



Collective guilt mediates the effect of beliefs about global warming on willingness to engage in mitigation behavior[☆]

Mark A. Ferguson^{a,*}, Nyla R. Branscombe^b

^a Department of Economics, University of Calgary, Calgary, AB, Canada

^b Department of Psychology, University of Kansas, Lawrence, KS, United States

ARTICLE INFO

Article history:

Available online 2 December 2009

Keywords:

Collective guilt
Proenvironmental behavior
Global warming
Social identity
Collective emotions
Conservation psychology

ABSTRACT

The present research examines whether collective guilt for an ingroup's collective greenhouse gas emissions mediates the effects of beliefs about the causes and effects of global warming on willingness to engage in mitigation behavior. In Study 1, we manipulate the causes and effects of global warming and then measure collective guilt. Results demonstrate that collective guilt for Americans' greenhouse gas emissions is stronger when participants believe that global warming is caused by humans and will have minor effects. Study 2 employs the same manipulations and then measures collective guilt and collective anxiety, as well as willingness to conserve energy and pay green taxes. This study replicates the effect from Study 1 and rules out collective anxiety as a plausible alternative mediator. Collective guilt for Americans' greenhouse emissions was the only reliable mediator of the effect of beliefs about global warming on willingness to engage in mitigation behaviors. The importance of collective guilt as a tool for promoting global warming mitigation is discussed.

© 2009 Elsevier Ltd. All rights reserved.

Global warming is one of the most pressing social issues of our times. According to the Intergovernmental Panel on Climate Change (2007), global warming is likely to have negative consequences for natural ecosystems and human societies in the coming decades. The National Academies of Science (2008) suggest that the "scientific understanding of [global warming] is now sufficiently clear to begin taking steps to prepare for [global warming] and to slow it" (p. 2). In psychology there have also been calls for reducing or mitigating global warming. For instance, Oskamp (2007) suggests that the current "generation's success in achieving sustainable patterns of living on the Earth will determine whether [it] will retain a livable environment for future generations" (p. 121). These concerns are echoed in the American Psychological Association's (2009) task force report outlining the urgent need for more research on the psychological or human dimensions of global warming (see also Gifford, 2007a).

1. Beliefs about global warming and mitigation behavior

Two psychological dimensions relevant to mitigation behavior are beliefs about the causes and effects of global warming (Clayton & Myers, 2009; Gifford, 2007b). In terms of causes, social and political debates about global warming (Dessler & Parson, 2006) revolve around whether natural processes (e.g., solar or volcanic activity) or human activities (e.g., electricity consumption, automobile emissions) are the main causes of global warming (i.e., attributions concerning its source can differ; Hilton, 2007). In terms of effects, debates revolve around whether the effects of global warming will be minor (e.g., slightly warmer days, localized flooding) or major (e.g., disease epidemics, submersion of coastlines). Expectations regarding people's capacity for managing the future effects of global warming should have consequences for willingness to change present-day behavior (e.g., Lazarus, 1999; Roese & Sherman, 2007). Given the prevalence of cause and effect beliefs in worldwide debates about global warming, addressing their role in eliciting mitigation behavior seems prudent.

Research by Malka, Krosnick, and Langer (2009) suggests that beliefs about the causes and effects of global warming relate to proenvironmental behavior. In an American nationally-representative sample, they found that believing global warming is caused by humans and is a severe threat to the world is related to greater proenvironmental behavior. Furthermore, this relationship is more likely to be found among those who trust scientists and/or are

[☆] Preparation of this manuscript was facilitated by an award from the Canadian Institute for Advanced Research.

* Corresponding author. Department of Economics, University of Calgary, 2500 University Drive N.W., Calgary, AB, Canada, T2N 1N4. Tel.: +1 403 220 6101.

E-mail address: mark.ferguson@ucalgary.ca (M.A. Ferguson).

Democrats or Independents—that is, among those who are more likely to believe that global warming is real. Malka et al.'s results coalesce with Heath and Gifford's (2006) showing that perceptions of global warming as caused by humans and/or has mostly negative effects predicts willingness to mitigate global warming. Similarly, the value-belief-norm model (Stern, 2000) suggests that perceiving adverse effects from global warming should promote mitigation behavior. Generally speaking, severe threats that present negative or adverse outcomes in the future are more likely to have a major effect on one's ingroup. Accordingly, these perspectives suggest that perceptions that global warming is caused by humans and/or has major effects should foster mitigation behavior, but this might depend on having the belief that global warming is real.

Although existing research suggests a relationship between beliefs about the causes and effects of global warming and pro-environmental behavior, the nature of this relationship is not well-specified. Existing research is primarily correlational. This leaves open the possibility that proenvironmental intentions and behaviors might be influencing beliefs about global warming (Bem, 1967). If so, then focusing on changing habitual behavior might be more important than focusing on changing beliefs in promoting global warming mitigation (American Psychological Association, 2009). Moreover, third variables might influence both global warming beliefs and mitigation behavior. For instance, many have suggested that group identification (with nature, humans, political groups, and others) affects both beliefs about global warming and willingness to engage in mitigation (American Psychological Association, 2009; Clayton & Opatow, 2003).

Even if beliefs about the causes and effects of global warming promote proenvironmental behavior, it is not clear whether these effects are additive or multiplicative. Heath and Gifford's (2006) research implies that these beliefs should have additive effects on behavior—a belief that global warming is caused by humans and will have major effects should both similarly motivate global warming mitigation. However, it is possible that beliefs about causes and effects have a multiplicative effect—that is, perceptions about the causes and effects of global warming could interact. For instance, believing that global warming is caused by humans might foster a sense of collective responsibility and willingness to engage in mitigation (e.g., Clayton & Myers, 2009). However, this willingness might depend upon the belief that the effects of global warming are minor. When the effects are not, then it is possible there is less impetus for mitigation (Brehm, 1999).

