Race, Class, Gender and Climate Change Communication

Adam R. Pearson, Matthew T. Ballew, Sarah Naiman, and Jonathon P. Schuldt

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Summary and Keywords

Interest in the audience factors that shape the processing of climate change messaging has risen over the past decade, as evidenced by dozens of studies demonstrating message effects that are contingent on audiences' political values, ideological worldviews, and cultural mindsets. Complementing these efforts is a growing interest in understanding the role of *nonpartisan* social factors—including racial and ethnic identities, social class, and gender—that have received comparably less attention but are critical for understanding how the challenges posed by climate change can be effectively communicated in pluralistic societies. Research and theory on the effects of race, ethnicity, socioeconomic status (education and income), and gender on climate change perceptions suggest that each of these factors can independently and systematically shape people's attitudes and beliefs about climate change, as well as both individual and collective motivations to address it. Moreover, the literature suggests that these factors often interact with political orientation (ideology and party affiliation) such that climate change beliefs and risk perceptions are typically more polarized for members of advantaged groups than disadvantaged groups. Notably, differential polarization in the perceived dangers posed by climate change has increased in some group dimensions (e.g., race and income) from 2000 to 2010. Groups for whom the issue of climate change may be less politically charged, such as racial and ethnic minorities and members of socioeconomically disadvantaged groups, thus represent critical audiences for bridging growing partisan divides and building policy consensus. Nevertheless, critical knowledge gaps remain. In particular, few studies have examined effects of race or ethnicity beyond the U.S. context or explored ways in which race, ethnicity, class, and gender may interact to influence climate change engagement. Increasing attention to these factors, as well as the role of diversity more generally in environmental communication, can enhance understanding of key barriers to broadening public participation in climate discourse and decision-making.

Keywords: diversity, race, ethnicity, gender, socioeconomic status, social identity, acculturation, group processes, intergroup relations

Perhaps more than any contemporary social issue, climate change presents a host of challenges that require broad and sustained cooperation across diverse groups with often-competing interests. Beyond physical changes to the environment, these challenges in-

clude serious social obstacles, from threats to public health and community infrastructure to threats to social and political institutions and livelihoods (Doherty & Clayton, 2011; IPCC, 2014; Swim et al., 2011). Moreover, disparities in these impacts have grown increasingly apparent. Current models suggest that economically developing nations in sub-Saharan Africa and South Asia—the world's poorest and fastest-growing regions that are least equipped to respond to climate change—will experience its most severe effects (Burke, Hsiang, & Miguel, 2015). Within nations, women, communities of color, and members of other socioeconomically disadvantaged groups are substantially more vulnerable to negative impacts of climate change than members of advantaged groups (Bullard, Johnson, & Torres, 2011; United Nations Development Programme, 2007; ISSC and UNESCO, 2013).

Because socioeconomically disadvantaged groups are not only more vulnerable to effects of climate change, but also lack key influence in environmental policymaking and access to green jobs that are fundamental to a clean energy economy, diversity has traditionally been viewed within the environmental sector through the lens of equity (e.g., as a matter of environmental justice; see Harper-Anderson, 2012). However, declining public interest in climate change globally over the past decade and a persistent gap between public and scientific consensus on climate change in pluralistic societies like the United States underscore an added significance of research and advocacy aimed at broadening public engagement on climate issues (Anderegg & Goldsmith, 2014; Brulle, Carmichael, & Jenkins, 2012). With growing diversity and transnational migration within the United States, Europe, and Australasia, many industrialized nations will soon have a more diverse demographic makeup than ever before (United Nations Development Programme, 2007). As the world's nations work to meet commitments from the 2015 Paris Agreement, cooperation to address climate threats both within and between nations is paramount.

Understanding how social identities shape public engagement on climate change will be critical to this cooperation. To date, however, research on identity processes in climate change communication has primarily focused on effects of political orientation (e.g., partisan affiliations and political ideology) and individual-level factors (e.g., science literacy and environmental attitudes) that influence the processing of climate-related messages. Considerably less attention has been paid to how *nonpartisan* identities and group memberships, such as those related to race, ethnicity, class, and gender, influence public responses to the climate crisis (Moser, 2016; Pearson & Schuldt, 2015; Pearson, Schuldt, & Romero-Canyas, 2016). Attention to these factors can help researchers, organizations, and policymakers better understand what brings diverse stakeholders to the table and can inform efforts to build public consensus and motivate collective action to address climate change.

In this article, we review extant research on public opinion, as well as theoretical perspectives and empirical findings within psychology and communication, to examine how race, ethnicity, socioeconomic status (income and education), and gender can influence the processing of climate-related messaging and issue engagement. Throughout the arti-

cle, we identify consensus findings and key knowledge gaps and highlight potential applications for developing more effective, inclusive, and informed climate advocacy.

Race, Ethnicity, and Climate Change

In their review of public opinion work on climate change, Wolf and Moser (2011; see also Moser, 2016) distinguish between *understanding* (acquiring and using accurate knowledge and information about climate change), *perception* (e.g., subjective experience and interpretations of others' beliefs and understandings), and *engagement* (personal connections that include cognitive, affective, and/or behavioral dimensions) as distinct but complementary ways that individuals respond to climate change. Next, we summarize existing research (where available) and theory that examines group differences (i.e., comparing the responses of two or more racial/ethnic groups) for each of these dimensions, focusing on empirical findings published since 2000.

Opinion polls over the past several decades reveal a racial/ethnic gap in environmental concern, including concerns about climate change, with non-White minorities in the United States expressing consistently *higher* levels of concern than Whites (e.g., Dietz, Dan, & Shwom, 2007; Guber, 2013; Leiserowitz & Akerlof, 2010; Macias, 2016A; McCright & Dunlap, 2011B; Speiser & Krygsman, 2014; Whittaker, Segura, & Bowler, 2005; Williams & Florez, 2002). Blacks and Latinos also typically express higher levels of support for national and international climate and energy policies than Whites. This includes proportionally higher support for regulating carbon emissions, improving fuel economy and household energy efficiency standards, and increasing taxes to mitigate climate change (see Figure 1, showing findings from Leiserowitz & Akerlof, 2010; also Dietz et al., 2007; Leiserowitz, 2006; and Krygsman, Speiser, & Lake, 2016).

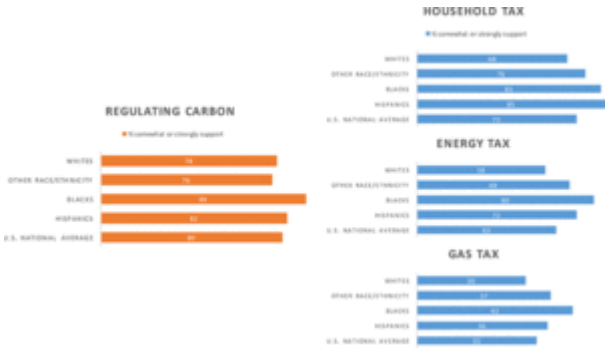

Figure 1. Percentage of U.S. respondents supporting climate and energy policies by race/ethnicity, from Leiserowitz and Akerlof (2010). Items include support or opposition to regulating carbon ("Regulating carbon dioxide (the primary greenhouse gas) as a pollutant"); a household tax ("Provide a government subsidy to replace old water heaters, air conditioners, light bulbs, and insulation. This subsidy would cost the average household $5 a month in higher taxes. Those who took advantage of the program would save money on their utility bills"); an energy tax ("Establish a special fund to help make buildings more energy efficient and teach Americans how to reduce their energy use. This would add a $2.50 surcharge to the average household's monthly electric bill"); and a gas tax ("Increase taxes on gasoline by 25 cents per gallon and return the revenues to taxpayers by reducing the federal income tax"). Results are aggregated from Leiserowitz and Akerlof (2010) and based on a nationally representative survey of 2,164 U.S. adults conducted in 2008. Racial/ethnic categories include Hispanics (13%), Blacks (11%), Other race/ethnicity (6%), and Whites (69%). See Leiserowitz and Akerlof (2010) for additional survey items and methodology.

