Explicit (but not implicit) environmentalist identity predicts pro-environmental behavior and
policy preferences

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- Environmentalist identity is associated with behavior and policy preferences.
- We introduce a novel implicit measure of environmentalist identity.
- Explicit identity is a strong and unique predictor of pro-environmental action.
- Implicit identity is not a unique predictor of pro-environmental action.
- We examine dispositional predictors of environmentalist identity.

Abstract

Awareness of environmental problems has increased dramatically over recent decades, but individual action to address environmental issues has remained stagnant. Shifting social identities may be an under-appreciated explanation of this gap: identification with environmentalists in the U.S. dropped from 78% to 42% since 1991. In four pre-registered studies of U.S. residents (total $N = 2,033$), we explored the predictors and outcomes of *environmentalist identity*. We also developed a novel implicit measure of less deliberate aspects of environmentalist identity. We used explicit and implicit environmentalist identity to predict self-reported environmental behaviors and policy preferences. Meta-analysis of our studies revealed that explicit identity was moderately associated with implicit identity ($r = .24$). Explicit identity strongly and uniquely predicted pro-environmental behaviors and policy preferences (partial r s = .58, .62), while implicit identity did not uniquely predict either (partial r s = .05, .05). Our findings highlight the importance of social identity in conservation.

1. Introduction

Behavioral and political change are curiously stagnant on environmental issues given recent increases in global environmental concern (Gallup, 2016; Gardner & Stern, 2008; National Geographic, 2014). Campaigns to address the psychological foundations of environmental problems by scientists, funding agencies, and policymakers generally focus on raising awareness and changing beliefs about the environment. For example, the United States National Science Foundation budgeted \$20m in 2010-11 alone for education programs about climate change (NSF, 2010). However, support for environmental action is only weakly predicted by beliefs about the environment across 47 countries (Eom, Kim, Sherman, & Ishii, 2016). Another approach to conservation has been studying the individual differences that predict pro-environmental behavior such as biospheric values (Steg, Bolderdijk, Keizer, & Perlaviciute, 2014) and personality traits, especially Openness to new experiences (Brick & Lewis, 2016). However, few interventions targeting values or personality traits have emerged, in part because it is difficult to permanently modify these factors (Manfredo et al., 2017).

A promising basis for conservation might be found in how people identify with groups that are associated with environmental beliefs or behaviors. Evidence is mounting that social identities are tightly linked to pro-environmental actions (Fielding & Hornsey, 2016; Fritzsche, Barth, Jugert, Masson, & Reese, 2017): whether people feel part of certain groups predicts whether they conserve water or vote for pro-environmental regulations.

1.1 Environmentalism. Multiple groups are associated with environmentally relevant behaviors. Party identity and political orientation are linked to pro-environmental behavior and policy support (Gromet, Kunreuther, & Larrick, 2013), perhaps due to increasing political polarization in the United States. Other groups linked with pro-environmental behavior include

the Green Party, vegetarians, and White people (Pearson & Schuldt, 2014). Groups associated with anti-environmental behavior include coal miners or free-market capitalists. However, the social group that is most conceptually consistent with pro-environmental behavior is *environmentalists*, whose defining feature is a shared desire for healthy ecosystems.

Environmental identity has changed dramatically in the last three decades (Gallup, 2016). In 1991, a strong majority of United States residents (78%) identified as environmentalists. By 2016, it fell to 42%. This decline accompanied the emergence of a partisan divide in environmentalist identity. Democrats and Republicans were equally likely to consider themselves as environmentalists in 1991, but by 2016 Democrats were twice as likely as Republicans to consider themselves environmentalists: 56% vs. 27% (Gallup, 2016). One possible account for these declines is a change in what 'environmentalist' means (Pearson & Schuldt, 2018). For example, public information campaigns and the deliberate politicization of environmental topics for political and financial gain may have bound environmentalist identity with left-wing politics (Dunlap & McCright, 2010). Recent studies suggest environmentalists in the United States are now seen as radical political activists (e.g., "militant", "unclean"; (Bashir, Lockwood, Chasteen, Nadolny, & Noyes, 2013) and a threat to society (Hoffarth & Hodson, 2016). To the extent that identification with environmentalists now signals negative qualities such as radicalism, individuals may be more likely to distance themselves from environmentalists.

The decline of environmentalist identity may pose a problem for the conservation movement. Individuals who think positively of environmentalists (Ratliff, Howell, & Redford, 2017) or who think of themselves as "environmentally-friendly consumers" (Kashima, Paladino, & Margetts, 2014; Whitmarsh & O'Neill, 2010) report engaging in more pro-environmental

behavior. Previous research on conservation and identity mostly examined identification with the environment as opposed to with a social group (Clayton, 2012). These 'environmental identity' measures overlap heavily with each other and with environmental concern and values (van der Werff, Steg, & Keizer, 2013). Different components of identifying with the environment appear to predict lower vs. higher cost pro-environmental behaviors (Kashima et al., 2014). One scale of environmental self-identity (van der Werff, Steg, & Keizer, 2014) taps social group membership but may potentially be confounded with past behavior.

Attitudes and behaviors are different from how much an individual feels that they are part of the social group *environmentalists*, and it is unknown whether group membership alone predicts pro-environmental concern and behaviors. Recent evidence suggests that environmentalist identity is a stronger predictor of self-reported pro-environmental behaviors in the United States than even political orientation (Brick et al., 2017). The current studies replicate and extend that finding with larger pre-registered studies that include multiple operationalizations of identity, behavior, and political preferences.

1.2 How social identity drives pro-environmental behavior. Social identities drive behavior across diverse contexts (Brewer, 2003, pp. 480-491; Dunning, 1999; Ellemers, Spears, & Doosje, 2002), including pro-environmental action (Fielding & Hornsey, 2016). Identifying with a group could lead to pro-environmental behavior through at least four routes:

1. Social identities provide guidance on how to act when individuals lack information or are ambivalent (informational social influence; (Brewer, 2003).
2. Social identities motivate behavior through the desire to act consistently with group goals (Cialdini, 2003; Oyserman, Fryberg, & Yoder, 2007). Therefore, motivations based on group membership can be externally driven: behaviors are changed to meet

the expectations of others. Acting in line with group goals may provide social benefits such as inclusion, whereas failing to do so may incur social costs such as criticism.

Group-based motivations can also be internally driven, for example to align behavior with personal values and beliefs.

3. Environmental issues such as conservation are commons dilemmas (Van Lange, Joireman, Parks, & Van Dijk, 2013), and interventions that lead to cooperation over limited resources are therefore well-suited to environmental issues. Notably, social identity interventions lead to greater cooperation over limited resources (van Vugt, 2009).
4. Identities can promote consistency and interdependence between pro-environmental behaviors in an effect called behavioral spillover ([Kashima et al., 2014](#); [Thøgersen, 1999](#); [Truelove, Carrico, Weber, Raimi, & Vandenberg, 2014](#); [Walker & Thomas, 2014](#)). For example, an environmentalist who agrees to install solar panels might later feel more motivated to compost. Behavioral spillover is especially important for conservation because most individuals are ignorant about which behaviors are most important, for example on climate change (Gardner & Stern, 2008) or water use (Attari, 2014), and because changes in multiple behaviors would be necessary for sufficient conservation to address massive problems like climate change.