2. The mediational role of collective guilt

What might account for increased mitigation behavior in response to beliefs about global warming? We suggest that collective guilt is one important mechanism. Collective guilt refers to the negative emotion that people experience when their ingroup as a whole is seen as responsible for harm-doing (see Wohl, Branscombe, & Klar, 2006 for a review). Collective guilt differs from personal guilt (Kaiser, Schultz, Berenguer, Corral-Verdugo, & Tankha, 2008) in that it derives from an individual's social identity (rather than personal identity) and their sense of collective responsibility (rather than personal responsibility) for wrongdoing events. For instance, Doosje, Branscombe, Spears, and Manstead (1998) showed that collective guilt facilitates reparations for the harms perpetrated by the Dutch against its former colonies. Analogously, collective guilt for an ingroup's pooled greenhouse gas emissions should elicit mitigation behavior. For instance, Ferguson and Branscombe (2009) showed that inducing Americans to think about future Americans as part of the present-day ingroup fosters

collective guilt for present Americans' pooled greenhouse gas emissions.

Two conditions seem particularly relevant for understanding when beliefs about global warming will elicit collective guilt. First, people must believe that their group is responsible for the harm done (Branscombe & Ferguson, 2009). This suggests that collective guilt is more likely to be experienced when people believe that global warming is caused by humans than when caused by nature. When people do not believe that their group is responsible for wrongs, then there is no basis for experiencing collective guilt. Second, people must believe that it is possible to repair the harm done (Schmitt, Miller, Branscombe, & Brehm, 2008; Wohl et al., 2006). This suggests that collective guilt is more likely to be experienced when people believe that global warming will have minor effects than when it will have major effects. When people believe that the harm produced by global warming will be catastrophic, then there is less sense that repair is possible (Slovic, 2000), reducing the potential for collective guilt. This is consistent with research by Brehm and colleagues (Brehm, 1999; Miron, Parkinson, & Brehm, 2007; Silvia & Brehm, 2001) showing that when it is perceived as difficult or impossible to achieve the goal of an emotion (such as repairing the harm done), then the intensity of the emotion diminishes. Taken together, this suggests that collective guilt is most likely to be experienced when global warming is believed to be caused by humans and will have minor effects.

Since collective guilt motivates behavior to repair wrong-doing, it follows that collective guilt should increase mitigation behavior. Accordingly, mitigation behavior should generally be stronger when people believe that global warming is caused by humans and will have minor effects—to the extent that those beliefs induce feelings of collective guilt. This is not to suggest that collective guilt is the sole mechanism affecting mitigation behavior, but that collective guilt should be a potent motivational guide for behavior when individuals believe that global warming is caused by humans and will have minor effects on an ingroup.

The proposed mediating role of collective guilt is consistent with research focusing on the role of social identity in proenvironmental behavior. For instance, Clayton and Opatow (2003) found that the strength of environmental identity predicted environmentally-protective attitudes and behavior. In addition, Uzzell, Pol, and Badenas (2002) suggest that place identity is related to one's sense of collective responsibility for improving environmental outcomes. Such research suggests that social identity (whether based on environmental beliefs or affinity with geographic locales) and a sense of collective responsibility influences positive environmental outcomes. Since collective guilt derives from social identity and involves a sense of collective responsibility for harmful events caused by the ingroup as a whole, it is possible that collective guilt represents a missing link between beliefs about global warming and mitigation behavior.

3. Overview of studies

Study 1 manipulates beliefs about the causes (nature, human) and effects (minor, major) of global warming and then measures collective guilt for Americans' greenhouse gas emissions. We expect that collective guilt will be higher when Americans believe that global warming is caused by humans and will have minor effects, relative to other conditions. Study 2 replicates this effect and tests whether collective guilt mediates the effects of beliefs on willingness to engage in mitigation behavior. We expect that mitigation measures will generally mirror the pattern of results shown by collective guilt, and that guilt will mediate the effect of beliefs on willingness to engage in mitigation.

4. Study 1

4.1. Methods

4.1.1. Participants and procedures

Seventy-nine individuals (34 men and 45 women) volunteered to participate in the study. Potential participants were approached in public areas on a Midwestern university campus (e.g., the student union) by a research assistant and were asked if they would be interested in participating in an opinion poll. Potential participants were then asked if they were American citizens and had not been in another opinion poll on campus. Only those who answered “yes” to both questions were eligible for the study. Those eligible were randomly-assigned to a 2 (global warming cause: nature, human) \times 2 (global warming effect: minor, major) between-subjects design.

Participants received a brief survey on a clipboard. They were told to first read the passage at the top of the page and then respond to the questions that followed. This passage stated that the poll was being conducted by the campus climate research center and that its scientists wanted to collect public reactions to recent findings. The passage discussed global warming. It said that while global warming was a well-documented phenomenon (a buildup of greenhouse gases in the atmosphere), scientists continue to examine the causes and effects of global warming. Subsequent text served to manipulate the cause and the effect of global warming. The passage stated that global warming was either caused by nature or humans, and would have minor or major effects on Americans in 50 years. For instance, participants in the *nature cause-minor effect* condition read that global warming was caused by natural events, such as solar flares and volcanic activity, and would have minimal effects on Americans in 50 years, amounting to some hot summer days and localized flooding. Participants in the *human cause-major effect* condition read that global warming was caused by human activities, such as burning fossil fuels or consuming electricity, and would have major effects on Americans in 50 years, such as widespread flooding, drought, or disease. The effect manipulation was specifically focused on effects for Americans to enhance the perception that harm was inflicted on the ingroup, rather than distant outgroups. Moreover, the manipulation focused on 50 years in the future to enhance the believability of harmful effects from global warming for participants.

After reading the passage, participants completed manipulation checks on the cause and effects of global warming, as well as collective guilt. It is important to note that the number of questions were minimized to reduce the burden on volunteer participants, who might otherwise feel unable to participate. They then received an information sheet explaining the purpose of the study and thanking them for their participation.

4.1.2. Manipulation checks

Participants completed two manipulation checks. As a check on the manipulation of the cause of global warming, participants were asked three questions ($\alpha = .91$) about the extent to which Americans today were responsible (at fault, to blame) for the effects of global warming. Responses were provided on 5-point scales ranging from 1 (not at all) to 5 (extremely). As a check on the manipulation of the effects of global warming, participants were asked three questions ($\alpha = .92$) about how much harm (suffering, damage) global warming would cause for Americans in 50 years. Responses were provided on 5-point scales ranging from 1 (none at all) to 5 (a whole lot).

4.1.3. Collective guilt

Participants also completed a measure of collective guilt. This measure consisted of three questions ($\alpha = .90$) that asked the

extent to which they felt guilty (regretful, remorseful) that Americans today produce greenhouse gas emissions (by driving automobiles and consuming electricity). Responses were provided on scales ranging from 1 (not at all) to 5 (extremely).