Other research conducted in the United States examining race and ethnicity in the context of climate change has documented group differences relative to climate beliefs and risk perceptions. For instance, a 2014 national probability survey that used a two-item index of concern, assessing whether respondents perceive climate change to be a crisis and whether respondents believe that it will negatively affect them personally, found that 71% of Hispanic Americans and 57% of Black Americans indicated that they were very or somewhat concerned about climate change, compared to 43% of White Americans (Jones, Cox, & Navarro-Rivera, 2014). In an analysis of 10 nationally representative Gallup polls between 2001 and 2010, McCright and Dunlap (2011A) found that non-Whites in the United States reported greater worry about global warming and concern that it will pose "a serious threat to you and your way of life in your lifetime" than Whites. Moreover, this racial/ethnic gap in concern remained when controlling for other sociodemographic variables often found to correlate with global warming beliefs and attitudes, including gender, age, annual income, education, political orientation, and religiosity. Similarly, in a cross-sectional analysis of Gallup survey responses from 1990, 2000, and 2010, Guber (2013) found that respondent race/ethnicity (White versus non-White) and political ideolo-

gy (conservatism versus liberalism) independently tracked environmental concern level, including about global warming—effects that have grown simultaneously over time (see also Macias, 2016A). Compared to other environmental issues, such as concern over air and water pollution, climate change also typically ranks higher in importance for U.S. racial and ethnic minorities than for Whites.

Macias (2016A) examined levels of perceived environmental risks among nine U.S. race and ethnic categories using data from the 2010 General Social Survey (GSS), comparing perceptions of climate change risk to those of air and water pollution, agricultural chemicals, and nuclear power generation. Over and above the effects of age, gender, household income, education, rural/urban place of residence, and political ideology (liberalism versus conservatism), racial and ethnic minority identification was found to be a consistently strong and independent positive predictor of perceived environmental risk, including risk posed by climate change, with non-Whites generally showing greater concern for climate change than U.S.-born Whites. Moreover, among non-Whites, concern for climate change was greater than concern for more localized issues, such as air pollution from cars and industry.

Other studies report significant differences among different racial and ethnic minority groups on environmental priorities. Jones and colleagues (2014) report that 39% of Black Americans rank climate change as the most important environmental issue, compared to 21% of Hispanics and 24% of White Americans. Hispanics, in turn, were more likely (46%) than Blacks (29%) and Whites (24%) to identify pollution as the country’s most serious environmental problem.

Despite these higher perceptions of environmental risks among minorities, there is some evidence of an inverse concern gap between U.S. Whites and non-Whites in response to questions that require participants to prioritize economic versus environmental concerns. An analysis of 2010 GSS data found that Blacks and foreign-born Latinos expressed greater support for prioritizing economic progress over environmental protection than do Whites, and that Blacks indicated less willingness to accept a lower standard of living to protect the environment than Whites (Macias, 2016B). Nevertheless, both U.S.-born Blacks and foreign-born Latinos perceived higher levels of environmental risks, including global warming, than U.S. Whites, controlling for a wide range of other demographic variables, including education, income, urban versus rural residence, and political ideology (liberalism versus conservatism).

Theoretical Perspectives on Racial and Ethnic Differences

Issues of equity are critical to understanding differences in climate change risk perceptions and environmental engagement between Whites and non-Whites. Early studies looked to explain disparities in pro-environmental attitudes on the basis of differing concerns about the environment, documenting ostensibly lower levels of concern among non-Whites relative to Whites. [For reviews of the political, social, and methodological factors contributing to these findings, see Mohai (2008), Macias (2016B), and Taylor (1989).]

However, these early studies often conflated concern with frequency of outdoor recreation (e.g., visits to natural parks), membership in environmental organizations, and charitable donations, rather than linking concerns to group-specific risk factors, such as greater health risks associated with exposure to industrial pollution among African American and Latino communities (Arp & Kenny, 1996; Bullard et al., 2011; Jones & Rainey, 2006; Macias, 2016A; Mohai & Bryant, 1998). Spurred largely by work within the field of environmental justice, a notable shift from assessing environmental concern based primarily on attitudes toward *conservation* (e.g., protection of natural spaces) to incorporating measures of environmental *risk* (particularly perceived exposure to environmental hazards) has afforded a more nuanced picture of group differences in environmental concern (see Mohai, 2008).

Differences in risk perceptions observed across racial and ethnic groups mirror a reality that minority communities in many industrialized nations suffer disproportionately from a wide range of environmental hazards compared to equivalent-income Whites. According to environmental deprivation theory, exposure to environmental hazards and harm leads to greater concern about the environment and increased support for protective behaviors (Whittaker, Segura, & Bowler, 2005). Due to persistent racial segregation and discrimination in real estate and insurance markets, housing, and infrastructure development, U.S. Blacks and Latinos are substantially more likely to live near hazardous industrial sites and high-pollution-emitting power plants than Whites (Bolin, 2006; Jones & Rainey, 2006; Mohai, 2008; Bullard et al., 2011). As a result, people of color in the United States experience up to 20 times the level of smog exposure as equivalent-income Whites (Clark, Millet, & Marshall, 2014). U.S. racial and ethnic minorities are also more likely to live in poverty and in hazard-prone areas than Whites, as illustrated by the devastating effects of Hurricane Katrina on minority communities in Louisiana (Laska & Morrow, 2006).

These differential vulnerabilities extend to climate-specific impacts (for reviews, see Cutter, Boruff, & Shirley, 2003; Cutter, Emrich, Webb, & Morath, 2009). For instance, California, one of the most racially and ethnically diverse U.S. states, also faces a wide range of severe environmental hazards due to climate change, including increases in wildfires, coastal flooding, erosion, and extreme heat. A 2012 study of the impacts of climate change on different populations across California found that four factors—lacking a high school diploma, being of low income, not speaking English, and being a person of color—were the strongest predictors of vulnerability; each was a stronger factor than being elderly, pregnant, or unemployed (Cooley, Moore, Heberger, & Allen, 2012). Consistent with environmental deprivation theory, differential exposure to the effects of climate change thus may help to explain why non-Whites show higher levels of environmental concern and support for risk-mitigating policies compared to Whites.

According to the differential vulnerability hypothesis, non-Whites in the United States may also feel more vulnerable to the effects of climate change than Whites, in part because of their less privileged position in society (Flynn, Slovic, & Mertz, 1994; Satterfield, Mertz, & Slovic, 2004). Indeed, in the United States, White males are significantly more likely than are members of other demographic groups to endorse denialist views of cli-

mate change, and also perceive fewer environmental risks generally, than women and non-Whites (McCright & Dunlap, 2011B; Satterfield et al., 2004). Support for the vulnerability hypothesis comes from a national probability sample in which the racial/ethnic gap in environmental concern was partially accounted for by non-Whites' greater awareness of disproportionate environmental hazards and greater perceived personal vulnerability, independent of effects of income, education, and political orientation (Satterfield et al., 2004).