These four routes for identity-based behavior change led to a burst of research linking social identities with pro-environmental outcomes (e.g., Brick et al., 2017; Fielding & Hornsey, 2016; Kashima et al., 2014; Whitmarsh & O'Neill, 2010). Given the apparent importance of social identities, further attention to measurement validity would be valuable. In environmental psychology, identity has usually been measured with self-report, which is convenient and

appears to show reliable effects but introduces specific limitations. Previous research has not investigated whether individuals are sometimes unable or unwilling to report their identification with social groups. Multiple types of identity measures might better reveal the link between identity and pro-environmental outcomes and potentially reveal blind spots from different methods.

1.3 Explicit and implicit measures of environmentalist identity. Explicit self-reported measures of identity capture peoples' conscious theories of what groups they belong to. These personal theories may be at odds with their identity as revealed by other means. As identification with environmentalists is now a strong signal of political affiliations (e.g., being a Democrat or Republican in the United States), people may be *unwilling* or *unable* to report the full extent of their identification with environmentalists (Milfont, 2008). For example, at a college that is politically progressive or left-wing students may claim to be environmentalists to signal that they are liberal even when it contradicts their private commitments (i.e., externally motivated environmentalists). Similarly, people in a town with a large oil industry may publicly disavow environmentalists even when this contradicts their private identities (i.e., hidden environmentalists, cf. Gal, 2015).

We used measures of implicit identity to tap into mental associations that lay outside of conscious awareness or control. The implicit measure in the current studies is the Single-Target Implicit Association Test (ST-IAT), which measures the speed at which people sort words into categories to assess the degree to which concepts are associated together in memory (Bluemke & Friese, 2008). Implicit measures are weakly correlated with explicit measures across domains (Cameron, Brown-Iannuzzi, & Payne, 2012; Greenwald, Poehlman, Uhlmann, & Banaji, 2009; Hofmann, Gawronski, Gschwendner, Le, & Schmitt, 2005). However, the strength of the

correlation varies widely based on factors such as whether the target construct is socially sensitive or well-elaborated (Nosek, 2005). Implicit measures have been fruitful for predicting a wide range of behaviors (Cameron et al., 2012; Greenwald et al., 2009). For example, implicit identification with math predicts whether people choose to major in math-intensive majors (Nosek, Banaji, & Greenwald, 2002), implicit shyness predicts spontaneous shy behavior (Asendorpf, Banse, & Mücke, 2002), and implicit Democrat/Republican identity predicts support for partisan welfare policies among self-described political independents (Hawkins & Nosek, 2012). Implicit measures of liking and disliking have also been used to understand environmental topics such as implicit attitudes toward nature (Schultz, Shriver, Tabanico, & Khazian, 2004), implicit biospheric values (Walker & Thomas, 2014), and implicit attitudes toward environmentally friendly grocery products (De Houwer & De Bruycker, 2007; Panzone, Hilton, Sale, & Cohen, 2016).

1.3.1 Note about measurement fidelity. As with almost any psychological measure, explicit and implicit measures of identity are susceptible to methodological influences outside of the constructs of interest. For example, explicit self-reports are susceptible to issues such as social desirability, recall bias, question framing, and acquiescence (for a review, see Krosnick & Presser, 2009), whereas implicit measures are susceptible to issues such as stimulus selection, cognitive control, and task-switching ability (Calanchini, Sherman, Klauer, & Lai, 2014; Greenwald, McGhee, & Schwartz, 1998; Mierke & Klauer, 2003). The inclusion of both explicit and implicit measures mitigates the disadvantages of each.

1.4 Study overview. Four pre-registered online studies investigated explicit and implicit environmentalist identity and their relation to self-reported pro-environmental behavior and policy preferences. The identity measures were consistent across the studies, and the outcome

measures were deliberately varied to test for direct and conceptual replication. These studies reveal the aspects of social identity that are associated with pro-environmental behaviors and political support.

2. Methods

We pre-registered each of the four studies and report all samples, conditions, measures, data exclusions, and how we determined sample sizes. The data, cleaning and analysis code, and text of all measures are freely available (<https://osf.io/84g5v/>). Analytic decisions are flagged below when they were not pre-registered. The similarities and differences between the four studies are described here.

2.1. Participants and design. Participants in four studies were volunteers at the research website Project Implicit (<https://implicit.harvard.edu>) and who were United States citizens or residents 18 or older. Out of an original combined sample of 2,187 participants, 7.1% were excluded for IAT misbehavior leaving a final sample of 2033 (individual study N s = 586, 469, 417, 561; see below for pre-registered exclusion criteria). In each study, participants completed four key measures: explicit and implicit measures of environmentalist identity, and pro-environmental behaviors and policy preferences. Participants who completed all four measures were $n = 1675$, slightly liberal on average, $M (SD) = 4.97 (1.71)$ from 1 (*conservative*) to 7 (*liberal*), 65.1% female, and median age = 33 years (39 excluding Study 3a). The participants in Study 3a were exclusively 18 years old, which provided the opportunity for a high-powered replication among a demographic more similar to a typical undergraduate student sample. Study 3a's results did not substantively differ from the other three studies, so we do not discuss this difference further.

2.2. Key measures. *Explicit environmentalist identity.* To measure whether individuals saw themselves as environmentalists, we used a four-item identity scale across all studies: "I see myself as an environmentalist"; "I am pleased to be an environmentalist"; "I feel strong ties with environmentalists"; and "I identify with other environmentalists" (Brick et al., 2017; Smith, Seger, & Mackie, 2007), rated from 1 (*disagree strongly*) to 7 (*agree strongly*). The four items were combined into a composite, and Cronbach's alphas were .91-.93 for all studies. Two other single-item explicit identity measures, inclusion of environmentalists in self and inclusion of nature in self, were assessed in Study 2 (Schultz, 2002). In our main analyses, we present the four-item measure because it was more reliable, explained more variance in preferences and behaviors, and was measured in all four studies.¹

Implicit environmentalist identity. For a measure of identity that bypasses self-report, we used the Single-Target Implicit Association Test (ST-IAT; (Bluemke & Fries, 2008), which measures associations between a single concept and its attributes (e.g., identification with environmentalists). In the current studies, the ST-IAT measured associations between the concepts 'Environmentalist' with 'Self' and 'Other'.

