

Climate Change: Psychological Solutions and Strategies for Change

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Abstract

Climate change is typically viewed as an “environmental” problem rather than the psychological issue that it represents. Given that barriers to proenvironmental behavior are rooted in psychological processes, solution approaches to combating climate change must incorporate significant psychological adaptations. Reframing climate change as a public health problem, highlighting success stories and health benefits, focusing on the here and now, providing specific direction for behavior change, and acknowledging moral, ethical, religious, and altruistic imperatives are all important components of successfully addressing the wicked problem of climate change.

Climate change is generally considered an “environmental problem,” largely relegated to the concern of a select group of environmental scientists and members of the public who call themselves *environmentalists* rather than the public at large (Broder, 2009; Shellenberger & Nordhaus, 2004). Only about 18% of the U.S. population is actively involved and mobilized in addressing climate change; the majority of U.S. citizens are not directly engaged with the issue or its solutions, if they even believe it is happening (Leiserowitz et al., 2009; see also Weber & Stern, 2011). This situation persists because of the psychological forces that create and maintain climate-changing behaviors, and despite myriad opportunities to implement psychological changes necessary to address and solve the crisis (e.g., American Psychological Association Task Force, 2009; Gifford, 2008; Koger & Winter, 2010; Swim et al., 2011a).

Framing climate change and other forms of planetary degradation as “environmental” may in fact reflect a societal defense mechanism (Freud, 1936), protecting people from feelings of anxiety, overwhelm, and helplessness by providing distance from or denial of the problem’s source and its solution, and minimizing personal responsibility (Lorenzoni et al., 2007; Shellenberger & Nordhaus, 2004; Stoll-Kleemann et al., 2001). Defense mechanisms represent a form of *emotion* (as opposed to *problem*) *focused coping*, as they reduce unpleasant affective responses and allow one to avoid directly confronting the issue (Lazarus & Folkman, 1984). However, given the predicted widespread and catastrophic consequences [see reviews by Intergovernmental Panel on Climate Change (IPCC), 2007; National Research Council, 2010], it is critical that people—as individuals and as members of social, industrial, and political systems—understand and overcome the psychological barriers to altering behaviors related to climate change.

Fortunately, attention to these issues is rapidly growing within the psychological community. Researchers have recently outlined the behavioral (consumption) causes (Stern, 2011; Swim et al., 2011a), the predicted consequences for human wellbeing, including adverse physical effects (Blashki et al., 2007; Centers for Disease Control and Prevention, 2009; IPCC, 2007; Kovats et al., 2005), mental health (Climate Institute, 2011; Doherty & Clayton, 2011; Few, 2007; Fritze et al., 2008), and interpersonal impacts (Doherty & Clayton, 2011), as well as response outcomes (Reser & Swim, 2011) related to climate change. Although there are many cognitive, ideological, social, emotional, and behavioral obstacles to addressing the risks of climate change (e.g., Gifford, 2011; Kollmuss & Agyeman, 2002; Malka et al., 2009; Weber & Stern, 2011), psychologists possess important, if not the most, critical knowledge and skills for creating, executing, and evaluating programs to address the challenges of climate change and other forms of environmental risk (Clayton & Brook, 2005; Doherty & Clayton, 2011; Koger & Scott, 2007; Koger & Winter, 2010; Scott & Koger, 2012; Swim et al., 2011b). In this article, we attempt to highlight some potential solution approaches, grounded in

psychological theory and research, to the problem of climate change (see Table 1). This review is not intended to be exhaustive; rather, it is our hope that it inspires further research and, more importantly, advocacy efforts in the interest of addressing this critical and imminent threat.

Psychological Solutions and Strategies

First, it is critical to treat climate change and other environmental challenges as originating in *psychological* (i.e., *behavioral, cognitive, emotional, and social*) processes as opposed to viewing them as purely scientific and technical problems (Gifford, 2011; Hoffman, 2010; Koger & Winter, 2010; Mayer & Frantz, 2008). Fortunately, many people (61%) recognize that technological solutions are not sufficient for addressing climate change; rather, individuals will need to make significant lifestyle changes (Leiserowitz et al., 2010).

Second, it is likely that the “gloom and doom” tone of much media (and scholarly articles) concerning climate change and other environmental issues is counterproductive, as it can trigger defenses against anxiety and threats to deep-seated belief systems. For in-

stance, many people hold fast to the idea that “the world is fundamentally just...fair, and stable,” and information that contradicts these “just world beliefs” may be dismissed and actually inspire a *reduced* willingness to engage in proenvironmental behaviors (Feinberg & Willer, 2011, p. 36). In that regard, the way information is presented or framed can significantly affect concern and subsequent action regarding issues such as climate change (Lakoff, 2010), and this effect seems to be moderated by political ideology (Malka et al., 2009). Specifically, appealing to core values, utilizing simple language, and activating emotional responses can increase public attention, inspire hope, and motivate action (ecoAmerica, 2009; Lakoff, 2010). For instance, in industrial and organizational settings, utilizing phrasing such as “smart building” or “high performance building” resulted in more support for and less resistance to change than the term “green building” (Hoffman, 2010). “Climate change” may be less politicizing than “global warming,” at least for certain populations (Schuldt et al., 2011; Villar & Krosnick, 2009), and speaking about “the air we breathe, [or] the water our children drink” and effects on public health is more widely engaging than the phrase “the environment” (ecoAmerica, 2009). In fact, framing climate change as a public health issue may provide a particularly effective strategy for engaging the public and offering hope for a healthier future (Maibach et al., 2010; Nisbet & Gick, 2008).