Additional survey findings lend further support to the vulnerability hypothesis. In a multi-year analysis of GSS data, Adeola (2004) found that disproportionate exposure to environmental hazards predicted Blacks' greater perception of a wide range of environmental risks, including those associated with industrial air pollution. Similarly, a 2014 nationally representative survey of U.S. adults found that the impacts of climate change may resonate more personally with African Americans than other racial and ethnic groups. Specifically, 62% of African Americans reported being personally affected by extreme weather, and only 21% reported believing that climate change would *not* personally affect them in their lifetime (versus 51% and 28% for the general American public) (Speiser & Krygsman, 2014). Moreover, a greater percentage of African Americans attributed increased severity of allergies (59%) and breathing problems (56%) to climate change than did the broader U.S. public (49% and 46%, respectively).

Non-Whites' risk perceptions appear to reflect long-standing environmental disparities rather than sensitivity to more acute hazards. For instance, a comparison of U.S. Blacks' concerns expressed in the 2000 and 2010 GSS suggests that their greater concern about climate change compared to Whites has remained relatively stable over time, rather than shifting in relation to high-profile disasters, such as Hurricane Katrina in 2005, that disproportionately affected Black communities. In 2000, 56.4% of Blacks and 45.4% of Whites reported believing that the temperature rise caused by climate change was "very" or "extremely" dangerous in 2000, whereas 55.1% of Blacks and 42.3% of Whites reported the same in 2010 (Macias, 2016A).

Greater vulnerability to environmental risks may also heighten concerns about climate change by strengthening pro-ecological values more generally. Kellstedt, Zahran, and Vedlitz (2008) found that climate risk perceptions were greater among non-Whites relative to Whites. However, when controlling for responses on the most widely used measure of ecological values [the New Ecological Paradigm (NEP) scale, which assesses perceptions of resource scarcity, human negative impacts on nature, and ethical responsibility toward nonhuman life; Dunlap, Van Liere, Mertig, & Jones, 2000], non-White identification predicted *lower* climate risk perception.

Finally, work on the "White male effect" in risk perception has highlighted the ways that gender, race, and political orientation can intersect to predict beliefs about climate change and support for mitigation policy. For instance, conservative White males are significantly more likely than other groups in the United States to deny the existence of climate change (Finucane, Slovic, Mertz, Flynn, & Satterfield, 2000; McCright & Dunlap,

2013). Environmental protections often entail governmental intervention into markets and restrictions on individual rights, which may conflict with conservative values, whereas regulations that emphasize collective rights and protection of minority populations often resonate with liberals (McCright, Dunlap, & Marquart-Pyatt, 2016; McCright & Dunlap, 2011B). Some scholars have argued that environmental beliefs, including skepticism about climate change, can serve an "identity-protective" function to protect the status afforded by advantaged group memberships (Kahan, Braman, Gastil, Slovic, & Mertz, 2007). Consistent with the identity-protective hypothesis, individuals from high-status groups, as well as those who are more likely to perceive prevailing group hierarchies as just and fair (e.g., conservative White males), are more likely to resist policies aimed at regulating environmental risks and to perceive them as threatening established social, economic, and political systems (Feygina, Jost, & Goldsmith, 2010; McCright & Dunlap, 2011B).

Nevertheless, the precise mechanisms through which racial/ethnic minority status enhances support for climate regulatory policies remain unclear. Dietz and colleagues (2007) found *direct* effects of race/ethnic minority identification on enhanced mitigation policy support, even when controlling for political ideology, education, income, and pro-ecological values (as assessed by the NEP scale). Whereas political orientation was strongly (if indirectly) associated with policy support and was not a significant predictor of policy support when accounting for ecological values and trust in environmental groups, non-White racial/ethnic identification remained a robust predictor of policy support when controlling for these as well as variety of other potential explanatory variables, including altruistic (versus egoistic/individualistic) orientation, future orientation, awareness of the negative impacts of climate change, and reported media exposure to climate-related information[1].

Ethnicity, Acculturation, and Climate Change Beliefs

Beyond effects of race, emerging research on the role of acculturation processes and well-documented effects of cultural values on pro-environmental behavior suggests a unique role of *ethnic* identity in climate change engagement. For instance, Asians and Latinos, the fastest-growing minority groups within the United States, consistently show among the highest levels of environmental concern of all U.S. racial and ethnic groups (e.g., Jones et al., 2014; Leiserowitz & Akerlof, 2010; Macias, 2016A, 2016B).

Macias (2016B) examined whether risk perception among U.S. immigrant groups shifts toward those of the majority group (e.g., Whites) as a result of cultural assimilation. Although higher risk perceptions were generally observed among non-Whites relative to Whites, evidence for environmental attitude assimilation was observed among those of Mexican origin. First-generation Mexican immigrants were over three times as likely as U.S.-born Whites to report a higher willingness to pay (including through higher taxes) to protect the environment. These effects were weaker, although still significant, for U.S.-born Latinos relative to U.S.-born Whites. Overall, these findings complement prior research documenting a pattern of ecological assimilation whereby U.S. immigrant groups become less concerned about the environment with greater assimilation (e.g., Schultz,

Unipan, & Gamba, 2000). Nevertheless, some studies beyond the U.S. context (e.g., Lovelock, Jellum, Thompson, & Lovelock, 2013, which looked at New Zealanders) have found no differences in environmental attitudes among immigrants compared to nonimmigrants, pointing to the need for additional research on the potential role of acculturation processes in public perceptions of climate change.

Psychological research has also identified distinct cultural orientations among Latinos in the United States, such as a strong, interdependent relational orientation that emphasizes social harmony, respect, and concern for the welfare of one's family and community (Holloway, Waldrip, & Ickes, 2009). These findings highlight the need for research aimed at better understanding Latinos' environmental engagement in order to develop culturally informed environmental advocacy. For instance, limited research has explored the role of trust as a possible conduit and barrier to minorities' environmental engagement, which may be particularly salient among historically disenfranchised groups and immigrant groups who have emigrated from regions with high levels of government corruption. Additional research has suggested that environmental attitudes of Latinos may be rooted in familial concerns and motivations to leave a sustainable world to future generations (Speiser & Krygsman, 2014). How might such concerns be leveraged into commensurate levels of environmental *action*—both in terms of consumer behaviors, such as "green" purchasing, and political action, such as voting and volunteering? These remain important questions for future research.

Future Directions: What Do We Need to Know About Racial and Ethnic Differences?

Despite growing interest in understanding how race and ethnicity shape public perceptions of climate change risk, few studies have looked beyond simplified White/non-White dichotomies or beyond the U.S. context. Indeed, our analysis of empirical studies published since 2000 that included one or more racial or ethnic group comparisons (as opposed to single-population or case studies) revealed a dearth of non-U.S. studies and few empirical studies focusing on race and ethnicity, generally, relative to the sizable literature on political partisanship. Moreover, many studies that do examine race or ethnicity treat racial and ethnic identification as statistical control variables, rather than as variables of primary theoretical interest, and only one published study (Schuldt & Pearson, 2016) reported formal tests of interaction effects of race or ethnicity with other key predictors of climate beliefs, such as political orientation (but see McCright & Dunlap, 2011A, for other work examining intersections of race and ideology).

