Social Climate Science: A New Vista for Psychological Science

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Abstract

The recent Paris Agreement to limit greenhouse gas emissions, adopted by 195 nations at the 2015 United Nations Climate Change Conference, signaled unprecedented commitment by world leaders to address the human social aspects of climate change. Indeed, climate change increasingly is recognized by scientists and policymakers as a social issue requiring social solutions. However, whereas psychological research on intrapersonal and some group-level processes (e.g., political polarization of climate beliefs) has flourished, research into other social processes—such as an understanding of how nonpartisan social identities, cultural ideologies, and group hierarchies shape public engagement on climate change—has received substantially less attention. In this article, we take stock of current psychological approaches to the study of climate change to explore what is "social" about climate change from the perspective of psychology. Drawing from current interdisciplinary perspectives and emerging empirical findings within psychology, we identify four distinct features of climate change and three sets of psychological processes evoked by these features that are fundamentally social and shape both individual and group responses to climate change. Finally, we consider how a more nuanced understanding of the social underpinnings of climate change can stimulate new questions and advance theory within psychology.

We are faced not with two separate crises, one environmental and the other social, but rather with one complex crisis which is both social and environmental. Strategies for a solution demand an integrated approach.—Pope Francis (*Laudato Si': On Care for Our Common Home* [Encyclical letter], 2015, p. 104)

On April 28, 2015, the Roman Catholic Church spearheaded the largest public relations campaign to date aimed at mobilizing politicians and the global public (including nearly 1.2 billion Catholics) to confront climate change and its social impacts. Following a series of summits that brought together scientists, legal experts, and political and religious leaders, Vatican officials cited the mitigation of climate change resulting from human activities as "a moral and religious imperative for humanity" (Pontifical Academy of Sciences, April 28, 2015) and noted the crucial roles of not only the natural sciences—but also the social sciences—in better understanding and addressing it.

Indeed, climate change is increasingly recognized as both a biophysical and social phenomenon (Hackmann, Moser, & Clair, 2014). Beyond physical changes to the environment, climate change presents serious societal challenges, from threats to public health and psychological well-being to potential harm to community infrastructure, work settings, and living environments (Edenhofer et al., 2014). Within the scientific community, there is unprecedented funding for cross-disciplinary research on climate change, with a particular emphasis on engaging

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those in the behavioral sciences to help inform the public of the risks of a warming planet and to speed the adoption of new energy policies and technology solutions to help mitigate climate change and adapt to its effects (see American Academy of Arts & Sciences, 2011; Clayton et al., 2015; Mooney, Duraiappah, & Larigauderie, 2013; Moser, 2016; National Research Council, 2010b; Swim, Geiger, & Zawadzki, 2014; Weaver et al., 2014).

So what can psychology contribute to the understanding of climate change as a human social phenomenon, and how might the study of climate change advance psychological science? As *Washington Post* columnist David Fahrenthold (2009) noted, climate change looks as if it was designed to be ignored: It is an *intergenerational global commons dilemma*—a vast, slow-moving problem affecting individuals and communities over the span of generations and around the globe. Psychological research over the past two decades has documented how individuals perceive the complexity and uncertainty inherent in climate-related risks. However, as each new round of international climate negotiations demonstrates, the ways in which people understand and engage with the issue of climate change are powerfully influenced by how *others*, including members of both ingroups and outgroups, respond to the problem—processes that psychologists are uniquely positioned to study (see Fielding et al., 2014; Postmes, 2015). There is a need for theory-driven social psychological research on climate change; that need, in turn, creates unique opportunities for psychological science to expand and to contribute to the public interest.

We explore these processes with three central questions in mind. First, from a psychological standpoint, what is "social" about the phenomenon of human-caused climate change? Second, how can an understanding of these social features inform current psychological perspectives on climate change? Finally, how might the study of climate change advance psychological science? We begin by taking stock of what current psychological perspectives have and have not contributed, focusing on major knowledge gaps within psychology. We then describe current physical and behavioral science research on climate change, including recent findings within psychology, that can offer a blueprint for a social climate science grounded in psychology. Specifically, our synthesis points to four distinct features of climate change—its collective, differential, destabilizing, and diffuse social causes and impacts—and three sets of social psychological processes that these features implicate—identity, power, and ideological processes—that can shape both individual and collective responses to climate change. Finally, we consider how an understanding of these features and processes can advance psychological science.

Psychology and Climate Change: Current Understandings and Knowledge Gaps

Psychology offers theories, methodologies, and analytical approaches that uniquely position it within the sciences to enable researchers to unpack the complex motivations that can shape public engagement with climate change (see Clayton et al., 2015; Steg & Vlek, 2009). Moreover, psychological processes often lend themselves more easily to intervention than do structural factors (e.g., changing economic and political institutions and policies; Shafir, 2013; Swim et al., 2014); thus, psychological research can identify critical levers for changing behavior to help people to mitigate as well as adapt to climate change. Nevertheless, climate change remains surprisingly understudied within psychology. An analysis of articles published in seven top-tier nonspecialized psychology journals—*Annual Review of Psychology, Perspectives on Psychological Science, American Psychologist, Psychological Science, Journal of Personality and Social Psychology, Journal of Applied Social Psychology*, and *Personality and Social Psychology Bulletin*—revealed that only 1.1% of articles (106 of 9,263) from 2005 to 2014 mentioned "climate change" or "global warming", even anecdotally.[1]

Much of the psychological research on environmental decision making to date has focused on individual-level factors (e.g., problem awareness or personal concern; see Dietz, Dan, & Shwom, 2007; Steg & Vlek, 2009). However, climate change, like many social issues, can be understood as a multilevel problem, with individual, group-level, and macrolevel structural (e.g., political or economic) influences (see Fig. 1).[2] In the following sections, we consider psychological contributions at the individual and group levels and highlight current gaps in understanding.

Individual-level perspectives

Psychological approaches to climate change have been heavily informed by research on human decision making that focuses on how individuals assess risk, process complexity and uncertainty, respond to incentives, and perceive temporal and spatial dimensions of environmental threats (for excellent reviews, see Gifford, 2011; Stern, 2011; and Weber, 2006, 2013). Additionally, major public opinion research initiatives in the United States (e.g., Yale Program on Climate Change Communication and the George Mason Center for Climate Change Communication: Leiserowitz, Maibach, Roser-Renouf, & Smith, 2011), Europe (e.g., Eurobarometer: European Commission, TNS Opinion and Social Network, 2014), Australia (e.g.,
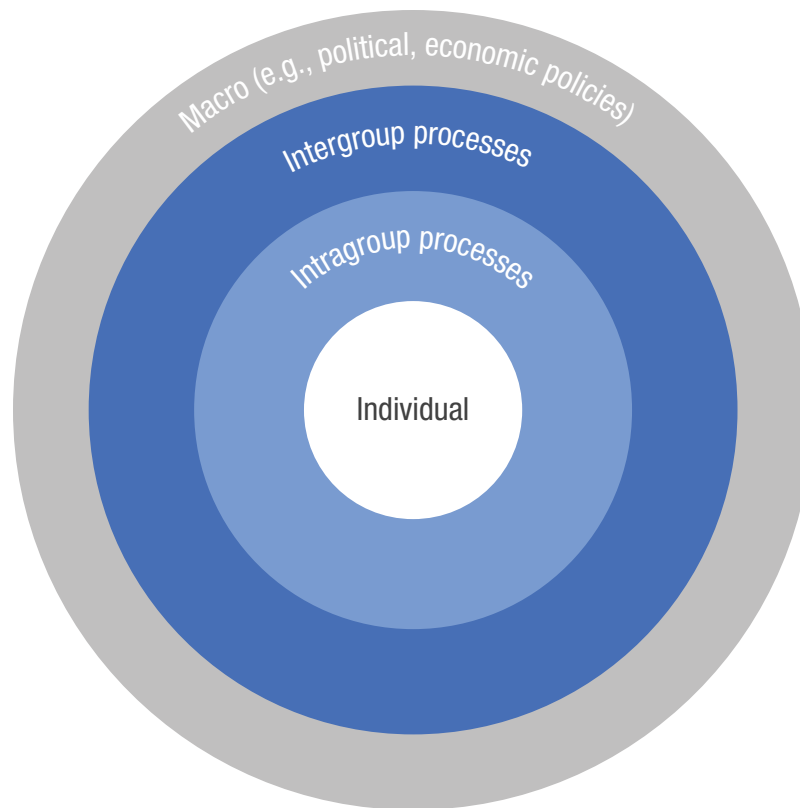
Fig. 1. Climate change as a multilevel social phenomenon. Psychological processes span individual, interpersonal, intragroup, intergroup, and macrosocietal levels. Whereas individual and macrolevel processes have received considerable attention within the social sciences, to date, group-level processes (shown in blue) have received more limited attention and are the focus of this article.

Leviston, Leitch, Greenhill, Leonard, & Walker, 2011), and New Zealand (e.g., New Zealand Attitudes and Values Study: Sibley & Kurz, 2013) regularly track public understanding of climate change and support for mitigation policies.

In particular, research from communication, behavioral economics, cognitive science, and evolutionary psychology highlights how the unique physical characteristics of climate change (e.g., its cumulative causes and uncertain impacts) and basic information-processing limitations can impede individual and collective efforts to address the problem (see Clayton et al., 2015, and Gifford's "dragons of inaction," 2011, p. 292; also Weber, 2013; Weber & Stern, 2011; and van Vugt, Griskevicius, & Schultz, 2014). Cognitive biases, such as a tendency to discount future costs of present energy consumption and a motivation to continue investing in ineffective or costly policies and practices (so-called *sunk costs*), can hinder mitigation and adaptation efforts (Gifford, 2011; see also Morgan & Keith, 2008). Together with the inherent complexity of climate change, these cognitive resource limitations can lead people to rely on personal experiences

and anecdotal information when judging climate-related risks, as when local temperature changes and exposure to extreme weather predict greater belief in global warming and more positive attitudes toward political candidates who support efforts to mitigate climate change (e.g., Akerlof, Maibach, Fitzgerald, Cedeno, & Neuman, 2013; Fielding et al., 2014; Lee, Markowitz, Howe, Ko, & Leiserowitz, 2015; Lewandowski, Ciarocco, & Gately, 2012; Li, Johnson, & Zaval, 2011; Myers, Maibach, Roser-Renouf, Akerlof, & Leiserowitz, 2012; Rudman, McLean, & Bunzi, 2013; Schuldt & Roh, 2014; van der Linden, 2015).

Affect similarly has been shown to influence climate-related beliefs and policy support. People in industrialized nations tend to perceive climate change as a distant problem, both geographically and temporally, which can dampen fear and other emotional responses that motivate efforts to mitigate climate change (Gifford, 2011; Leiserowitz, 2006; Moser, 2007; Smith & Leiserowitz, 2012; Weber, 2006). However, many common ways of conceptualizing affect within psychology have received surprisingly little attention in climate research, such as

distinguishing between affect elicited by climate change (*integral affect*) and affect that stems from sources unrelated to climate change but nevertheless may influence how climate change is perceived (*incidental affect*; see Lu & Schuldt, 2015, 2016). Such distinctions may prove especially useful in understanding how social contexts surrounding environmental decision making can influence how people process environmental threats.