It seems crucial to build motivation from a positive, rather than a negative, source. Consider the civil rights movement: “Martin Luther King Jr.’s ‘I have a dream’ speech is famous because it put forward an inspiring, positive vision that carried a critique of the current moment within it...had King given an ‘I have a nightmare’ speech instead,” the movement might have turned out differently (Shellenberger & Nordhaus, 2004, p. 31). Comparably, Roszak (1994), the father of Ecopsychology, warned about the counterproductive “green guilt and ecological overload” conveyed by many environmental initiatives. People must have a sense of the positive impacts of behavioral change to muster support for and cooperation with proenvironmental actions, and to overcome the inclination for hopelessness (i.e., “Hope Theory,” Snyder, 2002). It is well known that depressive symptoms including feelings of anxiety, paralysis, and lack of motivation occur when the causes of events are seen as unchangeable and global (i.e., Learned Helplessness, Seligman, 1975; cf., Hopelessness theory, Abramson et al., 1989; see also Gillham et al., 2001); this is particularly relevant to issues of environmental degradation (Evans & Stecker, 2004). Still, there is hope for reversing these tendencies. Teaching individuals about problem solving skills via participation in community volunteer organizations enhanced people’s perception of or actual control over local environmental

Table 1. Psychological Solutions to Environmental Challenges: Empirically and Theoretically Based Prescriptions

EMPIRICALLY BASED PRESCRIPTIONS	THEORETICALLY BASED PRESCRIPTIONS
Reframe climate change and environmental challenges from “environmental” to “psychological/behavioral”	Highlight the positive, and inspire hope
Emphasize the immediacy and local nature of the issues	Encourage individuals to partake in behaviors that will be most impactful
Emphasize problem-focused coping and enhance perceived behavioral control	
Provide incentives (both financial and social) for desired behaviors and ask for a commitment to conservation and efficiency	
Encourage experiences in nature, and emphasize health benefits of preserving/experiencing nature	
Increase personal connectedness with nature (“ecological identity”)	Appeal to morals, ethics, faith, and altruism

conditions and consequent feelings of empowerment (i.e., “Theory of Learned Hopefulness,” Zimmerman, 1990).

The nascent Transition Town movement represents an example of such positive visioning in addressing the difficulties posed by climate change and peak oil at the local community level. Following the motto, “from oil dependency to local resilience” (Hopkins, 2008), groups in various international communities are adapting institutional-based systems largely dependent on fossil fuels, including methods of energy and food production, transportation, material consumption, and economic structures to locally based, alternative energy systems. The success of Transition Towns may be attributed in part to the approach of such behavioral adaptation as an “opportunity” to make a positive personal change, through the recovery of personal and community-based power over issues like oil dependency and climate change, rather than as a “threat” to current lifestyles, which are maintained by the institutional petroleum-based systems (Hopkins & Lipman, 2009). The Transition approach is comparable to that of the Voluntary Simplicity movement, wherein individuals consciously shift their lifestyle from one based on materialism and consumption toward a focus on community, compassion, and personally meaningful pursuits (Elgin, 1998). Research suggests that not only are such individuals happier, but they are also more likely to engage in proenvironmental behaviors (e.g., Brown & Kasser, 2005).

An emphasis on local issues also addresses the third issue with respect to confronting climate change: people generally respond only to crises that are visually apparent, physically and psychologically close by (i.e., happening here, now, to me), and unambiguous (Gattig & Hendrickx, 2007; Ornstein & Ehrlich, 2000; Weber, 2006); all characteristics that climate change generally lacks (Frantz & Mayer, 2009), and will likely lack for some time (Weber & Stern, 2011). Thus, when recruiting support for individual behavior change, it is important to highlight the here and now: local and regional impacts of climate change are already occurring, and there is a high probability of adverse effects to all of us. Public appeals should therefore include concrete details, images, and stories of the impacts on individual people, places, economies, cultures, and ecosystems. People are much more likely to engage in behavior change when they are presented with evidence of environmental risks that directly appeal to their beliefs and values (Stern, 2000; Werner & Adams, 2001) and when consequences are specific and personal. For instance, most people react more strongly to environmental and other threats after reading a story about one, personally salient individual rather than statistics concerning thousands or a million potential victims (Slovic, 2007; Slovic & Slovic, 2004–2005). In contrast to this “identifiable victim

effect” (Jenni & Loewenstein, 1997), abstract discussion of environmental issues is largely ineffective in enacting change (Chawla & Cushing, 2007; Hungerford & Volk, 1990).

Public concern about risks like climate change will likely increase as its impacts occur more locally and immediately and thus become more salient; for instance, as severe weather events such as hurricanes become more common and their relationship to climate change is emphasized (Sunstein, 2006). Visceral fear and stress responses mobilize people to respond to threats, ideally by changing the external situation (solving the problem). Activating emotional reactions relative to the danger of climate change and other environmental threats will therefore be critical for garnering individual and collective responses (Weber, 2006), while also providing specific actions people can take to reduce feelings of being overwhelmed. That is, it is important to emphasize problem-focused (vs. emotion-focused) coping in which evaluating alternative solutions, problem solving, and behavioral actions are utilized to alleviate the stress associated with a given threat (e.g., Homburg & Stolberg, 2006; Lazarus & Folkman, 1984; Spedden, 1998). For instance, perceived behavioral control (belief in one’s ability to perform a particular action and belief in its success), as identified in the *Theory of Planned Behavior* (Ajzen, 1991), is an important contributor to proenvironmental behaviors (Bamberg & Möser, 2007; Kollmuss & Agyeman, 2002) including behaviors related to addressing climate change (Lorenzoni et al., 2007).