Given their differential vulnerability and awareness of general inequities (Satterfield et al., 2004), members of minority groups may be motivated by concerns that are less rooted in political partisanship or ideology when it comes to climate change. Consistent with this reasoning, in a large, nationally representative survey, Schuldt and Pearson (2016) found that U.S. public opinion about climate change is less politically polarized for racial and ethnic minorities than for Whites. Most strikingly, political ideology, a variable that strongly predicts climate polarization in the United States, was substantially less predic-

tive of the climate beliefs of non-Whites than of Whites. This same pattern held for other opinion metrics examined, including belief in scientific consensus and support for mitigation efforts (regulating greenhouse gases). An examination of Whites' and non-Whites' climate risk perceptions in the 2000 and 2010 GSS (see Figures 2A and 2B) further illustrates differential polarization, whereby U.S. Whites generally show stronger partisan effects relative to non-Whites—and this finding suggests that differential polarization has increased over time (for similar effects for income, discussed in more detail later in this article, see Figures 3A and 3B). These findings point to the importance of considering *interactive* effects of race/ethnicity and other sociocultural predictors of climate change perceptions and public engagement.

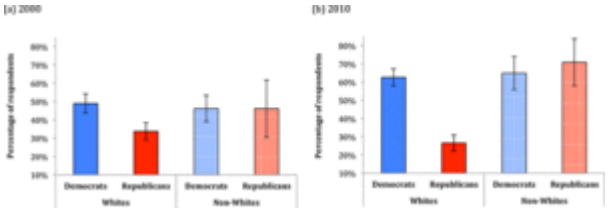

Figure 2. Weighted percentage of U.S. respondents indicating the "rise in the world's temperature" is "extremely dangerous" or "very dangerous," by race and party affiliation, in 2000 (a) and 2010 (b). Error bars represent 95% confidence intervals.

Note: Question wording referenced the greenhouse effect in 2000 and climate change in 2010.

Source: GSS.

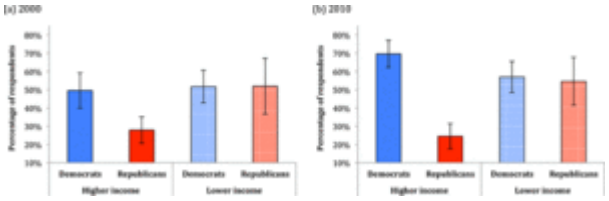

Figure 3. Weighted percentage of U.S. respondents indicating the "rise in the world's temperature" is "extremely dangerous" or "very dangerous," by total household income and party affiliation, in 2000 (a) and 2010 (b). Income categories correspond to the bottom and top quintiles (see Bohr, 2014). Error bars represent 95% confidence intervals.

Note: Question wording referenced the greenhouse effect in 2000 and climate change in 2010.

Source: GSS.

Due to sample size constraints, a majority of empirical studies collapse racial and ethnic minority group memberships to examine White/non-White dichotomies, potentially masking factors that may differentially shape climate change engagement both within and between different racial and ethnic minority groups. For instance, despite being the fastest-growing minority group in the United States, few studies have examined climate-related

attitudes and beliefs of Asians and Asian Americans. Asian Americans have the highest average income and education level of all minority groups within the United States. Yet, they also show the highest levels of concern for climate change and support for policies aimed at mitigating climate change of all racial and ethnic subgroups (Speiser & Krygsman, 2014), presenting a challenge to current theoretical perspectives that emphasize higher economic status and group advantage as motivating resistance to environmental regulations.

In a national-level survey that oversampled Asian, African, and Hispanic/Latino American populations, 83% of Asian Americans indicated that they were convinced that climate change is happening, and 50% believed that humans can make a difference in slowing or reducing climate change, compared to 71% and 40% of the U.S. public, respectively (Speiser & Krygsman, 2014). Whether these differences can be explained by unique acculturation experiences, differential exposure to environmental hazards, or specific cultural orientations, such as greater collectivism and interdependence among East Asians compared to those originating from Europe and other Western nations (e.g., Fuligni, Tseng, & Lam, 1999; Markus & Kitayama, 1991) remains an important question for future inquiry.

From Public Understanding to Public Engagement

To date, existing research has largely focused on public understanding and perceptions of climate change, and to a lesser extent on how members of different racial and ethnic groups collectively engage with the issue of climate change (Moser, 2016; Wolf & Moser, 2011). Understanding *how* different groups engage with environmental organizations and initiatives remains a critical question for future research. Barriers to racial and ethnic minority participation in mainstream environmental organizations and professions are well documented (Mohai, 1985, 2003; Taylor, 2014). A 1992 study found that nearly one-third of U.S. environmental organizations had no minorities on their staff (Taylor, 2010).

Although diversity has increased in mainstream environmental organizations over the past two decades, it remains far below national levels. A recent survey of 293 U.S. environmental government agencies, nonprofits, and foundations found that non-White minorities comprised no more than 16% of staff in all three types of institutions, despite constituting 38% of the U.S. population and 29% of the overall U.S. science and engineering workforce (Taylor, 2014). Clean energy jobs are among the most promising areas for addressing economic inequality within and between nations, as they include high-paying jobs with relatively low educational requirements (Bivens, Irons, & Pollack, 2009; Harper-Anderson, 2012; Pinderhughes, 2006; U.S. Bureau of Labor Statistics, 2010). Nevertheless, employment statistics for science, technology, engineering, and math (STEM) professions within the United States paint a grim picture for racial and ethnic diversity within environmental STEM. An analysis of U.S. occupational disparities across 16 fields revealed lower levels of non-White representation in environmental and conservation pro-

fessions than in other STEM fields, with 50%–60% less minority representation within these fields, on average, than the national STEM average (Pearson & Schuldt, 2014).

Scholars have pointed to the historical low priority given to the concerns of communities of color by environmental organizations as one factor contributing to these disparities (e.g., Mohai, 1985). Although these and other structural barriers, such as insular hiring practices and historically limited outreach among national organizations (Taylor, 2014), may substantially undermine minority engagement in the environmental sector, other hidden motivational barriers, such as prevalent racial, ethnic, and class stereotypes associated with the term *environmentalist* and a lack of visible representation in the environmental sector generally, may also contribute to these disparities (Gibson-Wood & Wakefield, 2013; Jones, 2002; Mohai, 2003; Naiman, 2014; Pearson & Schuldt, 2014; Schelhas, 2002).

Social psychological research suggests that people are motivated to behave in ways that are congruent with the actions of other in-group members, including members of one's own racial/ethnic group (i.e., identity-based motivation; Oyserman, 2009; Oyserman, Fryberg, & Yoder, 2007). For instance, despite their generally higher levels of concern, African Americans and U.S. Latinos are less likely to speak out on their views about climate change when they are perceived to deviate from those of family and friends. Whereas 53% of White Americans and 44% of Asian Americans reported feeling comfortable discussing differing views on climate change in a recent national-level survey, only 26% of African Americans and 34% of Latinos reported feeling comfortable doing the same (Speiser & Krygsman, 2014). Thus, factors beyond awareness of climate change and its differential impacts, such as perceptions of how one's racial/ethnic in-group perceives and engages with environmental problems, may influence how members of underrepresented groups respond to environmental advocacy efforts and engage with environmental causes (Pearson et al., 2016).