5. Results

5.1. Manipulation checks

A 2 (Cause: nature, human) \times 2 (Effect: minor, major) ANOVA was performed on the manipulation checks for the cause and the effect of global warming. For the cause of global warming, this analysis yielded a main effect of cause, $F(1, 75) = 7.59, p < .01$, partial $\eta^2 = .09$. As expected, participants who read that global warming was caused by humans reported that Americans were more responsible for the effects of global warming ($M = 3.79, SD = .84$) than did those who read that global warming was caused by nature ($M = 3.18, SD = 1.17$). Neither the main effect of effect, $F(1, 75) = 1.05, p = .31$, partial $\eta^2 = .01$ —nor the cause \times effect interaction, $F(1, 75) = .86, p = .36$, partial $\eta^2 = .01$ —was significant.

For the effect of global warming, this analysis yielded a main effect of effect, $F(1, 75) = 3.94, p = .05$, partial $\eta^2 = .05$. As expected, participants who read that global warming would have a major effect on Americans in 50 years reported that there would be greater harm ($M = 3.72, SD = .95$) than did those who read that global warming would have a minor effect ($M = 3.26, SD = 1.30$). Furthermore, this analysis yielded an unexpected main effect of cause, $F(1, 75) = 11.51, p < .01$, partial $\eta^2 = .13$. Participants who read that global warming was caused by humans reported that Americans in 50 years would suffer greater harm ($M = 3.90, SD = .88$) than did those who read that global warming was caused by nature ($M = 3.15, SD = 1.24$). The cause \times effect interaction did not reach significance, $F(1, 75) = 2.96, p < .10$, partial $\eta^2 = .04$.

5.2. Collective guilt

A 2 (Cause: nature, human) \times 2 (Effect: minor, major) ANOVA was performed on the collective guilt measure. This analysis yielded a main effect of cause, $F(1, 75) = 9.80, p < .01$, partial $\eta^2 = .12$. Participants who read that global warming was caused by humans reported more collective guilt ($M = 3.30, SD = 1.02$) than those who read that global warming was caused by nature ($M = 2.61, SD = 1.13$). This main effect was qualified by a significant cause \times effect interaction, $F(1, 75) = 7.02, p = .01$, partial $\eta^2 = .09$. As expected, participants in the human cause-minor effect condition reported more collective guilt ($M = 3.65, SD = .84$) than did those in the other three conditions ($M = 2.73, SD = 1.12$), $F(1, 77) = 10.22, p < .01$, partial $\eta^2 = .12$. The main effect of effect was not significant, $F(1, 75) = 0.02, p = .88$, partial $\eta^2 = .01$. Fig. 1 presents the condition means for collective guilt.

6. Discussion

The results of Study 1 demonstrate that collective guilt is experienced in response to beliefs about the causes and effects of global warming. In particular, participants reported more collective guilt in the *human cause-minor effect* condition than they did in the other conditions. When participants believed that humans cause global warming and it will have minor effects on future Americans, collective guilt was strongest. These results are consistent with the view that people must think that their group is responsible for harm done, as well as see it as feasible to repair the harm done, in order to experience collective guilt (Branscombe & Ferguson, 2009).

One unexpected result was that participants reported perceiving the harm from global warming as greater when it was caused by

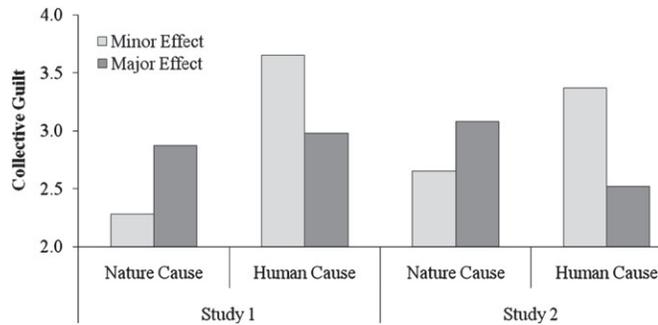


Fig. 1. The effect of beliefs about global warming on collective guilt in studies 1 and 2.

humans than when it was caused by nature. This is consistent with research by Reicher, Podpadec, Macnaghton, Brown, and Eiser (1993). In their studies, people who considered a hazard to be “man-made”—in their case, nuclear radiation—considered it to be more harmful than when the hazard was considered “natural.” As a result, events that are seen as caused by humans have the potential to be seen as more harmful than events that are seen as caused by nature. When global warming is perceived as an event caused by humans, then it must be harmful, as the event would not have occurred “naturally.” Similar conclusions can be drawn from research on risk perception. For instance, Breakwell (2007) has suggested that risk communications regarding “man-made” hazards stimulate greater anxiety, presumably because of their perceived destructive potential relative to “natural” hazards.

This raises the question of whether the effects of beliefs about global warming are specific to collective guilt. That is, could an alternative collective emotion be significant for eliciting mitigation behavior? One important possibility is collective anxiety or the worry that arises from possible negative outcomes for future ingroup members. For instance, discourse about global warming emphasizes worries about harm to future generations unless present-day group members engage in mitigation (Gore, 2006; Oskamp, 2007). Since people might consider “man-made” hazards to be exceptionally harmful (Reicher et al., 1993), it is possible that people might experience more collective anxiety when they believe that global warming is caused by humans. Further, this anxiety might be attenuated when the effects of global warming are major (Brehm, 1999, Silvia & Brehm, 2001), as little can be done to manage them (Slovic, 2000). Hence, it is possible that collective anxiety could explain the pattern of results that we found for collective guilt in Study 1.

Accordingly, Study 2 will attempt to replicate the collective guilt effects from Study 1, while examining whether collective anxiety is a viable alternative explanation. We predict that collective anxiety will not provide the same pattern of results as collective guilt, as fear appeals produce mixed results depending upon the nature of the envisioned harm (Shehryar & Hunt, 2005). Study 2 will also examine whether collective emotions mediate the effects of beliefs about global warming on willingness to engage in mitigation behavior. We predict that the effects of beliefs on two mitigation behaviors—willingness to conserve energy and pay green taxes—will be mediated by collective guilt.

