



# Diverse segments of the US public underestimate the environmental concerns of minority and low-income Americans

Adam R. Pearson<sup>a,1</sup>, Jonathon P. Schuldt<sup>b</sup>, Rainer Romero-Canyas<sup>c,d</sup>, Matthew T. Ballew<sup>e</sup>, and Dylan Larson-Konar<sup>c,f</sup>

<sup>a</sup>Department of Psychology, Pomona College, Claremont, CA 91711; <sup>b</sup>Department of Communication, Cornell University, Ithaca, NY 14853; <sup>c</sup>Environmental Defense Fund, New York, NY 10010; <sup>d</sup>Department of Psychology, Columbia University, New York, NY 10027; <sup>e</sup>Yale School of Forestry and Environmental Studies, Yale University, New Haven, CT 06511; and <sup>f</sup>Department of Psychology, University of Florida, Gainesville, FL 32611

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**In a nationally representative survey experiment, diverse segments of the US public underestimated the environmental concerns of nonwhite and low-income Americans and misperceived them as lower than those of white and more affluent Americans. Moreover, both whites and nonwhites and higher- and lower-income respondents associated the term “environmentalist” with whites and the well-educated, suggesting that shared cultural stereotypes may drive these misperceptions. This environmental belief paradox—a tendency to misperceive groups that are among the most environmentally concerned and most vulnerable to a wide range of environmental impacts as least concerned about the environment—was largely invariant across demographic groups and also extended to the specific issue of climate change. Suggesting these beliefs are malleable, exposure to images of a racially diverse (vs. nondiverse) environmental organization in an embedded randomized experiment reduced the perceived gap between whites’ and nonwhites’ environmental concerns and strengthened associations between nonwhites and the category “environmentalists” among minority respondents. These findings suggest that stereotypes about others’ environmental attitudes may pose a barrier to broadening public engagement with environmental initiatives, particularly among populations most vulnerable to negative environmental impacts.**

diversity | sustainability | climate change | stereotypes | social influence

**E**nvironmental problems like climate change present a host of unique risks, from threats to public health to unprecedented political and economic challenges, that require cooperation among diverse stakeholders. There is considerable evidence that such challenges disproportionately threaten racial and ethnic minority and low-income communities. Within the United States, race and income predict differential exposure to a wide range of environmental hazards linked to persistent health disparities (1–5). For instance, epidemiological studies indicate that fine air pollutants are responsible for nearly one in five ischemic heart-disease-related deaths nationwide, with the highest mortality rates occurring in large, racially and ethnically diverse metropolitan areas (4). Due in part to discriminatory zoning practices and racial segregation in the United States, blacks and Latinos are significantly more likely to live in regions with hazardous waste (2) and substandard air quality (6, 7) and experience 38% higher residential NO<sub>2</sub> air pollution concentrations, on average, relative to whites (8). Moreover, although outreach efforts within the United States have traditionally focused on enhancing the salience of environmental hazards to increase public concern, national opinion polls reveal high awareness of environmental risks and strong support for environmental protections (e.g., regulating carbon emissions) among US Latinos, blacks, and Asians, including during periods of economic decline (9–15).

Despite these inequities, racial and ethnic minorities remain underrepresented in key decision-making bodies within the US environmental sector. Despite constituting nearly 40% of the US population (16), minorities comprise just 12% of staff of both US government environmental agencies and nongovernmental

environmental organizations (17). This underrepresentation may carry substantial societal costs. Persistent social divides over both local and national environmental policies highlight the need to better understand factors that impede public engagement, particularly among fast-growing segments of the US public (18). Moreover, new labor demands, driven by global growth in clean energy and energy-efficient products and services, will require more inclusive workforce development and recruitment efforts (17). Understanding factors that influence minority and low-income Americans’ participation in environment-related professions and decision making may help governments develop more equitable environmental policies, as well as meet key sustainable development goals (19).

Whereas a substantial body of literature has documented both environmental inequities and the political processes that generate and sustain them (2, 18), few studies have examined public perceptions that might facilitate or impede efforts to address these inequities (20–22). We examine one such set of psychological processes—people’s beliefs about the environmental concerns of others, particularly of vulnerable populations—which may have implications for efforts to mobilize public support for pro-environmental initiatives (2, 12). We find that despite reporting high levels of environmental concern, racial and ethnic minorities and low-income groups are perceived as least concerned by large segments of the US public. Additionally, we

## Significance

**Perceived norms (e.g., beliefs about the consensus views of others) have been shown to predict a broad range of pro-environmental behaviors. We document widespread underestimation of the environmental concerns of a broad range of sociodemographic groups among the US public. This underestimation was largest for judgments of minorities’ and low-income Americans’ concerns—groups that indicate high levels of environmental concern in public opinion surveys—and tracked with stereotypes of environmentalists as white and highly educated, similarly widely shared across demographic groups. These findings point to false beliefs about the environmental concerns of vulnerable populations as a potential impediment to addressing environmental inequities and broadening public participation in environmental decision making.**

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<sup>1</sup>To whom correspondence should be addressed. Email: adam.pearson@pomona.edu.

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find that this environmental belief paradox extends to minority and lower-income respondents, who similarly underestimate the environmental attitudes of their own social groups (i.e., ingroups), and that these misperceptions track with stereotypes of environmentalists as white and middle-class that are similarly shared across a broad range of demographic groups.