Summary

Research on the role of race and ethnicity in climate change engagement has critical implications for outreach and advocacy. Given that environmental risks, including those posed by climate change, are unequally distributed across groups in society, and many communities of color are acutely aware of these disparities, messages that address these inequities are likely to be substantially more effective in engaging these communities than are those aimed at heightening awareness of climate change in general or of its distal effects (e.g., loss of sea ice). Moreover, messages that seek to bridge political disagreements may be relatively ineffective for groups whose views on the issue may be less rooted in political beliefs (Schuldt & Pearson, 2016). Finally, engagement with environmental organizations may be shaped, in no small part, by one's perceived similarity to individuals within these groups, as well as by perceptions of how responsive these organizations are to the concerns of racial and ethnic minorities. Thus, advocacy messages that are sensitive to the unique concerns of minority communities—and particularly those his-

torically underrepresented in the environmental movement—may be particularly effective for enhancing public engagement on climate change within pluralistic societies.

Social Class and Climate Change

Compared to race and ethnicity, class and gender have received substantially more attention in public opinion research on climate change, particularly outside the U.S. context. Racial and ethnic differences often coincide with socioeconomic factors; however, there are empirical, conceptual, and practical reasons for distinguishing them. In this section, we review research examining how two forms of class differences—income and education level—relate to public perceptions of climate change, as well as how understanding these differences can inform organizational advocacy and public outreach.

Economic projections suggest that unmitigated climate change will disproportionately affect the world's poor (Burke et al., 2015; Gheytanchi et al., 2007; IPCC, 2014; Sterner, 2015; Swim et al., 2009). Moreover, analyses of public opinion data over that past three decades suggest that economic insecurity contributed to declining concern about global warming in the United States after the Great Recession of 2008 (Scruggs & Benegal, 2012). Awareness of inequities between groups can exacerbate hostility within and between nations and undermine the ability of communities to adapt to climate impacts (Agyeman, Bullard, & Evans, 2003). In addition, some scholars (Nisbet, 2009) have suggested that partisan disagreement over climate issues may be rooted in part in differing economic values. Thus, understanding socioeconomic status and class relations between groups may help inform our understanding of how the public understands the risks associated with climate change and which groups are viewed as responsible for both causing and helping to mitigate its effects.

Income

Evidence for differences in climate change understanding and risk perceptions across income levels remains mixed (McCright, Dunlap, & Xiao, 2014). Several studies have found that when accounting for effects of other demographic variables (e.g., race, education, and political orientation), income remains a weak positive predictor of both the belief that anthropogenic climate change is occurring (for cross-national meta-analytic evidence, see Hornsey, Harris, Bain, & Fielding, 2016; McCright & Dunlap, 2011B) and knowledge about climate change (e.g., McCright, 2010). For example, an analysis of U.S. public opinion polls from 2001 to 2008 (McCright, 2010) revealed a positive association between income and belief in the scientific consensus regarding climate change, that climate change is already happening, and that humans are the primary cause of it.

Although higher-income respondents may show enhanced scientific understanding of climate change, other studies have found that lower-income respondents are nevertheless more concerned about climate change and perceive it as a greater risk (Bohr, 2014; Macias, 2016A; McCright & Dunlap, 2011B; Semenza et al., 2008; Stokes, Wike, & Carle, 2015; Xiao & McCright, 2012). For instance, a 2015 Pew Research Center study (Stokes

et al., 2015) found that Americans who make less than $50,000 a year were more likely than those making more than $50,000 to believe that climate change is a very serious problem (49% versus 41%, respectively). These differences were even greater for perceptions of personal harm. Whereas 37% of those making less than $50,000 were very concerned that climate change would harm them personally, only 21% of those making more than $50,000 were very concerned. These results are consistent with the notion that greater income is associated with decreased perceptions of climate risks (e.g., Macias, 2016B; McCright & Dunlap, 2011B; for similar evidence in cross-national comparisons of public concern in poorer versus wealthier nations, see Sandvik, 2008).

Theoretical approaches to understanding group differences in relation to socioeconomic status have primarily emphasized differential vulnerability and sensitivity to effects of climate change among individuals of lower socioeconomic status compared to individuals of higher socioeconomic status. For instance, wealthier individuals may have lower risk perceptions related to climate change because they have the economic means to address threats posed by climate change (e.g., Semenza et al., 2008). Conversely, poorer people might feel a heightened sense of vulnerability to negative impacts of climate change because they lack the financial means to address such threats and may live and work in areas that are more vulnerable to climate impacts (Crona, Wutich, Brewis, & Gartin, 2013; Mirza, 2003; Swim et al., 2009).

In contrast to research on perceived vulnerability to climate change, early research hypothesized a positive relationship between felt financial security and support for policies aimed at reducing greenhouse gas emissions, reasoning that less wealthy individuals might be equally or more concerned about climate change as wealthier individuals, but they may be less willing to support economically costly policies, such as new or higher taxes (see O'Connor, Bord, Yarnal, & Wiefek, 2002). Nevertheless, empirical support for this account is weak. For instance, among residents in central Pennsylvania—a region heavily dependent on coal—income was unrelated to support for government regulations (including higher taxes) to reduce greenhouse gas emissions or willingness to purchase energy-efficient products. However, income was a strong *negative* predictor of support for two voluntary actions "to slow global warming," which included driving less and using less heating or cooling at home. When accounting for effects of education and political orientation, lower-income respondents indicated a greater willingness to drive less, carpool, and use mass transit, as well as reduce energy use for heating and cooling to slow climate change, than higher-income respondents (O'Connor et al., 2002). Thus, lower-income individuals may be more likely to support voluntary actions to help mitigate climate change when those actions have minimal short-term costs and may reap longer-term economic benefits.

As with race and ethnicity, recent studies have begun to explore interactive effects between income and political partisanship in predicting climate change beliefs in the United States (see Figures 3A and 3B). Using data from the 2010 GSS that controlled for other sociodemographic variables, including race, gender, age, and education, Bohr (2014) found that higher income predicted a greater likelihood of dismissing climate dangers

and a lower likelihood of ranking climate change as the most important environmental problem facing the United States among Republican-leaning individuals, but not among Democrats or independents (who showed consistently greater perceptions of the dangers of climate change). Notably, at the bottom quintile of income, party affiliation was not a significant predictor of the perceived danger of climate change. In contrast, income predicted a *greater* likelihood of ranking climate change as the most important environmental problem among Democrats and independents. Thus, income appears to have divergent effects on climate change beliefs as a function of political orientation, with lower-income individuals generally showing less political polarization for key climate change beliefs.

Attitudes toward inequality and group hierarchies may also influence how people process climate risks and their support for mitigation policies. For instance, individuals who are high on social dominance orientation (Pratto, Sidanius, Stallworth, & Malle, 1994), an ideology reflecting a preference for social hierarchies, generally perceive lower environmental and climate change risks (Kahan et al., 2012). Similarly, right-wing authoritarianism, a tendency to submit to authority and support existing power structures, predicts opposition to environmental protection policies, which may be viewed as a threat to national sovereignty (Altemeyer, 2003; Schultz & Stone, 1994). Generally, individuals with a more advantaged position in society may be motivated to maintain their relative position and thus may be more likely to dismiss the dangers of climate change or perceive climate regulations as threatening advantageous social and economic systems (Bohr, 2014; Jacquet, Dietrich, & Jost, 2014).