Personal values and beliefs about the nature and fragility of the planet's ecosystems also predict climate beliefs. Value-beliefs-norms theory (Stern, 2000; Stern, Dietz, Abel, Guagnano, & Kalof, 1999; see also De Groot & Steg, 2008), for instance, posits that people who hold less egoistic and more altruistic values tend to view the environment as more delicate, threatened, and interconnected. Scores on the New Ecological Paradigm Scale (Dunlap, Van Liere, Mertig, & Jones, 2000)—the most widely used measure of proenvironmental beliefs—predict not only personal concerns about climate change and support for ameliorative policies (e.g., Shwom, Bidwell, Dan, & Dietz, 2010) but also the belief that one's actions can influence it (Kellstedt, Zahran, & Vedlitz, 2008). When coupled with stronger feelings of personal efficacy and responsibility, these beliefs translate into proenvironmental norms and actions, such as joining an environmental organization (Stern, 2000). Group-related values, such as those related to political liberalism and conservatism and political party affiliation can also shape individuals' proenvironmental beliefs, including how climate science is understood and interpreted (e.g., McCright, Charters, Dentzman, & Dietz, 2016). We describe these processes in more detail in the proceeding sections.

Other individual-level perspectives highlight the power of behavioral feedback (e.g., feedback about energy use; Fischer, 2008; also Karlin, Zinger, & Ford, 2015), intrinsic and extrinsic incentives (e.g., Bolderdijk et al., 2013; Stern, 2011), and low-cost actions that promote greater energy efficiency (e.g., weatherizing homes; see Dietz, Gardner, Gilligan, Stern, & Vandenbergh, 2009; and Steg & Vlek, 2009), as well as the role of personality traits associated with proenvironmental beliefs (e.g., Brick & Lewis, 2014; also Markowitz, Goldberg, Ashton, & Lee, 2012).

Group-level perspectives

Compared with psychological research on individual-level processes, fewer studies have examined how people respond to climate change at the intragroup and intergroup levels. This is surprising, given that the climate crisis is often portrayed as a cooperative problem—a "commons" dilemma (Ostrom et al., 2002)—where noncooperation among both individuals and groups in limiting use of fossil fuel can lead to long-term collective harm. Moreover, when it comes to formulating policy, most decision making occurs on behalf of others, including members of both ingroups and outgroups (e.g., international negotiations). Thus, group dynamics play a central role in shaping how people respond to climate change. Two areas of research that highlight the value of intragroup and intergroup perspectives include research on social norms and political polarization of climate change beliefs.

A substantial body of research documents the power of social norms in driving proenvironmental behavior (for reviews, see Cialdini, 2003; Griskevicius, Cialdini, & Goldstein, 2008; and Schultz, Nolan, Cialdini, Goldstein, & Griskevicius, 2007). When proenvironmental norms are salient, park visitors are less likely to pilfer "souvenirs" (petrified wood) from a national park (Cialdini, 2003), parking patrons are less likely to litter an unsolicited handbill (Cialdini, Reno, & Kallgren, 1990), and hotel guests are more likely to reuse towels, conserving water and energy (Goldstein, Cialdini, & Griskevicius, 2008). Recent work has extended these findings by examining how others' beliefs about climate change ("meta-beliefs"; Ding, Maibach, Zhao, Roser-Renouf, & Leiserowitz, 2011; see also Pearson & Schuldt, 2015), and particularly a belief in scientific consensus on climate change, can sway personal beliefs about climate change and support for mitigation policies. In survey experiments, individuals who were (accurately) informed of the strong consensus among scientists that climate change is happening and that it is caused by human activities were more likely to report believing that the phenomenon is real, human caused, serious, and solvable, and these beliefs, in turn, predicted greater support for public action (Lewandowsky, Gignac, & Vaughan, 2013; van der Linden, Leiserowitz, & Maibach, 2015). Thus, perceived scientific consensus appears to be an important gateway belief influencing public responses to climate change.

The roles of political ideology and party affiliation also have received considerable attention in the social and behavioral sciences, including within psychology. Political polarization on the issue of climate change has steadily increased within the United States and some European nations over the past decade (Capstick, Whitmarsh, Poortinga, Pidgeon, & Upham, 2015). In 1997, Democrats and Republicans were equally likely to believe that global warming was occurring (47% and 46%, respectively), whereas by 2008, 76% of Democrats, but only 41% of Republicans, shared this view (Dunlap, 2008; for a review, see McCright & Dunlap, 2011b).

The political divide on climate change between Democrats and Republicans reflects both identity processes
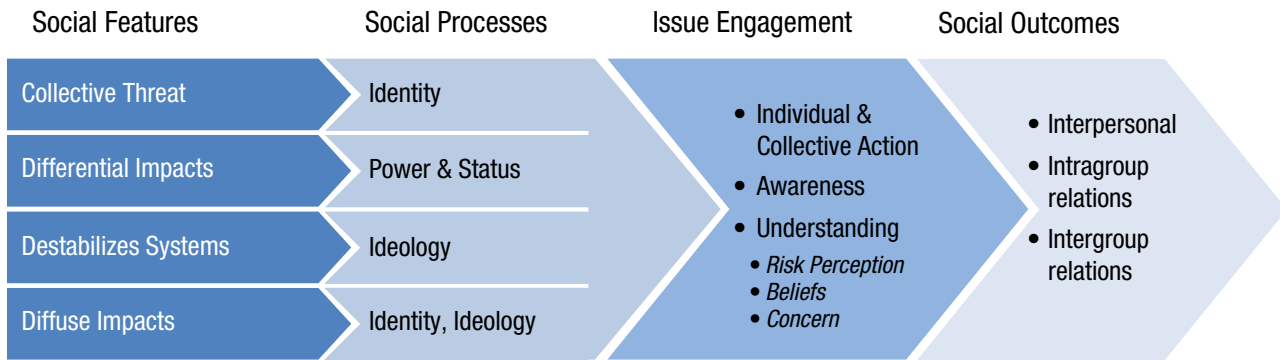
Fig. 2. An integrated framework for social climate science. Features of the phenomenon give rise to social psychological processes that, in turn, shape how people individually and collectively respond to climate change. How people engage with the issue can further impact relations between individuals and groups. Arrows illustrate linkages described in the text.

(e.g., party affiliation) as well as different values and ideological beliefs (e.g., support for vs. opposition to government regulation; Wood & Vedlitz, 2007; resistance to policies that challenge the status quo; Feygina, Jost, & Goldsmith, 2010; for a review of these distinct processes, see Daniels, Krosnick, Tichy, & Tompson, 2012). For instance, research (e.g., Kahan et al., 2012) suggests that conservatives' skepticism may be motivated, in part, by efforts to identify with and align their views with those of other conservatives (Unsworth & Fielding, 2014). Beyond party affiliation, ideological differences within political parties also independently predict climate-related beliefs (Guber, 2013; Jacquet, Dietrich, & Jost, 2014). For instance, only 25% of Tea Party Republicans (a more ideologically conservative group) report believing that global warming is occurring, compared with 61% of non-Tea Party Republicans (Pew Research Center, 2013). We consider these distinct processes in more detail later.

This research underscores the importance of considering how both lower-level (individual) and higher-level psychological processes (e.g., group dynamics) influence how people understand and respond to climate change. Indeed, climate change is a multilevel problem that affects and is affected by relationships at every level of social interaction, from neighborhoods to nations; yet, psychology currently lacks an integrated framework for understanding these social dimensions (see Fielding et al., 2014; Moser, 2016; Postmes, 2015; and Steg & Vlek, 2009). In this article, we offer an initial blueprint for a social climate science that is grounded in an understanding of the unique biophysical and social features of the problem. Specifically, within this framework, we distinguish between features of the *phenomenon* of climate change (e.g., its differential effects on poorer vs. wealthier nations) and social psychological *processes* that these features implicate (e.g., power dynamics and hierarchical relations).

A Framework for Social Climate Science

Research from both the natural and social sciences suggests four distinct features of climate change that are fundamentally social and that implicate core social psychological processes that shape how people—individually and collectively—perceive and respond to the problem. In the following, we describe each of these features and then highlight empirical findings that illustrate how these features can shape higher-level (intra- and intergroup) responses to climate change (see Fig. 2 for an overview of the framework).[3]

We believe that this framework could help psychologists pursue three goals that could strengthen the existing synergy between psychology and climate science, as well as build new connections; specifically, these goals are (a) to identify human social dimensions of climate change, change adaptation, and mitigation[4]; (b) to understand how both individual- and group-level processes shape human contributions and responses to climate change; and (c) to understand how these psychological processes, in turn, are shaped by climate change.

Social features of the phenomenon of climate change

Research within interdisciplinary climate science points to four core features of climate change that are inherently social, driven by human social behavior with social psychological consequences (for a brief summary, see Table 1).

Collective threat. Climate change is a quintessential "commons" problem: It is a phenomenon caused by the collective actions of individuals and groups motivated by short-term gains (e.g., energy consumption) that can

Table 1. Climate Change Is a *Collective* Problem With *Differential*, *Destabilizing*, and *Diffuse* Social Causes and Social Impacts

A *collective* action problem
Many climate experts view a global increase of 2°C as a key tipping point, beyond which effects of climate change are expected to grow increasingly unmanageable. To keep the planet below this threshold, the world's nations need to cut current emissions by 40%–70% by 2050 and to near-zero by the end of the century (Edenhofer et al., 2014). Collective challenges can implicate shared aspects of identity, including shared costs and benefits of addressing climate change, both within and between nations.

Differential causes and effects
Developing nations, such as those in sub-Saharan Africa and Southeast Asia, that have contributed little to existing greenhouse gas levels are most vulnerable to the effects of climate change (Burke et al., 2015). Within nations, economically disadvantaged groups, including racial and ethnic minorities, women, and the poor, are more vulnerable to climate change than members of advantaged groups. These differential causes and effects implicate group differences and status and hierarchical relations within and between nations.

A socially *destabilizing* phenomenon
Climate change threatens individuals and groups, as well as the economic and political systems on which they depend. Some adaptation measures will require the abandonment of cultural practices such as the consumption of many native plant and animal species that may exacerbate conflict between groups (Adger, Barnett, Brown, Marshall, & O'Brien, 2013). These destabilizing effects can evoke psychological responses to buffer against threats to important values and belief systems.