Public opinion scholarship has traditionally examined personal environmental attitudes and beliefs, with fewer studies assessing how people perceive the environmental concerns of different demographic groups. This is surprising, given that perceived norms—beliefs about what others think and do—are powerful drivers of environmental behavior. For example, people are more likely to act on their proenvironmental values (23) and to save water, conserve energy, and avoid littering when led to believe that a majority of similar others do the same (24, 25). Moreover, interventions signaling that conservation is normative have been shown to be nearly twice as effective at promoting energy savings as monetary incentives or statewide campaigns urging reduced consumption during periods of peak demand (26). Negative consequences of pluralistic ignorance—a false belief that one's personal views deviate from the consensus views of others (27)—are similarly well-documented. These include attitudinal and behavioral conformity to the (mis)perceived norm (25, 27), feelings of alienation (27), and self-silencing when discussing potentially divisive topics, such as climate change (28).

The present study investigated whether perceptions of others' environmental concerns, and particularly those of ingroup members, vary systematically across demographic groups, which may have implications for understanding how members of underrepresented groups engage with environmental organizations and initiatives. Identity-based motivation theory posits that minority and lower-income Americans are particularly attuned to norms signaling what is appropriate and preferred by their ingroup and, consequently, are more likely to engage in behaviors perceived as normative or “identity-congruent” (29). In the absence of such information, people may rely on stereotypes to infer ingroup norms (29, 30). For instance, in part due to greater resource constraints, Americans of lower socioeconomic status are more sensitive to the opinions of others, relative to individuals of higher socioeconomic status, and show stronger effects of perceived norms on their environmental behavior (31). Additional research suggests perceived norms may influence whether members of minority groups engage in conversation about environmental issues. In a nationally representative survey, 53% of whites indicated a willingness to discuss differing viewpoints on climate change with family and friends, compared with 44% of Asians, 34% of Latinos, and 26% of blacks, despite all three minority groups reporting greater concern than whites about the impacts of climate change on their communities (32). Thus, inferences about what ingroup members believe may impact how people—particularly members of minority and lower-income groups—engage with environmental causes.

In the present research, we focus on perceived attitudinal norms—specifically, estimates of others' environmental concerns—given their documented role in promoting individual and collective proenvironmental behaviors (25, 33, 34) and longstanding scholarly interest in the environmental concerns of minority groups within the United States (14). We document the nature of these perceptions in a national probability sample and the extent to which they may be rooted in stereotypic representations of environmentalists. Given common media portrayals of environmentalists as white and middle-class (14, 35), we hypothesized that respondents would underestimate the environmental concerns of racial and ethnic minority and lower-income Americans, but not those of whites and higher-income Americans, and that the former would be viewed as relatively non-representative of the category “environmentalists.” Our nationally representative survey also allowed us to explore whether these perceptions would generalize to minority and lower-income respondents, and to white males, a group that shows uniquely low perceptions of environmental risks in national surveys—consistent with their more privileged position in US society (15, 36).

To test the potential causal role of minority representation as a driver of these perceptions, participants evaluated either an ostensibly racially/ethnically diverse or nondiverse environmental organization's mission statement in an embedded randomized experiment before indicating their responses. Despite the prevalence of pro-diversity messages within US organizations (37, 38), and increasingly within the US environmental sector (39), few studies have examined how such messages are perceived by different segments of the public. Research suggests diversity cues, such as images conveying high minority representation and statements signaling organizational commitment to diversity, can enhance perceptions of minority inclusion and promote a sense of belonging among members of underrepresented groups (38). Thus, we hypothesized that exposure to a racially and ethnically diverse environmental organization would enhance perceptions of the environmental concerns of nonwhites and reduce the tendency to associate whites (vs. nonwhites) with the category “environmentalists.”

## Study Overview

Utilizing a probability-based sample of US adults, the present research examined (i) public perceptions of the environmental concerns of various sociodemographic groups and (ii) how these perceptions relate to stereotypic representations of environmentalists. We document consensus in these perceptions, their inaccuracy relative to self-reports, and their sensitivity to organizational diversity messages.

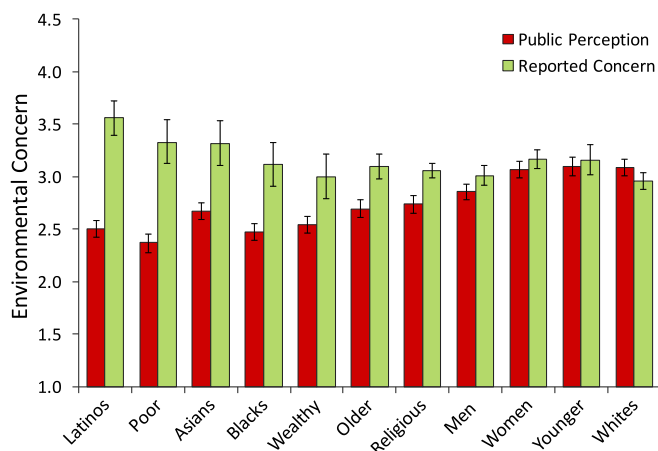
Participants completed survey items indicating their level of concern for the environment (scale: 1 = not at all concerned, 2 = somewhat concerned, 3 = moderately concerned, 4 = very concerned, 5 = extremely concerned) and whether they identified as an “environmentalist” (1 = yes, definitely, 2 = yes, somewhat, 3 = no). Participants then indicated, on 5-point scales, age (1 = very young, 3 = neutral, 5 = very old) and class (1 = very poor, 3 = neutral, 5 = very rich and 1 = very uneducated, 3 = neutral, 5 = very educated) associations with the term “environmentalist,” and the extent to which they associated each of five racial/ethnic groups with the category “environmentalists” (1 = not at all, 5 = very much). Last, they rated the level of environmental concern of each of 12 US demographic groups using the same 5-point scale used to assess respondents' personal level of concern. Respondents in the bottom (<\$15,000) and top (>\$150,000) income deciles were used as reference groups for “Poor” and “Wealthy” response categories, respectively.