In sum, research suggests that wealthier people may report a greater understanding of climate change, yet perceive the risks posed by climate change to be relatively low. In addition, individuals with higher incomes show stronger political polarization of climate change beliefs than do those with lower incomes. Few studies have examined explanations for differences across income levels; however, differential access to resources, differential status, and differing vulnerability to the effects of climate change appear to be important mechanisms that warrant further research.

Education

In a cross-national study via the Gallup World Poll of 119 countries in 2007 and 2008, representing 90% of the world’s population, Lee, Markowitz, Howe, Ko, and Leiserowitz (2015) found that educational attainment was the strongest predictor of awareness of climate change across Africa, Asia, Europe, North America, Australia, and Latin America. Similarly, an examination of climate change perceptions in six countries (including Ecuador, the United States, Australia, and the United Kingdom) found that education was positively associated with common awareness of global climate problems across all cultures (Crona et al., 2013).

Additional empirical studies lend further support for the notion that education predicts greater awareness of climate change (Crona et al., 2013; Lee et al., 2015; McCright et al., 2014), belief that climate change is occurring (Hornsey et al., 2016; McCright & Dunlap,

2011B), and knowledge about climate change (e.g., believing that humans are the main cause; McCright, 2010), as well as support for mitigation efforts and particularly support for government programs (e.g., O'Connor et al., 2002).

Nevertheless, education does not always predict stronger belief in climate change or greater risk perceptions. In a representative sample of U.S. adults, those with the highest degree of science literacy and quantitative reasoning ability were not the most concerned about climate change; rather, they were the ones among whom polarization on other cultural dimensions was greatest. Specifically, differences between those with more hierarchical and individualistic (as opposed to egalitarian and communal) worldviews—cultural orientations predicting greater skepticism of environmental risks—were greatest among those with higher science literacy and quantitative ability (Kahan et al., 2012).

Additional studies have found that education level also interacts with political orientation to predict climate change–related beliefs. For example, an analysis of Gallup data from 2010 to 2015 (Newport & Dugan, 2015) found that as education increased among U.S. Democrats, the belief that the dangers of climate changes are exaggerated decreased. Specifically, only 15% of those with a graduate degree believed that the dangers were exaggerated, compared to 27% with a high school education or less. However, the opposite trend was found among U.S. Republicans: as education increased, Republicans were *more* likely to believe that the threat of climate change is exaggerated (74% versus 57% endorsement of this idea, respectively).

This interaction between education and party affiliation was also evident in respondents' expressed worry about climate change, knowledge about climate change (that it is human-caused), and thinking that climate change will seriously threaten our way of life. Similar interactions between education and political orientation have been documented for the belief that climate change is occurring (McCright & Dunlap, 2011A), general climate change skepticism (Tranter & Booth, 2015), and concern about climate change (Hamilton, 2011; Hamilton & Keim, 2009; McCright & Dunlap, 2011B), as well as general environmental risk perceptions (e.g., Macias, 2016A). Moreover, using national-level U.S. survey data, McCright and Dunlap (2011A) found that both party identification and political ideology interacted with educational attainment to predict concern and beliefs about global warming. Generally, whereas education level positively predicts the beliefs and climate concerns of Democrats and liberals, Republicans and conservatives are more likely to express skepticism and less concern about climate change as education increases.

In short, existing research indicates that education can reify cultural and political positions. Several theoretical accounts have been posited to account for these effects, including information processing theory (Wood & Vedlitz, 2007) and the elite cues hypothesis (e.g., Lupia & McCubbins, 1998). That is, people process information through a filter related to their background (such as their race, gender, income, education, political ideology, and cultural values), and rely selectively on information from elite sources that they trust. In this way, people may perceive themselves as increasingly informed on scientific issues even if they do not expose themselves to differing viewpoints (see McCright,

2011B). Moreover, according to information processing theory, the more uncertain the information environment surrounding an issue is, the more likely individuals are to rely on background factors in messages, rather than objective information, to evaluate the issue.

Psychological research on motivated reasoning has also been used to explain the effects of education and information literacy on political polarization. In particular, work on motivated cognition posits that people are motivated to interpret and process information in ways that bolster their worldviews (Kunda, 1990; Taber & Lodge, 2006). Exposure to politically divisive issues like climate change may activate people's political propensities, as well as their tendency to make more extreme decisions that align with the perceived views of their group (i.e., group polarization; Mutz, 2006; also Kahan, Jenkins-Smith, & Braman, 2011). Thus, as people become more educated about climate change, their beliefs may diverge in ways that align with the ostensible views of other group members as they seek information validating their ideological position. Approaches that seek to merely fill gaps in knowledge ("knowledge deficit" approaches) may thus be minimally effective for motivating concern about the risks posed by climate change and mobilizing action (Moser, 2010), and they may even impede engagement among more ideologically conservative groups and those with more hierarchical and individualistic worldviews.

Future Directions: What Do We Need to Know About Class Differences?

Taken together, although beliefs and awareness of climate change generally increase with education and income level, political ideology and partisan affiliations systematically interact with these variables (e.g., Bohr, 2014; Hamilton, 2011; McCright & Dunlap, 2011A).

Specifically, socioeconomic status—including both income and educational attainment—tends to predict stronger partisan divides on climate change beliefs and risk perceptions. These interactive effects may help to partially explain why class differences can sometimes appear small or inconsistent in their effects (e.g., McCright et al., 2014). In addition, there is evidence of increased risk perceptions of climate change among the world's poor (e.g., Stokes et al., 2015). Individuals who lack access to financial resources have a heightened sense of vulnerability and concern about the negative impacts of climate change.

Cross-national public opinion surveys point to an urgent need to promote climate literacy globally to increase fundamental awareness of climate change (Lee et al., 2015). Nevertheless, assuming that socioeconomically disadvantaged groups lack knowledge regarding climate change can be problematic (Moser, 2010). For instance, taking a purely knowledge-deficit approach to climate advocacy can backfire among individuals, such as U.S. conservatives, for whom scientific information about the issue and its dissemination may be filtered in ways that align with prior ideological views (Bohr, 2014). A failure to attend to issues of class in climate messaging, particularly the concerns of disadvantaged groups, can also inadvertently perpetuate class-based stereotypes that associate being an

environmentalist with being affluent and highly educated (Mohai, 2008; Jones, 2002; Pearson & Schuldt, 2014), which may suppress engagement among lower-income and less-educated individuals. Thus, messaging that accurately reflects and portrays diversity in income and education levels among those concerned about climate change may enhance the effectiveness of outreach initiatives, particularly within communities of lower socioeconomic status.

Studies on social class relations and public perceptions of changing economic conditions have been surprisingly overlooked in climate change communication research. Within the United States, class conflict now ranks ahead of other leading sources of perceived conflict (e.g., between immigrants and native-born citizens, between Blacks and Whites), with over two-thirds of Americans endorsing the view that there are “strong” or “very strong” conflicts between the rich and the poor (Morin, 2012). Beyond the United States, growing global economic inequality may shape how people—and particularly poorer individuals—engage with climate change (United Nations Development Programme, 2007). Studies on civic engagement suggest that economic inequality can undermine trust and cooperation by attenuating optimism about the future and reducing a sense of shared fate across economic strata (Uslaner & Brown, 2005). Nevertheless, perceptions of group disadvantage can also evoke collective anger, which can motivate people from disadvantaged groups to take collective action on behalf of their groups (van Zomeren, Postmes, & Spears, 2008). Thus, understanding whether public awareness and concern about economic inequality enhance or impede collective action to address climate change remains a critical question for future research.