7. Study 2

7.1. Methods

7.1.1. Participants and procedures

Seventy-four individuals (26 male and 48 female) volunteered to participate. Comparable to Study 1, participants were approached on a Northeastern university campus and asked to be

in an opinion poll. Participants who were American citizens and had not previously participated in an opinion poll were eligible to participate. Those eligible were handed a brief survey and were directed to read the passage at the top of the first page. This passage was the same as in Study 1, serving as the manipulation of the cause (nature, human) and effect (minor, major) of global warming.

After reading this passage, participants were directed to answer the questions that followed. These questions measured collective emotions (both guilt and anxiety), as well as willingness to engage in two forms of behavior to mitigate global warming (i.e., conserving energy and paying green taxes). Following Malka et al.'s (2009) suggestion that people must believe that global warming is a real phenomenon for beliefs about the causes and effects of global warming to influence mitigation behavior, participants then responded to a measure of their confidence that global warming exists. The manipulation checks from Study 1 were omitted to reduce the burden on participants. Given that the manipulation was successful in Study 1, it seemed reasonable that comparable results on collective guilt would provide empirical support for the manipulation's efficacy in Study 2. Afterwards, participants were handed a sheet that explained the purpose of the study and thanked them for their participation.

7.1.2. Dependent measures

Participants first completed two measures of collective emotions. The collective anxiety measure consisted of three questions ($\alpha = .89$) assessing the extent to which participants felt nervous (worried, apprehensive) about the effects of global warming on Americans in 50 years. They then completed the same measure of collective guilt from Study 1 ($\alpha = .92$). Responses on the emotion measures were provided on scales ranging from 1 (not at all) to 5 (extremely).

Participants next completed two measures of willingness to engage in behavior to mitigate global warming. First, they completed a measure of willingness to conserve energy. This measure consisted of three questions ($\alpha = .66$), which assessed how willing participants were to use energy-efficient light bulbs (reduce the amount of electric lighting used, reduce the use of electronic equipment). Second, they completed a measure of willingness to pay green taxes. This measure consisted of three questions ($\alpha = .79$), which assessed how willing they would be to pay higher taxes on gasoline (20¢ per gallon), electricity (\$15 per month), and income (\$50 per year) to promote reductions in greenhouse gas emissions. Responses on these measures were provided on scales ranging from 1 (not at all) to 5 (extremely).

Last, participants completed a measure tapping their confidence that global warming exists. This measure consisted of a single question assessing the extent to which participants were confident that the Earth's climate is generally warming. Responses on this measure were provided on a scale ranging from 1 (not at all) to 5 (extremely).

8. Results

8.1. Preliminary analyses

A 2 (Cause: nature, human) \times 2 (Effect: minor, major) ANOVA was conducted on the measure of confidence that global warming exists. This analysis did not yield a main effect of cause, $F(1, 64) = .89$, $p = .35$, partial $\eta^2 = .01$, a main effect of effect, $F(1, 64) = .37$, $p = .55$, partial $\eta^2 = .01$, or a cause \times effect interaction, $F(1, 64) = .64$, $p = .42$, partial $\eta^2 = .01$. This shows that the manipulations of cause and effect beliefs about global warming had no effect on participants' pre-existing beliefs about whether global warming is a real occurrence.

A frequency distribution did reveal that six participants (2 females and 4 males), evenly distributed across conditions, responded below the scale midpoint on confidence that global warming is real. They were omitted from subsequent analyses for not meeting the precondition of perceiving that global warming is real (remaining sample: $M = 4.26$, $SD = .73$). The same pattern of results emerged whether or not these skeptical participants were included.

8.2. Collective emotions

A 2 (Cause: nature, human) \times 2 (Effect: minor, major) ANOVA was conducted to examine the effect of cause and effect beliefs about global warming on collective emotions. For collective anxiety, this analysis did not yield a main effect of cause, $F(1, 64) = .01$, $p = .91$, partial $\eta^2 = .00$, a main effect of effect, $F(1, 64) = .69$, $p = .41$, partial $\eta^2 = .01$, or a cause \times effect interaction, $F(1, 64) = 2.46$, $p = .12$, partial $\eta^2 = .04$. Still, the mean response observed across conditions for the anxiety measure was noteworthy (3.49 on a five-point scale).

For collective guilt, the main effect of cause was not significant, $F(1, 64) = .08$, $p = .773$, partial $\eta^2 = .01$, nor was the main effect of effect, $F(1, 64) = .57$, $p = .45$, partial $\eta^2 = .01$. However, this analysis yielded the expected significant cause \times effect interaction, $F(1, 64) = 5.25$, $p < .05$, partial $\eta^2 = .08$. Consistent with Study 1, participants in the *human cause-minor effect* condition reported more collective guilt ($M = 3.37$, $SD = 1.05$) than participants in the other three conditions ($M = 2.71$, $SD = 1.17$), $F(1, 66) = 4.53$, $p < .05$, partial $\eta^2 = .06$. Fig. 1 presents the condition means for collective guilt.

8.3. Willingness to engage in mitigation

A 2 (Cause: nature, human) \times 2 (Effect: minor, major) ANOVA was also conducted to examine willingness to mitigate global warming. For energy conservation, this analysis did not yield a main effect of cause, $F(1, 64) = .60$, $p = .44$, partial $\eta^2 = .01$ or a main effect of effect, $F(1, 64) = .03$, $p = .87$, partial $\eta^2 = .01$. However, it did yield a cause \times effect interaction, $F(1, 64) = 3.92$, $p = .05$, partial $\eta^2 = .06$. Participants in the *human cause-minor effect* condition were marginally more willing to conserve energy ($M = 4.00$, $SD = .69$) than those in the other three conditions ($M = 3.63$, $SD = .90$), $F(1, 66) = 2.80$, $p < .10$, partial $\eta^2 = .04$.

For paying green taxes, this analysis did not yield a main effect of cause, $F(1, 64) = 1.36$, $p = .25$, partial $\eta^2 = .02$ or a main effect of effect, $F(1, 64) = .06$, $p = .80$, partial $\eta^2 = .01$. However, it did yield a cause \times effect interaction, $F(1, 64) = 4.43$, $p < .05$, partial $\eta^2 = .07$. As expected, participants in the *human cause-minor effect* condition reported more willingness to pay green taxes ($M = 3.25$, $SD = .85$) than participants in the other three conditions ($M = 2.65$, $SD = 1.05$), $F(1, 66) = 4.96$, $p < .05$, partial $\eta^2 = .07$. Fig. 2 presents the condition means for the willingness to engage in mitigation measures.

