad array of domains such as emotion regulation (Garland, Gaylord, & Fredrickson, 2011) and well-being (Brown & Ryan, 2003; Hollis-Walker & Colosimo, 2011) as well as mental health (Grossman, Niemann, Schmidt, & Walach, 2004; Keng, Smoski, & Robins, 2011). Several studies also indicated that mindfulness

might improve different instances of mental performance such as creativity (Baas, Nevicka, & Ten Velden, 2014), working memory capacity (Mrazek, Franklin, Phillips, Baird, & Schooler, 2013), attentional control (Teper & Inzlicht, 2013), sustained attention (Maclean et al., 2010) and cognitive abilities in general (see Chiesa, Calati, & Serretti, 2011, for a review).

Research in environmental psychology has begun only recently to explore whether trait mindfulness could also be related to pro-environmental behavior. Initially, empirical evidence showed that trait mindfulness was linked to lower self-reported ecological footprints (Brown & Kasser, 2005). Amel, Manning, and Scott (2009) in particular found that a component of mindfulness called "acting with awareness" was associated with stronger tendencies toward pro-environmental behavior. To explain such a finding the authors advanced that attentional awareness is essential to perceive and act in accordance with (scarce) pro-environmental cues present in our society.

Potential mechanisms explaining the association between trait mindfulness and pro-environmental behavior have been recently explored by Barbaro and Pickett (2015). Building on previous work showing that trait mindfulness favors a sense of a greater personal bond with nature and the environment (Howell, Dopko, Passmore, & Buro, 2011), the authors found that nature connectedness mediated the association between trait mindfulness and pro-environmental concern. Hence, the enhanced capacity of mindful individuals to direct their attention toward the present reality, including the environment and the world they live in, might play a role in reducing the perceived distance between the self and nature, which in turn might promote pro-environmental concern (Dutcher, Finley, Luloff, & Johnson, 2007).

Although connection to nature constitutes a precise and well-founded explanation, in our view the association between mindfulness and pro-environmental behavior could be profitably

understood in broader terms by considering a general orientation supporting the observance of hierarchies among individuals and groups that is social dominance orientation (SDO; Pratto, Sidanius, & Levin, 2006).

The Mediating Role of Social Dominance

In accordance with the point of view of a person characterized by high levels of social dominance orientation, interpersonal and intergroup relationships are, or should be, highly hierarchical (Pratto et al., 2006; Sidanius & Pratto, 2001). Indeed, SDO reflects a preference for group-based hierarchies and a stratified vision of social structures that emphasizes inequality, antagonism and the supremacy of the strong over the weak. The social consequences of such a competitive orientation are rather straightforward. Dominant individuals express higher levels of prejudice (Altemeyer, 1998), tend to discriminate against out-group members (Sidanius, Pratto, & Mitchell, 1994), and grant support to cruel initiatives (e.g., torture) and warfare (Sidanius & Pratto, 2001).

Recently, Milfont and colleagues have argued and found that social dominance does not apply exclusively to social groups (Milfont, Richter, Sibley, Wilson, & Fischer, 2013). The authors advanced that the predilection for asymmetrical relationships typical of dominant individuals is not confined within the human realm, but it also extends to the rapport between humans, other species, and the environment in general, with humans being dominant over nature. Therefore, a person with high levels of SDO will give primacy to human over environmental needs when those are conflicting (Milfont & Sibley, 2014).

Using a New Zealand national representative sample, Milfont et al. (2013) reported that SDO was negatively associated with a concern for nature and with the belief that climate change

is caused by human activity. Furthermore, a comparison between residents of several different countries showed that similar findings emerged also at a collective level. That is, country-level SDO was negatively associated with country-level environmentalism (both objective and subjective indicators; see Milfont et al., 2013). A different work showed that SDO is also linked to people's support for unrestricted environmental exploitation, on the basis of a hierarchy-enforcement hypothesis (Milfont & Sibley, 2014). In addition to that, a plausible mechanism at the basis of the SDO-ecological behavior link we suggest here can also be traced back to earlier work on the NEP-HEP (New Environmental Paradigm-Human Exemptionalism Paradigm) distinction, where human concern for the environment was conceptualized to be opposed to the belief that humans have the right to dominate the rest of the natural world and the right to exploit natural resources without restrictions (e.g., Dunlap & Van Liere, 1978). A general link between SDO and environmental concerns, suggested by the work of Milfont and colleagues, represents an important assumption of our hypotheses and is also coherent with results of other previous work linking general social psychological factors to pro-environmental concerns and behavior. For example, general appreciation or affinity towards diversity, which conceptually stands in opposition to SDO, were shown to be positively associated with pro-environmental behavior (Corral-Verdugo et al., 2009); also, general ethnocentrism and right-wing authoritarianism were negatively linked to pro-environmental behavior (Carrus, Passafaro, & Bonnes, 2004).