This ST-IAT consisted of five blocks (20 trials in the first block, 48 trials in other blocks). Participants in the first block sorted words belonging to one of two categories ('Self' and 'Other') by pressing either "E" (for 'Other') or "I" for (for 'Self'). In the second and third blocks, participants sorted words belonging to one of three categories ('Self', 'Other', and 'Environmentalist') by pressing either "E" (for Other) or "I" for (for 'Self' or 'Environmentalist'). In the fourth and fifth blocks, participants did the same except 'Environmentalist' words were also categorized with the 'Other' words instead of the 'Self' words. The stimuli presented in the

¹ Complementary analyses using the single-item measures found consistent yet smaller effects than the four-item measure, likely in part because of higher measurement error. These identity measures are described in section 2.3.

first block were divided equally between the two categories, whereas the other blocks contained 14 trials each for the paired stimuli and 20 trials for the stimuli that were not paired with another category.²

The ST-IAT was scored using the *D2* algorithm (Greenwald, Nosek, & Banaji, 2003), which indexed how quickly participants categorized words when 'Environmentalist' was paired with 'Self' compared to when 'Environmentalist' was paired with 'Other'. The pre-registered analytic plan stated that participants would be excluded from all analyses for careless responding if more than 10% of the trials on the ST-IAT were faster than 400 ms. This criterion excluded 15 (2.5%) participants in Study 1, 39 (7.7%) participants in Study 2, 71 (12.5%) participants in Study 3a, and 29 (4.9%) participants in Study 3b. The stimuli for 'Self' were: *Mine, Myself, I, My, Self*. The stimuli for 'Other' were *They, Their, Them, Theirs, Other*. To select the stimuli for the 'Environmentalist' category, we conducted a pilot study of 130 Amazon MTurk participants who generate synonyms for the word 'Environmentalist' and also rated the overlap between Environmentalists and words chosen by the researchers in advance. The final stimuli were selected because of high agreement between raters for representing Environmentalists while not strongly implying other demographics such as gender: *Environmentalist, Conservationist, Preservationist, Tree-Hugger*. These terms were also chosen because they balance positively and negatively valenced words.

We tested slight variations on the procedure in each study. In Study 1, the ST-IAT alternated between congruent and incongruent blocks instead of going in sequential order (i.e.,

² To test for order effects, in Studies 1 & 2 participants were randomly assigned to the ST-IAT as above or in a flipped order where Other/Environmentalist vs. Self were Blocks 2 & 3 and Other vs. Self/Environmentalist were Blocks 4 & 5 (Greenwald, McGhee, & Schwartz, 1998). Self-Environmentalist block first yielded higher implicit identity, $F(1,945)=76.5, p<.0001$. However, entering order with explicit and implicit identity into two regressions predicting behavior and then policy preferences, with or without the 2- and 3-way interactions, yielded no main nor interaction effects of order, all $ps \geq .29$. Order does not account for the main findings.

congruent blocks first, then incongruent blocks second or vice versa). In Study 2, the critical blocks were in sequential order but were doubled in length to 96 trials. Finally, Studies 3a and 3b used the standard ST-IAT described above. These changes were not pre-registered and did not affect the pattern of results. Cronbach's alphas were $\geq .96$ for all studies.

Pro-environmental behavior. To test a behavioral outcome of environmentalist identity, participants completed multiple scales reporting the frequency of pro-environmental behaviors. Different scales were used to test for convergent validity of the relationships with explicit and implicit identity. In Study 1, participants reported six behaviors from the Recurring Environmental Behavior Scale including water conservation, reusable bag use, and discussing environmental topics (Brick et al., 2017), Cronbach's alpha = .84. In Study 2, participants reported five difficult civic and pro-environmental behaviors from the Environmental Action Scale (Alisat & Riemer, 2015), including volunteering for an environmental organization and participating in a community event focused on environmental awareness, Cronbach's alpha = .86. In Studies 3a and 3b, participants completed all 21 items of the Recurring Environmental Behavior Scale (Brick et al., 2017), spanning individual and social conservation actions such as talking with others about environmental topics, Cronbach's alphas 3a = .79, 3b = .84. These scales were measured from 1 (*never*), 3 (*sometimes*), to 5 (*always*), and assessed the frequency of different kinds of pro-environmental behaviors (Stern, 2000). See Supplement for item text.

Environmental policy opinion. To test how environmentalist identity relates to policy opinions, participants reported their policy preferences about environmental issues from 1 (*disagree strongly*) to 7 (*agree strongly*) in all studies. Study 1 had two items assessing opinions about specific issues: "The United States should implement cap-and-trade or a carbon tax to reduce greenhouse gas emissions" and "The United States should approve the Keystone XL

pipeline that would carry crude oil from the Alberta tar sands" [reverse-scored]. These items were combined into a composite, $r(538) = .42, p < .0001$ (see Supplement for analyses with these items as separate predictors that show the same result).

Study 2 contained three policy items assessing broader preferences: "The United States should create more laws to reduce global warming", "The United States should create a carbon pollution tax in order to reduce global warming," and "The United States should support international efforts to reduce global warming." These items were combined into a composite, Cronbach's alpha = .90.

Study 2's policy measure yielded restricted range at the high end, so in Studies 3a & 3b we introduced a trade-off between environmental and economic concerns in the policy opinion measure: "The United States should create more laws to reduce global warming, even if those laws cost American jobs," "The United States should create a carbon pollution tax in order to reduce global warming, even if the tax reduces the ability of American businesses to compete globally," and "The United States should support international efforts to reduce global warming, even if other countries like China don't participate."

In Studies 3a and 3b, we also measured opinions about a novel environmental issue to avoid explicit memories of personal commitments, e.g., stances on familiar issues like climate change. A mock article was created to appear to be from the *Los Angeles Times* newspaper titled "Controversy over commercial development in East Rock". The 260-word article described a legal challenge to a commercial development in the desert based on an inadequate environmental review (see Supplement for image and text). Participants responded to two items from 1 (*not at all*) to 7 (*extremely*): "How much do you support stopping construction for the next three weeks for the independent environmental review?" and "How much do you support allowing

construction on the East Rock business development to continue without further review?"

[reverse-scored]. These two items were highly associated, $r(760) = .57, p < .0001$. To achieve the greatest construct coverage, these novel policy questions were combined with the three trade-off questions into a composite score, Cronbach's alphas 3a = .83, 3b = .88 (see Supplement for exploratory analyses that separate out the novel policy items and find parallel results).

2.3 Additional measures. We also investigated additional measures as predictors of environmentalist identity. We measured childhood experiences, environmental attitudes, key demographics, motivations to act pro-environmentally, feeling awe, and perceptions of environmentalists' social status (see below). Mapping these predictors could establish convergent and divergent validity for the identity measures, provide insight into their origins and causes, and inform interventions for increasing environmentalist identity (Clayton & Opatow, 2003). Zero-order correlations of these variables with key measures are in Table 4. See the pre-registered analytic plans for the hypotheses and questionnaire order associated with these predictors and see the Supplement for those results.

Internal and external motivation to respond pro-environmentally (Studies 3a & 3b). This 10-item, two-construct scale was adapted from (Plant & Devine, 1998) to focus on motivation to act pro-environmentally, e.g., "Because of today's politically correct standards, I try to appear pro-environmental" [external] and "I attempt to behave pro-environmentally because it is personally important to me" [internal], rated from 1 (*disagree strongly*) to 7 (*agree strongly*).