To date, few empirical studies have explored how class affects risk perceptions and collective engagement. Understanding the mechanisms through which class influences climate change perceptions and beliefs can inform outreach efforts that might capitalize on these pathways. For instance, a vulnerability perspective can help to explain why members of economically disadvantaged groups may be likely to perceive greater risks associated with climate change, and why members of more advantaged groups may be motivated to minimize these risks. Climate change communicators might better employ this pathway by focusing on how individuals *across* levels of socioeconomic status (e.g., both the wealthy and the poor) are vulnerable to climate impacts. Future research should also look beyond objective measures of income and education to include the perceived stability of political and economic institutions and perceptions of potential threats that environmental actions may pose to these systems.

Finally, differentiating between *objective* (e.g., reported income) and *subjective* measures of class (e.g., perceived class rank) may also be fruitful. Studies examining social class disparities in health demonstrate that subjective social class rank predicts physical health and well-being, even after accounting for objective measures of class (e.g., income and educational attainment) (Adler, Epel, Castellazzo, & Ickovics, 2000; Cohen et al., 2008). Moreover, both objective and subjective class have been found to predict cooperation and pro-social behavior. For instance, in a series of experiments, Piff, Kraus, Côté, Cheng, and Keltner (2010) found that compared to people from higher-social-class backgrounds,

those from lower-social-class backgrounds—measured both in terms of resources and perceived class rank—were more charitable toward others. Thus, above and beyond objective indicators of social class, people's perceptions of their relative position in a social hierarchy, as well as subjective perceptions of resource scarcity and diminished rank, predict psychological motives, behaviors, and important life outcomes (Kraus & Stephens, 2012; Mullainathan & Shafir, 2014). Assessing both types of metrics, thus, may be fruitful for understanding the complex ways in which class may influence how and when people collectively respond to climate challenges.

Gender and Climate Change

A sizable body of literature has documented a small but persistent gender gap in environmental concern, such that women typically express greater levels of concern than men (e.g., Finucane, Slovic, Mertz, Flynn, & Satterfield, 2000) and demonstrate heightened perceptions of risks across a broad range of environmental hazards (Arnocky & Stroink, 2011; Dietz, Stern, & Guagnano, 1998; McCright & Dunlap, 2013; Satterfield et al., 2004; for reviews of gender effects on environmental-risk perceptions more generally, see Davidson & Freudenburg, 1996; Finucane et al., 2000; Kahan, Braman, Gastil, Slovic, & Mertz, 2005). Some researchers note that the strongest differences are generally observed when worrying about specific environmental issues, especially localized problems with obvious health risks (Xiao & McCright, 2012).

With respect to climate change, women are typically more likely than men to believe that climate change is happening (e.g., Hornsey et al., 2016; McCright, Dunlap, & Xiao, 2013); worry about its effects (e.g., McCright, 2010; McCright & Sundström, 2013); perceive more climate change risks (e.g., Brody, Zahran, Vedlitz, & Grover, 2008; Hamilton, 2011; van der Linden, 2015); express more knowledge about climate change (e.g., McCright, 2010); and perceive global warming as posing a threat within their lifetime (Hamilton, 2011). Moreover, women are less likely than men to endorse denialist beliefs about climate change (e.g., Feygina et al., 2010; McCright & Dunlap, 2011A) and express skepticism about its existence on social media (Holmberg & Hellsten, 2015). As discussed earlier, research on the "White male effect" suggests that White men in particular, and especially conservatives, report less concern about climate change and endorse more denialist beliefs than women and members of other racial and ethnic groups (McCright & Dunlap, 2011A).

Gender effects have been consistently demonstrated cross-nationally. For example, according to the Pew Research Center (Stokes et al., 2015), in 2015, U.S. women were more likely than men to report believing that climate change is a very serious problem (51% versus 39%, respectively) and that it is already harming people (45% versus 36%), and being very concerned that it will harm them personally (36% versus 23%). Women were also more likely than men in a number of economically wealthier countries (e.g., United States, Canada, United Kingdom, Australia, and Italy) to endorse the view that people will

need to make major changes in their lifestyles to reduce the effects of climate change (gender differences between women and men ranged from 6% to 18% across nations).

In another study examining Gallup data from 2001 to 2008 (McCright, 2010), women showed greater knowledge of climate change (i.e., believing scientific consensus, believing that effects are already happening, and believing that humans are primary causes of it) than men, and also expressed greater concern about climate change (i.e., worrying about it and thinking that it will threaten their way of life and that the seriousness is underestimated). However, women underestimated their subjective understanding of climate change, perceiving themselves to be significantly less knowledgeable than men, even after accounting for objective knowledge.

Several theoretical explanations for the consistent gender gap on climate change and environmental perceptions, more broadly, have been proposed, including gender socialization (e.g., McCright, 2010; McCright & Xiao, 2014; Zelezny, Chua, & Aldrich, 2000), the vulnerability hypothesis (e.g., Finucane et al., 2000; Kalof, Dietz, Guagnano, & Stern, 2002; Satterfield et al., 2004), and differences in feminist beliefs (e.g., Somma & Tolleson-Rinehart, 1997), as well as gender differences in system-justifying beliefs (e.g., Feygina et al., 2010; Goldsmith, Feygina, & Jost, 2013). We discuss these perspectives in more detail next.

Theoretical Perspectives on Gender Differences

According to socialization perspectives, women have a greater propensity to show compassion and express an “ethic of care” (Zelezny et al., 2000, p. 445), consistent with a socialization to be more nurturing and cooperative—more “other” oriented—than men, which may partially account for women’s greater concerns for the needs of the environment. Moreover, in part due to their economically disadvantaged position relative to men, women are typically more vulnerable to a broad range of environmental hazards (Finucane et al., 2000; Satterfield et al., 2004). These differences in socialization and relative group status are theorized to lead to disparate value orientations (e.g., more altruistic values among women relative to men; Dietz et al., 2007; Stern, Dietz, & Kalof, 1993), health and safety concerns (e.g., Blocker & Eckberg, 1997; Xiao & McCright, 2012), and differing risk perceptions, generally (e.g., Bord & O’Connor, 1997; Xiao & McCright 2012), which have received relatively consistent support from the literature (McCright & Sundström, 2013).

Consistent with the socialization and gendered risk perception hypotheses, an analysis of Gallup data from 2001 to 2008 revealed that women expressed consistently greater risk perceptions of climate change, which was predictive of greater concern about global environmental issues more generally (Xiao & McCright, 2012). In contrast, weaker support for the health and safety explanation was obtained: Women were only slightly more worried about global health-related environmental problems, leading the authors to conclude that gender differences are likely “due to differentially perceived vulnerability to risk” (Xiao & McCright, 2012, p. 1082). Finally, no support was obtained for parenthood

and differential family roles (e.g., Davidson & Freudenburg, 1996), suggesting that these gender differences may stem more from differing socialization experiences of men and women, rather than the different roles that men and women occupy in many societies. Further supportive of this notion, analyses of a nationally representative sample of U.S. adults revealed that value orientations about social roles (e.g. “ethic of care”)—but not social roles themselves—predict environmental concern, including concerns about climate change (Strapko, Hempel, MacIlroy, & Smith, 2016).