Let us now turn to the association between mindfulness and SDO. In our opinion, there are several reasons to advance that individuals high in trait mindfulness should be less likely to exhibit high levels of social dominance. There is evidence that mindfulness disposition and mindfulness training such as meditation are associated with greater engagement in ethical decision making (Ruedy & Schweitzer, 2010) and prosocial behavior (Condon, Desbordes,

Miller, & DeSteno, 2013; Lim, Condon, & DeSteno, 2015) or reduced interpersonal hostility (Kemeny et al., 2012). A possible explanation for these findings resides in the tendency of mindful individuals to be more empathic and compassionate towards others' feelings and needs (Dekeyser, Raes, Leijssen, Leysen, & Dewulf, 2008; Kemeny et al., 2012; Shapiro, Schwartz, & Bonner, 1998). Conversely, in a longitudinal study, SDO, because of its competitive stance and reduced concern towards others, has been found to negatively influence empathy (Sidanius et al., 2013). In addition, evidence of the negative association between SDO and empathy was also provided by several cross-sectional and neuroscientific studies (Bäckström & Björklund, 2007; Chiao, Mathur, Harada, & Lipke, 2009; McFarland, 2010). Interestingly, Brown (2011) found that engaging in helpful behavior actively reduced the SDO of the helpers. Thus emerges a consistent pattern indicating that empathic concerns and prosociality have opposite associations with mindfulness and SDO.

That trait mindfulness and SDO are negatively associated can also be inferred by a somewhat related line of research that focused on inclusiveness of identity. More specifically, high SDO is negatively related to the extent others are included in one's own individual identity (McFarland, Webb, & Brown, 2012; Pratto et al., 1994). In other words, dominant individuals are willing to put distance between themselves and other individuals, especially those believed to be weaker and inferior, and to narrow the portion of humanity with which they want to identify.

Trait mindfulness, in contrast, operates in the opposite direction. Indeed, there is evidence that mindfulness is positively associated with allo-inclusive identity, which refers to a broad self-construal that also includes other social, animal and environmental identities (e.g., Howell et al., 2011; Leary, Tipsord, & Tate, 2008). Furthermore, mindfulness is also positively associated with the basic needs of interpersonal relatedness, which capture the willingness to relate, identify, and

care about other individuals (Brown & Ryan, 2003). Again, these findings suggest a plausible link between SDO, trait mindfulness, and pro-environmental behavior in light of the robust evidence linking environmentally-inclusive self-identity patterns to conservation behavior (e.g., Clayton & Opotow, 2003; Van der Werff, Steg & Keizer, 2014; Whitmarsh & O'Neill, 2010).

A final piece of evidence supporting the notion that trait mindfulness and SDO could be related comes from research on motivation and well-being. In particular, trait mindfulness and SDO have an opposite association with preference for extrinsic (e.g., social status, financial income, exterior appearance) vs. intrinsic goals (e.g., personal growth, positive interpersonal relationships). According to Duriez, Vansteenkiste, Soenens, and De Witte (2007), the pursuit of extrinsic (but not intrinsic) goals, is associated with high levels of SDO because of its focus on social comparison and interpersonal competition over material achievement. The opposite holds for trait mindfulness. More specifically, mindful individuals attach more value to intrinsic rather than extrinsic goals (Kasser et al., 2005).

All in all, the research reviewed above indicates that SDO reflects a competitive vision of the world sustained by lack of empathy and concern for others and a reduced willingness to identify with others, as well as by the endorsement of extrinsic values. As trait mindfulness, in contrast, connects to greater ethicality, compassion, prosocial intentions, empathy and inclusive identification, we expect trait mindfulness and social dominance to be negatively correlated.

Based on this hypothesized relationship between trait mindfulness and SDO, together with previous work showing that SDO is negatively linked to environmental concern (e.g., Milfont et al., 2013; Milfont & Sibley, 2014, 2016), we advance that trait mindfulness is related to pro-environmental behavior through SDO.