Childhood experiences (Study 2). Childhood experiences with animals and plants may foster pro-environmental values and environmentalist identity (Brügger, Kaiser, & Roczen, 2011; Hinds & Sparks, 2008; Matsuba & Pratt, 2013). Participants reported the frequency of childhood experiences with nature in six items: "Before you turned 18, how many times did you

go to [aquariums/zoos/natural history museums]?", rated *0, 1-2 times, 3-4 times, 5-6 times, 7-8 times, 9 times or more*; "Before you turned 18, how much time did you spend at a summer camp or other group organization in nature (outside of a city)?", rated *Never, 1 day-2 weeks, Less than 4 weeks, Less than 6 weeks, Less than 8 weeks, Less than 10 weeks, 10 weeks or more*; and two items entered in whole years: "Of the 18 years of your childhood, [how many years did you live in a house with a pet?] / [for how many years were you primarily responsible for feeding a pet?]"

Environmental concern (Study 1). To assess beliefs and attitudes about humans damaging the natural environment, five items from the New Ecological Paradigm scale were combined into a composite, Cronbach's alpha = .80 (Dunlap, Van Liere, Mertig, & Jones, 2000; subset used by Stern, 1999).

Education (Studies 1-3b). Participants reported their highest completed level of education: 1 (*elementary school*), 2 (*junior high*), 3 (*some high school*), 4 (*high school graduate*), 5 (*some college*), 6 (*associate's degree*), 7 (*bachelor's degree*), 8 (*some graduate school*), 9 (*master's degree*), 10 (*M.B.A.*), 11 (*J.D.*), 12 (*M.D.*), 13 (*Ph.D.*), 14 (*other advanced degree*). Because this scale is not strictly ordinal, scores were made into a composite of less than bachelor's (1-6), bachelor's (7), or more than bachelor's (8-14), and this composite was used for correlations.

Political orientation (Studies 1-3b). Participants reported their political ideology on a scale from 1 (*strongly conservative*) to 7 (*strongly liberal*). In Study 2, participants also responded to two questions: "In general, how liberal or conservative are you on social issues?" and "In general, how liberal or conservative are you on economic issues?" from 1 (*strongly conservative*) to 7 (*strongly liberal*). The additional variables in Study 2 were excluded from analyses, as they were mostly redundant.

Rurality (Studies 2, 3a, & 3b). Participants reported the rurality of their current home address using the nine-item USDA Rural-Urban Continuum Codes, e.g., 1 (*county in metropolitan area of 1 million population or more*) to 9 (*completely rural or less than 2,500 urban population, not adjacent to a metro area*).

Inclusion of self in nature and inclusion of self in environmentalists (Schultz, 2001). Participants saw seven images of two progressively overlapping circles labeled "Self" and "Nature", and later another seven images for "Self" and "Environmentalists" and were instructed each time to select one of the circles (see Footnote 2).

Contact with environmentalists (Studies 3a & 3b). Participants responded to three questions: "How many [friends/family/co-workers] can you think of that would identify as environmentalists?" If any > 0, they answered: "How often do you spend time with these [friend(s)/family member(s)/co-worker(s)]?", rated from 1 (*none*) [labeling error] to 7 (*very often*).

Awe (Studies 3a & 3b). Participants responded to a six-item scale measuring the trait tendency to experience the emotion awe (Shiota, Keltner, & John, 2006), e.g., "I feel wonder almost every day," rated from 1 (*disagree strongly*) to 7 (*agree strongly*).

Social status of environmentalists (Studies 3a & 3b). The MacArthur Ladder Scale of Subjective Social Status was adapted for environmentalists (Operario, Adler, & Williams, 2004). Participants chose the social status of environmentalists by selecting a rung on a ten-rung ladder, with the top being those who have the highest standing in their community and the bottom being those with the lowest standing.

3. Results

Each study's main pre-registered analyses tested for the unique contributions of explicit and implicit identity. We present the main findings with meta-analysis and provide separate analyses when a measure was not assessed in all studies. Aggregating across the four studies, participants reported positively identifying with environmentalists on average, $M (SD) = 5.00 (1.35)$, range = 1-7. Implicitly, they were about as fast to respond to pairings of "Self" with "Environmentalist" as they were to respond to pairings of "Other" and "Environmentalist". Most individuals reported engaging in most pro-environmental behaviors "sometimes" as shown by the median frequency of behaviors. Support for pro-environmental policy was moderately positive. Descriptives of key variables by study are given in Tables 1 & 2.

Table 1. *Demographics by study.*

	<i>n</i>	Female %	White %	Age <i>M (SD)</i>
Study 1	586	61.0	73.5	39.0 (14.0)
Study 2	469	68.7	75.7	41.5 (16.2)
Study 3a	417	73.6	62.4	18.0 (0.00)
Study 3b	561	61.1	71.9	41.6 (15.8)

Table 2. *Descriptive statistics of identity and outcome variables by study.*

Study 1	Range	<i>n</i>	<i>M</i>	<i>SD</i>
Implicit identity	n/a	558	-0.04	0.26
Explicit identity	1-7	545	5.03	1.34
Behavior	1-5	544	2.80	0.77
Policy preferences	1-7	545	5.07	1.41
Study 2				
Implicit identity	n/a	394	-0.08	0.25
Explicit identity	1-7	376	5.03	1.35
Behavior	1-5	374	1.99	1.01
Policy preferences	1-7	375	5.84	1.36
Study 3a				
Implicit identity	n/a	393	-0.09	0.24
Explicit identity	1-7	325	4.54	1.27
Behavior	1-5	321	2.80	0.48
Policy preferences	1-7	303	4.93	1.16
Study 3b				
Implicit identity	n/a	539	-0.04	0.27
Explicit identity	1-7	479	5.25	1.33
Behavior	1-5	473	3.07	0.52
Policy preferences	1-7	455	5.58	1.29

Note: The behavior and policy measures differed between studies: see Methods. Higher scores indicate stronger environmentalist identity, more frequent pro-environmental behavior, and more support for pro-environmental policies.

As predicted, explicit environmentalist identity was positively associated with pro-environmental behavior, $r(1710) = .51, p < .0001$, and policy preferences, $r(1710) = .62, p < .0001$. Implicit identity was also positively associated with the outcomes, behavior $r(1676) = .19, p < .0001$, policy $r(1676) = .19, p < .0001$ (see Table 4).

3.1. Meta-analysis. To test whether implicit and explicit environmentalist identity uniquely predict pro-environmental behavior and policy preferences, we conducted a random-effects meta-analysis of partial correlations using the R package *metafor* (Viechtbauer, 2010). First, pro-environmental behavior was predicted from implicit and explicit identity. Then, policy

preferences were predicted from implicit and explicit identity. The partial correlations were Fisher's z -transformed for analyses and converted back to Pearson's r for interpretation. Partial correlations drop any variance that is shared between predictors of the outcome, and remaining effects can be interpreted as unique contributions of that predictor similar to a regression coefficient. We also examined the correlations between implicit and explicit identity, meta-analytic $r = .24$, $p < .00001$ (see Figure 1 and Tables 3 & 4).

