LATERAL ATTITUDE CHANGE ON ENVIRONMENTAL ISSUES: IMPLICATIONS FOR THE CLIMATE CHANGE DEBATE

By

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ABSTRACT

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As it becomes increasingly urgent to take steps to reduce climate change, a number of scholars have begun to explore ways in which attitudes toward climate change are shaped, including the influence of messages people hear in the context of the ongoing climate change debate. What has not yet been addressed, however, is that these arguments are affecting not only climate change attitudes (direct attitude change), but other environmental attitudes as well (lateral attitude change). To explore this possibility, two experimental studies were conducted in which participants were exposed to messages either in favor of or opposed to taking action to mitigate climate change. Attitudes toward climate change, the closely-related issue of recycling, and several more distantly-related issues were assessed both before and after message exposure. Results indicated that lateral attitude change (specifically, generalization) occurred for recycling attitudes, but not the other attitudes. In addition, both attitude polarization and depolarization were observed as a result of these message effects. General implications of this finding for public opinion are discussed.

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INTRODUCTION

Recent years have witnessed increasingly urgent warnings from the scientific community about the seriousness of a range of environmental issues, including desertification (Romm, 2011), habitat loss (Mantyka-Pringle, Martin, & Rhodes, 2012), overharvesting (Genner et al., 2010), and agricultural crises (Zhang et al., 2008). Many of these problems are also connected to the broader issue of climate change, with recent assessments from the 2014 Intergovernmental Panel on Climate Change (IPCC) suggesting that these processes have already begun to impact both humans and non-human species (Core Writing Team, Pachauri, & Meyer, 2015).

Because of the urgency of taking action to address climate change, it is unsurprising that a growing body of research is devoted to understanding and changing pertinent attitudes and behaviors (e.g., Haggard, Yao, & Cai, 2014; Schuldt & Roh, 2014). Most of these studies focus on direct attitude change, examining how exposure to messages about climate change specifically impact climate change attitudes, beliefs, and knowledge. For example, such studies might look at the impacts of exposure to various types of news and entertainment media (Nisbet, Cooper, & Ellithorpe, 2015) or of environmental education (Eagles & Demar, 1999).

Something that has not yet been considered in this literature, however, is *lateral attitude change* (Glaser, Dickel, Liersch, Rees, Sussenbach, & Bohner, 2015), whereby an influence attempt affects attitudes other than those specifically targeted by a message.

Specifically, scholars have failed to explore the possible ways in which messages about climate change may indirectly be affecting other, psychologically related attitudes. If such processes are occurring, then the debate about climate change may have implications for a wide range of environmental issues. Particularly in the U. S., where climate change is a politically divisive topic (Cruz, 2015; McCright & Dunlap, 2011), lateral attitude change may also help account for observed polarization or partisan sorting on broader environmental issues (Cruz, 2015; McCright, Xiao, & Dunlap, 2014). Specifically, attending to messages that strongly advocate or oppose action on climate change may drive attitudes about both climate change and other environmental issues to greater extremes, widening the discrepancy between those with pro- and anti-environmental attitudes.

The purpose of this paper will be to address this gap in the literature, by exploring processes of lateral attitude change in the context of the climate change debate. In particular, the goal will be to understand the implications of exposure to both pro- and anti-action messages for attitudes about other environmental issues. These results may also point to ways in which messages may be designed to capitalize on lateral attitude change for pro-environmental (or anti-environmental) means.

LITERATURE REVIEW

In many ways the focus on messages that can impact climate change attitudes directly is unsurprising. For one, the projected consequences of climate change are severe enough that convincing the public to take action is becoming increasingly important. The 2014 IPCC (Core Writing Team et al., 2015) has concluded that climate change has already begun to impact a range of terrestrial and aquatic species, affecting their geographic ranges, behavioral patterns, and population sizes. Additional evidence evaluated by the panel has also indicated that crop yields are already beginning to suffer, and that water resources are becoming less abundant and lower in quality. In the future, projections suggest that water scarcity, flooding, and food insecurity are likely to affect growing numbers of people around the world. Moreover, climate change is expected to exacerbate a number of health issues, particularly in countries with higher rates of poverty and weaker infrastructures.

Furthermore, the timeliness of this issue means that people are exposed to numerous messages about climate change on a daily basis. Analyses of U. S. network news programs, for example, have demonstrated that coverage has increased over time, from about 21.3 broadcasts per year between 1995 and 2004 (Boykoff, 2007) to about 67.7 broadcasts per year between 2005 and 2011 (Hart & Feldman, 2014). Hundreds of other news stories and blog posts containing the phrases "climate change" or "global warming" are also published each day (Google News, 2015), and people are likely to be

exposed to additional messages from other readers and viewers. For example, Jang and Hart (2015) found that in the U. S. alone, over 6000 tweets about climate change or global warming are posted on a typical day.

Given the seriousness of the issue, scholars have been understandably concerned with the effects of these messages on public opinion. Several authors, for example, have examined the ability of self-reported media exposure or education to predict attitudes and beliefs (e.g., McCright & Dunlap, 2011; Nisbet et al., 2008). A few other studies have also involved attempts to influence opinions directly, by experimentally manipulating the information to which people are exposed (Schuldt & Roh, 2014; van der Linden, Leiserowitz, Feinberg, & Maibach, 2014). For example, Schuldt, Konrath, and Schwarz (2011) found that reported beliefs about climate change differ depending on whether the questions refer to *climate change* or *global warming*, particularly for Republicans.