The Present Study

On the one hand, previous research has shown that trait mindfulness is related to pro-environmental concern (e.g., Amel et al., 2009; Barbaro & Pickett, 2015; Brown & Kasser, 2005). On the other hand, previous studies (Milfont et al., 2013; Milfont & Sibley, 2014, 2016) have shown a relationship between social dominance and pro-environmental attitudes and behavior. Thus, drawing on these studies, we would expect trait mindfulness to be related to pro-environmental behavior through SDO. Specifically, we hypothesized that greater trait mindfulness is related to greater pro-environmental behavior through a lower level of social dominance.

We carried out two studies in order to investigate the expected relationships. In the first study, we surveyed a relatively large sample across two university campuses to investigate the relationships between trait mindfulness, social dominance and pro-environmental behavior. Once these relationships were established, we devised the second study in order to replicate Study 1's results through a known groups approach[1] (Creswell & Clark, 2007; Wiggins, 1973). Thus, in Study 2, we measured pro-environmental behavior and belief in global climate change across two groups: a group of practitioners and a group of non-practitioners of Buddhist meditation. The core Buddhist practice of participants included in this study is reciting the *daimoku* (the sentence "Nam-myoho-renge-kyo") in order to awaken one's Buddha nature composed of wisdom and compassion. Mantra meditation is one of many meditation practices showing beneficial effects on the individual's well-being and emotional balance. Reciting the daimoku directs towards and sustains attention on the sound of the sentence to be repeated, in order to detect the distracting thoughts and disengage attention from them without any judgment on the content of the thought or the distraction itself.. In this sense, practitioners of Buddhism daily

practice their mindfulness about life and about their role in it and, indeed, mindfulness meditation practice typically derives from several different Buddhist traditions (Davidson & Kaszniak, 2015; Kabat-Zinn, 1994).

We acknowledge that mindfulness is a multifaceted construct that can be studied at different levels (e.g., state, practice, training and trait). We are also aware that both the scale approach and the contrast between practitioners and non-practitioners of Buddhist meditation have important limitations and are far from being exhaustive. However we think that the combination of the two methods provides sufficient confidence in our findings and is appropriate for the purposes of the present research. Moreover, to extend the relationship between trait mindfulness and pro-environmental outcomes, we used two different measures: i) a scenario task where participants have to simulate a budget attribution to the environment; ii) a measure of belief in global climate change (see below for explanations).

Study 1

Method

Participants

Two hundred and seventy-nine undergraduate students at two university campuses of Rome, Italy participated in the study (M_{age} = 22.95; SD = 2.48; range 19 to 31 years; 60% women).

Procedure and Measures

Data were collected through an on-line questionnaire administered by trained assistants, who approached students in the common spaces of the University campus, asking them to voluntarily take part in a University survey on issues of sustainability and climate change perception.

Participants were then given a laptop, which they used to individually fill in the questionnaire online in a single session, in the public spaces of the University campus (e.g., classrooms, libraries, waiting rooms, etc.). Immediately after completing the questionnaire they were asked to return the laptop to the assistants. Participants were assured about the anonymity of their responses and were not given any financial compensation. The survey took about 15 minutes to be completed.

Mindfulness. We assessed people's mindfulness through 15-items of the Italian version of the Mindfulness Attention Awareness Scale (MAAS; Veneziani & Voci, 2015; Chiesi, Donati, Panno, Giacomantonio, & Primi, 2017). Respondents rated the extent to which they agreed with self-descriptive statements reflecting mindfulness: 'I tend to walk quickly to get where I'm going without paying attention to what I experience along the way' (reverse-coded item); $\alpha = .85$. Ratings were made on a 5-point scale, with the response anchored at the ends with 1 (strongly disagree) and 5 (strongly agree). This 5-point scale has been used in several studies (e.g., Brown & Ryan, 2003). Higher scores indicated greater trait mindfulness.

Social Dominance Orientation. We used the Italian version of the Social Dominance Orientation Scale that includes 16 items to assess people's social dominance orientation (Aiello, Chirumbolo, Leone, & Pratto, 2005). This measure taps individual orientation towards group inequality. An example of one of these 16 items is 'All groups should be given an equal chance in life' (reverse-coded item); $\alpha = .85$. Ratings were made on a 5-point scale, with the response anchored at the ends with 1 (strongly disagree) and 5 (strongly agree). This 5-point scale has been used in previous studies by the SDO authors (e.g., Sidanius, Pratto, & Bobo, 1994). Higher scores indicated greater SDO.