A spatially and temporally *diffuse* threat
Many people view climate change as a distant threat in both space and time. Cognitive limitations make it difficult for people to process information about distant and uncertain threats in ways that motivate action. Moreover, long time lags between activities that increase global CO_2 levels and their observable effects make causal attributions more difficult, which can further undermine collective action (Weber, 2013). Diffuse aspects of climate change broaden the social scope of the problem beyond traditionally studied relationships within psychology to include relationships with other nations, future generations, and other species.

result in long-term collective harm (Gifford, 2008; Ostrom et al., 2002; van Vugt, 2009; for a complementary perspective from classical welfare economics, see Sussman, Weaver, & Grambsch, 2014). Carbon emissions are produced by collective human activities at a rate that is currently double what is removed from the atmosphere by natural processes; yet, few countries have enacted national legislation to curb emissions (Mellilo, Richmond, & Yohe, 2014). Climate change is also fundamentally a cooperative problem, requiring collective action to develop, communicate, and implement effective adaptation and mitigation measures (Moser, 2016; van Zomeren, Spears, & Leach, 2010). Many climate experts view a global increase of 2°C above preindustrial levels as a key tipping point, beyond which effects on biological systems are expected to grow increasingly unmanageable and dire.[5] To keep warming below 2°C, the world needs to cut current greenhouse gas emissions by 40%–70% by 2050 and to near-zero by the end of the century (Edenhofer et al., 2014). Current pledges to limit emissions as part of the 2015 United Nations Paris Agreement would cut warming to 3.5°C. However, additional cooperative efforts—such as encouraging presently uncommitted nations to limit emissions and encouraging all nations to cap emissions growth by 2030—would keep warming below 2°C (to track ongoing international commitments and their projected global impacts, see Climate Interactive's "Climate Scoreboard" at www.climateinteractive .org/programs/scoreboard/).

These collective causes and consequences can shape how people perceive and respond to the threat of climate change. For instance, people who believe that the risks from global warming are severe and believe that their actions can affect collective outcomes are more likely to support ameliorative policies and to take action to mitigate its effects (Lubell, Zahran, & Vedlitz, 2007). Moreover, emphasizing the numerous collective benefits to addressing climate change (e.g., economic and scientific advances; opportunities to help one's community) can motivate actions even among those who are skeptical that climate change is happening (Bain et al., 2016).

Differential impacts. In addition to the collective features of climate change, scientists have highlighted the phenomenon's differential causes and impacts (Swim & Clayton, 2010). At the international level, Western industrialized nations contribute significantly more carbon emissions into the global atmosphere per capita than do developing nations. For instance, as of 2013, annual carbon emissions per person in India were 1.9 tons, compared with 7 tons in Europe and 16.4 tons in the United States (Friedlingstein et al., 2014). Moreover, many developing nations that have contributed little to existing greenhouse gas levels are most vulnerable to the effects of climate change (Edenhofer et al., 2014). Climate models show that developing nations in sub-Saharan Africa and South Asia—the world's most heavily populated and fastest growing regions—will experience the most severe

effects of climate change (e.g., more extreme weather, worse effects of rising seas) and yet are least equipped to respond to its effects (see Burke, Hsiang, & Miguel, 2015). Within nations, women, racial and ethnic minorities, and members of other economically disadvantaged groups experience harmful impacts of climate change at substantially greater levels than members of advantaged groups, such as Whites and the more affluent (United Nations Development Programme, 2007).

The differential causes and effects of climate change highlight the role of intergroup inequities and hierarchical relations within and between nations in addressing climate change. Indeed, global income inequality is expected to rise substantially within the next several decades as some nations stand to benefit economically from regional warming (colder and wealthier nations, such as Canada, Russia, and Scandinavia), whereas others—especially warmer and poorer nations close to the equator—will be negatively impacted (Burke et al., 2015). Thus, power, status, and hierarchical relationships may both contribute to and be shaped by climate change, which may affect perceptions of who is responsible for addressing it.

Destabilizing systems. Climate change also is fundamentally about transformation: not only is it physically destabilizing, disrupting the physical composition of land, sea, and air, but it is also socially destabilizing, threatening communities as well as the social, economic, and political systems on which they depend (Adger, Barnett, Brown, Marshall, & O'Brien, 2013; Doherty & Clayton, 2011; Hsiang, Burke, & Miguel, 2013; and Melillo et al., 2014). For instance, the current trajectory of warming is projected to disrupt agricultural production and food supplies throughout much of the world, leading to a decline in average global incomes by a quarter by 2100 (Burke et al., 2015).

The destabilizing effects of climate change can elicit different coping responses as people individually and collectively seek to adapt (Clayton et al., 2015; National Research Council, 2010a; Reser & Swim, 2011). Group conflict is especially likely to increase in regions lacking social programs and safety nets that allow for flexible responses to natural disasters (Casillas & Kammen, 2010; Hsiang, Burke, & Miguel, 2013). For example, climate change likely worsened recent droughts in the Fertile Crescent that led to the displacement of more than 1 million people and contributed to popular uprisings against the Syrian government (Kelley, Mohtadi, Cane, Seager, & Kushnir, 2015).

Climate change also destabilizes communities by threatening culturally valued practices and traditions. For example, in the world's coastal regions, the growing risk of storm surge threatens agricultural practices and urban planning (Obia, Archibong, Ekum, Itam, & Elekima, 2015).

Moreover, some adaptation measures will require the abandonment of traditional practices, such as the consumption of threatened native plant and animal species, which may further disrupt communities (see Adger et al., 2013; Doherty & Clayton, 2011). Finally, the adoption of mitigation measures, such as a move to renewable energy, may disrupt economic development in nations whose economies depend on fossil fuel production and use.

Diffuse impacts. Climate change also has unique features of time and scale that distinguishes it from other social problems: It is a vast, slow-moving problem with global effects that span generations (Edenhofer et al., 2014; Melillo et al., 2014). These unique temporal and spatial features have social psychological consequences. Long time lags between human activities that contribute to climate change and their observable effects make attributions of blame and responsibility for addressing climate change more difficult, which can impede collective action (Weber, 2013). Moreover, people in Western nations tend to view climate change and its effects as a psychologically distant threat in both space and time (Leiserowitz, 2005; Spence, Poortinga, & Pidgeon, 2012). These unique features can dampen emotional reactions to climate change and reduce perceptions of its risks. For instance, Spence et al. (2012) found that encouraging people to consider how climate change would affect local communities increased concerns about global warming, whereas encouraging them to consider its effects on more distant communities had no effect on their level of concern. Thus, people may express greater concern about climate impacts when those affected are perceived as closer in physical proximity or in time (e.g., present vs. future generations; Zaval, Markowitz, & Weber, 2015; see also Trope & Liberman, 2010).

From social features to psychological processes

The four features of climate change that we have described can serve as the basis for advancing the psychological study of climate change beyond how individuals respond to the problem to consider how people *collectively* respond to climate risks and the social psychological consequences of these responses (e.g., how different beliefs about climate change can affect intergroup relations; see Postmes, 2015). Specifically, we highlight three sets of social psychological processes—identity, power, and ideological processes—that psychological research and theory suggest can influence how people respond to each of the social features of climate change.

Figure 2 illustrates hypothesized linkages between the four social features of climate change and social psychological processes they implicate. For instance, whereas

the collective features of climate change can prompt collective action by emphasizing shared aspects of identity (Bamberg, Rees, & Seebauer, 2015), the destabilizing effects of climate change can elicit ideological responses that serve to buffer against the threats that climate change and climate-related policies may pose to individuals, groups, and institutions (Jacquet et al., 2014). In the following, we review empirical evidence for each of these processes and highlight relevant psychological theory that can further elucidate their role in shaping how people respond to climate change.

Social identity processes. A growing body of evidence suggests how people think about and respond to climate change is powerfully influenced by social identity processes and group memberships (Bliuc et al., 2015; Clayton & Myers, 2009; Fielding et al., 2014; Leary, Toner, & Gan, 2011; Pearson & Schuldt, 2015; Postmes, Rabinovich, Morton, & van Zomeren, 2013; Rees & Bamberg, 2014; Schuldt & Pearson, 2016; Swim & Becker, 2012). Indeed, both skeptics and believers, including scientists, view themselves as members of distinct communities, with shared goals, values, and beliefs that conflict with those of the other side (Bliuc et al., 2015).

Psychological theories of identity have long acknowledged the fundamental human motive to behave in ways that signal acceptance as a valued group member (e.g., Baumeister & Leary, 1995). Moreover, social identity perspectives suggest that people participate in social movements not only to effect social change but also to establish social identities and strengthen social ties with fellow group members (see Hogg, 2007; and Klandermans, 2004). Thus, social identities can affect both how people perceive risks associated with climate change and how they engage with groups associated with efforts to address it.

Political affiliation. Among the most heavily studied identity influences in the climate domain are effects of political party affiliation. National surveys reveal a growing political divide in the United States on climate-related beliefs and support for mitigation policies along two key social dimensions: party identification (e.g., between Democrats and Republicans) and ideological values and beliefs (e.g., between liberals and conservatives). Although correlated, these dimensions have been found to independently (and simultaneously) predict climate beliefs and policy support (see McCright & Dunlap, 2011a, 2011b); thus, we consider these two sources of influence separately.

Research in political science and communication points to two primary mechanisms through which party identification can shape climate change beliefs. According to information-processing theory (Wood & Vedlitz, 2007), people's beliefs and experiences, including their perceptions of other group members' beliefs, form the foundation for how they perceive social and political issues. Thus, individuals tend to adopt beliefs that are shared by members of salient ingroups and may resist revision of these beliefs when they are confronted with conflicting information (Kahan et al., 2007; McCright & Dunlap, 2011a). A complementary perspective—the elite cues hypothesis (see Krosnick, Holbrook, & Visser, 2000)—suggests that people rely on information from high-status ingroup members (e.g., political leaders) when an issue is perceived to be complex or controversial.

Consistent with information-processing theory, several studies have shown that as education and science literacy increase within the U.S. public, political polarization on climate change becomes stronger, suggesting that people process climate-related information in ways that reinforce their prior political stance (e.g., Hamilton, 2011; Kahan et al., 2012; McCright, 2011). Moreover, Congressional press release statements and roll call votes on climate-related bills issued by Democrat and Republican leaders predict changes in perceptions of the threat among Democrat and Republican voters, respectively, over time (Brulle, Carmichael, & Jenkins, 2012). Thus, when party elites disagree, the public may rely on factors such as party affiliation when processing information, which can exacerbate polarization on climate change.

Identity influences beyond the partisan divide. A growing body of research suggests that emphasizing shared costs and benefits of cooperating to address climate change can motivate collective action by signaling shared aspects of identity. According to the social identity model of collective action (van Zomeren et al., 2010), people take action when they believe that their group's actions can be effective, when they experience strong emotional reactions (e.g., feelings of injustice), and when they identify with groups attempting to mobilize action. Research suggests that identification with groups trying to mobilize action is among the strongest predictors of collective action. A series of studies examining what motivates people to join local climate change initiatives found that how strongly people identified with the group involved in the cause consistently had the strongest effect on their motivations to participate, over and above concerns about costs and benefits of participating (Bamberg et al., 2015). In addition, whereas those who more strongly identified with the group showed intrinsic motivations to participate (e.g., viewing the group's goals as more important than one's personal reasons for participating), those with low levels of identification were more extrinsically motivated, focusing on personal costs and benefits of participating (see also Stürmer & Simon, 2004; and van Zomeren et al., 2010).