To investigate the potential malleability of these perceptions, respondents were randomly assigned to evaluate either a racially and ethnically diverse or nondiverse environmental organization mission statement in an embedded experiment (*SI Appendix, Fig. S1*) before completing the survey items described above. Additionally, to assess the generalizability of these perceived norms in light of research on labeling effects in environmental surveys (40), respondents were randomly assigned to estimate concerns about “the environment” or “climate change,” the latter representing a specific environmental issue that is highly politicized in the United States.

## Results

All analyses report weighted estimates to match US Census Bureau population characteristics. Below, we present analyses reporting unadjusted (raw) estimates. Robustness tests showing similar patterns controlling for political ideology, household income, educational attainment, gender, and treatment effects, as well as a more detailed description of all analytic procedures, are included in *SI Appendix*.

Figs. 1 and 2 show mean estimates aggregated across diversity treatment conditions (for disaggregated estimates see *SI Appendix, Figs. S10 and S11* and treatment effect analyses discussed below). As shown in Fig. 1, on average, participants significantly underestimated the environmental concerns of all rated demographic groups except whites and younger Americans, relative to each group's mean level of reported concern ( $P$ s < 0.001). Participants also rated all groups except whites, women, and younger Americans significantly below the scale midpoint (3.0)



**Fig. 1.** Mean perception of each rated demographic group's concern (red bar) and each group's mean reported concern (green bar) for the environment, aggregated across diversity treatment conditions. Error bars are 95% CIs. Groups are ordered, left to right, by magnitude of underestimation.

( $P$ s < 0.001). In contrast, participants overestimated whites' environmental concern, relative to whites' mean self-report ( $P$  = 0.002). Self-reported levels of concern showed the opposite pattern, with nonwhites reporting significantly higher levels of concern, on average, than whites ( $P$  < 0.001) and significantly above the scale midpoint ( $P$ s < 0.001). These differences remained significant when controlling for political ideology, gender, education, and income (*SI Appendix*).

Moreover, as hypothesized, both whites and nonwhites (aggregated across black, Latino, and Asian respondents) underestimated the concern of each rated minority group compared with each group's mean self-report rating ( $P$ s < 0.001) and misperceived each rated minority group's concern as being lower than that of whites ( $P$ s < 0.001) (*SI Appendix*, Figs. S2–S3). Similar effects emerged for income: Americans across income deciles underestimated the environmental concerns of poor and wealthy Americans ( $P$ s < 0.01) and rated poor Americans as significantly less concerned than wealthy Americans ( $P$  < 0.001) (*SI Appendix*, Fig. S4). This pattern shows consensus in lay beliefs about the environmental attitudes of nonwhite and lower-income Americans across demographic groups.

Next, we examined whether nonwhites' tendency to underestimate their own racial/ethnic group's concern reflected a pattern of pluralistic ignorance (27, 28), whereby nonwhites misperceive that their level of concern differs from that of other ingroup members. *SI Appendix*, Fig. S5 shows the proportion of respondents who indicated a level of environmental concern either above, equal to, or below what they reported for their racial/ethnic ingroup. Consistent with this possibility, whereas blacks ( $\chi^2$  = 7.483,  $P$  = 0.024), Latinos ( $\chi^2$  = 20.614,  $P$  < 0.001), and Asians ( $\chi^2$  = 9.814,  $P$  = 0.007) were more likely to report being more concerned than others in their racial/ethnic ingroup than to report being equally or less concerned, whites were more likely to report being less concerned rather than more concerned than other whites ( $\chi^2$  = 5.543,  $P$  = 0.019), reflecting opposite patterns of pluralistic ignorance for nonwhites and whites. A similar pattern of pluralistic ignorance was observed for income, with a majority (54.1%) of respondents in the lowest income decile reporting being more concerned than those in their comparative income group ( $\chi^2$  = 12.250,  $P$  = 0.002) (*SI Appendix*).

Moreover, as hypothesized, participants showed strong consensus in their racial, ethnic, and class associations with the term “environmentalists.” On average, both white and nonwhite respondents associated environmentalists with whites more than nonwhites ( $P$ s < 0.001) (*SI Appendix*). In contrast, respondents' associations for blacks, Latinos, and Asians fell reliably below the midpoint of the scale, reflecting a dissociation between these

groups and environmentalists ( $P$ s < 0.001) (Fig. 2A and *SI Appendix*, Fig. S6). Similar consensus was found for class (wealth and education) associations, such that the term “environmentalist” was associated with being moderately wealthy and highly educated, relative to the scale midpoints ( $P$ s < 0.001), as well as younger in age ( $P$  < 0.001) (Fig. 2B and *SI Appendix*, Fig. S6). These associations varied little as a function of respondents' race/ethnicity or socioeconomic status, indicating broad consensus in societal stereotypes of environmentalists.