An example of structured problem-focused coping is the innovative approach instantiated at the Environmental Health Clinic at New York University. Analogous to other university health clinics, “impatiens” (people who are tired of waiting for legislative action) make appointments to discuss environmental health concerns and receive “prescriptions” for actions they may take, such as opportunities to engage in local data collection and projects aimed to improve environmental health. The goal of the clinic is to convert people’s anxiety and concern about environmental issues into specific, measurable, and significant actions (Schaffer, 2008).

In that regard, behavioral interventions are much more likely to succeed when people are given instructions for specific and do-able actions (Grundy & Osbaldiston, 2006; McKenzie-Mohr & Smith, 1999) or information that is tailored to the individual’s particular situation (Daamen et al., 2001; Lorenzoni, et al., 2007). Fortunately, there are several organizations that have published Internet guides to help consumers reduce their own climate-changing emissions, although it may be more effective to promote one-time purchases of energy-efficient vehicles, appliances, and home insulation or solar power systems rather than trying to alter habitual behaviors (Gardner

Et Stern, 2008; Stern, 2000; see also Dietz et al., 2009, for an extended list of highly impactful behaviors).

There also exists an important positive feedback loop regarding behavioral change: if one participates in a small action, he/she often feels empowered by the perception of control over the situation and becomes more likely to engage in more and larger actions (i.e., enhanced self-efficacy; Bandura, 1977). Consequently, acting at the individual/household level can evolve into community action and ultimately efforts to lobby legislators or industry for change. Readers may recognize this phenomenon as resembling the classic *Foot-in-the-door*, described by social psychologists (Freedman & Fraser, 1966). Overall, constructive action that better the ecological and social climate fosters participants' personal growth and sense of efficacy, and greater feelings of empowerment lead to more environmental and social change (Schusler et al., 2009; but see Power & Mont, 2010). Notably, however, the individual's motivation for performing the behavior is an important variable, and "rebound effects" may occur, where engaging in some environmentally friendly behaviors may actually *reduce* one's incentive to perform others (e.g., "I recycle, so I don't have to worry about reducing my consumption" or "I can drive more because my car gets such great gas mileage") (e.g., Kurz, 2002; Thøgersen & Crompton, 2009). More research is needed to determine the conditions that produce foot-in-the-door as opposed to rebound effects.

It is widely recognized that short-term costs or benefits often outweigh the long term in decision making (i.e., *contingency traps*, Baum, 1994; *proximal cognition*, Björkman, 1984; *subjective discount rates*, Howard, 2000, 2002). This is particularly true in situations where longer term costs and benefits are uncertain (Mischel & Grusec, 1967), as is the case in many of the decisions that must be made concerning environmental issues. Consequently, another approach to initiating environmentally related behavior change is to provide monetary and/or social incentives; that is, policies or governmental regulations that make environmentally harmful behaviors more costly initially or make proenvironmental behaviors more immediately lucrative. For example, the American Recovery and Reinvestment Act of 2009 provides tax credit incentives to individuals and businesses who upgrade to energy-efficient appliances, utilize energy-efficient building products, install renewable energy systems on their property, or purchase alternative-fuel vehicles (U.S. Department of Energy, n.d.). Comparably, discussions concerning the implementation of a carbon tax have become more prevalent among policy makers around the world. A carbon tax is a fee on fossil fuel use or production based on how much carbon these processes emit; in effect, a carbon tax is a tax on electricity, natural gas, or oil. By

making "dirty" fuels more expensive and alternative energy sources more cost competitive, a carbon tax is intended to encourage businesses, as well as individuals, to become "cleaner" consumers (Dowdey, 2007). Yet these same consumers may quickly adapt to these price changes; over time, punishers like the carbon tax might become ever more bearable, requiring ever increasing price changes to maintain greener behaviors over the long term (Low & Heinen, 1993). It may thus be important to implement a strategy wherein people are required to make a commitment to efficient goods and practices in advance (Keren & Roelofsma, 1995). Under such circumstances they will often choose the larger, longer term benefit over a smaller, more immediate reward (i.e., "self-control," Rachlin, 1991; see also McKenzie-Mohr & Smith, 1999, regarding the role of committing to proenvironmental behaviors).

In general, financial incentives are limited in efficacy and can undermine intrinsic motives such as relationships, community membership, and personal growth that are more sustainable over the long term (Crompton & Kasser, 2010; Kasser & Ryan, 1996; Power & Mont, 2010). It is thus unlikely that governmental regulation alone will be effective in enacting lasting and mainstream proenvironmental behaviors. Rather, to effectively make human behaviors more sustainable, it is necessary for all "sustainability science players" (i.e., climate scientists, economists, technologists, climate modelers, policy makers, and psychologists) to work collaboratively (Gifford, 2008).

Equally if not more important than this collective effort of scientists and professionals is the sound engagement of citizens in local sustainability movements. In fact, the most progress in addressing climate change and related risks will probably need to occur at the level of the individual (Clayton & Brook, 2005; Gifford, 2008; Koger & Winter, 2010). Although financial incentives such as rebates can help motivate energy efficient construction and appliance purchases, *social reinforcers* (such as those communicated by social norms) are perhaps even more powerful (e.g., Stern, 1992). Community-based projects to install wind-power (Nevin, 2010) and collaborations between friends and neighbors to research and purchase solar panels (Neuringer & Oleson, 2010) reflect the power of social engagement to inspire and foster the maintenance of proenvironmental behaviors.