As the research we have cited highlights, social identity processes can both unite and divide people on the issue of climate change. Collective threats can enhance the salience of shared aspects of identity in ways that motivate cooperation (Dovidio et al., 2004); yet, common identities can be difficult to sustain over time, and this may be particularly true as climate change exposes and exacerbates inequities between groups (Burke et al., 2015; Cheung, Luke, & Maio, 2014). In one study, participants who were shown evidence of excessive energy use by fellow Americans (ingroup) versus Chinese (outgroup) were more likely to attribute climate change to natural rather than human causes, which, in turn, predicted less concern about the issue and less support for both domestic and global mitigation policies (Jang, 2013). Thus, identifying the conditions under which people form and maintain collective identities around shared threats with differential causes and impacts, as well as identifying which identity dimensions are important for climate engagement (e.g., perceiving oneself as similar to an advocacy group's members vs. invested in the group's goals; see Masson & Fritsche, 2014), are critical questions for future psychological research.

The social context of climate change also affords a unique opportunity to examine how both individual- and group-level psychological processes can interact to influence how people process threatening information. For instance, uncertainty about the causes and long-term effects of climate change is often viewed as a barrier to public mobilization (e.g., Barrett & Dannenberg, 2014; Budescu, Broomell, & Por, 2009; Pidgeon & Fischhoff, 2011). However, uncertainty has also been shown to increase collective action by enhancing identification with groups engaged in activist causes. Extreme and enduring uncertainty due to economic collapse or natural disasters can lead people to seek out and identify with ideologically more extreme groups or make existing groups more extreme to cope with and reduce the uncertainty (Hogg, 2007). Thus, uncertainty surrounding climate change may interact with identity processes in ways that both hinder and enhance collective efforts to address the problem.

Power, status, and hierarchical relations. Climate change disproportionately affects marginalized communities and the poor (National Research Council, 2010a). Whereas the shared costs of inaction and shared benefits of addressing climate change can make common identities and collective goals salient, its differential impacts can highlight inequities between groups and different group motivations for responding to climate change. In particular, research suggests that power, status, and hierarchical relations influence how people assess the risks of climate change—topics that psychologists are well positioned to address.

Generally, the opinions of high-status individuals (and particularly high-status ingroup members) can have a stronger influence in swaying people's beliefs about climate change than other key influences, including scientific information, news stories about climate change, and even personal experiences with extreme weather (Brulle et al., 2012). Moreover, beliefs about hierarchical relations can influence how people process environmental risks. Individuals who are high on social dominance orientation (Pratto, Sidanius, Stallworth, & Malle, 1994), an ideology reflecting a preference for social hierarchies, perceive lower environmental and climate change risks (Kahan et al., 2012). Similarly, right-wing authoritarianism, a tendency to submit to authorities and prevailing power structures, predicts opposition to environmental protection policies, which are viewed as a threat to national sovereignty or dominion over nature (Altemeyer, 2003; Schultz & Stone, 1994).

Group differences in risk perception. A growing body of research suggests that groups that are disproportionately affected by environmental hazards tend to show higher levels of climate-related concerns and may be especially motivated by equity concerns when it comes to addressing climate change (see Mohai, 2008). Indeed, opinion polls over the past several decades reveal a racial/ethnic gap on environmental concern—including concerns about climate change—with non-White minorities expressing consistently higher levels of concern than Whites (Dietz et al., 2007; Gruber, 2013; Leiserowitz & Akerlof, 2010; Macias, 2016; Speiser & Krygsman, 2014). Public opinion polls document similar gaps in relation to gender and socioeconomic status, with women and low-income respondents expressing greater environmental concern than men and wealthier respondents, respectively (Guber, 2013; Pearson & Schuldt, 2015; Scruggs & Benegal, 2012; for similar findings at the cross-national level showing greater concern among poorer vs. wealthier nations, see Kim & Wolinsky-Nahmias, 2014). These findings are particularly striking given that the public often associates proenvironmentalism with Whites and the more affluent (Mohai, 2003).

These differences in risk perception mirror a reality that low-income and racial/ethnic minority communities disproportionately suffer from a wide range of environmental hazards. For instance, due to persistent racial segregation and discrimination in land use, 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 with equivalent-incomes (Mohai, 2008). As a result, people of color in the United States experience up to 20 times the level of smog exposure as Whites (Clark, Millet, & Marshall, 2014). Nationally, 67% of Blacks and

80% of Latinos live in counties with substandard air quality, compared with 57% of Whites, and hospitalization rates for asthma among Blacks and Latinos is nearly four times the rate among Whites (see Bullard, Johnson, & Torres, 2011).

According to the differential vulnerability hypothesis, White males in the United States may feel less vulnerable to the effects of climate change than non-Whites and women, in part because of their more privileged position in society (Satterfield, Mertz, & Slovic, 2004; see also Flynn, Slovic, & Mertz, 1994). Indeed, in the United States, White males are significantly more likely than are other demographic groups to endorse denialist views of climate change and perceive fewer environmental risks generally than women and non-Whites (McCright & Dunlap, 2011a; Satterfield et al., 2004). Additional 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).

Although racial/ethnic differences in environmental concerns have been observed over and above effects of political orientation (see Macias, 2016), political ideologies may nevertheless contribute to group differences in risk perceptions. For example, compared with other demographic groups, White males also more strongly favor group hierarchies (e.g., Flynn et al., 1994; Kahan et al., 2007) and may be more likely to perceive environmental regulations as challenging existing social, economic, and political institutions (see Jacquet et al., 2014). We discuss these ideological processes in more detail in the next section.

Despite their high levels of concern, racial and ethnic minorities in the United States have long been underrepresented in environmental organizations and professions (Taylor, 2014). Census data show that environment-related fields are among the least racially and ethnically diverse of all science, technology, and engineering (STEM) professions in the United States, showing, on average, half of the levels of non-White representation as other STEM professions (Pearson & Schuldt, 2014). Although a variety of structural barriers may contribute to this attitude–participation gap in minority engagement (e.g., insular hiring practices, limited outreach among national organizations, historically; see Taylor, 2014), a variety of social psychological factors, such as stereotypic associations with the term *environmentalist* and the perceived exclusivity of environmental organizations, may also contribute to disparities in organizational and professional engagement (see Pearson & Schuldt, 2014; and Schuldt & Pearson, 2016). In particular, research on identity-based motivation

suggests that people are motivated to behave in ways that are congruent with the actions of ingroup members (Oyserman, Fryberg, & Yoder, 2007). Thus, factors beyond awareness of climate change and its impacts, such as the visible representation of non-Whites in environmental organizations, may also affect a willingness to join environmental causes—an important avenue for future psychological research.

Social class and inequality. Finally, the role of social class relations and changing socioeconomic conditions has been surprisingly overlooked in the climate domain; yet, the differential and destabilizing effects of climate change point directly to the importance of these processes. Within the United States, class conflict now ranks ahead of other leading sources of perceived conflict (e.g., between immigrants and native-born citizens or between Blacks and Whites), with more than 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, people in developing countries and among the world's poor face far more severe adaptation challenges than those in wealthier nations (United Nations Human Development Programme, 2007).

Studies on civic participation 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). Indeed, cooperation in experimental resource dilemmas tends to decline with real or perceived inequity (Aquino, Steisel, & Kay, 1992; Foddy & Dawes, 2008; see also Piff, Kraus, Cote, Cheng, & Keltner, 2010). However, perceptions of group disadvantage can also evoke group-based anger, which can motivate people from disadvantaged groups to take collective action on behalf of their group (van Zomeren et al., 2010). Thus, whether public concern about rising inequality in the United States and across the globe enhances or impedes collective action to address climate change remains an important question for psychological science.

Ideological processes. The socially destabilizing effects of climate change point to a critical role for ideological influences on how people process and respond to climate risks.[6]

As previously noted, much of the literature on the role of ideology, to date, has focused on effects of political ideology (conservatism vs. liberalism) as a predictor of climate change beliefs and concerns in the United States (see McCright & Dunlap, 2011b). Environmental protection often entails governmental intervention into markets and restrictions on individual rights, which may conflict with key conservative values, whereas regulations that emphasize collective rights and the protection of

vulnerable populations often resonate more with liberals (McCright et al., 2016; McCright & Dunlap, 2011a). Moreover, international treaties aimed at curbing emissions may be seen as a threat to national sovereignty, an additional concern of conservatives. Thus, the political divide on both the science of climate change and policies aimed at mitigating climate change may reflect not only identity processes (e.g., party affiliation) but also differing values and ideological beliefs of liberals and conservatives (see Campbell & Kay, 2014).

Nevertheless, when it comes to political ideology, U.S. conservatives appear to be unique in denying the existence of human-caused climate change. For example, a study of nine national conservative parties found that only U.S. conservatives expressed skepticism of anthropogenic climate change, and all but those in the United States and Australia supported regulating carbon emissions (Batstrand, 2015; but see Poortinga, Spence, Whitmarsh, Capstick, & Pidgeon, 2011, for evidence of conservative skepticism within the United Kingdom). Thus, psychologists might find it productive to explore ideological factors that shape climate change beliefs and policy support beyond the U.S. political context (see Daniels et al., 2012). Indeed, liberalism and conservatism reflect one dimension among an array of more general ideological processes studied by psychologists, such as responses to group and system threats, as well as culture-specific values and belief systems, that may influence how people engage with the issue of climate change. Investigating these processes may offer important insights into how the global public engages with the issue of climate change, beyond the United States (see Lee et al., 2015).

Group- and system-justifying ideologies. System justification theory (Jacquet et al., 2014; Jost, Banaji, & Nosek, 2004) posits that people are motivated to defend the self and their social groups as well as the social, economic, and political systems on which they depend. Generally, as worldviews become more individualistic and hierarchical, perceptions of climate risks diminish (Kahan et al., 2012). Some scholars have argued that at the group level, environmental beliefs, including beliefs about climate change, serve an "identity-protective" function to protect the status afforded by advantaged group memberships (Kahan et al., 2007). Consistent with the identity-protective hypothesis, research has shown that individuals from high-status groups who prefer group hierarchies (e.g., White males) are more likely to resist regulatory policies aimed at reducing environmental risks and perceive them as challenges to established social, economic, and political institutions (McCright & Dunlap, 2011a; see also Feygina, Jost, & Goldsmith, 2010).

Beyond concerns at the group level, threats to social, economic, and political institutions can also motivate system-justifying beliefs and action in ways that can affect how people perceive climate-related threats. When U.S. participants were led to believe that the economic system exerted a strong (vs. weak) impact on their life circumstances, they were more likely to misremember details from a newspaper article about carbon emissions in a system-exonerating direction: They recalled lower carbon emissions than were reported (Hennes, Jost, & Ruisch, 2013). In contrast, reframing environmental protection as consistent with system-justifying needs (e.g., reminding people that it is patriotic to conserve national resources) increased support for environmental protections among those who were more motivated to defend the status quo (see Feygina et al., 2010; and Feygina, 2013).

In another series of experiments, Feinberg and Willer (2011) found that threats to beliefs that the world is just, orderly, and stable increased denial of global warming and decreased support for mitigation policies. Thus, awareness of the destabilizing impacts of climate change can paradoxically drive resistance to warnings about climate change to buffer against existential threats that climate change poses. A sense of powerlessness has also been shown to foster system justification (Van der Toorn et al., 2015). Thus, status and ideology may interact to shape climate attitudes and beliefs—an important area of inquiry for future research.