***Pro-Environmental Behavior*.** We used 17 items measuring people's tendency to engage in pro-environmental behaviors (some items were borrowed from Markowitz, Goldberg, Ashton, & Lee, 2012, see online appendix). This measure assessed self-reported pro-environmental behavior in six different domains (i.e., energy, water, recycling, sustainable mobility, re-using, eating; see online appendix). A composite score of these 17 items indicated participants' pro-environmental behavior; $\alpha = .72$. Ratings were made on a 5-point scale, with the response anchored at the ends with 1 (strongly disagree) and 5 (strongly agree). Higher scores indicated higher pro-environmental behavior.

Results

To investigate our hypotheses of the relationships between trait mindfulness, SDO, and pro-environmental behavior, we computed zero-order correlations among these variables (see Table 1). As predicted, trait mindfulness was significantly and positively associated with pro-environmental behavior. Our results also showed that SDO was significantly negatively related to both trait mindfulness and pro-environmental behavior.

To understand the mechanisms underlying the relationships between trait mindfulness, SDO and pro-environmental behavior, we used the PROCESS macro for SPSS (Hayes, 2013) that tested our mediation hypothesis. The mediation model was estimated to derive the total and direct associations of trait mindfulness with pro-environmental behavior, as well as the indirect relationship among these variables through SDO. We estimated the indirect effect of trait mindfulness on pro-environmental behavior, quantified as the product of the ordinary least squares (OLS) regression coefficient estimating SDO from trait mindfulness (path *a* in Figure 1), and the OLS regression coefficient estimating pro-environmental behavior from SDO, controlling for trait mindfulness (path *b* in Figure 1). A bias-corrected bootstrap-confidence

interval (CI) for the product of these paths that does not include zero provides evidence of a significant indirect effect (Preacher & Hayes, 2008). Using the PROCESS macro with 5,000 bootstrap samples, our results revealed a significant positive indirect effect of trait mindfulness on pro-environmental behavior through SDO (point estimate = 0.040; 95% CI = 0.005 to 0.080). As shown in the Figure 1, SDO is a significant mediator even if not accounting for the entire relationship between trait mindfulness and pro-environmental behavior. These results will be discussed together with the results from Study 2.

Study 2

Method

Participants

Study 1 showed that trait mindfulness is related to pro-environmental behavior through SDO. In Study 2, we sought to replicate Study 1's results comparing a group of practitioners of Buddhist meditation (n = 44, M_{age} = 49.36; SD = 12.25; range 24 to 74 years; 65% women) to a group of non-practitioners (n = 53, M_{age} = 42.68; SD = 7.53; range 27 to 63 years; 58% women) of Buddhist meditation.

Procedure and Measures

Data were collected through paper and pencil questionnaires administered by trained assistants. The participants of the group of practitioners of Buddhist meditation were recruited with the help of the Italian Buddhist Institute Soka Gakkai, that gathers Italian people practicing the Buddhism of Nichiren Daishonin. We talked with representatives of the Italian Buddhist association Soka Gakkai in Rome to have the consent to contact members, then we asked

participants to fill in the questionnaire during the weekly meetings of the association. The same measures used for practitioners of Buddhist meditation were also administered to non-practitioners. Respondents of this second group were contacted by the research assistant in public areas and waiting rooms in Rome's main train station. Participants were asked to voluntarily take part in a University survey on issues of sustainability and climate change perception, and to fill in the questionnaire while waiting for their train. The survey took about 15 minutes to be completed. Participants were assured about the anonymity of their responses and were not given any financial compensation. Four individuals declined to fill in the questionnaire.

In Study 2, we added a measure of belief in climate change (see below for explanations) to extend Study 1's results to the more global issue of climate change perceptions.

Political Orientation. The self-placement on the left–right (liberal–conservative) dimension was measured with the following item: 'Considering the current political context in Italy, how would you describe your political orientation?' A 5-point response scale was used (1 = left, 2 = center-left, 3 = center, 4 = center-right, 5 = right).

Mindfulness. We used the 15-items of the Italian version of the MAAS to test the difference between groups in trait mindfulness (Veneziani & Voci, 2015; Chiesi, Donati, Panno, Giacomantonio, & Primi, 2017). Using the standard response scale, ratings were made on a 7-point scale, with the response anchored at the ends with 1 (strongly disagree) and 7 (strongly agree); $\alpha = .85$. Higher scores indicated greater trait mindfulness.