Figure 1. *Explicit identity is a strong and unique predictor of pro-environmental behavior (1a) and policy preferences (1b), and implicit identity is not a unique predictor, shown with meta-analysis forest plots using random effects.*

1a)

1b)

Table 3. Pooled effect sizes of partial correlations from random effects meta-analysis.

	<i>n</i>	<i>r</i> [95% CI]	<i>Z</i>	<i>p</i>
Implicit on behavior	1712	.05 [-.01, .12]	1.48	.13
Implicit on policy	1678	.05 [-.02, .12]	1.48	.14
Explicit on behavior	1712	.58 [.49, .67]	12.5	< .00001
Explicit on policy	1678	.62 [.56, .67]	22.2	< .00001
Implicit and explicit	1725	.24 [.20, .29]	10.8	< .00001

Note. Implicit = implicit environmentalist identity, Explicit = explicit environmentalist identity, and partial *r*s include the other identity measure, except for the Pearson's correlation between the two.

Explicit environmentalist identity was highly predictive of self-reported pro-environmental behavior and policy preferences, partial *r*s = .58, .62, *p*s < .00001, suggesting that social identity may be important for pro-environmental action. In contrast, implicit environmentalist identity did not uniquely predict pro-environmental behavior nor policy preferences, partial *r*s = .05, .05, *p*s = .13, .14. To investigate whether the predictions were

improved by accounting for externally motivated environmentalists (high explicit/low implicit) or hidden environmentalists (low explicit/high implicit), we also conducted an analysis examining whether implicit and explicit identity interacted to predict behavior and policy preferences. Behavior and policy preferences were separately regressed onto standardized implicit and explicit identity and their interaction term, again using the R package `metafor` to combine the four studies meta-analytically. There was no evidence for an interaction between implicit and explicit identity, partial r s for the interaction predicting behavior, $r = .07, p = .33$; predicting policy, $r = .06, p = .57$.

We also examined the heterogeneity of the effect sizes across studies. Four of the effect sizes showed greater variation across the studies than might be expected by chance: explicit on behavior, $Q = 22.28, p < .0001$, explicit on policy, $Q = 10.62, p = .01$, interaction on behavior, $Q = 30.85, p < .0001$, and interaction on policy, $Q = 79.81, p < .0001$. Other effects were non-significant, $ps \geq .10$. The differences between estimates may be due to changes between studies in the policy items, behavior items, sample populations, or statistical noise.

Table 4. Descriptive statistics and zero-order correlations (Studies 1-3b, $N_s \leq 1706$ differ by cell; see Table 2).

	Explicit	Implicit	Pol	Edu	Concern	Camp	Pet	Awe	Status	IMS	EMS	Behav	Policy
Studies	1-3b	1-3b	1-3b	1-3b	1	2	2	3a-b	3a-b	3a-b	3a-b	1-3b	1-3b
<i>M</i>	5.00	-.06	4.93	1.98	5.66	2.90	12.0	5.40	5.90	5.07	2.94	2.70	5.35
<i>SD</i>	1.35	.26	1.70	.90	1.13	2.31	6.32	.96	1.96	1.22	1.21	.82	1.37
Implicit	.25 ^c												
Pol	.49 ^c	.19 ^c											
Edu	.19 ^c	.06 ^b	.17 ^c										
Concern	.58 ^c	.28 ^c	.54 ^c	-.03									
Camp	.15 ^b	.08	.13 ^c	.17 ^c	n/a								
Pet	.19 ^c	.01	.01	.02	n/a	.20 ^c							
Awe	.35 ^c	.06	.06	.10 ^b	n/a	n/a	n/a						
Status	.31 ^c	.09 ^a	.15 ^c	.15 ^c	n/a	n/a	n/a	.12 ^b					
IMS	.71 ^c	.21 ^c	.42 ^c	.23 ^c	n/a	n/a	n/a	.34 ^c	.32 ^c				
EMS	-.21 ^c	-.07 ^a	-.08 ^a	-.21 ^c	n/a	n/a	n/a	-.10 ^b	-.06	-.21 ^c			
Behav	.51 ^c	.19 ^c	.28 ^c	.07 ^b	.48 ^c	.18 ^c	.14 ^b	.39 ^c	.26 ^c	.61 ^c	-.24 ^c		
Policy	.62 ^c	.19 ^c	.61 ^c	.17 ^c	.67 ^c	.10 ^a	.07	.24 ^c	.25 ^c	.66 ^c	-.16	.29 ^c	

Note: ^a $p \leq .05$, ^b $p \leq .01$, ^c $p \leq .001$

Note. Explicit = explicit environmentalist identity; Implicit = implicit environmentalist identity; Pol = political orientation from conservative to liberal; Edu = education composite; Concern = pro-environmental concern; Camp = frequency of attending summer camp during childhood; Pet = childhood years lived with a pet; Awe = trait awe; Status = social status of environmentalists; IMS = internal motivation to appear pro-environmental; EMS = external motivation to appear pro-environmental, Behav = pro-environmental behavior frequency, Policy = pro-environmental policy preferences

3.1.1. Robustness check with structural equation model. Due to measurement unreliability, partial correlations are vulnerable to high false-positive rates when used to establish incremental validity (Westfall & Yarkoni, 2016). To address this issue, we also conducted the incremental validity analyses as structural equation models (SEM) that take into account measurement variance using the R package *lavaan* (Rosseel, 2012). Individual-level data were aggregated across all four studies for these analyses. The indicators for the explicit identity latent variable were the four explicit identity items used in all analyses and the indicators for the implicit identity latent variable were *D* scores calculated separately for the first ST-IAT critical blocks and the second ST-IAT critical blocks. Using this approach, we removed error variance by accounting for the covariances between the indicator variables. The model predicting behavior was a good fit (Schreiber, Nora, Stage, Barlow, & King, 2006) on 1 of 3 fit indexes, SRMR = .027, and a poor fit on the other two indices, CFI = .938, RMSEA = .143. This model found slightly weakened behavior prediction for explicit identity, $\beta = .49, p < .001$, and slightly improved behavior prediction for the ST-IAT, $\beta = .10, p = .005$. The model predicting policy preferences was also a good fit on 1 of 3 fit indexes, SRMR = .027, and a poor fit on the other two indices, CFI = .940, RMSEA = .143. This model did not change the conclusions about policy for either explicit identity, $\beta = .62, p < .001$, or implicit identity, $\beta = .04, p = .14$. We also conducted similar SEM models where ST-IAT had three indicators (dividing the trials by thirds instead of halves). The measurement model with three indicators is just-identified, and therefore model misfit can only result from the structural relations between constructs. The pattern of results did not change. Note that the main meta-analysis results use partial correlations, which are similar but not interchangeable with the above β s. Overall, this SEM-based approach

strengthens the interpretation suggested by the partial correlation approach: explicit (but not implicit) identity is a strong predictor of pro-environmental behavior and policy preferences.