Cultural and moral ideologies. Cultural and moral belief systems can also impact climate-related behavior. Meta-analyses comparing predictors of climate change beliefs across nations suggest that cultural worldviews are often stronger predictors of belief in climate change than many other variables that might be intuitively presumed to predict these beliefs, such as general education level, knowledge about the issue, and personal experiences with extreme weather (Hornsey, Harris, Bain, & Fielding, 2016). In a cross-national study in which messages designed to increase intentions to purchase carbon offsets were tested in the United States and India (Rattan, Savani, & Romero-Canyas, 2015), appeals emphasizing choice and moral responsibility motivated American but not Indian airplane ticket buyers to purchase carbon offsets. In contrast, appeals invoking religious values (preserving the sanctity of the natural environment) motivated Indians but had no effect on Americans. These findings point to the importance of culturally congruent messages for motivating proenvironmental behavior and highlight the potential dangers of failing to consider how appeals that resonate within nations may fail, or even backfire, in international contexts.

Climate change is also increasingly framed in moral terms (e.g., as a social justice issue; see Markowitz & Shariff, 2012). Feinberg and Willer (2013) found that liberals, but not conservatives, viewed environmental issues in moral

terms, primarily informed by principles of harming versus caring for others—principles that climate organizations overwhelmingly use in their advocacy efforts (Nisbet, Markowitz, & Kotcher, 2012). In contrast, reframing proenvironmental messages in terms of purity (e.g., keeping natural spaces clean), a moral value that resonates with conservatives, increased conservatives' belief in global warming. Moral emotions such as guilt can also motivate collective efforts to reduce climate change, which, in some cases, may outweigh financial considerations. In one study, participants who were primed with guilt—a moral emotion that denotes shared responsibility—before reading about climate change indicated greater support for costly mitigation efforts (e.g., a higher tax on gasoline) relative to a control group and those primed with anger (Lu & Schuldt, 2015). However, research suggests that the more distant victims of climate change are geographically or in time (e.g., future generations), the less morally obligated people feel to act on their behalf (Markowitz & Shariff, 2012). Thus, the diffuse temporal and spatial properties of climate change may undermine perceived moral imperatives to address climate change.

Finally, despite the considerable media attention surrounding the climate change initiatives of Pope Francis (2015), the role of religion in environmental decision making has been largely overlooked within psychology. Public opinion surveys have shown that frequency of religious attendance predicts a weaker belief in global warming, even after controlling for a variety of confounding variables (e.g., age, political orientation, education, income; Scruggs & Benegal, 2012). Whether identity, ideological processes, or other psychological mechanisms can explain these effects remains to be explored.

How Can Climate Science Advance Psychological Science?

To this point, we have focused on how psychology can advance understanding of the social drivers of climate change. Indeed, many scholars have emphasized ethical imperatives for addressing climate change and have offered practical guidelines for increasing psychology's contribution to the science and communication of climate change (e.g., Swim et al., 2011; see also van der Linden, Maibach, & Leiserowitz's, 2015, article in *Perspectives on Psychological Science*). But what might psychologists have to gain from studying climate change? We conclude by considering *scientific* imperatives for studying climate change for advancing psychological research and theory.

Practically, psychology has much to gain as a global interdisciplinary science in working with climate researchers in other disciplines. Climate science has a uniquely global footprint, with growing opportunities for collaborative research in many economically developing regions in Africa, Asia, and South America (Bettencourt & Kaur, 2011; Kates, 2011). Within the scientific community, there is unprecedented funding for cross-disciplinary research on climate change, with a particular interest in engaging the behavioral sciences to speed the adoption of policies and technology solutions to help mitigate climate change and to help communities adapt to its effects (see American Academy of Arts & Sciences, 2011; Clayton et al., 2015; National Research Council, 2010b).

Exploring the unique features of climate change—its collective, differential, destabilizing, and diffuse characteristics—also has the potential to stimulate new sets of distinctly psychological questions, such as how and when do people think beyond themselves? How do collective threats impact intergenerational thinking? And when are social identities contingent on a sense of place (e.g., felt connections to physical environments; Stedman, 2003)? We conclude by considering each of these questions.

Questions about how and when humans think beyond borders, our own species, and terrestrial environments are not only of pragmatic concern but have the potential to substantially inform psychological theory. Climate change is projected to result in the extinction of one in six species globally and nearly one in four species in South America (Urban, 2015). Marine ecosystems are especially at risk due to ecological pressures that are largely invisible to the public. Ocean surface waters have become 30% more acidic since the Industrial Revolution, a development that is projected to destroy many of the planet's coral reefs and the diverse ecosystems that depend on them by 2050 (Melillo et al., 2014). Threats to marine ecosystems have direct and tangible consequences for human populations, as these ecosystems produce 25% of the annual total fish catch for nearly 1 billion people in Asia alone (Hoegh-Guldberg et al., 2007). These challenges present unique and fertile ground for psychologists to examine how people understand threats to nonterrestrial and largely invisible ecosystems that support a majority of the global population (see Schuldt, McComas, & Byrne, 2016).

The temporal and geographic scope of climate change necessitates coordination and cooperation on a scale unlike any other social issue. But can people maintain and act on a global identity? Can group identities incorporate living kinds beyond humans? Theories of intergroup relations are often silent in addressing how and when social identities and hierarchical relations extend beyond national borders and to other species (see Amiot & Bastian, 2015; Crompton & Kasser, 2009; McFarland, Webb, & Brown, 2012; Swim & Bloodhart, 2015). Similarly, whether people can transcend generational boundaries to act in the interests of future generations—questions of intergenerational psychology—remain largely open for research and theory development (see Postmes et al.,

2013; and Hershfield, Bang, & Weber, 2013). The question of when people are willing to sacrifice for future generations only recently has gained traction within psychology (Wade-Benzoni, Sondak, & Galinsky, 2010; also Jacquet et al., 2013). In one study, the motivation to leave a positive legacy predicted donations to an environmental charity and mitigation intentions (e.g., purchasing green products; Zaval et al., 2015). Legacy-inducing challenges like climate change may also affect intertemporal discounting by enhancing individuals' orientation toward future outcomes (Wade-Benzoni, Tost, Hernandez, & Larrick, 2012; see also Vandenbergh & Raimi, 2015). The unique temporal dimensions of climate change afford opportunities to examine how people make decisions that affect future generations and have the potential to exert effects over vast periods of time (e.g., millennia).

Finally, cultural psychologists have shown that physical environments can shape cultural practices in ways that give rise to marked differences in cognition (Uskul, Kitayama, & Nisbett, 2008). How will climate change alter cultural practices that are tied to identity, community, and a sense of place? Coastal communities in economically developing nations such as Indonesia, India, and Bangladesh, as well as in the U.S. (e.g., the Mississippi River delta) already face adaptation pressures from rising sea levels that stand to markedly disrupt traditional ways of life. The rapid retreat of glaciers at high altitudes, such as the iconic snow of Mt. Kilimanjaro, similarly threatens the cultural identities of native communities (Adger et al., 2013). To date, few cross-cultural studies have explored effects of such large-scale environmental changes on human cognition and social behavior.

Conclusion

The critical challenge for climate science and the creation of policy aimed at climate adaptation and mitigation is the same: people. Perhaps more than any contemporary issue, climate change presents unique challenges that require broad and sustained cooperation among parties with diverse and often competing interests. Current social science perspectives, including those within psychology, have focused largely on social impacts (e.g., drought, famine, and disease) rather than contributing processes (Edenhofer et al., 2014; see also Clayton et al., 2015). With a new international agreement for cutting carbon emissions now in place (the 2015 Paris Agreement), many societies will begin working to meet their greenhouse gas reduction goals. Achieving these goals will require attitude and behavior changes on the part of individuals and groups. Psychologists are uniquely positioned to help people adapt to this new reality. Through its diverse approaches to understanding how people respond to

their social and physical environments, psychology is not only well equipped to contribute to current scientific understanding of the human dimensions of climate change, but the unique features of climate change offer fertile ground for advancing psychological research and theory in kind.

Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

Notes

1. Range is from 0.49% (*Psychological Science*) to 4.57% (*American Psychologist*) of all articles published 2005–2014. Our analysis focused on research published in nonspecialized journals. Nevertheless, we note that there are many excellent specialized psychology journals that feature climate-related research (e.g., *Journal of Environmental Psychology* and *Environment & Behavior*), as well as a number of interdisciplinary outlets that publish original social and behavioral science research on climate change (e.g., *Nature Climate Change, Climatic Change*, and *Global Environmental Change*).
2. For similar arguments for moving beyond a common emphasis on intrapsychic and interpersonal motivations in psychological research more generally, see Leary, Raimi, Jongman-Sereno, and Diebels (2015).
3. Given the complexity of a phenomenon like climate change, we do not view these features and psychological processes as exhaustive but rather as illustrative of major social dimensions of the problem that can be addressed by psychological science.
4. *Adaptation* refers to the process of adjustment to climate change and its effects in order to lessen its harm (e.g., developing coastal neighborhoods in ways that take sea level rise into account) or to exploit its potential benefits (e.g., green energy development), whereas *mitigation* refers to the process of reducing emissions or sequestering greenhouse gases so as to limit future climate change (Edenhofer et al., 2014). Adaptation and mitigation represent complementary strategies for reducing the risks of climate change but operate on different time scales: Whereas adaptation addresses near-term risks, mitigation represents a long-term management strategy (Edenhofer et al., 2014). Thus, each strategy represents a distinct and important domain for psychological inquiry.
5. The projected global effects of warming beyond 2°C are substantial, resulting in the extinction of up to 58% of all vertebrate species, by current estimates, compared with the extinction of 11%–34% of vertebrate species at warming below 2°C (Pereira et al., 2010). With the implementation of all current national

pledges to reduce greenhouse gas emissions within the Paris Agreement, to date, the planet is currently on track to warm 3.5°C above preindustrial levels by 2100 (Climate Interactive, 2015).

6. We use the term *ideology* here to refer to an interrelated set of moral, social, and political attitudes that includes affective, cognitive, and motivational components (Jost, 2006).

References

Adger, W. N., Barnett, J., Brown, K., Marshall, N., & O'Brien, K. (2013). Cultural dimensions of climate change impacts and adaptation. *Nature Climate Change*, *3*, 112–117.

Akerlof, K., Maibach, E. W., Fitzgerald, D., Cedeno, A. Y., & Neuman, A. (2013). Do people "personally experience" global warming, and if so, how does it matter? *Global Environmental Change*, *23*, 81–91.

Altemeyer, B. (2003). What happens when authoritarians inherit the earth? A simulation. *Analyses of Social Issues and Public Policy*, *3*, 161–169.

American Academy of Arts & Sciences. (2011). *Beyond technology: Strengthening energy policy through social science*. Retrieved from https://www.amacad.org/pdfs/alternativeenergy.pdf

Amiot, C. E., & Bastian, B. (2015). Toward a psychology of human–animal relations. *Psychological Bulletin*, *141*, 6–47.