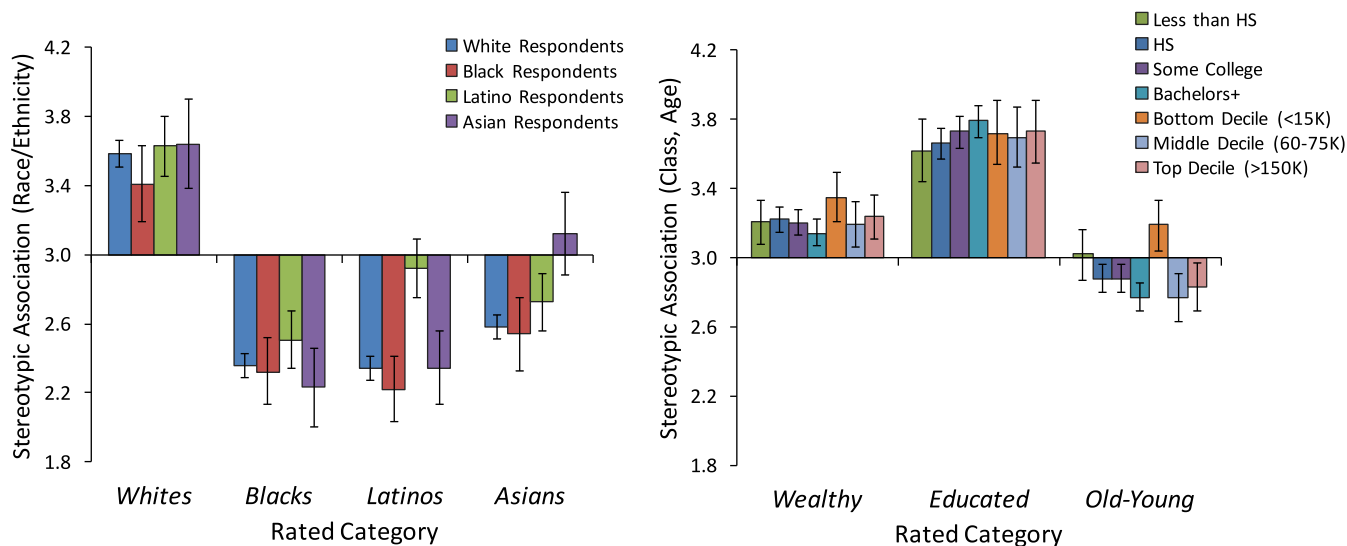
These stereotypic associations did not match the distribution of respondents who self-identified as an environmentalist across demographic groups. Compared with white respondents (50.2%), fewer blacks (33.1%;  $\chi^2$  = 13.58,  $P$  < 0.001), but a significantly greater proportion of Latinos (65.2%;  $\chi^2$  = 13.26,  $P$  < 0.001) and Asians (67.6%;  $\chi^2$  = 7.90,  $P$  = 0.005), self-identified as an environmentalist. Moreover, when controlling for gender and political ideology, neither education [ $B$  = 0.037, odds ratio (OR) = 1.038,  $P$  = 0.227] nor income ( $B$  = 0.002, OR = 1.002,  $P$  = 0.880) was a significant predictor of self-identification as an environmentalist (for further information see *SI Appendix*, Fig. S8A–C).

These stereotypic associations, as well as the underestimation of environmental concern across target groups, were similar when comparing white male respondents to other demographic groups (i.e., nonwhite male respondents) (see *SI Appendix* for more on these analyses). Consistent with research on the “white male effect” (15, 36), when controlling for political ideology, white males reported less environmental concern than other respondents (aggregated) [means ( $M$ s) = 2.86 and 3.21, respectively,  $t(1,163)$  = 4.828,  $P$  < 0.001; including white females,  $M$  = 3.06,  $P$  = 0.013]. However, as with other respondents, white males significantly underestimated the environmental concerns of all target groups ( $t$ s < -3.32,  $P$ s < 0.01) except younger Americans ( $t$  = 1.13,  $P$  = 0.26) and whites ( $P$  = 0.057) and showed similar stereotypic biases in associating environmentalists with whites more than nonwhites ( $P$ s < 0.001) (*SI Appendix*).

Next, we examined whether respondents' stereotypic associations with the term “environmentalists” predicted their estimation of their racial/ethnic ingroup's level of environmental concern, potentially reflecting a process whereby attitudinal norms are inferred, in part, through stereotypic representations of who comes to mind when one thinks of an environmentalist. As anticipated, for both white and nonwhite respondents, the strength of association between their racial/ethnic ingroup and the term “environmentalists” strongly predicted estimates of their ingroup's environmental concern, even when controlling for their self-reported environmental concern (all  $P$ s < 0.001) (*SI Appendix*, Table S2).

To explore the malleability of these perceptions, we examined whether exposure to a racially and ethnically diverse vs. non-diverse environmental organization mission statement would correct respondents' false belief that whites are more environmentally concerned than nonwhites and reduce bias in associating whites (vs. nonwhites) with environmentalists. Specifically, we computed two difference scores reflecting (i) bias in respondents' ratings of whites' environmental concern relative to their ratings for nonwhites (averaged across all nonwhite target categories) (Fig. 3, *Left*) and (ii) bias in associating environmentalists with whites relative to nonwhites (Fig. 3, *Right*), with positive scores indicating a perception that whites are more environmentally concerned and more strongly associated with the term “environmentalists” than nonwhites, respectively.