3.2 Predictors of environmentalist identity (Study 2). Revealing what causes environmental identity might illuminate pathways responsible for its decline and could also inform interventions to increase helpful behaviors. We hypothesized in pre-registration that implicit identity would be positively related to these childhood experiences: frequency of childhood visits to museums, attendance of summer camp, lived with a pet, and took care of a pet. However, these experiences were unrelated to implicit identity, all zero-order $|rs| \leq .09$, $ps > .08$. Implicit identity was then regressed onto these four variables simultaneously. None predicted implicit identity, all $ps \geq .12$, all eta-squared $\leq .01$, suggesting that implicit identity is not related to the self-reported frequency of these childhood experiences. Exploratory analyses revealed that implicit identity was unrelated to currently living in a rural area, $r(1135) = -.06$, $p = .06$.

Implicit identity was also hypothesized in pre-registration to be positively related to internal motivation to be pro-environmental, dispositional awe, and social status of environmentalists (Studies 3a & 3b; see Table 4). Implicit environmentalism was related to internal motivation, $r(797) = .21$, $p < .001$, and social status of environmentalists, $r(755) = .09$, $p = .019$. Regressions were run in Studies 3a & 3b predicting implicit identity from these three predictors. All betas are standardized. Higher internal motivation was positively related to higher implicit identity in both samples, Study 3a $\beta = .06$, $t(293) = 3.67$, $p < .001$, Study 3b $\beta = .04$, $t(454) = 2.79$, $p = .006$. No other effects were significant, $ps \geq .25$. Overall, there was partial support for these factors predicting implicit identity.

In contrast, explicit identity was associated with nearly every factor, including these novel zero-order correlations: living in a rural area, $r(1135) = -.15, p < .0001$, childhood summer camp attendance, $r(373) = .15, p = .003$, childhood living with a pet, $r(367) = .19, p = .0003$, and education, $r(1710) = .19, p < .0001$ (see Table 4). To explore the more novel predictors, exploratory analyses were run predicting explicit identity from internal motivation to be pro-environmental, dispositional awe, and social status of environmentalists. Across Studies 3a & 3b, all three factors uniquely predicted explicit identity, $ps \leq .003$, and the strongest was internal motivation, $\beta = .94, t(751) = 25.1, p < .0001$.

Our pre-registered analytic plans specified that further tests between the factors in Table 4 would be exploratory. Overall, the pattern of zero-order correlations suggests many factors might contribute to explicit identity, particularly environmental concern, $r(542) = .58, p < .0001$, and internal motivation to appear pro-environmental $r(794) = .71, p < .0001$ (see Table 4). It could be valuable to study these associations longitudinally and/or experimentally to discover their potential consequences.

4. Discussion

Four high-powered pre-registered studies examined the relationships between environmentalist identity and pro-environmental behavior, policy opinions, childhood experiences, and dispositions. Meta-analysis revealed that explicit identity is a strong and reliable predictor of pro-environmental behavior and policy preferences, consistent with recent work highlighting environmentalist identity (Brick et al., 2017; Fielding & Hornsey, 2016). Social identity appears a valuable tool to understand and influence pro-environmental actions including voting. Identifying with environmentalists may lead to associating pro-environmental

behaviors with self-worth (Baumeister & Leary, 1995), which could in turn cause both public and private conservation actions.

We also show for the first time that implicit environmentalist identity is a reliable construct that is moderately and positively related to explicit identity. Although implicit identity is positively associated with pro-environmental behavior and policy preferences, it does not uniquely predict those outcomes when controlling for explicit identity. Also, we did not find evidence that accounting for interactions between implicit and explicit identity improved the prediction of behavior and policy preferences (e.g., externally motivated environmentalists that have higher explicit identity but lower implicit identity or hidden environmentalists that have lower explicit identity and higher implicit identity). These findings suggest that self-reports of environmentalist identity are sufficient for predicting environmental behavior and policy preferences.

A recent theory of implicit associations, the Bias of Crowds model (Payne, Vuletich, & Lundberg, 2017), suggests that implicit associations are better understood as properties of groups rather than of individuals. Weak individual-level correlations in these studies are consistent with this perspective. Because implicit associations reflect group-level processes in the Bias of Crowds model, stronger correlations should be expected when group levels of implicit environmentalist identity are correlated with group-level behavior. Future research could examine whether region-level implicit environmentalist identity predicts aggregated outcomes such as regional pro-environmental laws or county-level recycling.

4.1. Limitations and future research. We relied on self-reports of behavior, which boosts construct comprehensiveness (by including a wide range of pro-environmental behaviors) and ease of data collection. However, self-reports of behavior are not the same as actual

behavior. A recent meta-analysis finds that the relationship between self-reported and objective pro-environmental behavior is only moderate at $r = .46$ (Kormos & Gifford, 2014), suggesting that there are differences in the processes underlying objective and self-reported behavior. From the perspective of dual-process models such as the MODE model (Motivation and Opportunity as DEterminants of the Attitude-Behavior Relation (Fazio & Towles-Schwen, 1999; Olson & Fazio, 2008), people have the motivation and opportunity to deliberate and override automatic mental processes when reporting their past behavior. In the current studies, self-reports of behavior could be driven by deliberative processes that artificially reduce their relationship with implicit identity and artificially inflate their relationship with explicit identity. In other words, the relationship between explicit identity and behavior may be inflated due to shared measurement variance. Because the SEM analyses did not assess behavior at the item-level, there is unfortunately no elegant way to remove this shared measurement variance. Future studies might use other behavior measures as suggested below.

The MODE model also predicts that implicit associations will influence behavior more when people lack the motivation or opportunity to override automatic mental processes. Future research examining situations where people do not have the motivation or opportunity to override automatic processes may therefore find stronger relationships between implicit identity and pro-environmental behavior. We suggest researchers consider impulsive or spontaneous pro-environmental behavior (e.g., recycling out of habit) or behavior where self-presentation motives are weak or absent (e.g., private home energy use).

A further limitation in this paper stems from the observed heterogeneity between studies, which are evident in the variability of the relationship between explicit identity and behavior and the poor model fit of the SEM analyses. This heterogeneity represents uncertainty around the

effect size estimates and therefore the specific estimates should be interpreted cautiously. Poor model fit might be expected based on the studies not being direct replications but rather conceptual replications using different scales and populations. Future studies using different methods or measures might find different effect sizes.

This paper also investigated novel associations with environmentalist identity. Internal motivation to appear pro-environmental was strongly and positively associated with explicit identity, behavior, and policy preferences, while external motivations were not. Environmentalist identity in the U.S. might be driven more by personal goals and values than external pressure or social signaling. This does not reveal how the environmentalist identity arose; external and internal motivations might both be involved. Further research manipulating the visibility or normative approval of pro-environmental actions (Brick et al., 2017) could help explore this divergence further by demonstrating the conditions under which external motivations drive behavior.