Aquino, K., Steisel, V., & Kay, A. (1992). The effects of resource distribution, voice, and decision framing on the provision of public goods. *Journal of Conflict Resolution*, *36*, 665–687.

Bain, P. G., Milfont, T. L., Kashima, Y., Bilewicz, M., Doron, G., Garðarsdóttir, R. B., . . . Corral-Verdugo, V. (2016). Co-benefits of addressing climate change can motivate action around the world. *Nature Climate Change*, *6*, 154–157.

Bamberg, S., Rees, J., & Seebauer, S. (2015). Collective climate action: Determinants of participation intention in community-based pro-environmental initiatives. *Journal of Environmental Psychology*, *43*, 155–165.

Barrett, S., & Dannenberg, A. (2014). Sensitivity of collective action to uncertainty about climate tipping points. *Nature Climate Change*, *4*, 36–39.

Batstrand, S. (2015). More than markets: A comparative study of nine conservative parties on climate change. *Politics & Policy*, *43*, 538–561.

Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, *117*, 497–529.

Bettencourt, L. M., & Kaur, J. (2011). Evolution and structure of sustainability science. *PNAS: Proceedings of the National Academy of Sciences of the United States of America*, *108*, 19540–19545.

Bliuc, A., McGarty, C., Thomas, E. F., Lala, G., Berndsen, M., & Misajon, R. (2015). Public division about climate change rooted in conflicting socio-political identities. *Nature Climate Change*, *5*, 226–229.

Bolderdijk, J. W., Steg, L., Geller, E. S., Lehman, P. K., & Postmes, T. (2013). Comparing the effectiveness of monetary versus moral motives in environmental campaigning. *Nature Climate Change*, *3*, 413–416.

Brick, C., & Lewis, G. J. (2014). Unearthing the "green" personality: Core traits predict environmentally friendly behavior. *Environment & Behavior*. Advance online publication. doi:10.1177/0013916514554695

Brulle, R. J., Carmichael, J., & Jenkins, J. C. (2012). Shifting public opinion on climate change: An empirical assessment of factors influencing concern over climate change in the U.S., 2002–2010. *Climatic Change*, *114*, 169–188.

Budescu, D. V., Broomell, S., & Por, H. (2009). Improving communication of uncertainty in the reports of the Intergovernmental Panel on Climate Change. *Psychological Science*, *20*, 299–308.

Bullard, R. D., Johnson, G. S., & Torres, A. O. (2011). *Environmental health and racial equity in the United States*. Washington, DC: American Public Health Association.

Burke, M., Hsiang, S. M., & Miguel, E. (2015). Global non-linear effect of temperature on economic production. *Nature*, *527*, 235–239.

Campbell, T. H., & Kay, A. C. (2014). Solution aversion: On the relation between ideology and motivated disbelief. *Journal of Personality and Social Psychology*, *107*, 809–824.

Capstick, S., Whitmarsh, L., Poortinga, W., Pidgeon, N., & Upham, P. (2015). International trends in public perceptions of climate change over the past quarter century. *Wiley Interdisciplinary Reviews: Climate Change*, *6*, 35–61.

Casillas, C. E., & Kammen, D. M. (2010, November 26). The energy–poverty–climate nexus. *Science*, *330*, 1181–1182.

Cheung, W. Y., Luke, M. A., & Maio, G. R. (2014). On attitudes towards humanity and climate change: The effects of humanity esteem and self-transcendence values on environmental concerns. *European Journal of Social Psychology*, *44*, 496–506.

Cialdini, R. B. (2003). Crafting normative messages to protect the environment. *Current Directions in Psychological Science*, *12*, 105–109.

Cialdini, R. B., Reno, R. R., & Kallgren, C. A. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of Personality and Social Psychology*, *58*, 1015–1026.

Clark, L. P., Millet, D. B., & Marshall, J. D. (2014). National patterns in environmental injustice and inequality: Outdoor NO2 air pollution in the United States. *PLoS ONE*, *9*(4), e94431. doi:10.1371/journal.pone.0094431

Clayton, S., Devine-Wright, P., Stern, P. C., Whitmarsh, L., Carrico, A., Steg, L., . . . Bonnes, M. (2015). Psychological research and global climate change. *Nature Climate Change*, *5*, 640–646.

Clayton, S., & Myers, G. (2009). *Conservation psychology: Understanding and promoting human care for nature*. Hoboken, NJ: Wiley-Blackwell.

Climate Interactive. (2015). *Scoreboard science and data*. Retrieved from https://www.climateinteractive.org/tools/scoreboard/scoreboard-science-and-data/

Crompton, T., & Kasser, T. (2009). *Meeting environmental challenges: The role of human identity*. Godalming, England: World Wildlife Fund–United Kingdom.

Daniels, D. P., Krosnick, J. A., Tichy, M. P., & Tompson, T. (2012). Public opinion on environmental policy in the United States. In M. Kraft & S. Kamieniecki (Eds.), *Handbook of U.S. environmental policy* (pp. 461–486). New York, NY: Oxford University Press.

De Groot, J. I. M., & Steg, L. (2008). Value orientations to explain beliefs related to environmental significant behavior: How to measure egoistic, altruistic, and biospheric value orientations. *Environment & Behavior*, *40*, 330–354.

Dietz, T., Dan, A., & Shwom, R. (2007). Support for climate change policy: Social psychological and social structural influences. *Rural Sociology*, *72*, 185–214.

Dietz, T., Gardner, G. T., Gilligan, J., Stern, P. C., & Vandenbergh, M. P. (2009). Household actions can provide a behavioral wedge to rapidly reduce U.S. carbon emissions. *PNAS: Proceedings of the National Academy of Sciences of the United States of America*, *106*, 18452–18456.

Ding, D., Maibach, E. W., Zhao, X., Roser-Renouf, C., & Leiserowitz, A. (2011). Support for climate policy and societal action are linked to perceptions about scientific agreement. *Nature Climate Change*, *1*, 462–466.

Doherty, T., & Clayton, S. (2011). The psychological impacts of global climate change. *American Psychologist*, *66*, 265–276.

Dovidio, J. F., ten Vergert, M., Stewart, T. L., Gaertner, S. L., Johnson, J. D., Esses, V. M., . . . Pearson, A. R. (2004). Perspective and prejudice: Antecedents and mediating mechanisms. *Personality and Social Psychology Bulletin*, *30*, 1537–1549.

Dunlap, R. E. (2008). *Climate-change views: Republican–Democratic gaps expand*. Gallup. Retrieved from http://www.gallup.com/poll/107569/ClimateChange-Views-RepublicanDemocratic-Gaps-Expand.aspx?g_source=dunlap%20climate%20change&g_medium=search&g_campaign=tiles

Dunlap, R. E., van Liere, K. D., Mertig, A. G., & Jones, R. E. (2000). Measuring endorsement of the New Ecological Paradigm: A revised NEP scale. *Journal of Social Issues*, *56*, 425–442.

Edenhofer, O., Pichs-Madruga, R., Sokona, Y., Minx, J. C., Farahani, E., Kadner, S., . . . Working Group III Technical Support Unit (Eds.). (2014). *Mitigation of climate change. Summary for policymakers. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. London, England: Cambridge University Press.

European Commission, TNS Opinion & Social Network (2014). *Climate change report* [Special Eurobarometer 409]. Retrieved from http://ec.europa.eu/clima/citizens/support/documentation_en.htm

Fahrenthold, D. A. (2009, December 4). Climate change is latest problem that's admitted but ignored. *Washington Post*. Retrieved from http://www.washingtonpost.com/wp-dyn/content/article/2009/12/04/AR2009120403619.html

Feinberg, M., & Willer, R. (2011). Apocalypse soon? Dire messages reduce belief in global warming by contradicting just-world beliefs. *Psychological Science*, *22*, 34–38.

Feinberg, M., & Willer, R. (2013). The moral roots of environmental attitudes. *Psychological Science*, *24*, 56–62.

Feygina, I. (2013). Social justice and the human–environment relationship: Common systemic, ideological, and psychological roots and processes. *Social Justice Research*, *26*, 363–381.

Feygina, I., Jost, J. T., & Goldsmith, R. E. (2010). System justification, the denial of global warming, and the possibility of "system-sanctioned change." *Personality and Social Psychology Bulletin*, *36*, 326–338.

Fielding, K. S., Hornsey, M. J., & Swim, J. K. (2014). Developing a social psychology of climate change. *European Journal of Social Psychology*, *44*, 413–420.

Fischer, C. (2008). Feedback on household electricity consumption: A tool for saving energy? *Energy Efficiency*, *1*, 79–104.

Flynn, J., Slovic, P., & Mertz, C. K. (1994). Gender, race, and perception of environmental health risks. *Risk Analysis*, *14*, 1101–1108.

Foddy, M., & Dawes, R. (2008). Group-based trust in social dilemmas. In A. Biel, D. Eek, T. Gärling, & M. Gustafson (Eds.), *New issues and paradigms in research on social dilemmas* (pp. 57–71). New York, NY: Springer.

Friedlingstein, P., Andrew, R. M., Rogelj, J., Peters, G. P., Canadell, J. G., Knutti, R., . . . Le Quéré, C. (2014). Persistent growth of CO_2 emissions and implications for reaching climate targets. *Nature Geoscience*, *7*, 709–715.

Gifford, R. (2008). Psychology's essential role in alleviating the impacts of climate change. *Canadian Psychology*, *49*, 273–280.

Gifford, R. (2011). The dragons of inaction: Psychological barriers that limit climate change mitigation and adaptation. *American Psychologist*, *66*, 290–302.

Goldstein, N. J., Cialdini, R. B., & Griskevicius, V. (2008). A room with a viewpoint: Using social norms to motivate environmental conservation in hotels. *Journal of Consumer Research*, *35*, 472–482.

Griskevicius, V., Cialdini, R. B., & Goldstein, N. J. (2008). Social norms: An underestimated and underemployed lever for managing climate change. *International Journal of Sustainability Communication*, *3*, 5–13.

Guber, D. L. (2013). A cooling climate for change? Party polarization and the politics of global warming. *American Behavioral Scientist*, *57*, 93–115.

Hackmann, H., Moser, S. C., & Clair, A. L. S. (2014). The social heart of global environmental change. *Nature Climate Change*, *4*, 653–655.

Hamilton, L. C. (2011). Education, politics, and opinions about climate change: Evidence for interaction effects. *Climatic Change*, *104*, 231–242.

Hennes, E. P., Jost, J. T., & Ruisch, B. C. (2013, November). *System justification distorts recall and evaluation of information about climate change*. Paper presented at the Psychonomic Society annual meeting, Toronto, Ontario, Canada.

Hershfield, H. E., Bang, H. M., & Weber, E. U. (2013). National differences in environmental concern and performance are predicted by country age. *Psychological Science*, *25*, 152–160.

Hoegh-Guldberg, O., Mumby, P. J., Hooten, A. J., Steneck, R. S., Greenfield, P., Gomez, E., . . . Hatziolos, M. E. (2007, December 14). Coral reefs under rapid climate change and ocean acidification. *Science*, *318*, 1737–1742.