As hypothesized, exposure to a diverse (vs. nondiverse) organization significantly reduced the perceived difference in environmental concern between whites and nonwhites, ( $P$  = 0.006) (Fig. 3 and *SI Appendix*). This effect was similar for white and nonwhite respondents, as indicated by a nonsignificant interaction between experimental treatment and respondent race/ethnicity (white vs. nonwhite) ( $P$  = 0.335). Further analyses suggested that the bias in perceived concern was reduced because exposure to a diverse organization decreased perceptions of whites' environmental concern specifically ( $P$  = 0.017), an unexpected finding that we discuss in more detail below. Exposure to



**Fig. 2.** Racial/ethnic (*Left*) and class (wealth and education) and age (*Right*) associations with the term “environmentalist” by respondent race/ethnicity and socioeconomic status (education and income), respectively. Bars indicate strength of association with each rated category relative to the scale midpoint. Scales were 1 = not at all to 5 = very much and 1 = very poor/uneducated/young, 3 = neutral, 5 = very wealthy/educated/old. Error bars are 95% CIs.

a diverse (vs. nondiverse) organization similarly attenuated bias in associating environmentalists with whites more than nonwhites, but only among minority respondents, as seen by a significant treatment  $\times$  race interaction ( $P = 0.019$ ) (Fig. 3). Simple effects analyses revealed that this was due to minority (but not white) respondents’ more strongly associating nonwhites with the category “environmentalists” in the diverse (vs. nondiverse) condition ( $P = 0.045$ ) (*SI Appendix*).

Finally, in a randomized, between-subjects design, we examined whether ratings of concern differed when respondents were asked about the environment vs. a specific and highly politicized environmental issue, climate change. A pattern similar to that reported in Fig. 1 emerged, with nonwhite and lower-income Americans rated as significantly less concerned about climate change than whites and wealthier Americans, respectively (*SI Appendix*, Fig. S9). Independent samples  $t$  tests indicated that six groups (Asians, Latinos, men, older, religious, and poor Americans) were perceived as more concerned about the environment in general than they were about climate change specifically ( $P_s < 0.05$ ); however, no other significant differences were found as a function of issue framing.

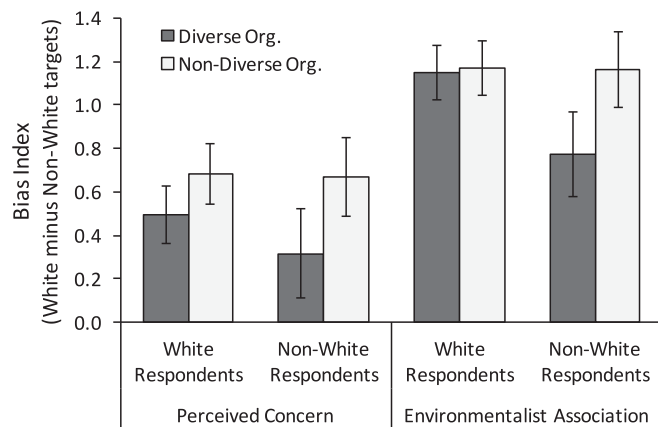
**Discussion**

Within the United States, racial and ethnic minorities are projected to account for a majority of the US population under 18 y of age by 2020 (41). These rapidly shifting demographics underscore a need for research that can inform efforts to broaden public participation in environmental decision making, and particularly among growing segments of the public that are disproportionately affected by environmental problems. Nevertheless, a variety of factors may limit attention to environmental justice, and race- and class-based environmental inequities in particular, including disagreements about their causes and remedies, and their historically low prioritization in environmental policy making (2, 22).

The present research points to public perceptions that may pose an additional barrier to addressing longstanding environmental disparities. Indeed, over 25 y since the first national-level study found that African Americans express as much environmental concern as white Americans (12), we find that diverse segments of the US public underestimate the environmental concerns of nonwhite and low-income Americans and misperceive them as lower than those of whites and more affluent Americans. We refer to this as a belief paradox as groups that are among the most vulnerable to environmental impacts and show high levels of

environmental concern in public opinion surveys, including in the present study, were rated as least concerned about the environment. Moreover, consensus perceptions of environmentalists as white and middle-class, documented here, generally did not reflect the demographic distribution of those who self-identified as an environmentalist. Notably, these perceptions were not limited to white males—a group that shows uniquely low levels of environmental risk perception within the United States (15, 36)—or to those born in the United States, and were shared by minority and lower-income respondents (see *SI Appendix* for more discussion).