Complementing these perspectives, feminist perspectives suggest that due to a history of oppression, women may identify more with vulnerability related to the exploitation of the natural environment, and thus feel compelled to take action to prevent it (Goldsmith et al., 2013; Shiva, 1989). In one study, awareness of gender inequality and commitment to egalitarian ideals (i.e., having feminist consciousness; Conover & Sapiro, 1993) were associated with greater support for environmental issues among both men and women (Gupte, 2002). In contrast, right-wing authoritarianism predicts opposition to environmental protection policies among both men and women (Altemeyer, 1998).

Psychological research on system justification may also help to explain gendered responses to climate policies. *System justification* refers to a tendency to defend the status quo and extant economic, social, and political systems as fair, desirable, and legitimate (e.g., Jost, Banaji, & Nosek, 2004; Jost & Hunyady, 2005). In particular, research suggests that stronger tendencies of men to support prevailing social and political institutions, particularly institutions that are perceived to be under threat, may also fuel resistance to regulatory policies aimed at mitigating climate change. As previously noted, individuals from higher status groups (e.g., White males) are especially likely to resist regulatory policies aimed at reducing environmental risks and perceive them as challenges to established social, economic, and political institutions (Feygina et al., 2010; McCright & Dunlap, 2011A). Policies aimed at mitigating climate change can represent a challenge to the status quo, which in turn can prompt responses to defend and legitimize those systems (e.g., minimizing or denying climate change, its human causes, or both). Consistent with this perspective, in one study, men were significantly more likely than women to deny the reality of environmental problems, a difference attributable in part to men’s stronger system justification tendencies (Feygina et al., 2010). In addition, men (particularly White men), reported greater understanding of climate change than other groups, and this subjective understanding was positively associated with denialist views. Thus, advocacy efforts focusing only on enhancing understanding of climate change and its impacts are likely to be ineffective (or may even backfire) among those who perceive both climate change and climate policies as threatening existing social hierarchies.

Future Directions: What Do We Need to Know About Gender Differences?

In sum, gender differences in beliefs about climate change, as well as perceptions of environmental risks more generally, have been consistently documented cross-nationally. Compared to men, women are more likely to express greater concern about climate

change, believe more strongly that climate change is happening, hold more objective knowledge about climate change (but also a tendency to underestimate their knowledge), and report greater perceptions of vulnerability to climate change. Differential vulnerability (e.g., Xiao & McCright, 2012), socialization experiences (e.g., Stern et al., 1993), differences in acceptance of feminist values (e.g., Goldsmith et al., 2013), and a differential endorsement of system-justifying beliefs (e.g., Feygina et al., 2010) may also help to account for gender differences in concern about (and perhaps belief in) climate change.

With regard to outreach focused on men, messages highlighting how pro-environmental actions enhance social stability and security (e.g., "Being pro-environmental allows us to protect and preserve the American way of life," "It is patriotic to conserve the country's natural resources," Goldsmith et al., 2013, p. 167) may be particularly effective in enhancing support for climate action, especially among higher-status groups (e.g., White men). In one study, this type of messaging reversed the typical negative relationship between system justification tendencies and environmental attitudes and behavior, such that those with greater system justification tendencies were *more* likely to express intentions to help the environment and sign environmental petitions than those not exposed to the message (Feygina et al., 2010). Thus, it is possible to capitalize on people's system-justifying motives to enhance pro-environmental actions by encouraging people to regard pro-environmental actions as protecting the status quo (i.e., as "system-sanctioned change"; see Feygina et al., 2010).

Although women may express greater concern about climate change, they remain substantially underrepresented in climate policymaking (e.g., Downey & Hawkins, 2008; Joireman & Liu, 2014; Scannell & Gifford, 2013). A comparison of 130 countries found that national parliaments with greater representation of women also had higher rates of ratification of environmental treaties (Goldsmith et al., 2013; Norgaard & York, 2005). Thus, outreach would do well to focus on increasing the representation of women in the environmental policy domain and consider social and cultural barriers to increasing women's engagement.

Finally, stereotypes associated with masculinity and femininity may influence how both men and women perceive and respond to climate change—another promising area for future climate communication research. Common portrayals of the natural environment as something that must be "cared for" and "nurtured" reflect common stereotypes associated with femininity. Such depictions might resonate more with women than men due to different socialization experiences. In contrast, "battle" metaphors (e.g., "fighting" global warming) linked to climate activism, and more stereotypically masculine traits, may resonate more strongly with male audiences (see Lakoff & Johnson, 1980). Understanding how these gendered metaphors affect public engagement is an important domain for future communication research.

Conclusion

Climate change is increasingly recognized by scientists and policymakers as a fundamentally social problem, highlighting the need for research that illuminates social factors that promote and impede public engagement with the issue. Political polarization has increased within the United States and some European nations over the past two decades (Capstick, Whitmarsh, Poortinga, Pidgeon, & Upham, 2015); however, disproportionate attention to the partisan gap by advocacy groups and the scientific community masks key nonpartisan factors that can also influence how different segments of the public engage with the issue of climate change (Pearson & Schuldt, 2015).

Social and behavioral science research from multiple disciplines, including psychology, communication, and sociology, has yielded a number of valuable insights into the ways that race, ethnicity, class, and gender systematically shape public engagement with climate change and can interact with partisan and other sociocultural factors (e.g., individualistic and hierarchical worldviews) to influence how people perceive climate risks. However, our review highlights an urgent need for research that goes beyond descriptive analyses to explore the underlying complex social processes that these differences may reflect and that can help to enrich our understanding of key social conduits and barriers to climate action. In addition, given substantial demographic shifts currently underway within the United States and many other nations within Europe and Australasia, the present review points to the need for additional research examining how public perceptions of diversity and economic inequality within nations may also shape collective actions on climate change.

Understanding factors that enhance social diversity in climate decision-making and environmental organizations may also help speed the development of innovative technological and policy solutions urgently needed to meet key carbon reduction targets. Social science research suggests that more diverse teams are better able to generate innovative and effective solutions to a wide range of complex problems (Hong & Page, 2004; Levine et al., 2014; Woolley, Chabris, Pentland, Hashmi, & Malone, 2010)—precisely the kind of solutions needed to avert the worst effects of climate change. Groups for whom the issue of climate change may be less politically charged, such as racial and ethnic minorities and members of socioeconomically disadvantaged groups, represent critical audiences for bridging partisan disagreements and building consensus on policy.

More generally, those tasked with communicating about climate change to the public should consider framing messages to better resonate with the cognitive, social, and motivational dimensions that differ between groups. At the same time, additional research into the factors that underpin racial, ethnic, class, and gender differences in climate change public opinion can help communicators fine-tune their messaging and circumvent biased modes of information-processing on the part of audiences, in order to enhance public outreach and ultimately adopt more effective approaches to addressing climate change.

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Notes:

(1.) Indeed, non-White racial/ethnic identification was the only variable to show a direct effect on mitigation policy support among all sociodemographic variables measured, including gender, income, education, age, geographic location, and political ideology.

Adam R. Pearson

Department of Psychology, Pomona College

Matthew T. Ballew

School of Social Science, Policy, and Evaluation, Claremont Graduate University

Sarah Naiman

Department of Natural Resources, Cornell University

Jonathon P. Schuldt

Department of Communication, Cornell University