As previously described, one of the current challenges is that people often do not engage in behavior change unless they view a risk as personally relevant. Yet, if people feel a deep connection to places, wilderness, and other species, then threats to these others are much more likely to be viewed as personal issues (Besthorn, 2001; Mayer & Frantz, 2004). In essence, we care for what we love. Positive

experiences in nature foster stronger personal investment in environmental issues, especially when those experiences occur during one's childhood (Chawla, 1998; Palmer, 1993). This connection to and appreciation for the natural environment and concern for its health is an essential part of developing an ecological identity (Clayton, 2003; Clayton & Myers, 2009).

Communicating the public health benefits of experiencing and preserving nature may also be an important solution approach to combating psychological barriers to climate change and other environmental health risks (reviewed in Koger & Winter, 2010). While experiences in nature foster personal investment in environmental health and stewardship, they also promote physical, emotional, and spiritual health (e.g., Frumkin, 2001; Maller et al., 2006; Miles, 1987). Natural environments possess restorative properties for attention and fatigue (Kaplan, 1995), alleviate stress and its adverse consequences (e.g., Cooper Marcus & Barnes, 1999; Frumkin, 2001, 2003; Ulrich, 1999), and wilderness therapy represents a successful means of providing mental health counseling for at-risk youth (e.g., Hill, 2007; Werhan & Groff, 2005). "Green exercise," even for short durations, has a beneficial effect on mood and self-esteem, especially in individuals suffering from mental illness (Barton & Pretty, 2010). Comparably, many planet-friendly behaviors are also beneficial to one's mental and physical health: for instance, walking or biking instead of driving; eating fewer animal-based products; buying local, fresh produce; spending time in nature; and engaging in community-based restoration projects rather than participating in the consumer culture. Such choices also confer economic benefits to the individual, either directly (spending less money on gas for one's car and material purchases) or indirectly (reduced health care costs; e.g., Macera, 2003).

Addressing global climate change and fostering overall environmental stewardship is becoming a focus of some mainstream and alternative educational institutions (Curry et al., 2002; Tudor & Dvornich, 2001), business and industry (Dechant & Altman, 1994; Hart & Milstein, 2003), and local community efforts. Many colleges and universities that are now requiring courses on environmental literacy, social responsibility, and sustainability report that upon completion of these courses, students are less apathetic, care more about future societies, are more willing to engage in social and environmental problem solving, and feel more capable of making a positive impact (Rowe, 2002). On a community-wide level, some cities have begun utilizing high-albedo roofs and surfaces on buildings, as well as increasing urban vegetation as a means of cooling and reducing energy use (and therefore CO₂ emissions) in local community "heat islands" (Akbari et al., 2001).

Moral, ethical, religious, and altruistic appeals may also serve as important solution approaches to environmental behavior change on their own, as well as by influencing environmental identity, stewardship, and a personal connection to nature (Moore & Nelson, 2010). The Catholic Coalition on Climate Change (2006), the Unitarian Universalist Association of Congregations (2006), and other faith-based groups encourage consideration of the moral implications of climate change and constructive action to mitigate its impacts. Surveys from over 150 Georgian Presbyterian churches revealed that the vast majority of ministers supported environmental stewardship (over "domination of nature"), and their personal proenvironmental behaviors had a significant influence on the behaviors and beliefs of the members of their congregation (Holland & Carter, 2005). Such "liberal" religion and the sanctification of nature (as opposed to "theological conservatism") encourage both leaders and followers to become more ethically involved in environmental issues and adopt more proenvironmental behaviors (Beyer, 2004; Tarakeshwar et al., 2001).

Conclusions

It is clearly an understatement to say that confronting the challenges posed by climate change is a highly stressful proposition; it is considered a "wicked problem" in its complexity and resistance to resolution (e.g., Australian Public Service Commission, 2007), and interdisciplinary collaborations are urgently needed (Smith et al., 2009; Swim et al., 2011a). However, given the wide-ranging and adverse consequences expected to undermine both human and planetary health, it is critical that we begin recognizing and overcoming the psychological obstacles to immediate and global human behavior change.

Reframing how climate change is communicated to the public as well as policy makers is a critical first step. Fortunately, think tanks are emerging to focus attention on effective communication approaches, for example, the Center for Climate Change Communication at George Mason University (www.climatechangecommunication.org/), the Climate Communication project of the Aspen Global Change Institute (<http://climatecommunication.org/>), the Center for Research on Environmental Decisions at Columbia University (<http://cred.columbia.edu/>), and the Yale Project on Climate Change Communication (<http://environment.yale.edu/climate/>) (see also Moser & Dilling, 2007).

Second, both individual and social barriers to change must be addressed, particularly to the extent that they reflect denial of one's own contributions and responsibility, or the possibility of effecting change at an individual level (Lorenzoni et al., 2007). Coincidentally,

developing solutions to climate change and other “environmental” problems can concomitantly reduce personal experiences of stress and its adverse health impacts (Homburg & Stolberg, 2006). Civic engagement and proenvironmental behaviors also promote a sense of empowerment and optimism, and provide more opportunities for social connections, thereby reducing adverse physical and mental health impacts while mitigating the threat of global climate change (reviewed in Doherty & Clayton, 2011).

Clearly, many questions remain in the search for identifying the most effective strategies and solution approaches for addressing the issue of climate change (e.g., Doherty & Clayton, 2011; Stern, 2011). Our hope, however, is that this review empowers readers to act in order to curb the threats associated with a changing climate.