These findings may carry practical implications. To the extent policymakers, scholars, and practitioners endorse similar views, these misperceptions may influence which groups’ perspectives get prioritized, and, more generally, contribute to the historical marginalization of minority and lower-income populations in environmental advocacy and policy making (2, 17). Indeed, national surveys of US environmental majors suggest differing priorities of whites and minorities within the professional pipeline: Whereas 53% of minorities rated diversity of workforce as very or extremely



**Fig. 3.** Average bias in perceptions of whites’ environmental concern relative to nonwhites’ (*Left*) and associations between whites and “environmentalists,” relative to nonwhites (*Right*), by exposure to a diverse (dark bars) or nondiverse (light bars) environmental organization. Error bars are 95% CIs.

important in their employment decisions, just 29% of whites did so; a similar racial/ethnic gap emerged in the importance white and nonwhite environmental majors placed on working with minority and low-income communities (42). Our findings may also have implications for how minorities and lower-income groups engage with advocacy organizations. Prior research suggests that negative stereotypes of environmentalists as eccentric and impersonable can reduce people's motivations to affiliate with environmental groups and adopt proenvironmental behaviors (43). Our findings suggest these stereotypes extend to broad sociodemographic categories that exclude a growing percentage of Americans. Identification with environmental groups has been shown to predict a wide range of environmental behaviors, including conservation behavior, consumer choices, and collective action to address environmental problems (44, 45). Viewing the category "environmentalists" as noninclusive may, thus, have implications for collective action by underrepresented groups and their trust in advocacy organizations and policy makers (46). Future research might consider these possibilities, as well as potential behavioral consequences of the perceptions documented here.

More generally, our findings highlight the need for additional research examining how identity factors, and particularly those related to race, ethnicity, and social class, may interact with perceived norms to shape proenvironmental behavior. Messages that incorporate normative information rank among the most effective behavioral interventions to promote conservation (25, 26, 47). However, we find that normative perceptions vary systematically across racial/ethnic groups within the United States and are sensitive to levels of diversity portrayed in environmental advocacy. Specifically, exposure to a racially diverse (vs. nondiverse) environmental organization reduced the racial gap in perceived environmental concerns and enhanced the perceived identity congruence between nonwhites and environmentalists among minority respondents. These findings point to the potential utility of identity-based normative messages (e.g., messaging that highlights the environmental concern of race- or class-based ingroups) for enhancing public engagement, particularly among historically underrepresented groups—a promising avenue for further study.

We note that the diversity messages used here may not generalize to all prodiversity messages conveyed by organizations. Indeed, in some contexts, prodiversity messages can be perceived by members of the majority group as biased, reducing these individuals' support for diversity initiatives (37). Moreover, efforts to address race-based inequities in environmental harms may be met with resistance by individuals who perceive that minorities have received advantageous treatment (22). Thus, racial bias may also hinder public support for addressing disparities, which may hold implications for how people respond to the types of diversity messaging examined here. Additionally, we found that exposure to a diverse (vs. nondiverse) organization decreased perceptions of whites' environmental concern, rather than increasing perceptions of nonwhites' environmental concern. Although our data cannot directly address this finding, research on stereotyping suggests that the portrayal of whites as a statistical minority in the diverse condition may have rendered whites, and their low representation, particularly salient when drawing inferences (48). Future research might explore whether varying the racial composition of an environmental organization (e.g., showing equal representation of whites and nonwhites) or frequency of exposure (e.g., repeated messaging) affects the malleability of judgments of minorities' concerns.

We note some additional limitations of this research. We focused on perceived attitudinal norms, given longstanding scholarly interest in the environmental concerns of vulnerable populations (14) and their demonstrated role in shaping environmental behaviors (25, 33). Future studies might examine whether our results generalize to other normative perceptions, such as beliefs about what behaviors are expected (prescriptive norms) or common (behavioral norms), which may interact with perceived attitudinal norms to influence behavior (25, 34). Additionally, to maximize statistical power, we restricted racial/ethnic subgroup analyses to the four

largest racial/ethnic US Census categories and examined effects of race and class separately, rather than their intersection—a potentially fruitful avenue for future work. Moreover, although we aggregate across diverse and nondiverse treatment conditions to show mean perceptions, as seen in Figs. 1 and 2, we note that these estimates may not fully represent those of the US public in the absence of such exposure. Future investigations might also consider other factors that may contribute to the perceptions documented here, such as a belief that minority and lower-income communities prioritize economic concerns over the environment (14) or tendencies to equate environmentalism with the protection of non-urban environments (2).

More generally, future research might examine the extent to which the misperceptions documented here contribute to the well-documented "attitude-action" gap in US environmental engagement. Indeed, in a recent survey, three in four Americans indicated that they were concerned about helping the environment in their daily lives, but only one in five reported that they make a sustained effort to live in ways that help protect the environment (49). Underestimating others' concern for the environment, and particularly the concerns of a growing segment of the US public, may hinder action among policy makers and impede broader collective action. As nations such as the United States become increasingly diverse, identifying pathways for broadening public engagement may help organizations and governments develop more just environmental policies, as well as meet key sustainability goals in the 21st century.

## Materials and Methods

**Participants.** A nationally representative survey of 1,212 US adults (18 y and older) was conducted April 15–May 1, 2016. The study was approved by the IRB at Cornell University. All questionnaires were administered in an online survey. Participants indicated their consent to participate before continuing. Median survey completion time was 15 min. The sample was drawn from GfK's KnowledgePanel, an online panel of members drawn using probability sampling methods. Respondents were recruited using a combination of random digit dial and address-based sampling, based on residential US Postal Service addresses; households were provided with internet access and/or a computer to complete the survey. Demographic variables were weighted, postsurvey, to match US Census Bureau Current Population Survey sample characteristics. For more information, see *SI Appendix, Table S1*. Data and study materials are available from the authors.