Social Dominance Orientation. We used the 16-items of the Italian version of the SDO scale to assess people's social dominance orientation (Aiello, Chirumbolo, Leone, & Pratto, 2005). As for the standard response scale, ratings were made on a 7-point scale, with the response anchored

at the ends with 1 (strongly disagree) and 7 (strongly agree); $\alpha = .85$. Higher scores indicated greater SDO.

Pro-Environmental Behavior. To broaden the results of Study 1, we used a different outcome measure for pro-environmental behavior. In a simulation scenario task, participants were asked to indicate, through a text response, the amount of money that they would assign to the Ministry of the Environment, out of a hypothetical money fund coming from the EU. Participants could choose an amount ranging from 0 to 100,000 € (see online appendix).

Belief in global climate change. We asked participants to read an article concerning climate change issues that appeared in print in one Italian weekly magazine–named "*Internazionale*". Then participants expressed to what extent they agreed with four statements concerning global climate change (see online appendix). A composite score of these items indicated belief in global climate change. Ratings were made on a 7-point scale, with the response anchored at the ends with 1 (strongly disagree) and 7 (strongly agree); $\alpha = .85$.

Results

To support our assumption that participants in the group of Buddhist practitioners were higher in trait mindfulness than the non-practitioners, we conducted a preliminary one-way ANOVA, comparing trait mindfulness scores of the practitioners of Buddhist meditation ($n = 44$) and those of the non-practitioners group ($n = 53$). The two groups differed significantly on the MAAS score, with practitioners of Buddhist meditation reporting a greater trait mindfulness than the non-practitioners: $F(1,96) = 4.06$, $p < .05$, ($M_{Practitioners} = 4.32$, $SD_{Practitioners} = .87$; $M_{Non\text{-}practitioners} = 3.93$, $SD_{Non\text{-}practitioners} = .99$); *Cohen's d* = .41.

To test our hypotheses of the relationships between trait mindfulness, SDO, pro-environmental behavior and belief in global climate change, we conducted a MANOVA comparing the practitioners of Buddhist meditation and non-practitioners. The MANOVA showed a statistically significant difference: F (3, 85) = 8.91, $p < .001$; *Wilk's Λ* = 0.761, *partial η2* = .24. More specifically, the two groups differed significantly on the SDO score: $F(1,87) = 10.91$, $p < .01$, *partial η2* = .11; pro-environmental behavior score: $F(1,87) = 9.64$, $p < .05$, *partial η2* = .10; and belief in global climate change score: $F(1,87) = 21.35$, $p < .001$, *partial η2* = .20 (see Table 2 for descriptive statistics).

To better understand the potential mechanisms underlying these relationships, we used the PROCESS macro for SPSS (Hayes, 2013) testing two mediation models, which included the two different outcomes investigated here (i.e., Model 1: pro-environmental behavior; Model 2: belief in global climate change). Mediation analysis with 5,000 bootstrap samples revealed a significant positive indirect effect, through SDO, on pro-environmental behavior (Model 1: point estimate = 4.32; 95% CI = 1.23 to 9.27) and belief in global climate change (Model 2: point estimate = 1.12; 95% CI = .33 to 2.31) when comparing non-practitioners vs. practitioners (see Table 3). In the Model 2, SDO is a significant mediator even if not accounting for the entire relationship between trait mindfulness and belief in global climate change.

Since participants' gender, age, and political orientation could be related to pro-environmental concerns (e.g., Dunlap & McCright, 2008; Fransson & Gärling, 1999; Hoffarth & Hodson, 2016) we tested the same mediation models that further included gender (men coded as 1 and women coded as 2), age, and political orientation as covariates. The relationships investigated did not substantially change after controlling for the effect of these covariates (Model 1: point estimate = 3.70; 95% CI = 0.69 to 9.49; Model 2: point estimate = 1.07; 95% CI

= 0.18 to 2.59). Interestingly, we found a marginally significant positive effect of age on pro-environmental behavior in Model 1 (Model 1: Age $\beta = .21$, $p = .06$), with older people being more environmentally oriented. No significant effects of gender and political orientation were found on either pro-environmental behavior or belief in global climate change ($p > .10$).