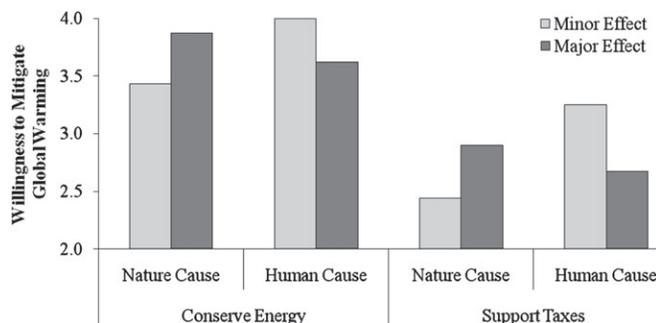


Fig. 2. The effect of beliefs about global warming on mitigation intentions in Study 2.

8.4. Moderated mediation

A moderated mediation analysis (Preacher, Rucker, & Hayes, 2007) was conducted to examine whether collective guilt mediates the cause \times effect beliefs interaction on willingness to conserve energy and pay green taxes. This analysis was conducted with AMOS 17.0 structural equation modeling software. The main effects of cause and effect, as well as the cause \times effect interaction, were included as independent variables, collective guilt (centered) as the mediator, and energy conservation and green tax support as the dependent variables. The interaction effect was coded to reflect the prediction that collective guilt should be stronger in the *human cause-minor effect* condition (+3/4) relative to the other three conditions (-1/4, -1/4, -1/4; Cohen, Cohen, West, & Aiken, 2003).

This approach to moderated mediation analysis differs from traditional approaches (e.g., Baron & Kenny, 1986) in two important ways. First, beta coefficient changes in the independent to dependent variable path, before and after inclusion of a mediator, are not considered evidence for mediation. Mediation is better captured by a product term between the independent variable to mediator and mediator to dependent variable paths. Second, the significance of a mediated effect is not determined by standard significance tests (e.g., z ; Sobel, 1982) but rather by bias-corrected confidence intervals. When the intervals do not contain zero, then a mediated effect is significant. For this analysis, 95% confidence intervals were computed based on 5000 bootstrapped resamples. This approach to moderated mediation was employed because it has been shown to be more reliable in studies with modest sample and effect sizes (see Preacher et al., 2007 for an overview).

The standardized beta coefficients and confidence intervals for the moderated mediation analysis are presented in Table 1. As seen in Table 1, collective guilt is a significant mediator of the cause \times effect interaction for energy conservation ($CI_{95} = .01, .45$) and tax support ($CI_{95} = .05, .56$). Participants in the *human cause-minor effect* condition reported more collective guilt than did participants in the other three conditions ($b^* = .50$, $p < .05$), and more collective guilt resulted in greater willingness to conserve energy ($b^* = .29$, $p < .05$) and pay green taxes ($b^* = .51$, $p < .01$). Furthermore, collective guilt did not mediate either of the main effects on energy conservation or tax support (all four intervals contain zero). This supports the notion that cause and effect beliefs about global warming interact to uniquely influence energy conservation and tax support by fostering collective guilt for the ingroup's greenhouse gas emissions.

9. Discussion

Study 2 replicated the pattern of results found in Study 1—collective guilt was stronger in the *human cause-minor effect*

Table 1

Beta coefficients and confidence intervals for moderated mediation analysis in Study 2.

	X \rightarrow W	W \rightarrow Y	X \rightarrow Y	CI ₉₅
Conserve energy				
Cause	-.24	.29*	-.07	-.28, .02
Effect	.18	.29*	.21	-.04, .24
Cause \times Effect	.50*	.29*	.29	.01, .45
Support taxes				
Cause	-.24	.51**	-.01	-.34, .05
Effect	.18	.51**	.13	-.08, .31
Cause \times Effect	.50*	.51**	.20	.05, .56

Note. X = main or interaction effect, W = collective guilt, Y = mitigation intentions, CI₉₅ = 95% confidence intervals. Beta coefficients have been standardized. Moderated mediation is significant when zero is not contained within the interval. * = $p < .05$, ** = $p < .01$.

condition relative to other conditions. This is consistent with past research on collective guilt, which suggests that the experience of collective guilt depends on a sense of collective responsibility for harm done, as well as believing that repairing the harm is possible (Schmitt et al., 2008). When these conditions are met—in the *human cause-minor effect* condition—collective guilt was strongest. This also supports the multiplicative view of beliefs about the causes and effects of global warming. It is not that such beliefs independently influence the urge to engage in mitigation (as shown by the lack of main effects), but that they do so jointly.

These results also demonstrate that collective guilt is influenced by beliefs about global warming, whereas collective anxiety is not. This suggests that the effects of these beliefs are indeed specific to collective guilt. Worries about the negative consequences of global warming on future generations are commonly cited in debates about global warming (Dessler & Parson, 2006; Gore, 2006), presumably to motivate behavior change. Nevertheless, collective anxiety might not foster mitigation behavior as much as undermine it (McCright, 2007). When people are frightened, they might be more motivated to deny a hazard than combat it (Becker & Josephs, 1988). Indeed, believing global warming is real was strongly associated with collective anxiety, irrespective of one's beliefs about its causes and effects (r s across cells range from .52 to .69).

Study 2 also revealed that collective guilt mediates the relationship between beliefs about global warming and energy conservation and green taxes. When beliefs increase collective guilt, they are more likely to motivate mitigation behavior; when beliefs decrease collective guilt, they are less likely to motivate mitigation behavior. This is not surprising. When people have a sense of collective responsibility for creating global warming, and they also believe that reducing global warming is possible, they feel guilty about the ingroup's collective greenhouse gas emissions. This is most likely to occur when people believe that global warming is caused by humans and will have minor effects. Such results suggest that collective guilt could play an important role in promoting global warming mitigation.