We also studied the potential origins of environmentalist identity by measuring childhood experiences with summer camps, animals, and museums. We found only weak connections between these recalled childhood experiences and explicit identity, and none with implicit identity. These results suggest that these recalled childhood experiences are unlikely to be the primary determinants of adult environmentalist identity. However, these measures were not validated for childhood exposure to nature. We encourage researchers to use more established measures (Pensini, Horn, & Caltabiano, 2016; Wells & Lekies, 2006). Another potential predictor of adult identity is the local communities in which people live. Future work on identity antecedents could examine community-level variables such as community political climate, other social identities, socioeconomic status, and educational attainment. Future research on education

may be particularly illuminating, as country-level educational attainment is the single strongest predictor of climate change awareness across 119 countries (Lee, Markowitz, Howe, Ko, & Leiserowitz, 2015).

Next, the stimuli used as synonyms for Environmentalist in the ST-IAT were not thoroughly validated. The terms were generated by the authors and iterated through an MTurk pilot study (see Methods: *Implicit environmentalist identity*) that used both open response and Likert-type ratings of synonym overlap with Environmentalists. Potential confounds such as positivity or negativity were not measured for the terms. As a reviewer helpfully pointed out, the negative term “Tree-Hugger” could have impacted the results. As a robustness check, we computed the ST-IAT *D* score with and without the “Tree-Hugger” term in Study 1 to see if the main findings were affected by this stimulus. The new ST-IAT *D* score was correlated with the original calculation at $r = .98$ and was similarly correlated with explicit identity and behavior, suggesting that the term “Tree-Hugger” did not change the main findings.

4.2. Conclusion. Environmental concern is growing in recent decades, but individual pro-environmental behavior remains stagnant. This disconnect creates the need for other predictors to understand and influence behavior. Social identity drives myriad behaviors (Ellemers et al., 2002) and holds particular promise for conservation because it can lead to mental associations between diverse environmental behaviors (Truelove et al., 2014). Across four pre-registered studies predicting a wide range of outcomes, we found that explicit environmentalist identity was strongly associated with pro-environmental behaviors and policy preferences. In contrast, implicit environmentalist identity had no unique contribution. These findings suggest that understanding individuals in social contexts can support the study of environmental behavior, and that self-report is sufficient for predicting behavior from

environmentalist identity. We welcome other researchers to use the novel implicit measure and analysis code to test for relationships with other identities and outcomes. Future research could isolate the key identities that influence pro-environmental actions, the origins of these identities, and design interventions to boost pro-environmental behavior by selectively highlighting or obscuring links with key social groups.

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Supplement

Behavior measures

All items were rated from 1 (*never*), 3 (*sometimes*), to 5 (*always*).

Study 1. Pro-environmental behavior (six items adapted from the Recurring Environmental Behavior Scale; Brick et al., 2017).

1. When you visit the grocery store, how often do you use reusable bags?"
2. How often do you conserve water when showering, cleaning clothes, washing dishes, watering plants, or during other activities?"
3. How often do you discuss environmental topics, either in person or with online posts (Facebook, Twitter, etc.)?"
4. When you buy clothing, how often is it from environmentally friendly brands?"
5. How often do you engage in political action or activism related to protecting the environment?"
6. How often do you educate yourself about the environment?"

Study 2. Civic pro-environmental behavior (Environmental Action Scale; Alisat & Reimer, 2015).

1. Participated in nature conservation efforts (e.g., planting trees, restoration of waterways).
2. Spent time working with a group/organization that deals with the connection of the environment to other societal issues such as justice or poverty.
3. Became involved with an environmental group or political party (e.g., volunteer, summer job, etc.).
4. Participated in a community event which focused on environmental awareness.

5. Consciously made time to be able to work on environmental issues (e.g., working part time to allow time for environmental pursuits, working in an environmental job, or choosing environmental activities over other leisure activities).

Studies 3a & 3b: Recurring Environmental Behavior Scale, 21 items (Brick et al., 2017).

1. When you visit the grocery store, how often do you use reusable bags?
2. How often do you walk, bicycle, carpool, or take public transportation instead of driving a vehicle by yourself?
3. How often do you drive slower than 60mph on the highway?
4. How often do you go on personal (non-business) air travel?
5. How often do you compost your household food garbage?
6. How often do you eat meat?
7. How often do you eat dairy products such as milk, cheese, eggs, or yogurt?
8. How often do you eat organic food?
9. How often do you eat local food (produced within 100 miles)?
10. How often do you eat from a home vegetable garden (during the growing season)?
11. How often do you turn your personal electronics off or in low-power mode when not in use?
12. When you buy light bulbs, how often do you buy high efficiency compact fluorescent (CFL) or LED bulbs?
13. How often do you act to conserve water, when showering, cleaning clothes, dishes, watering plants, or other uses?
14. How often do you use aerosol products?

15. When you are in PUBLIC, how often do you sort trash into the recycling?
16. When you are in PRIVATE, how often do you sort trash into the recycling?
17. How often do you discuss environmental topics, either in person or with online posts (Facebook, Twitter, etc.)?
18. When you buy clothing, how often is it from environmentally friendly brands?
19. How often do you carry a reusable water bottle?
20. How often do you engage in political action or activism related to protecting the environment?
21. How often do you educate yourself about the environment?

Novel policy preference measure: Studies 3a & 3b

Los Angeles Times

MOST POPULAR LOCAL SPORTS ENTERTAINMENT POLITICS ORANGE COUNTY OPINION

Controversy over commercial development in East Rock

OCTOBER 27, 2016, 9:45 AM

A proposed commercial development in California came under fire this week due to environmental concerns. The East Rock site is located in remote southeastern California far away from the nearest city. The East Rock development was proposed by a consortium of American businesses including an unnamed major car maker widely thought to be either General Motors or Ford. The proposed site would lead to 1.2 million square feet of manufacturing and office space and was located at East Rock because of inexpensive land.

However, irregularities were revealed last month in the developer's environmental review to the state of California. Non-profit environmental advocacy groups such as the Sierra Club are focusing on this report. "The mistakes in this report suggest a pattern of intentional deception. The damage to the local ecosystem and threatened bird species is much greater than was expected before, and this compromises the environmental safety of the entire project. We urge this project to stop construction for the next three weeks to allow an independent body to conduct a high-quality environmental review. We recognize this would incur as much as \$150,000 in additional costs, but the environmental problems are too large to ignore."

In response, a spokesperson for the developer stated: "We apologize for the minor errors in the state report. There were minor accidents and we have already submitted a revised version. The big picture has not changed: this development complies with state and federal law, protects the environment adequately, and will provide thousands of new jobs at a time the local economy desperately needs a boost."

Additional measures

To test secondary hypotheses across the studies, we also assessed several additional measures (see Method). In Study 1 we included environmental concern to test for overlap with the identity measures. In Study 2 we assessed inclusion of self in nature (Schultz, 2002) and inclusion of self in environmentalists as additional identity measures (see Footnote 2). We also measured childhood experiences such as attending summer camp, contact with environmentalists, and whether the participants lived in a rural/urban area. In Study 3, we assessed dispositional awe (Shiota et al., 2006), perceived social status of environmentalists (adapted from (Operario et al., 2004), and internal/external motivation to respond pro-environmentally (adapted from (Plant & Devine, 1998). See Methods for the measures, the pre-registered analytic plans for those hypotheses, and both the main paper, and below for the results.