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REFERENCES

- Abramson, L. Y., Alloy, L. B., & Metalsky, G. I. (1989). Hopelessness depression: A theory-based subtype of depression. *Psychological Review*, *96*, 358–372.
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*, 179–211.
- Akbari, H., Pomerantz, M., & Taha, H. (2001). Cool surfaces and shade trees to reduce energy use and improve air quality in urban areas. *Solar Energy*, *70*, 295–310.
- American Psychological Association Task Force on the Interface Between Psychology and Global Climate Change. (2009). Psychology and global climate change: Addressing a multi-faceted phenomenon and set of challenges. Retrieved August 15, 2011 from www.apa.org/science/about/publications/climate-change.aspx
- Australian Public Service Commission. (2007). Tackling wicked problems: A public policy perspective. Retrieved July 10, 2011 from www.apsc.gov.au/publications07/wickedproblems2.htm
- Bamberg, S., & Möser, G. (2007). Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour. *Journal of Environmental Psychology*, *27*, 14–25.
- Bandura, A. (1977). Self-Efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*, 191–215.
- Barton, J., & Pretty, J. (2010). What is the best does of nature and green exercise for improving mental health? A multi-study analysis. *Environmental Science & Technology*, *44*, 3947–3955.
- Baum, W. M. (1994). *Understanding behaviorism: Science, behavior, and culture*. New York, NY: HarperCollins.
- Besthorn, F. H. (2001). Transpersonal psychology and deep ecological philosophy: Exploring linkage and applications for social work. *Journal of Religion & Spirituality in Social Work: Social Thought*, *20*, 23–44.
- Beyer, P. (2004). The global environment as a religious issue: A sociological analysis. *Religion*, *22*, 1–19.
- Björkman, M. (1984). Decision making, risk taking and psychological time: Review of empirical findings and psychological theory. *Scandinavian Journal of Psychology*, *25*, 31–49.
- Blashki, G., McMichael, T., & Karoly, D. J. (2007). Climate change and primary health care. *Australian Family Physician*, *36*, 986–989.
- Broder, J.M. (2009). Seeking to save the planet, with a thesaurus. *New York Times*. Retrieved July 1, 2011, from www.nytimes.com/2009/05/02/us/politics/02enviro.html
- Brown, K. W., & Kasser, T. (2005). Are psychological and ecological well-being compatible? The role of values, mindfulness, and lifestyle. *Social Indicators Research*, *74*, 349–368.
- Catholic Coalition on Climate Change (2006). Welcome. Retrieved July 1, 2011 from <http://catholicsandclimatechange.org/>
- Centers for Disease Control and Prevention (2009). Climate change and public health. Retrieved July 1, 2011 from www.cdc.gov/ClimateChange/policy.htm
- Chawla, L. (1998). Significant life experiences revisited: A review of research on sources of environmental sensitivity. *The Journal of Environmental Education*, *29*, 11–21.
- Chawla, L., & Cushing, D. F. (2007). Education for strategic environmental behavior. *Environmental Education Research*, *13*, 437–452.
- Clayton, S. (2003). Environmental identity: A conceptual and an operational definition. In S. Clayton, and S. Opatow (Eds.), *Identity and the natural environment: The psychological significance of nature* (pp. 45–66). Cambridge, MA: Massachusetts Institute of Technology Press.
- Clayton, S., & Brook, A. (2005). Can psychology help save the world? A model for conservation psychology. *Analyses of Social Issues and Public Policy*, *5*, 87–102.
- Clayton, S., & Myers, G. (2009). *Conservation psychology: Understanding and promoting human care for nature*. West Sussex, UK: Wiley-Blackwell.
- Climate Institute, The (2011). *A climate of suffering: The real cost of living with inaction on climate change*. Melbourne & Sydney: The Climate Institute.
- Cooper Marcus, C., & Barnes, M. (1999). Introduction: Historical and cultural perspective on healing gardens. In C. Cooper Marcus, and M. Barnes (Eds.), *Healing gardens: Therapeutic benefits and design recommendations* (pp. 1–26). New York, NY: John Wiley & Sons.
- Crompton, T., & Kasser, T. (2010). Human identity: A missing link in environmental campaigning. *Environment: Science & Policy for Sustainable Development*, *52*, 23–33. Available at <http://www.environmentmagazine.org/Archives/Back%20Issues/July-August%202010/human-identity-full.html>. Retrieved December 29, 2011.
- Curry, J. M., Heffner, G., & Warners, D. (2002). Environmental service-learning: Social transformation through caring for a particular place. *Michigan Journal of Community Service Learning*, *9*, 58–66.
- Daamen, D. D. L., Staats, H., Wilke, H. A. M., & Engelen, M. (2001). Improving environmental behavior in companies: The effectiveness of tailored versus nontailored interventions. *Environment and Behavior*, *33*, 229–248.
- Dechant, K., & Altman, B. (1994). Environmental leadership: From compliance to competitive advantage. *Academy of Management Executive*, *8*, 7.