General Discussion

The present research consists of two studies designed with two main purposes in mind. First, we wanted to replicate and support the association between trait mindfulness and pro-environmental behavior. In Study 2, we also included a measure of global climate change perception. Consistent with previous research (Amel et al., 2009; Barbaro & Pickett, 2015), we found that pro-environmental behavior was positively associated with individual differences in mindfulness. A similar pattern emerged in Study 2 also when considering belief in global climate change as an outcome. The second purpose of the present research was to point out whether trait mindfulness was related to pro-environmental behavior (and to belief in global climate change) through social dominance orientation. That is, we hypothesized and found that a broad motivational orientation (i.e., social dominance; Pratto et al., 2006) was partly responsible for the association between trait mindfulness and the tendency to engage in pro-environmental behavior (Study 1) as well as for the association between the Buddhist practice of mindfulness and two types of pro-environmental outcomes (i.e., the intention to give money for the environment and belief in global climate change; Study 2). The fact that the mediation model holds with different outcomes increases confidence in the belief that our findings substantiate a broad-spectrum model that could be highly generalizable to several types of environment-related outcomes.

Previous research found that connectedness and identification with nature mediated the association between trait mindfulness and pro-environmental preferences (Barbaro & Pickett,

2015). Our focus on SDO enriches these results as it considers a broader construct referring to a general orientation towards hierarchicalized relations including humans and the natural world at large (see also Milfont et al., 2013). The present study offers relevant insight into these connections and might stimulate future research in this vein. For example, an environment-dominant view could be negatively related to the connectedness to nature, thus giving rise to more resource-exploitation and environment-damaging behavior. In other words, these constructs (i.e., trait mindfulness, SDO, and connectedness to nature) might play a relevant role when people make environmental decisions. Thus, longitudinal research could shed light on the causal associations between these factors.

Obviously, other explanations of the association between trait mindfulness and pro-environmental behavior are possible and deserve more attention. For example, in a recent paper, Panno and colleagues advanced the idea that cognitive reappraisal of emotion (i.e., an emotion-regulation strategy) positively influences both acknowledgment of climate change and subsequent pro-environmental behavior. The theoretical account behind such a study is that "people's cognitive reappraisal determines how individuals appraise climate change-related stimuli (e.g., a rise in temperature, a change in weather patterns, and emotions concerning these phenomena) and the type of goals they pursue (e.g., reducing their ecological footprint)" (Panno et al., 2015, p.859). In this vein, the attention and awareness facets of mindfulness might lead people to pay more attention to climate change-related stimuli and, in turn, foster their pro-environmental behavior. Future research shedding light on these mechanisms is needed.

A novel contribution of the present research resides in the negative association that emerged between trait mindfulness and SDO, which, to the best of our knowledge, is reported here for the first time. Besides its novelty, this might be regarded as an important finding

clarifying the process through which trait mindfulness affects several outcomes, especially those related to egalitarianism and pro-social behavior. In addition, this association provides solid ground for the examination of the effect of trait mindfulness in domains where it has been rarely studied, such as intergroup relations.

If we acknowledge that generalizing our findings to mindfulness training is strictly speculative, yet not impossible, the present work could have important applied implications. Mindfulness-based programs are starting to gain popularity also as useful interventions in schools, targeting both teachers and pupils, to promote human health and well-being (e.g., Gold et al., 2010). In a similar vein, we think that mindfulness aspects could be fruitfully incorporated within environmental education programs particularly those involving outdoor nature experiences (e.g., Carrus, Passiatore, Pirchio, & Scopelliti, 2015). Short mindfulness training could act in a synergic manner with nature appreciation and conservation concepts, to foster a non-dominant view of human-nature relations. Mindfulness and social dominance, although they can be considered in terms of individual differences like in the present study, can also vary with contextual features and different types of interventions (e.g., Baas et al., 2014, Brown, 2011; Davidson & Kaszniak, 2015; Guimond, Dambrun, Michinov, & Duarte, 2003; Morrison, Fast, & Ybarra, 2009). For instance, Brown (2011) found that engaging in helping others reduced SDO levels. Lim and colleagues (2015) showed that a mindfulness meditation training self-administered via web applications and smart technologies was effective in determining more compassionate behavior toward strangers. Bearing in mind that trait mindfulness is negatively related to SDO, we could expect that mindfulness training, by people who desire to reduce their ecological footprint, might be helpful in the pursuit of this desire because such training might foster pro-environmental behavior or belief in global climate change through the lowering of

SDO. Thus, mindfulness training could be adopted with the purpose of coping with climate and ecological issues. This is encouraging in terms of the applicability of our findings. Clearly, future research is needed in this direction.