10. General discussion

The present research supports the notion that collective guilt mediates the effects of beliefs about global warming on willingness to engage in mitigation. Three important results were obtained. First, collective guilt and mitigation intentions were both jointly affected by beliefs about the causes and effects of global warming. In Studies 1 and 2, we found that collective guilt is stronger when people believe that global warming is caused by humans and will have minor effects, relative to the other conditions. In Study 2, these same conditions similarly influenced mitigation intentions. This multiplicative effect suggests that beliefs about global warming can affect willingness to mitigate global warming. Second, the effect of such beliefs on collective emotions was specific to collective guilt. When collective anxiety was examined as a plausible alternative to collective guilt, beliefs about the causes and effects of global warming had no effect.

Third, collective guilt mediated the joint influence of beliefs about global warming on willingness to engage in mitigation. When beliefs about global warming increase collective guilt, they increase willingness to conserve energy and pay green taxes. This was more likely to occur when people believed global warming was caused by humans and would have minor effects. However, when beliefs about global warming decrease collective guilt, they decrease willingness to conserve energy and pay green taxes. This was most likely to occur when people do not believe that global warming is caused by humans and will have minor effects. These results suggest that collective guilt might play a noteworthy role in mitigating global warming.

10.1. Relevance to research on collective emotions

The present research extends existing work on collective emotions. In terms of collective guilt, rather than focusing on intentional harm perpetrated by the ingroup against outgroups in the past, this research inverts the standard paradigm—to unintentional harms perpetrated by the ingroup against itself in the future. This inversion has important consequences for existing work. First, it encourages researchers to look deeper into the variables that foster collective guilt. Such a focus can not only draw out novel variables (who gets harmed, whether it was intended, and so on), but it could call into question underlying assumptions that might restrict research (e.g., that collective guilt stems from outgroup harm because the ingroup would not harm itself). Second, it encourages researchers to consider a broader range of contexts that could elicit collective guilt. Global warming arises from the collective actions of social groups—their customary production and consumption behaviors (American Psychological Association, 2009). This suggests strong potential for group members to feel collective guilt for the actions of their contemporaries.

Although this research did not support collective anxiety as an alternative motivator of mitigation intentions, this does not mean that this emotion plays no role whatsoever. Personal anxiety motivates both avoidance (Loewenstein, Weber, Hsee, & Welch, 2001) and prevention of feared outcomes (Molden, Lee, & Higgins, 2008), with prevention more likely if the intensity of anxiety is relatively low (Brehm, 1999; Janis & Feshbach, 1953; Moser, 2007). These same predictions should hold for collective anxiety. Nonetheless, the question about when anxiety will be sufficiently low remains—and the antecedent conditions for relatively low anxiety could differ for personal and collective anxiety. For instance, temporal distance research suggests that anxiety should be higher when the feared outcome is closer in time (Liberman, Trope, & Stephan, 2007). If global warming were to have its harshest effects in ten years rather than fifty, people should experience more anxiety in that case. However, is this personal or collective anxiety? One could argue that personal anxiety will be highest when the feared outcome is closer in time (focus is on the harm to myself), whereas collective anxiety will be highest when the feared outcome is more distant in time (focus is on the harm to my group). Thus, the intensity of personal and collective anxiety might have different antecedents, which suggests that both could affect global warming mitigation under different conditions.

Other collective emotions might also play an important role in mitigation intentions. For instance, positive collective emotions (e.g., pride, happiness) might motivate proenvironmental behavior in certain contexts (Akerlof & Shiller, 2009; Diener, Lucas, Schimmack, & Helliwell, 2009; Tracy & Robins, 2007). For instance, Stürmer, Simon, Loewy, and Jorger (2003) found that positive feelings about one's ingroup motivates social advocacy on behalf of the group. In addition, Homberg and Stolberg (2006) found that positive feelings about the group's ability to manage environmental problems (rather than one's own ability) elicited more proenvironmental behavior than did negative feelings. Because framing global warming negatively might diminish mitigation under certain conditions (Broemer, 2004; Moser, 2007), considering the effect of positive collective emotions could be a useful direction for future research.

10.2. Relevance to research on proenvironmental behavior

The present research extends existing research on proenvironmental behavior. Research has long suggested that guilt can motivate proenvironmental behavior (Bamburg & Moser, 2007; Kaiser & Shimoda, 1999; Widegren, 1998). However, these studies

consider guilt as stemming from one's personal behavior, rather than guilt stemming from the collective behavior of one's ingroup. Given that these distinct sources for feeling guilt—personal versus group behavior—likely have distinct consequences for regulating emotion (see Smith & Mackie, 2008), they are likely to have distinct consequences for proenvironmental behavior. To our knowledge, this is the first research to consider the effects of collective guilt on global warming mitigation.

The notion that collective guilt can increase proenvironmental behavior leads to questions about the factors that might increase collective guilt. One possibility is group identification. This research showed that Americans can feel collective guilt for Americans' collective contributions to greenhouse gas emissions. This suggests that increasing American identification might lead to increased collective guilt and mitigation behavior. However, it is important to consider that high identifiers are often more willing to deny harm-doing, responsibility for harm-doing, or justify harm-doing (Branscombe & Miron, 2004). Thus, the role of group identification on collective guilt is likely to be complex and would be a useful avenue for future research.

In addition, the particular type of identity considered might influence collective guilt. Our research considered American identity. Nonetheless, conservation psychologists have shown that several identities are related to proenvironmental behavior, including one's identification with place, nature, or animals (Clayton & Myers, 2009; Mashek, Stuewig, Furukawa, & Tangney, 2006). To the extent that one of these identities is salient, people might experience collective guilt for harm done against these other entities (e.g., neighbors, rainforests, or polar bears). Given that American society has not historically addressed global warming (Dessler & Parson, 2006; Frantz & Mayer, 2009), American identity might not be the most potent, identity-based generator of collective guilt and mitigation behavior. However, future research addressing which identities are most likely to foster collective guilt would need to be mindful that some identities are more likely to be salient and readily adopted by everyday citizens than are others.

10.3. Limitations of the present research

The present research has important limitations. For instance, the sample in Study 2 was comprised of people who had at least some confidence that global warming was real. Given that Malka et al. (2009) found no relationship between beliefs about the causes and effects of global warming and mitigation behavior for those who did not believe in global warming, restriction of the sample to those who did seem reasonable. Still, even though the same general pattern of results was obtained when skeptics were included in the data set, it is possible that the sample restriction may limit these results to people with a minimal belief in global warming.