- Dietz, T., Gardner, G. T., Gilligan, J., Stern, P. C., & Bandenbergh, M. P. (2009). Household actions can provide a behavioral wedge to rapidly reduce U.S. carbon emissions. *Proceedings of the National Academy of Sciences*, *106*, 18452–18456.
- Doherty, T. J., & Clayton, S. (2011). The psychological impacts of global climate change. *American Psychologist*, *66*, 265–276.
- Dowdey, S. (2007). How carbon tax works. Retrieved July 1, 2011, from <http://science.howstuffworks.com/environmental/green-science/carbon-tax.htm>
- ecoAmerica (2009). Climate and energy truths: Our common future. Retrieved November 21, 2011 from www.ecoamerica.org/sites/default/files/press/ecoAm_Climate_Energy_Truths.pdf
- Elgin, D. (1998). *Voluntary Simplicity: Toward a way of life that is outwardly simply, inwardly rich (Revised Edition)*. New York: William Morrow & Co.
- Evans, G. W., & Stecker, R. (2004). Motivational consequences of environmental stress. *Journal of Environmental Psychology*, *24*, 143–165.
- Feinberg, M., & Willer, R. (2011). Apocalypse soon? Dire messages reduce belief in global warming by contradicting just-world beliefs. *Psychological Science*, *22*, 34–38.
- Few, R. (2007). Health and climatic hazards: Framing Social Research on vulnerability, Response and adaptation. *Global Environmental Change* *17*, 281–295.
- Frantz, C. M., & Mayer, F. S. (2009). The emergency of climate change: Why are we failing to take action? *Analyses of Social Issues & Public Policy*, *9*, 205–222.
- Freedman, J. L., & Fraser, S. C. (1966). Compliance without pressure: The foot-in-the-door technique. *Journal of Personality and Social Psychology*, *4*, 195–202.
- Freud, A. (1936). *The ego and the mechanisms of defense*. London: Hogarth Press and Institute of Psycho-Analysis.
- Fritze, J. G., Blashki, G. A., Burke, S. and Wiseman, J. (2008). Hope, despair and transformation: Climate change and the promotion of mental health and wellbeing. *International Journal of Mental Health Systems*, *2*. Retrieved November 13, 2008, from <http://ijmhs.com/content/2/1/13>
- Frumkin, H. (2001). Beyond toxicity: Human health and the natural environment. *American Journal of Preventive Medicine*, *20*, 234–240.
- Frumkin, H. (2003). Healthy places: Exploring the evidence. *American Journal of Public Health*, *93*, 1451–1456.
- Gardner, G. T., & Stern, P. C. (2008). The short list: The most effective actions U.S. households can take to curb climate change. *Environment*, *50*, 12–24.
- Gattig, A., & Hendrickx, L. (2007). Judgmental discounting and environmental risk perception: Dimensional similarities, domain differences, and implications for sustainability. *Journal of Social Issues*, *63*, 21–39.
- 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.
- Gillham, J., Shatte, A., Reivich, K., & Seligman, M. (2001). Optimism, pessimism and explanatory style. In E. C. Chang (Ed.), *Optimism and pessimism: Implications for theory, research and practice* (pp. 53–75). Washington, DC: American Psychological Association.
- Grundy, C.S., & Osbaldiston, R. (2006). Techniques of behavior change. In R.M. MacNair (Ed.), *Working for peace: A handbook of practical psychology and other tools* (pp. 255–262). Atascadero, CA: Impact.
- Hart, S. L., & Milstein, M. B. (2003). Creating sustainable value. *Academy of Management Executive*, *17*, 56.
- Hill, N. R. (2007). Wilderness therapy as a treatment modality for at-risk youth: A primer for mental health counselors. *Journal of Mental Health Counseling*, *29*, 338–349.
- Hoffman, A. J. (2010). Climate change as a cultural and behavioral issue: Addressing barriers and implementing solutions. *Organizational Dynamics*, *39*, 295–205.
- Holland, L., & Carter, J. C. (2005). Words v. deeds: A comparison of religious belief and environmental action. *Sociological Spectrum: Mid-South Sociological Association*, *25*, 739–753.
- Hornburg, A., & Stolberg, A. (2006). Explaining pro-environmental behavior with a cognitive theory of stress. *Journal of Environmental Psychology*, *26*, 1–14.
- Hopkins, R. (2008). *The transition handbook: From oil dependency to local resilience*. White River Junction, VT: Chelsea Green Publishing.
- Hopkins, R., & Lipman, P. (2009). Who we are and what we do. The Transition Network Ltd., 1. Retrieved July 1, 2011 from http://transitionculture.org/wp-content/uploads/who_we_are_high.pdf
- Howard, G. S. (2000). Adapting human lifestyles for the 21st Century. *American Psychologist*, *55*(5), 509–515.
- Howard, G. S. (2002). *How should I live my life: Psychology, environmental science, and moral traditions*. New York, NY: Rowman & Littlefield.
- Hungerford, H. R., & Volk, T. L. (1990). Changing learner behavior through environmental education. *Journal of Environmental Education*, *21*, 8–22.
- Intergovernmental Panel on Climate Change. (2007). Climate Change 2007: Synthesis Report. Retrieved September 3, 2008, from www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf
- Jenni, K. E., & Loewenstein, G. (1997). Explaining the "Identifiable Victim Effect." *Journal of Risk and Uncertainty*, *14*, 235–257.
- Kaplan, S. (1995). The restorative benefits of nature: Toward an integrative framework. *Journal of Environmental Psychology*, *15*, 169–182.
- Kasser, T., & Ryan, R. M. (1996). Further examining the American dream: Differential correlates of intrinsic and extrinsic goals. *Personality and Social Psychology Bulletin*, *22*, 280–287.
- 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.
- Keren, G., & Roelofsma, P. (1995). Immediacy and certainty in intertemporal choice. *Organizational Behavior and Human Decision Processes*, *63*, 287–297
- Koger, S. M., & Scott, B. A. (2007). Psychology and environmental sustainability: A call for integration. *Teaching of Psychology*, *34*, 10–18.
- Koger, S. M., & Winter, D. D. (2010). *The psychology of environmental problems: Psychology for sustainability (3rd Edition)*. New York: Taylor & Francis: Psychology Press.
- Kollmuss, A., & Agyeman, J. (2002). Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research*, *8*, 239–260.
- Kovats, R.S., Campbell-Lendrum, D., & Matthies, F. (2005). Climate change and human health: Estimating avoidable deaths and disease. *Risk Analysis*, *25*, 1409–1418.
- Kurz, T. (2002). The psychology of environmentally sustainable behavior: Fitting together pieces of the puzzle. *Analyses of Social Issues and Public Policy*, *2*, 257–278.
- Lakoff, G. (2010). Why it matters how we frame the environment. *Environmental Communication*, *4*, 70–81.
- Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York: Springer.