**Procedure and Materials.** Analyses focused on the four largest US Census racial/ethnic demographic groups. Racial/ethnic respondent categories (self-identified) were created to provide nonoverlapping sample estimates for the four largest US racial/ethnic demographic groups, corresponding to racial/ethnic categories rated in the survey: Hispanics/Latinos, non-Hispanic whites, non-Hispanic blacks/African Americans, and non-Hispanic Asian/Asian Americans (for more information, see *SI Appendix*). Household income was treated as a continuous variable when included as a covariate in analyses, assessed as a 19-category measure from "less than \$5,000" to "\$175,000 or more." For comparisons for income, deciles are reported, with respondents in the bottom (<\$15,000) and top (>\$150,000) income deciles used as comparison groups for poor and wealthy categories, respectively, corresponding to a lower-income category below the 2016 federal poverty designation of \$16,020 for a two-person household and an upper-income category above the modal open-ended response (\$100,000) in surveys asking Americans to indicate the annual income necessary for a family to be considered wealthy (50). A binary measure of self-identification as an environmentalist was used in analyses, collapsing across "yes, definitely" and "yes, somewhat" responses to reflect identification or nonidentification (for a summary of all three response categories, see *SI Appendix, Fig. S8*).

Participants were randomly assigned to evaluate one of two mission statements (*SI Appendix, Fig. S1*). Both statements described a hypothetical US-based environmental organization that focuses on "helping companies, governments, and communities find ways to protect the environment and empower people to live better lives." In the diverse condition, the organization was described as one where "different perspectives are valued" and included an image showing a racially and ethnically diverse staff. The non-diverse condition excluded this information. Participants then evaluated the organization's inclusivity (e.g., "This organization is open to people with

diverse backgrounds and perspectives"; 1 = strongly disagree, 2 = somewhat disagree, 3 = neither agree nor disagree, 4 = somewhat agree, 5 = strongly agree) as a manipulation check (for more about this task and measures, see *SI Appendix*). Participants then indicated age, class, and racial/ethnic category associations with the term "environmentalists." Last, they estimated how concerned each of the 11 demographic groups (order randomized) in the United States is about either the environment or climate change,

randomized between subjects. For detailed information on study measures, see *SI Appendix*.