In addition, the manipulation of beliefs about the severity of effects from global warming raises issues familiar to research on severe or dreaded risks (Slovic, 2000). Such research suggests that perceptions of dreaded risks are complex: they are not only likely to be seen as more severe, but also as catastrophic, fatal, threatening, hard to prevent, uncontrollable, difficult to reduce, and so on (see Breakwell, 2007 for a review). The inherent complexity of severe or dreaded risks raises questions about the specific mechanisms underlying the effects of our severity of effects manipulation. Severe risks might lead people to deny the reality of global warming (Moser & Dilling, 2004), or severe risks might reduce their sense of group efficacy (a belief that the ingroup can reduce global warming; Bandura, 2000). Given that the belief manipulations did not affect the perceived reality of global warming or collective anxiety, the first alternative seems tenuous. Still, unpacking the specific relationship between severe or dreaded risks and collective

emotions more generally (guilt, anxiety, shame, anger, and others) would be an important avenue for future research.

The present research also focused on a limited range of mitigation behaviors—energy conservation and green tax support. Although these behaviors are commonly considered in debates about global warming (Dessler & Parson, 2006), other behaviors are also important (such as auto emissions, recycling, and civic engagement). Future research should consider measuring other behaviors, as well as examining their relationship to established measures of mitigation behavior (e.g., Davis, Green, & Reed, 2009). In addition, future research would benefit from assessing actual behavior (Nolan, Schultz, Cialdini, Goldstein, & Griskevicius, 2008). Our research examined what people were willing to do (not what they have actually done), which is not necessarily the best predictor of behavior (Kruglanski & Higgins, 2007).

11. Conclusion

The present research provides support for the notion that collective guilt mediates the effects of beliefs about the cause and effect of global warming on willingness to participate in mitigation. When people believe that their group is responsible for harming the natural world and that the damage can be repaired (such as when the effects are relatively minor), their feelings of collective guilt are likely to elicit behaviors to repair the harm done. As with guilt based on one's personal behaviors, guilt based on an ingroup's collective behaviors can foster proenvironmental behavior. Given that an individual's carbon footprint will generally be smaller than that of their ingroup, the ingroup's carbon footprint might provide a more potent basis for the experience of "green" or "eco-guilt." If so, then subsequent efforts to regulate the experience of collective guilt could be a valuable tool in broader efforts to promote a sustainable world for future generations.

Acknowledgement

The authors thank Marcela Aranha, Alexa Gonzalez, Amber Humphrey, Kyle Lang, Brett Lemker, Casey Montgomery, and Lauren Ryan for their assistance with this research.

References

- Akerlof, G. A., & Shiller, R. J. (2009). *Animal spirits: How human psychology drives the economy, and why it matters for global capitalism*. Princeton, NJ: Princeton University Press.
- 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 from: <http://www.apa.org/releases/climate-change.pdf>.
- Bamberg, S., & Moser, 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. (2000). Exercise of human agency through collective efficacy. *Current Directions in Psychological Science*, 9, 75–78.
- Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51, 1173–1182.
- Becker, M. H., & Josephs, J. G. (1988). Aids and behavioral change to reduce risk: a review. *American Journal of Public Health*, 78, 394–410.
- Bem, D. J. (1967). Self-perception: an alternative interpretation of cognitive dissonance phenomena. *Psychological Review*, 74, 183–200.
- Branscombe, N. R., & Ferguson, M. A. (2009). Collective guilt. In J. M. Levine, & M. A. Hogg (Eds.), *Encyclopedia of group processes and intergroup relations*. Thousand Oaks, CA: Sage Publications.
- Branscombe, N. R., & Miron, A. M. (2004). Interpreting the ingroup's negative actions toward another group: emotional reactions to appraised harm. In L. Z. Tiedens, & C. W. Leach (Eds.), *The social life of emotions* (pp. 314–335). New York: Cambridge University Press.
- Breakwell, G. M. (2007). *The psychology of risk*. New York: Cambridge University Press.
- Brehm, J. W. (1999). The intensity of emotion. *Personality and Social Psychology Review*, 3, 2–22.