- Leiserowitz, A., Maibach, E., & Light, A. (2009). Global warming's six Americas: An audience segmentation analysis. Center for American progress. Retrieved April 5, 2011, from www.americanprogress.org/issues/2009/05/6americas.html
- Leiserowitz, A., Maibach, E., Roser-Renouf, C., & Smith, N. (2010). *Climate change in the American Mind: Americans' global warming beliefs and attitudes in June 2010*. Yale University and George Mason University. New Haven, CT: Yale Project on Climate Change Communication. <http://environment.yale.edu/climate/files/ClimateBeliefsJune2010.pdf>
- Lorenzoni, I., Nicholson-Cole, S., & Whitmarsh, L. (2007). Barriers perceived to engaging with climate change among the UK public and their policy implications. *Global Environmental Change, 17*, 445–459.
- Low, B. S., & Heinen, J. T. (1993). Population, resources, and environment: Implications of human behavioral ecology for conservation. *Population and Environment: A Journal of Interdisciplinary Studies, 15*, 7–41.
- Macera, C. A. (2003). Commentary: Can walking lower medical care costs? *International Journal of Epidemiology, 32*, 814–815.
- Maibach, E. W., Nisbet, M., Baldwin, P., Akerlof, K., & Diao, G. (2010). Reframing climate change as a public health issue: An exploratory study of public reactions. *BMC Public Health, 10*, 299. www.biomedcentral.com/1471-2458/10/299
- Malka, A., Krosnick, J. A., & Langer, G. (2009). The association of knowledge with concern about global warming: Trusted information sources shape public thinking. *Risk Analysis, 29*, 633–647.
- Maller, C., Townsend, M., Pryor, A., Brown, P., & St. Leger, L. (2006). Healthy nature healthy people: 'Contact with nature' as an upstream health promotion intervention for populations. *Health Promotion International, 21*, 45–54.
- Mayer, F. S., & Frantz, C. M. (2004). The connectedness to nature scale: A measure of individuals' feeling in community with nature. *Journal of Environmental Psychology, 24*, 503–515.
- Mayer, F. S., & Frantz, C. M. (2008). Framing the question of survival: Psychological insights and limitations. *Conservation Biology, 22*, 823–825.
- McKenzie-Mohr, D., & Smith, W. (1999). *Fostering sustainable behavior: An introduction to community-based social marketing*. Gabriola Island, BC: New Society Publishers.
- Mischel, W., & Guresec, J. (1967). Waiting for rewards and punishments: Effects of time and probability on choice. *Journal of Personality and Social Psychology, 5*, 24–31.
- Miles, J. (1987). Wilderness as a healing place. *Journal of Experiential Education, 10*, 4–10.
- Moore, K. D., & Nelson, M. P. (2010). *Moral ground: Ethical action for a planet in peril*. San Antonio, TX: Trinity University Press.
- Moser, S. C., & Dilling, L. (2007). *Creating a climate for change: Communicating climate change and facilitating social change*. New York: Cambridge University Press.
- National Research Council. (2010). *Advancing the science of climate change*. Washington, DC: National Academies Press.
- Neuringer, A., & Oleson, K. C. (2010). Helping for change. *The Behavior Analyst, 33*, 181–184.
- Nevin, J. A. (2010). The power of cooperation. *The Behavior Analyst, 33*, 189–191.
- Nisbet, E. K. L., & Glick, M. L. (2008). Can health psychology help the planet? Applying theory and models of health behaviour to environmental actions. *Canadian Psychology, 49*, 296–303.
- Ornstein, R., & Ehrlich, P. (2000). *New world, new mind: Moving toward conscious evolution*. Cambridge, MA: Malor Books, ISHK.
- Palmer, J. A. (1993). Development of concern for the environment and formative experiences of educators. *The Journal of Environmental Education, 24*, 26–30.
- Power, K., & Mont, O. (2010). Dispelling the myths about consumption behaviour. *Knowledge Collaboration & Learning for Sustainable Innovation, ERSCP-EMSU Conference, Delft, The Netherlands*, October 25–29, 2010.
- Rachlin, H. (1991). *Introduction to Modern Behaviorism (3rd Ed)*. New York: W. H. Freeman and Company.
- Reser, J. P., & Swim, J. K. (2011). Adapting to and coping with the threats and impacts of climate change. *American Psychologist, 66*, 277–289.
- Roszak, T. (1994). Green guilt and ecological overload. In M. Walker (Ed.), *Reading the Environment*. New York: W.W. Norton & Co.
- Rowe, D. (2002). Environmental literacy and sustainability as core requirements: Success stories and models. In W. L. Filho (Eds.), *Teaching sustainability at universities: Toward curriculum greening*. New York: Peter Lang International Academic Publishers.
- Schaffer, A. (2008). Prescriptions for health, the environmental kind. The New York Times, Health section. Retrieved March 26, 2009, from www.nytimes.com/2008/08/12/health/12clin.html?_r=1&sc=1&sq=environmental%20health%20clinic&st=cse
- Schuldt, J. P., Konrath, S. H., & Schwarz, N. (2011). "Global warming" or "climate change"? Whether the planet is warming depends on question wording. *Public Opinion Quarterly, 75*, 115–124.
- Schusler, T.M., Krasny, M.E., Peters, S.J., & Decker, D.J. (2009). Developing citizens and communities through youth environmental action. *Environmental Education Research, 15*, 111–127.
- Scott, B. A., & Koger, S. M. (2012). Psychology and environmental sustainability: What's good for the Earth is good for us. Appendix in W. Weiten, et al., *Psychology Applied to Modern Life: Adjustment in the 21st Century (10th Edition)*. Belmont, CA: Wadsworth, Cengage Learning.
- Seligman, M. E. P. (1975). *Helplessness: On depression, development and death*. San Francisco, CA: Freeman.
- Shellenberger, M., & Nordhaus, T. (2004). The death of environmentalism: Global warming politics in a post-environmental world. Retrieved July 1, 2011 from http://thebreakthrough.org/images/Death_of_Environmentalism.pdf
- Slovic, P. (2007). "If I look at the mass I will never act": Psychic numbing and genocide. *Judgment and Decision Making, 2*, 79–97.
- Slovic, S., & Slovic, P. (2004–2005). Numbers and nerves: Toward an affective apprehension of environmental risk. *Whole Terrain, 13*, 14–18.
- Smith, J.W., Positano, S., Stocks, N., & Shearman, D. (2009). *A new way of thinking about our climate crisis: The rational-comprehensive approach*. Lewiston, NY: Edwin Mellen Press.
- Snyder, C. R. (2002). Hope theory: Rainbows of the mind. *Psychological Inquiry, 13*, 249–275.
- Spedden, S. E. (1998) Risk perception and coping. In A. Lundberg (Ed.) *The environment and mental Health: A guide for clinicians* (pp. 103–114). Mahwah, NJ: Erlbaum.
- Stern, P. C. (1992). What psychology knows about energy conservation. *American Psychologist, 37*, 1224–1232.
- Stern, P. C. (2000). Psychology and the science of human-environment interactions. *American Psychologist, 55*, 523–530.
- Stern, P. C. (2011). Contributions of psychology to limiting climate change. *American Psychologist, 66*, 303–314.