Hogg, M. A. (2007). Uncertainty–identity theory. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 39, pp. 69–126). San Diego, CA: Academic.

Hornsey, M. J., Harris, E. A., Bain, P. G., & Fielding, K. S. (2016). Meta-analyses of the determinants and outcomes of belief in climate change. *Nature Climate Change*, *6*, 622–626.

Hsiang, S. M., Burke, M., & Miguel, E. (2013). Quantifying the influence of climate on human conflict. *Science, 341*(6151). doi:10.1126/science.1235367

Jacquet, J., Dietrich, M., & Jost, J. T. (2014). The ideological divide and climate change opinion: "Top-down" and "bottom-up" approaches. *Frontiers in Psychology*, *5*, Article 1458. Retrieved from http:journals.frontiersin.org/article103389/fpsycg2014.01458

Jacquet, J., Hagel, K., Hauert, C., Marotzke, J., Röhl, T., & Milinski, M. (2013). Intra-and intergenerational discounting in the climate game. *Nature Climate Change*, *3*, 1025–1028.

Jang, S. M. (2013). Framing responsibility in climate change discourse: Ethnocentric attribution bias, perceived causes, and policy attitudes. *Journal of Environmental Psychology*, *36*, 27–36.

Jost, J. T. (2006). The end of the end of ideology. *American Psychologist*, *61*, 651–670.

Jost, J. T., Banaji, M. R., & Nosek, B. A. (2004). A decade of system justification theory: Accumulated evidence of conscious and unconscious bolstering of the status quo. *Political Psychology*, *25*, 881–919.

Kahan, D. M., Braman, D., Gastil, J., Slovic, P., & Mertz, C. K. (2007). Culture and identity-protective cognition: Explaining the white-male effect in risk perception. *Journal of Empirical Legal Studies*, *4*, 465–505.

Kahan, D. M., Peters, E., Wittlin, M., Slovic, P., Ouellette, L. L., Braman, D., & Mandel, G. (2012). The polarizing impact of science literacy and numeracy on perceived climate change risks. *Nature Climate Change*, *2*, 732–735.

Karlin, B., Zinger, J. F., & Ford, R. (2015). The effects of feedback on energy conservation: A meta-analysis. *Psychological Bulletin*, *141*, 1205–1227.

Kates, R. W. (2011). What kind of a science is sustainability science? *PNAS: Proceedings of the National Academy of Sciences of the United States of America*, *108*, 19449–19450.

Kelley, C. P., Mohtadi, S., Cane, M. A., Seager, R., & Kushnir, Y. (2015). Climate change in the Fertile Crescent and implications of the recent Syrian drought. *PNAS: Proceedings of the National Academy of Sciences of the United States of America*, *112*, 3241–3246.

Kellstedt, P. M., Zahran, S., & Vedlitz, A. (2008). Personal efficacy, the information environment, and attitudes toward global warming and climate change in the United States. *Risk Analysis*, *28*, 113–126.

Kim, S. Y., & Wolinsky-Nahmias, Y. (2014). Cross-national public opinion on climate change: The effects of affluence and vulnerability. *Global Environmental Politics*, *14*, 79–106.

Klandermans, B. (2004). The demand and supply of participation: Social-psychological correlates of participation in social movements. In D. Snow, S. Soule, & H. Kriesi's (Eds.), *The Blackwell companion to social movements* (pp. 360–379). New York, NY: Blackwell.

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

Leary, M. R., Raimi, K. T., Jongman-Sereno, K. P., & Diebels, K. J. (2015). Distinguishing intrapsychic from interpersonal motives in psychological theory and research. *Perspectives on Psychological Science*, *10*, 497–517.

Leary, M. R., Toner, K., & Gan, M. (2011). Self, identity, and reactions to distal threats: The case of environmental behavior. *Psychological Studies*, *56*, 159–166.

Lee, T. M., Markowitz, E. M., Howe, P. D., Ko, C. Y., & Leiserowitz, A. A. (2015). Predictors of public climate change awareness and risk perception around the world. *Nature Climate Change*, *5*, 1014–1020.

Leiserowitz, A. (2005). American risk perceptions: Is climate change dangerous? *Risk Analysis*, *25*, 1433–1442.

Leiserowitz, A. (2006). Climate change risk perception and policy preferences: The role of affect, imagery, and values. *Climatic Change*, *77*, 45–72.

Leiserowitz, A., & Akerlof, K. (2010). *Race, ethnicity and public responses to climate change*. New Haven, CT: Yale Project on Climate Change. Retrieved from http://environment.yale.edu/uploads/RaceEthnicity2010.pdf

Leiserowitz, A., Maibach, E., Roser-Renouf, C., & Smith, N. (2011). *Global warming's six Americas in May 2011*. New Haven, CT: Yale Project on Climate Change Communication, Yale University and George Mason University.

Leviston, Z., Leitch, A., Greenhill, M., Leonard, R., & Walker, I. (2011). *Australians' views of climate change*. Canberra, Australia: Commonwealth Scientific and Industrial Research Organisation.

Lewandowski, G. W., Ciarocco, N. J., & Gately, E. L. (2012). The effect of embodied temperature on perceptions of global warming. *Current Psychology*, *31*, 318–324.

Lewandowsky, S., Gignac, G. E., & Vaughan, S. (2013). The pivotal role of perceived scientific consensus in acceptance of science. *Nature Climate Change*, *3*, 399–404.

Li, Y., Johnson, E. J., & Zaval, L. (2011). Local warming daily temperature change influences belief in global warming. *Psychological Science*, *22*, 454–459.

Lu, H., & Schuldt, J. P. (2015). Exploring the role of incidental emotions in support for climate change policy. *Climatic Change Letters*, *131*, 719–726.

Lu, H., & Schuldt, J. P. (2016). Compassion for climate change victims and support for mitigation policy. *Journal of Environmental Psychology*, *45*, 192–200.

Lubell, M., Zahran, S., & Vedlitz, A. (2007). Collective action and citizen responses to global warming. *Political Behavior*, *29*, 391–413.

Macias, T. (2016). Environmental risk perception among race and ethnic groups in the United States. *Ethnicities*, *6*(1), 111–129.

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

Markowitz, E. M., & Shariff, A. F. (2012). Climate change and moral judgment. *Nature Climate Change*, *2*, 243–247.

Masson, T., & Fritsche, I. (2014). Adherence to climate change-related ingroup norms: Do dimensions of group identification matter? *European Journal of Social Psychology*, *44*, 455–465.

McCright, A. M. (2011). Political orientation moderates Americans' beliefs and concern about climate change. *Climatic Change*, *104*, 243–253.

McCright, A. M., Charters, M., Dentzman, K., & Dietz, T. (2016). Examining the effectiveness of climate change frames in the face of a climate change denial counter-frame. *Topics in Cognitive Science*, *8*, 76–97.

McCright, A. M., & Dunlap, R. E. (2011a). Cool dudes: The denial of climate change among conservative white males in the United States. *Global Environmental Change*, *21*, 1163–1172.

McCright, A. M., & Dunlap, R. E. (2011b). The politicization of climate change and polarization in the American public's views of global warming, 2001–2010. *The Sociological Quarterly*, *52*, 155–194.

McFarland, S., Webb, M., & Brown, D. (2012). All humanity is my ingroup: A measure and studies of identification with all humanity. *Journal of Personality and Social Psychology*, *103*, 830–853.

Melillo, J. M., Richmond, T. C., & Yohe, G. W. (Eds.). (2014). *Climate change impacts in the United States: The Third National Climate Assessment*. Washington, DC: U.S. Global Change Research Program. doi: 10.7930/J0Z31WJ2

Mohai, P. (2003). Dispelling old myths: African American. *Environment: Science and Policy for Sustainable Development, 45*(5), 10–26.

Mohai, P. (2008). Equity and the environmental justice debate. *Research in Social Problems and Public Policy*, *15*, 21–49.

Mooney, H. A., Duraiappah, A., & Larigauderie, A. (2013). Evolution of natural and social science interactions in global change research programs. *PNAS: Proceedings of the National Academy of Sciences of the United States of America*, *110*, 3665–3672.

Morgan, M. G., & Keith, D. W. (2008). Improving the way we think about future energy use and emissions of carbon dioxide. *Climatic Change*, *90*, 189–215.

Morin, R. (2012). *Rising share of Americans see conflict between rich and poor*. Pew Research Center. Retrieved from http://www.pewsocialtrends.org/2012/01/11/rising-share-of-americans-see-conflict-between-rich-and-poor/

Moser, S. C. (2007). More bad news: The risk of neglecting emotional responses to climate change information. In S. C. Moser & L. Dilling (Eds.), *Creating a climate for change* (pp. 64–80). New York, NY: Cambridge University Press.

Moser, S. C. (2016). Reflections on climate change communication research and practice in the second decade of the 21st century: What more is there to say? *Wiley Interdisciplinary Reviews: Climate Change, 7*, 345–369.

Myers, T., Maibach, E. W., Roser-Renouf, C., Akerlof, K., & Leiserowitz, A. (2012). The relationship between personal experience and belief in the reality of global warming. *Nature Climate Change*, *3*, 343–347.

National Research Council. (2010a). *Adapting to the impacts of climate change*. Washington, DC: National Academies Press.

National Research Council. (2010b). *Advancing the science of climate change*. Washington, DC: National Academies Press.

Nisbet, M. C., Markowitz, E. M., & Kotcher, J. E. (2012). Winning the conversation: Framing and moral messaging in environmental campaigns. In *Talking green: Exploring contemporary issues in environmental communications* (pp. 9–36). New York, NY: Peter Lang.

Obia, A. E., Archibong, A. E., Ekum, S. A., Itam, E. B., & Elekima, I. W. (2015). Climate change and the effect of sea-level rise on the coastal fishing communities of Cross River Estuary: The concept of floating sustainable settlements as a solution. *International Journal of Sustainable Building Technology & Urban Development*, *6*, 25–33.

Ostrom, E., Dietz, T., Dolsak, N., Stern, P. C., & Weber, E. U. (Eds.). (2002). *The drama of the commons*. Washington, DC: National Academies Press.

Oyserman, D., Fryberg, S. A., & Yoder, N. (2007). Identity-based motivation and health. *Journal of Personality and Social Psychology*, *93*, 1011–1027.

Pearson, A. R., & Schuldt, J. P. (2014). Facing the diversity crisis in climate science. *Nature Climate Change*, *4*, 1039–1042.

Pearson, A. R., & Schuldt, J. P. (2015). Bridging climate communication divides: Beyond the partisan gap. *Science Communication*, *37*, 805–812.

Pereira, H. M., Leadley, P. W., Proença, V., Alkemade, R., Scharlemann, J. P., Fernandez-Manjarrés, J. F., . . . Walpole, M. (2010). Scenarios for global biodiversity in the 21st century. *Science, 330*, 1496–1501.