- Broemer, P. (2004). Ease of imagination moderates reactions to differently framed health messages. *European Journal of Social Psychology*, 34, 103–119.
- Clayton, S., & Myers, G. (2009). *Conservation psychology: Understanding and promoting human care for nature*. Hoboken, NJ: Wiley-Blackwell.
- Clayton, S., & Opatow, S. (Eds.). (2003). *Identity and the natural environment*. Cambridge, MA: MIT Press.
- Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences* (3rd ed.). Mahwah, NJ: Lawrence Erlbaum Associates.
- Davis, J. L., Green, J. D., & Reed, A. (2009). Interdependence with the environment: commitment, interconnectedness, and environmental behavior. *Journal of Environmental Psychology*, 29, 173–180.
- Dessler, A. E., & Parson, E. A. (2006). *The science and politics of global climate change: A guide to the debate*. New York: Cambridge University Press.
- Diener, E., Lucas, R. E., Schimmack, U., & Helliwell, J. F. (2009). *Well-being for public policy*. New York: Cambridge University Press.
- Doosje, B., Branscombe, N. R., Spears, R., & Manstead, A. R. (1998). Guilty by association: when one's group has a negative history. *Journal of Personality and Social Psychology*, 75, 872–886.
- Ferguson, M.A., & Branscombe, N.R. Collective guilt mediates the effect of inclusive temporal categorization on willingness to act on behalf of future group members, submitted for publication.
- Frantz, C. M., & Mayer, F. S. (2009). The emergency of climate change: why are we failing to take action? *Analyses of Social Issues and Public Policy*, 9, 205–222.
- Gifford, R. (2007a). Environmental psychology and sustainable development: expansion, maturation, and challenges. *Journal of Social Issues*, 63, 199–212.
- Gifford, R. (2007b). *Environmental psychology: Principles and practice* (4th ed.). Colville, WA: Optimal Books.
- Gore, A. (2006). *An inconvenient truth: The planetary emergency of global warming and what we can do about it*. New York: Rodale Books.
- Heath, Y., & Gifford, R. (2006). Free-market ideology and environmental degradation: the case of beliefs in global climate change. *Environment & Behavior*, 38, 48–71.
- Hilton, D. (2007). Causal explanation: from social perception to knowledge-based causal attribution. In A. W. Kruglanski, & E. T. Higgins (Eds.), *Social psychology: Handbook of basic principles* (pp. 232–253). New York: Guilford Press.
- Homburg, A., & Stolberg, A. (2006). Explaining pro-environmental behavior with a cognitive theory of stress. *Journal of Environmental Psychology*, 26, 1–14.
- Intergovernmental Panel on Climate Change. (17 November 2007). Climate change 2007: synthesis report. Retrieved June 22, 2008 from: http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf.
- Janis, I., & Feshbach, S. (1953). Effects of fear-arousing communications. *Journal of Abnormal and Social Psychology*, 48, 78–92.
- Kaiser, F. G., Schultz, P. W., Berenguer, J., Corral-Verdugo, V., & Tankha, G. (2008). Extending planned environmentalism: anticipated guilt and embarrassment across cultures. *European Psychologist*, 13, 288–297.
- Kaiser, F. G., & Shimoda, T. A. (1999). Responsibility as a predictor of ecological behaviour. *Journal of Environmental Psychology*, 19, 243–253.
- Kruglanski, A. W., & Higgins, E. T. (Eds.). (2007). *Social psychology: Handbook of basic principles* (2nd ed.). New York: Guilford Press.
- Lazarus, R. S. (1999). *Stress and emotion: A new synthesis*. New York: Springer Publishing Company.
- Liberman, N., Trope, Y., & Stephan, E. (2007). Psychological distance. In A. W. Kruglanski, & E. T. Higgins (Eds.), *Social psychology: Handbook of basic principles* (pp. 353–384). New York: Guilford Press.
- Loewenstein, G. F., Weber, E. U., Hsee, C. K., & Welch, N. (2001). Risk as feelings. *Psychological Bulletin*, 127, 267–286.
- 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.
- Mashek, D., Stuewig, J., Furukawa, E., & Tangney, J. (2006). Psychological and behavioral implications of connectedness to communities with opposing values and beliefs. *Journal of Social & Clinical Psychology*, 25, 404–428.
- McCright, A. M. (2007). Dealing with climate change contrarians. In S. C. Moser, & L. Dilling (Eds.), *Creating a climate for change: Communicating climate change and facilitating social change* (pp. 200–212). New York: Cambridge University Press.
- Miron, A. M., Parkinson, S. K., & Brehm, J. W. (2007). Does happiness function like a motivational state? *Cognition & Emotion*, 21, 248–267.
- Molden, D. C., Lee, A. Y., & Higgins, E. T. (2008). Motivations for promotion and prevention. In J. Y. Shah, & W. L. Gardner (Eds.), *Handbook of motivation science* (pp. 169–187). New York: Guilford Press.
- 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: Communicating climate change and facilitating social change* (pp. 64–80). New York: Cambridge University Press.
- Moser, S. C., & Dilling, L. (2004). Making climate hot: communicating the urgency and challenge of global climate change. *Environment*, 46, 32–46.
- Nolan, J. M., Schultz, P. W., Cialdini, R. B., Goldstein, N. J., & Griskevicius, V. (2008). Normative social influence is undetected. *Personality and Social Psychology Bulletin*, 34, 913–923.
- Oskamp, S. (2007). Applying psychology to help save the world: reflections on a career in psychology. *Analyses of Social Issues and Public Policy*, 7, 121–136.
- Preacher, K. J., Rucker, D. D., & Hayes, A. F. (2007). Addressing moderated mediation hypotheses: theory, methods, and prescriptions. *Multivariate Behavioral Research*, 42, 185–227.
- Reicher, S., Podpadek, T., Macnaghton, P., Brown, R., & Eiser, J. R. (1993). Taking the dread out of radiation? Consequences of and arguments over the inclusion of radiation from nuclear power production in the category of the natural. *Journal of Environmental Psychology*, 13, 93–109.
- Roese, N. J., & Sherman, J. W. (2007). Expectancy. In A. W. Kruglanski, & E. T. Higgins (Eds.), *Social psychology: Handbook of basic principles* (pp. 91–115). New York: Guilford Press.
- Schmitt, M. T., Miller, D. A., Branscombe, N. R., & Brehm, J. W. (2008). The difficulty of making reparations affects the intensity of collective guilt. *Group Processes and Intergroup Relations*, 11, 267–279.
- Shehryar, O., & Hunt, D. M. (2005). A terror management perspective on the persuasiveness of fear appeals. *Journal of Consumer Psychology*, 15, 275–287.
- Silvia, P. J., & Brehm, J. W. (2001). Exploring alternative deterrents to emotional intensity: anticipated happiness, distraction, and sadness. *Cognition & Emotion*, 15, 575–592.
- Slovic, P. (2000). *The perception of risk*. Sterling, VA: Earthscan Publications.
- Smith, E. R., & Mackie, D. M. (2008). Intergroup emotions. In M. Lewis, J. M. Haviland-Jones, & L. Feldman Barrett (Eds.), *Handbook of emotions* (3rd ed.). (pp. 428–439) New York: Guilford Press.
- Sobel, M. E. (1982). Asymptotic confidence intervals for indirect effects in structural equation models. In S. Leinhardt (Ed.), *Sociological methodology 1982* (pp. 290–312). San Francisco, CA: Jossey-Bass.
- Stern, P. (2000). Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues*, 56, 407–424.
- Stürmer, S., Simon, B., Loewy, M., & Jorger, H. (2003). The dual-pathway model of social movement participation: the case of the fat acceptance movement. *Social Psychology Quarterly*, 66, 71–82.
- The National Academies of Science. (2008). Understanding and responding to climate change. Retrieved August 31, 2008 from: http://dels.nas.edu/dels/rpt_briefs/climate_change_2008_final.pdf.
- Tracy, J. L., & Robins, R. W. (2007). Emerging insights into the nature and function of pride. *Current Directions in Psychological Science*, 16, 147–150.
- Uzzell, D., Pol, E., & Badenas, D. (2002). Place identification, social cohesion, and environmental sustainability. *Environment & Behavior*, 34, 26–53.
- Widegren, O. (1998). The new environmental paradigm and personal norms. *Environment and Behavior*, 30, 75–100.
- Wohl, M. J. A., Branscombe, N. R., & Klar, Y. (2006). Collective guilt: emotional reactions when one's group has done wrong or been wronged. *European Review of Social Psychology*, 17, 1–37.