- Stoll-Kleeman, S., O'Riordan, T., & Jaeger, C. C. (2001). The psychology of denial concerning climate mitigation measures: Evidence from Swiss focus groups. *Global Environmental Change, 11*, 107-117.
- Sunstein, C.R. (2006). The availability heuristic, intuitive cost-benefit analysis, and climate change. *Climatic Change, 77*, 195-210.
- Swim, J. K., Clayton, S., & Howard, G. S. (2011a). Human behavioral contributions to climate change: Psychological and contextual drivers. *American Psychologist, 66*, 251-264.
- Swim, J. K., Stern, P.C., Doherty, T. J., Clayton, S., Reser, J. P., Weber, E. U., Gifford, R., & Howard, G. S. (2011b). Psychology's contributions to understanding and addressing global climate change. *American Psychologist, 66*, 241-250.
- Tarakeshwar, N., Swank, A. B., Pargament, K. I., & Mahoney, A. (2001). The sanctification of nature and theological conservatism: A study of opposing religious correlates of environmentalism. *Review of Religious Research, 42*, 387-404.
- Thøgersen, J., & Crompton, T. (2009). Simple and painless? The limitations of spillover in environmental campaigning. *Journal of Consumer Policy, 32*, 141-163.
- Thompson, L. G. (2010). Climate change: The evidence and our options. *The Behavior Analyst, 33*, 153-170.
- Tudor, M. T., & Dvornich, K. M. (2001). The NatureMapping program: Resource agency environmental education reform. *The Journal of Environmental Education, 32*, 8-14.
- Ulrich, R.S. (1999). Effects of gardens on health outcomes: Theory and research. In C. Cooper Marcus & M. Barnes (Eds.), *Healing gardens: Therapeutic benefits and design recommendations* (pp. 27-86). New York, NY: John Wiley & Sons.
- Unitarian Universalist Association of Congregations (2006). Threat of global warming/climate change: 2006 Statement of conscience. Retrieved July 1, 2011 from www.uua.org/justice/statements/statements/8061.shtml
- U.S. Department of Energy (n.d.). Consumer energy tax incentives. United States department of energy for consumers. Retrieved July 10, 2011 from www.energy.gov/taxbreaks.htm
- Villar, A., & Krosnick, J. A. (2009). Global warming vs. climate change, taxes vs. prices: Does word choice matter? *Climatic Change, 105*, 1-12.
- 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., & Stern, P. C. (2011). Public understanding of climate change in the United States. *American Psychologist, 66*, 315-328.
- Werhan, P.O., & Groff, D.G. (2005, November). Research Update: The wilderness therapy trail. *Parks and Recreation, 24-29* [Online Edition]. Retrieved July 1, 2011 from http://findarticles.com/p/articles/mi_m1145/is_11_40/ai_n15966766/pg_1?tag=artBody;col1
- Werner, C. M., & Adams, D. (2001). Changing homeowners' behaviors involving toxic household chemicals: A psychological, multilevel approach. *Analyses of Social Issues and Public Policy, 1*, 1-31.
- Zimmerman, M. A. (1990). Toward a theory of learned hopefulness: A structural model analysis of participation and empowerment. *Journal of Research in Personality, 24*, 71-86.

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