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- Chakraborty J, Maantay JA, Brender JD (2011) Disproportionate proximity to environmental health hazards: Methods, models, and measurement. *Am J Public Health* 101:527–536.
- Mohai P, Pellow D, Roberts JT (2009) Environmental justice. *Annu Rev Environ Resour* 34:405–430.
- Morello-Frosch R, Jesdale BM (2006) Separate and unequal: Residential segregation and estimated cancer risks associated with ambient air toxics in U.S. Metropolitan areas. *Environ Health Perspect* 114:386–393.
- Fann N, et al. (2012) Estimating the national public health burden associated with exposure to ambient PM<sub>2.5</sub> and ozone. *Risk Anal* 32:81–95.
- Waters MC (2016) Life after hurricane Katrina: The Resilience in Survivors of Katrina (RISK) project. *Sociol Forum* 31:750–769.
- Bell ML, Ebisu K (2012) Environmental inequality in exposures to airborne particulate matter components in the United States. *Environ Health Perspect* 120:1699–1704.
- Miranda ML, Edwards SE, Keating MH, Paul CJ (2011) Making the environmental justice grade: The relative burden of air pollution exposure in the United States. *Int J Environ Res Public Health* 8:1755–1771.
- Clark LP, Millet DB, Marshall JD (2014) National patterns in environmental injustice and inequality: Outdoor NO<sub>2</sub> air pollution in the United States. *PLoS One* 9:e94431.
- Dietz T, Dan A, Shwom R (2007) Support for climate change policy: Social psychological and social structural influences. *Rural Sociol* 72:185–214.
- Leiserowitz A, Akerlof K (2010) Race, ethnicity and public responses to climate change (Yale Univ, New Haven, CT). Available at [climatecommunication.yale.edu/publications/race-ethnicity-and-public-responses-to-climate-change/](http://climatecommunication.yale.edu/publications/race-ethnicity-and-public-responses-to-climate-change/). Accessed October 16, 2018.
- Macias T (2016) Environmental risk perception among race and ethnic groups in the United States. *Ethnicities* 16:111–129.
- Mohai P (2003) Dispelling old myths: African American. *Environ Sci Policy Sustain Dev* 45:10–26.
- Pearson AR, Ballew MT, Naiman S, Schuldt JP (2017) Race, class, gender and climate change communication. *Oxford Encycl Clim Chang Commun* 1:1–38.
- Jones RE (2002) Blacks just don't care: Unmasking popular stereotypes about concern for the environment among African-Americans. *Int J Public Adm* 25:221–251.
- Kalof L, Dietz T, Guagnano G, Stern PC (2002) Race, gender and environmentalism: The atypical values and beliefs of white men. *Race Gender Class* 9:112–130.
- US Census Bureau (2012–2016) AC demographic and housing estimates: 2012–2016 American Community Survey 5-year estimates. Available at [https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS\\_16\\_5YR\\_DP05&src=pt](https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_DP05&src=pt). Accessed September 8, 2018.
- Taylor DE (2014) The state of diversity in environmental organizations (Univ of Michigan, Ann Arbor, MI).
- Weinstein JN, et al. (2017) *Communities in Action: Pathways to Health Equity* (National Academies Press, Washington, DC).
- United Nations (2018) The sustainable development goals report 2018 (United Nations, New York), pp 1–56.
- Chanin J (2018) The effect of symbolic racism on environmental concern and environmental action. *Environ Sociol* 4:457–469.
- Benegal SD (2018) The spillover of race and racial attitudes into public opinion about climate change. *Environ Polit* 27:733–756.
- Dietz T, Duan R, Nalley J, Van Witsen A (2018) Social support for water quality: The influence of values and symbolic racism. *Hum Ecol Rev* 24:51–70.
- Steg L (2016) Values, norms, and intrinsic motivation to act proenvironmentally. *Annu Rev Environ Resour* 41:277–292.
- Cialdini RB (2003) Crafting normative messages to protect the environment. *Curr Dir Psychol Sci* 12:105–109.
- Miller DT, Prentice DA (2016) Changing norms to change behavior. *Annu Rev Psychol* 67:339–361.
- Benartzi S, et al. (2017) Should governments invest more in nudging? *Psychol Sci* 28:1041–1055.
- Prentice DA, Miller DT (1993) Pluralistic ignorance and alcohol use on campus: Some consequences of misperceiving the social norm. *J Pers Soc Psychol* 64:243–256.
- Geiger N, Swim JK (2016) Climate of silence: Pluralistic ignorance as a barrier to climate change discussion. *J Environ Psychol* 47:79–90.
- Oyserman D, Fryberg SA, Yoder N (2007) Identity-based motivation and health. *J Pers Soc Psychol* 93:1011–1027.
- Rivera LM, Benitez S (2016) The roles of in-group exemplars and ethnic racial identification in self-stereotyping. *Soc Cogn* 34:604–623.
- Eom K, Kim HS, Sherman DK (2018) Social class, control, and action: Socioeconomic status differences in antecedents of support for pro-environmental action. *J Exp Soc Psychol* 77:60–75.
- Speiser M, Krygsman K (2014) American climate values 2014: Insights by racial and ethnic groups (ecoAmerica, Washington, DC).
- de Groot JIM, Abrahamse W, Jones K (2013) Persuasive normative messages: The influence of injunctive and personal norms on using free plastic bags. *Sustainability* 5:1829–1844.
- Blanton H, Köblitz A, McCaul KD (2008) Misperceptions about norm misperceptions: Descriptive, injunctive, and affective 'social norming' efforts to change health behaviors. *Soc Personal Psychol Compass* 2:1379–1399.
- Finney C (2014) *Black Faces, White Spaces: Reimagining the Relationship of African Americans to the Great Outdoors* (Univ of North Carolina Press, Chapel Hill, NC).
- Xiao C, McCright AM (2015) Gender differences in environmental concern. *Environ Behav* 47:17–37.
- Dover TL, Major B, Kaiser CR (2016) Members of high-status groups are threatened by pro-diversity organizational messages. *J Exp Soc Psychol* 62:58–67.
- Purdie-Vaughns V, Steele CM, Davies PG, Dittmann R, Crosby JR (2008) Social identity contingencies: How diversity cues signal threat or safety for African Americans in mainstream institutions. *J Pers Soc Psychol* 94:615–630.
- Beasley MA (2017) Beyond diversity: A roadmap to building an inclusive organization (Univ of Connecticut, Storrs, CT).
- Schuldt JP, Enns PK, Cavaliere V (2017) Does the label really matter? Evidence that the US public continues to doubt "global warming" more than "climate change." *Clim Change* 143:271–280.
- US Census Bureau (2018) Older people projected to outnumber children for first time in U.S. history. Available at <https://www.census.gov/newsroom/press-releases/2018/cb18-41-population-projections.html>. Accessed July 24, 2018.
- Taylor DE (2007) Diversity and equity in environmental organizations: The salience of these factors to students. *J Environ Educ* 39:19–44.
- Bashir NY, Lockwood P, Chasteen AL, Nadolny N, Noyes I (2013) The ironic impact of activists: Negative stereotypes reduce social change influence. *Eur J Soc Psychol* 43:614–626.
- Whitmarsh L, O'Neill S (2010) Green identity, green living? The role of pro-environmental self-identity in determining consistency across diverse pro-environmental behaviours. *J Environ Psychol* 30:305–314.
- Bamberg S, Rees J, Seebauer S (2015) Collective climate action: Determinants of participation intention in community-based pro-environmental initiatives. *J Environ Psychol* 43:155–165.
- Harring N, Jagers S, Jagers SC (2013) Should we trust in values? Explaining public support for pro-environmental taxes. *Sustainability* 5:210–227.
- Osbaldiston R, Schott JP (2012) Environmental sustainability and behavioral science: Meta-analysis of proenvironmental behavior experiments. *Environ Behav* 44:257–299.
- Pratto F, Hegarty P, Korchmaros J (2007) How communication practices and category norms lead people to stereotype particular people and groups. *Stereotype Dynamics: Language-Based Approaches to the Formation, Maintenance, and Transformation of Stereotypes*, eds Kashima Y, Fiedler K, Freytag P (Psychology, New York), pp 293–313.
- Anderson M (2017) For Earth Day, here's how Americans view environmental issues. Available at [www.pewresearch.org/fact-tank/2017/04/20/for-earth-day-heres-how-americans-view-environmental-issues/](http://www.pewresearch.org/fact-tank/2017/04/20/for-earth-day-heres-how-americans-view-environmental-issues/). Accessed July 24, 2018.
- Parker K (2012) Yes, the rich are different. Available at [www.pewsocialtrends.org/2012/08/27/yes-the-rich-are-different/](http://www.pewsocialtrends.org/2012/08/27/yes-the-rich-are-different/). Accessed July 24, 2018.