Even though this research offers notable strengths (e.g., the use of multiple outcomes such as pro-environmental behavior and belief in global climate change), some limitations should be considered when drawing conclusions from it. First, although we used a known groups approach to shed light on the relationships between trait mindfulness, SDO, pro-environmental behavior, and belief in global climate change, the mediating role of SDO needs to be supported by further empirical evidence. Thus, future longitudinal studies investigating causal mechanisms underlying these relationships are needed. Second, the results of the current research shed light on the relationships between trait mindfulness, SDO, pro-environmental behavior and belief in global climate change. Future research should use experimental manipulations inducing a transient state of mindfulness to test whether even such a state could affect people's SDO, pro-environmental behavior, as well as belief in global climate change. It is true that the cross-sectional nature of the studies does not allow causal inferences; nevertheless our results provide relevant insights into the relationships between trait mindfulness, SDO, pro-environmental behavior and belief in global climate change. In addition, participants in Study 2 belong to a specific population (Soka Gakkai Buddhists) and practice a specific type of meditation (i.e., Buddhism of Nichiren Daishonin); it is possible that different kinds of meditation could differently contribute to the level of trait mindfulness or to the changes in SDO and pro-environmental behavior (see Lutz, Dunne, & Davidson, 2007, for a review). Likewise, it is also possible that certain characteristics concerning ethics and general worldview might differ among groups of religious and non-religious meditators. Thus, future studies should take into account

different kinds of meditation, also in non-religious contexts, to establish whether there are differences in these relationships when meditation is differently operationalized. With regard to measures, in Study 1, we sought to measure pro-environmental behavior through six environmental domains (i.e., energy, water, recycling, sustainable mobility, re-using, eating) using the minimum number of possible items. We have therefore used a short measure of self-reported pro-environmental behavior that is not standardized. Nevertheless, it has shown an acceptable internal consistency (α = .72), whereby it would seem suitable to the aims of the current study. Clearly, these results provide a first step in this avenue of research, and future studies using a standardized measure of pro-environmental behavior could add robustness to our findings.

In the present research, trait mindfulness was measured exclusively with the MAAS. This scale generally provides good reliability, it has been adapted and validated to the Italian context, and it is concise. Nevertheless, the MAAS focuses on the attentional facet of mindfulness and excludes the acceptance component (as explicitly stated by the authors, Brown & Ryan, 2003), which in many circumstances has been proven to be central (Cardaciotto et al., 2008). Future research on this topic should use or include alternative measures of trait mindfulness.

Previous studies have pointed out some links that could relate mindfulness and social dominance orientation to pro-environmental preferences, such as ecological dominance orientation, connectedness to nature or other personality dispositions (e.g., Amel et al., 2009; Barbaro & Pickett, 2015; Brown & Kasser, 2005; Milfont et al., 2013; Milfont & Sibley 2014, 2016). It was beyond the scope of the current study to investigate all of these, but we cannot rule out that some of these might play a further role in the relationships between trait mindfulness,

SDO, and pro-environmental behavior. Thus, future studies should take into account these factors when examining these relationships.

In conclusion, our results increase knowledge about social dominance theory (e.g., Milfont et al., 2013; Pratto et al., 2006) and are also relevant for research that relies on trait mindfulness in predicting pro-environmental behavior and belief in global climate change (e.g., Amel et al., 2009; Barbaro & Pickett, 2015; Brown & Kasser, 2005). Broadly speaking, the results of this research promise novel insight into these connections across various fields including social psychology and environmental research, as we advanced a model illustrating a relevant and broad potential mechanism underlying the association between mindfulness and pro-environmental behavior. In addition, the present work suggests that a dominant view, whether it pertains to the strong and weak or to humans and nature, does not fit well with a mindful stance. This misfit holds the potential to be a powerful tool to promote a more egalitarian and pro-environmental society at large.

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Footnotes

[1] The known groups approach consists of identifying two groups that clearly differ along a particular dimension to investigate a behavioral outcome or a specific phenomenon (Creswell & Clark, 2007; Wiggins, 1973).