Supplemental hypotheses and results

The analytic plans for each study included secondary hypotheses. These planned analyses comprised three main goals for exploring the effects of implicit identity: 1) identify potential moderators of implicit effects on behavior or policy preferences, 2) identify childhood predictors of implicit identity in adulthood, and 3) use any childhood predictors to test mediation through implicit identity. In sum, there was no evidence for any of these relationships. This is consistent with the meta-analytic result showing little effect of implicit identity on behavior or policy preferences. All secondary hypotheses and results follow below.

Study 1. Hypothesis 3. Implicit identity was hypothesized to uniquely predict policy preferences better when explicit identity with environmentalism was moderate (Hawkins & Nosek 2012). A dummy variable was created for moderate identity values following the analytic plan (3.5-4.5 on the 7-point scale). A linear regression predicting policy preferences using

implicit identity, moderate vs. non-moderate explicit identity, and their interaction yielded no interaction effect, $p = .09$, eta-squared = .01. This hypothesis was not supported.

Study 2. Hypothesis 2b. The effect of explicit identity on policy preferences was hypothesized to be greater for conservatives. A regression predicting policy preferences was run with explicit identity, political orientation, and their interaction as predictors. The interaction was not significant, $p = .98$, eta-squared = .00. This hypothesis was not supported.

Hypothesis 2c. The effect of implicit identity on policy preferences and behavior was hypothesized to be separate from the effect of inclusion of nature in self. Two regressions were run with the predictors explicit identity, implicit identity, and inclusion of nature in self in Study 2. All betas below are standardized except for dummy variables. Policy preferences were not uniquely predicted by implicit identity, $p = .55$, consistent with no effect in the meta-analysis. Behavior was uniquely predicted by implicit identity, $\beta = .10$, $t(369) = 2.13$, $p = .03$, eta-squared = .01. However, the other predictors showed stronger unique effects: explicit identity $\beta = .32$, $t(369) = 6.13$, $p < .001$, eta-squared = .09; inclusion of nature in self $\beta = .27$, $t(369) = 5.27$, $p < .001$, eta-squared = .07. This hypothesis was partially supported.

Hypothesis 3. Implicit identity was hypothesized to uniquely predict policy preferences better when explicit identity with environmentalism was moderate (Hawkins & Nosek, 2012) (same as Study 1 Hypothesis 3). Dummy explicit identity predicted policy, $\beta = -.94$, $t(371) = -6.19$, $p < .0001$, eta-squared = .09, and implicit identity as well, $\beta = .21$, $t(371) = 2.63$, $p = .009$, eta-squared = .00. Their interaction was significant, $\beta = -.33$, $t(371) = -2.09$, $p = .038$, eta-squared = .01. This hypothesis was partially supported but the interaction effect was very small and of little practical importance.

Hypothesis 4a. Implicit identity was hypothesized to be positively related to contact with environmentalists (friends, family, and coworkers). Implicit identity regressed onto these three contact variables simultaneously. None predicted implicit identity, all $ps \geq .72$, all eta-squared = .00, nor was there any significant zero-order relationship with implicit identity, all $rs \leq .06$, $ps \geq .37$. This hypothesis was not supported.

Hypothesis 4b. See main results.

Hypothesis 4c. Implicit identity was hypothesized to mediate effects of either childhood contact with environmentalists or contact with nature on policy preferences and/or behavior. Four mediation models were performed with the two predictors from Hypotheses 4a & 4b that had the largest relationships with implicit identity: museum visits and contact with environmentalist friends. There was no evidence for mediation through implicit identity, indirect effect $\beta_s = .00$, .02, .01, .02, $ps = .54$, .16, .53, .11.

Study 3. *Hypothesis 3a-c.* See main results.

Hypothesis 4. Implicit identity was hypothesized to mediate the effects of dispositional awe, internal motivation to be pro-environmental, and social status of environmentalists on policy preferences and behavior. Combined across both studies, two mediation models were performed with implicit identity as the mediator and the three predictors as separate independent variables. In neither Study 3a and 3b, implicit identity did not mediate the effect of these predictors on policy preferences, indirect effect $|\beta_s| \leq .02$, $ps \geq .18$, or on behavior, indirect effect $|\beta_s| = .00$, $ps \geq .91$. In sum, there was no evidence for mediation through implicit identity.

Robustness checks and analysis plan deviations

Study 1. The pre-registered analysis plan stated that policy opinions would analyzed separately if $r < -.75$, and $r(538) = .42$, $p < .001$. The policy beliefs were combined to pool effect

sizes across studies for the meta-analysis. As a robustness check for the main approach, the policy items were also analyzed separately using partial correlations. Support for a carbon tax was uniquely predicted by explicit identity, $r(541) = .47, p < .0001$, and also implicit identity, $r(541) = .10, p = .017$. Opposing the Keystone XL pipeline (the pro-environmental stance) was uniquely predicted by explicit identity, $r(538) = .45, p < .0001$, and uniquely by implicit identity, $r(538) = .11, p = .013$. These results are consistent with the two-item policy composite used in the main analyses.

Study 2. Length of ST-IAT. In Study 2, the ST-IAT was doubled in length from 192 critical trials (48 trials / critical blocks) to 384 critical trials (96 trials / critical block). This change may be responsible for differences in predictive validity compared to other studies, as participant fatigue may have increased the relative contribution of non-associative processes in ST-IAT performance (Calanchini & Sherman, 2013). However, we urge caution with comparing effects across the studies. Different results could also be due to the different operationalizations of policy preferences and behaviors. The meta-analytic pooled effect sizes are the most reliable estimate of the aggregate relationship between implicit identity with policy support and behavior.

Study 2 had a lower retention rate (37%) relative to the other two studies using general population samples (Studies 1 & 3b: 69%). This lower retention rate could have also induced differential attrition. Relative to Studies 1 and 3b, there were more women in Study 2 (69%; 61% in Study 1, and 61% in Study 3b). However, participants in Study 2 were not different than Studies 1 and 3b on political ideology, education, or age, $ps > .05$.

Studies 3a-b. The pre-registered analysis plan stated that the three policy opinions and the two novel policy reactions would be combined into separate composites. The two composites are analyzed separately here using partial correlations. The three-item policy composite was

uniquely predicted from explicit identity, 3a & 3b $rs \geq .61$, $ps < .0001$, but not from implicit identity, $|rs| \leq .04$, $ps \geq .43$. The two-item novel policy composite was uniquely predicted from explicit identity, $rs \geq .45$, $ps < .0001$, but not from implicit identity, $|rs| \leq .10$, $ps \geq .06$. These results are consistent with the five-item policy composite in the main analyses.

In sum, secondary analyses and robustness checks suggest that the main meta-analytic results are reliable and robust. Explicit identity is a strong and unique predictor of behavior and policy preferences, whereas implicit identity is not.