Pew Research Center. (2013, November 1). *GOP deeply divided over climate change*. Retrieved from http://www.people-press.org/2013/11/01/gop-deeply-divided-over-climate-change/

Pidgeon, N. F., & Fischhoff, B. (2011). The role of social and decision sciences in communicating uncertain climate risks. *Nature Climate Change*, *1*, 35–41.

Piff, P. K., Kraus, M. W., Cote, S., Cheng, B. H., & Keltner, D. (2010). Having less, giving more: The influence of social class on prosocial behavior. *Journal of Personality and Social Psychology*, *99*, 771–784.

Pontifical Academy of Sciences (2015, April 28). *Declaration of religious leaders, political leaders, business leaders, scientists and development practitioners*. Retrieved from http://www.casinapioiv.va/content/dam/accademia/pdf/declaration%20(final).pdf

Poortinga, W., Spence, A., Whitmarsh, L., Capstick, S., & Pidgeon, N. F. (2011). Uncertain climate: An investigation into public scepticism about anthropogenic climate change. *Global Environmental Change*, *21*, 1015–1024.

Pope Francis. (2015). Laudato si': On care for our common home [Encyclical]. Retrieved from http://w2.vatican.va/content/francesco/en/encyclicals/documents/papa-francesco_20150524_enciclica-laudato-si.html

Postmes, T. (2015). Psychology: Climate change and group dynamics. *Nature Climate Change*, *5*, 195–196.

Postmes, T., Rabinovich, A., Morton, T., & van Zomeren, M. (2013). Towards sustainable social identities: Including our collective future in the self-concept. In H. C. M. van Trijp (Ed.), *Encouraging sustainable behavior: Psychology and the environment* (pp. 185–202). New York, NY: Psychology Press.

Pratto, F., Sidanius, J., Stallworth, L. M., & Malle, B. F. (1994). Social dominance orientation: A personality variable predicting social and political attitudes. *Journal of Personality and Social Psychology*, *67*, 741–763.

Rattan, A., Savani, K., & Romero-Canyas, R. (2015, May). *Motivating environmental behavior by framing carbon offset requests using culturally relevant frames*. Paper presented at the Association for Psychological Science, New York, NY.

Rees, J. H., & Bamberg, S. (2014). Climate protection needs societal change: Determinants of intention to participate in collective climate action. *European Journal of Social Psychology*, *44*, 466–473.

Reser, J. P., & Swim, J. K. (2011). Adapting to and coping with the threat and impacts of climate change. *American Psychologist*, *66*, 277–289.

Rudman, L. A., McLean, M. C., & Bunzl, M. (2013). When truth is personally inconvenient, attitudes change: The impact of extreme weather on implicit support for green politicians and explicit climate-change beliefs. *Psychological Science*, *24*, 2290–2296.

Satterfield, T. A., Mertz, C. K., & Slovic, P. (2004). Discrimination, vulnerability, and justice in the face of risk. *Risk Analysis, 24*, 115–129.

Schuldt, J. P., McComas, K. A., & Byrne, S. E. (2016). Communicating about ocean health: Theoretical and practical considerations. *Philosophical Transactions of the Royal Society B: Biological Sciences, 371*, Article 20150214.

Schuldt, J. P., & Pearson, A. R. (2016). The role of race and ethnicity in climate change polarization: Evidence from a U.S. national survey experiment. *Climatic Change, 136*, 495–505.

Schuldt, J. P., & Roh, S. (2014). Of accessibility and applicability: How heat-related cues affect belief in "global warming" versus "climate change." *Social Cognition, 32*, 217–238.

Schultz, P. W., Nolan, J. M., Cialdini, R. B., Goldstein, N. J., & Griskevicius, V. (2007). The constructive, destructive, and reconstructive power of social norms. *Psychological Science, 18*, 429–434.

Schultz, P. W., & Stone, W. F. (1994). Authoritarianism and attitudes toward the environment. *Environment & Behavior, 26*, 25–37.

Scruggs, L., & Benegal, S. (2012). Declining public concern about climate change: Can we blame the great recession? *Global Environmental Change, 22*, 505–515.

Shafir, E. (Ed.). (2013). *The behavioral foundations of public policy*. Princeton, NJ; Princeton University Press.

Shwom, R., Bidwell, D., Dan, A., & Dietz, T. (2010). Understanding U.S. public support for domestic climate change policies. *Global Environmental Change, 20*, 472–482.

Sibley, C. G., & Kurz, T. (2013). A model of climate change belief profiles: How much does it matter if people question human causation? *Analyses of Social Issues and Public Policy, 13*, 245–261.

Smith, N., & Leiserowitz, A. (2012). The rise of global warming skepticism: Exploring affective image associations in the United States over time. *Risk Analysis, 32*, 1021–1032.

Speiser, M., & Krygsman, K. (2014). *American Climate Values 2014: Insights by racial and ethnic groups*. Washington, DC: Strategic Business Insights and ecoAmerica.

Spence, A., Poortinga, W., & Pidgeon, N. F. (2012). The psychological distance of climate change. *Risk Analysis, 32*, 957–972.

Stedman, R. C. (2003). Is it really just a social construction? The contribution of the physical environment to sense of place. *Society & Natural Resources, 16*, 671–685.

Steg, L., & Vlek, C. (2009). Social science and environmental behaviour. In J. J. Boersema & L. Reijnders (Eds.), *Principles of environmental sciences* (pp. 97–141). Amsterdam, the Netherlands: Kluwer Academic.

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

Stern, P. C. (2011). Contributions of psychology to limiting climate change. *American Psychologist, 66*, 303–314.

Stern, P. C., Dietz, T., Abel, T. D., Guagnano, G. A., & Kalof, L. (1999). A value-belief-norm theory of support for social movements: The case of environmentalism. *Human Ecology Review, 6*, 81–97.

Stürmer, S., & Simon, B. (2004). The role of collective identification in social movement participation: A panel study in the context of the German gay movement. *Personality and Social Psychology Bulletin, 30*, 263–277.

Sussman, F., Weaver, C. P., & Grambsch, A. (2014). Challenges in applying the paradigm of welfare economics to climate change. *Journal of Benefit Cost Analysis, 5*, 347–376.

Swim, J. K., & Becker, J. C. (2012). Country contexts and individuals' climate change mitigating behaviors: A comparison of U.S. versus German individuals' efforts to reduce energy use. *Journal of Social Issues, 68*, 571–591.

Swim, J. K., & Bloodhart, B. (2015). Portraying the perils to polar bears: The role of empathic and objective perspective-taking toward animals in climate change communication. *Environmental Communication, 9*, 446–468.

Swim, J. K., & Clayton, S. (2010). *SPSSI policy statement: SPSSI and global climate change*. Washington, DC: Society for the Psychological Study of Social Issues.

Swim, J. K., Geiger, N., & Zawadzki, S. J. (2014). Psychology and energy-use reduction policies. *Policy Insights From the Behavioral and Brain Sciences, 1*, 180–188.

Swim, J. K., Stern, P. C., Doherty, T. J., Clayton, S., Reser, J. P., Weber, E. U., . . . Howard, G. S. (2011). Psychology's contributions to understanding and addressing global climate change. *American Psychologist, 66*, 241–250.

Taylor, D. E. (2014). *The state of diversity in environmental organizations: Mainstream NGOs, foundations, government agencies*. Retrieved from http://www.diversegreen .org/the-challenge/

Trope, Y., & Liberman, N. (2010). Construal-level theory of psychological distance. *Psychological Review, 117*, 440–463.

United Nations Development Programme. (2007). *U.N. Human Development Report 2007/2008: Fighting climate change. Human solidarity in a divided world*. New York, NY: Palgrave Macmillan.

Unsworth, K. L., & Fielding, K. S. (2014). It's political: How the salience of one's political identity changes climate change beliefs and policy support. *Global Environmental Change, 27*, 131–137.

Urban, M. C. (2015, May 1). Accelerating extinction risk from climate change. *Science, 348*, 571–573.

Uskul, A. K., Kitayama, S., & Nisbett, R. E. (2008). Ecocultural basis of cognition: Farmers and fishermen are more holistic than herders. *PNAS: Proceedings of the National Academy of Sciences of the United States of America, 105*, 8552–8556.

Uslaner, E. M., & Brown, M. (2005). Inequality, trust, and civic engagement. *American Politics Research, 33*, 868–894.

Vandenbergh, M. P., & Raimi, K. T. (2015). Climate change: Leveraging legacy. *Ecology Law Quarterly, 42*, 139–170.

van der Linden, S. (2015). The social-psychological determinants of climate change risk perceptions: Towards a comprehensive model. *Journal of Environmental Psychology, 41*, 112–124.

van der Linden, S., Maibach, E., & Leiserowitz, A. (2015). Improving public engagement with climate change: Five "best practice" insights from psychological science. *Perspectives on Psychological Science, 10*, 758–763.

van der Toorn, J., Feinberg, M., Jost, J. T., Kay, A. C., Tyler, T. R., Willer, R., & Wilmuth, C. (2015). A sense of powerlessness fosters system justification: Implications for the legitimation of authority, hierarchy, and government. *Political Psychology*, *36*, 93–110.

van Vugt, M. (2009). Averting the tragedy of the commons: Using social psychological science to protect the environment. *Current Directions in Psychological Science*, *18*, 169–173.

van Vugt, M., Griskevicius, V., & Schultz, P. (2014). Naturally green: Harnessing Stone Age psychological biases to foster environmental behavior. *Social Issues and Policy Review*, *8*, 1–32.

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

van Zomeren, M., Spears, R., & Leach, C. W. (2010). Experimental evidence for a dual pathway model analysis of coping with the climate crisis. *Journal of Environmental Psychology*, *30*, 339–346.

Wade-Benzoni, K. A., Sondak, H., & Galinsky, A. D. (2010). Leaving a legacy: Intergenerational allocations of benefits and burdens. *Business Ethics Quarterly*, *20*, 7–34.

Wade-Benzoni, K. A., Tost, L. P., Hernandez, M., & Larrick, R. P. (2012). It's only a matter of time: Death, legacies, and intergenerational decisions. *Psychological Science*, *23*, 704–709.

Weaver, C. P., Mooney, S., Allen, D., Beller-Simms, N., Fish, T., Grambsch, A. E., . . . Winthrop, R. (2014). From global change science to action with social sciences. *Nature Climate Change*, *4*, 656–659.

Weber, E. U. (2006). Experience-based and description-based perceptions of long-term risk: Why global warming does not scare us (yet). *Climatic Change*, *77*, 103–120.

Weber, E. U. (2013). Doing the right thing willingly: Behavioral decision theory and environmental policy. In E. Shafir (Ed.), *The behavioral foundations of policy* (pp. 380–397). Princeton, NJ: Princeton University Press.

Weber, E. U., & Stern, P. C. (2011). Public understanding of climate change in the United States. *American Psychologist*, *66*, 315–328.

Wood, B. D., & Vedlitz, A. (2007). Issue definition, information processing, and the politics of global warming. *American Journal of Political Science*, *51*, 552–568.

Zaval, L., Markowitz, E. M., & Weber, E. U. (2015). How will I be remembered? Conserving the environment for the sake of one's legacy. *Psychological Science*, *26*, 231–236.