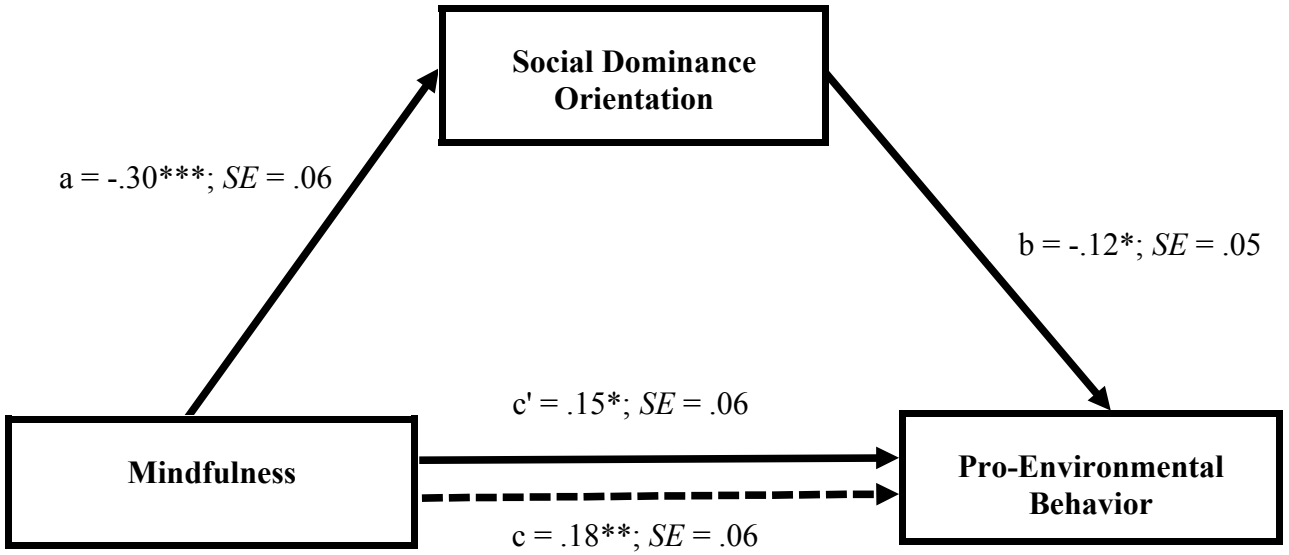

Figure 1. Path coefficients for mediation analysis in Study 1. *Note.* Dotted line denotes the effect of mindfulness on pro-environmental behavior, when social dominance orientation is not included as a mediator. *a*, *b*, *c* and *c′* are unstandardized OLS regression coefficients. * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 1

Means, standard deviations, and intercorrelations among variables investigated in Study 1.

	1	2	3
1 MAAS – Mindfulness	1		
2 SDO – Social Dominance Orientation	-.28***	1	
3 Pro-environmental Behavior	.20**	-.18**	1
M (*SD*)	2.38 (*.64*)	2.37 (*.65*)	2.83 (*.53*)

* $p < .05$; ** $p < .01$; *** $p < .001$. *Note. The scale range for all variables was 1 – 5.*

Table 2

Means and standard deviations of SDO, pro-environmental behavior and belief in global climate change scores in the practitioners and non-practitioners of Buddhist meditation.

	Practitioners M (*SD*)	Non-practitioners M (*SD*)
SDO – Social Dominance Orientation	2.03 (.70)	2.65 (1.00)
Pro-Environmental Behavior	65.15 (11.50)	53.88 (20.04)
Belief in Global Climate Change	5.31 (.85)	3.99 (1.60)

Note. The scale range for SDO and Belief in Global Climate Change was 1 – 7. Pro-environmental behavior range was 0 - 100

Table 3

Path coefficients for mediation analyses in Study 2.

		Path Coefficients			
	Pro-environmental Outcomes	*a* (*SE*)	*b* (*SE*)	*c* (*SE*)	*c'* (*SE*)
Model 1	Pro-Environmental Behavior	- 10.25 (2.94)**	- .42 (.13)**	9.32 (3.76)*	5.00 (3.80)
Model 2	Belief in Global Climate Change	- 10.16 (3.00)**	- .11 (.04)**	5.39 (1.14)***	4.27 (1.16)***

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

Note. a coefficient denotes the effect of Buddhist practicing on SDO; b coefficient denotes the effect of SDO on pro-environmental outcome; c coefficient denotes the effect of Buddhist practicing on pro-environmental outcome, when SDO is not included as a mediator; c' coefficient denotes the effect of Buddhist practicing on pro-environmental outcome, when SDO is included as a mediator. a, b, c and c' are unstandardized OLS regression coefficients.