Although these studies have provided some important insights, the focus has been restricted to direct effects; message exposure is either measured or manipulated, and climate change attitudes and beliefs are the key dependent variables. On the other hand, scholars have neglected to explore the possibility that these messages are also causing lateral attitude change, altering attitudes on issues other than those specifically discussed (Glaser et al., 2015).

Although most persuasion research focuses on direct attitude change, processes of lateral attitude change have captured the interest of a number of scholars, driven in

particular by the work of early consistency theorists (Festinger, 1957; Heider, 1946) and by Moscovici's work on minority influence (e.g., Moscovici, 1980). Most recently, Glaser et al. (2015) have also developed a framework for integrating existing research on lateral attitude change, distinguishing between two distinct processes: *generalization* and *displacement*. An overview of each type of lateral attitude change is provided in the following paragraphs. In both cases, the attitude structure is conceived of as an attitude hierarchy (Hunter, Levine, & Sayers, 1976), in which lower-order attitudes are driven by higher-order attitudes; for example, attitudes toward climate change might be driven by more general environmental attitudes.

Generalization

According to Glaser et al. (2015) generalization occurs when an influence attempt affects both a target attitude and a psychologically-related attitude, either because of the automatic spread of an evaluation from one attitude object to another or because of conscious deliberation about the relevance of the message to other attitudes. In the context of an attitude hierarchy, generalization could result either from a direct effect of the message on the psychologically-related attitude or an indirect effect, whereby the message had a direct effect on the target attitude, which in turn had an effect on the psychologically-related attitude.

The theoretical foundation for generalization comes from the early work of consistency theorists, who suggested that changes to related attitudes could serve to

resolve dissonance produced by changes in a target attitude (Festinger, 1957) or to achieve balance in a set of attitudes (Heider, 1946). Glaser et al. (2015) also argue that generalization typically occurs when the target of a persuasive message is motivated to accept the advocated attitude change. For example, people may be motivated to accept an attitude change if it is consistent with their existing attitudes (i.e., the message is pro-attitudinal). In addition, people might feel motivated to accept an argument from majority source because they believe that the majority's position reflects objective reality (Mackie, 1987) or because it is normative to do so (Moscovici, 1980).

Several studies have found evidence of generalization effects. For example, Mackie (1987) found that participants who were initially opposed to U. S. military action in the Western hemisphere came to view it more favorably after hearing a pro-action message from a majority source. Moreover, the argument also affected attitudes toward military budget cuts, even though this issue was not addressed by the message. Likewise, Fazio, Eiser, and Shook (2004) found that attitudes developed about one set of objects are consistently generalized to other objects that are similar in appearance. In a series of studies, these authors had subjects play a BeanFest video game, in which they were required to choose whether or not to eat a series of beans of different shapes and patterns. Some of the beans were harmful and others were beneficial, leading subjects to develop positive or negative attitudes toward the beans that they saw during play. When the participants were subsequently asked to evaluate a new set of beans, the

attitudes they had initially developed were found to generalize to the new ones—beans that looked similar to the harmful ones were evaluated negatively, and beans that looked similar to the beneficial ones were evaluated positively.

Displacement

Displacement occurs when an influence attempt affects a related attitude, but *not* the target attitude. Like generalization, Glaser et al. (2015) suggest that displacement may occur either through the automatic spread of an evaluation or through conscious reasoning. However, unlike generalization, changes to the focal attitude are deliberately suppressed. The result is that attitude change is observed on psychologically-related attitudes, but not on the focal attitude. Glaser et al. (2015) also assert that displacement is only likely to occur when someone is motivated *not* to accept attitude change. In other words, displacement is unlikely to occur unless a message is counter-attitudinal; there is little reason to avoid an attitude change that is consistent with one's existing attitudes. In the context of an attitude hierarchy, displacement would presumably occur as the result of a direct effect of a message on the psychologically-related attitude, accompanied by a null effect of the message on the target attitude.

Displacement is somewhat less intuitive than generalization, but there are several theoretical accounts that help explain why these effects are observed (e.g., De Vries, De Dreu, Gordijn, & Schuurman, 1996; Martin & Hewstone, 2008). Most of these accounts have evolved out of Moscovici's work on minority influence (Moscovici &

Faucheux, 1972; Moscovici, 1980; Moscovici, 1985a; Moscovici, 1985b), following his suggestion that minority sources could affect attitudes "on an indirect, latent level" (Moscovici, 1980, p. 213).

One useful perspective, developed Crano and his colleagues (Alvaro & Crano, 1996; Alvaro & Crano, 1997; Crano & Alvaro, 1998; Crano & Chen, 1998), is the *context/comparison model* of social influence. This model suggests that displacement results when people are persuaded by an influence attempt, but they want to avoid being associated with the source or message position. In particular, displacement is expected to occur when the message advocates a minority position (i.e., one that is supported by less than half of the population), because the target of the influence attempt will purportedly try to resist persuasion in order to avoid being associated with a deviant opinion. If the source is an in-group minority, however, source derogation and counter-arguing are limited, which leads the target to accept the arguments being made. As a result, the target ends up in the uncomfortable position of grappling with a desire to resist direct attitude change and a tendency to find the arguments persuasive. This inconsistency can then be resolved by changing a related attitude, producing the observed displacement effect. Because the displacement creates an attitudinal inconsistency, however, there is likely to be a delayed change in either the focal attitude (i.e., a sleeper effect; Hovland, Lumsdaine, & Sheffield, 1949) or in the related attitude (i.e., dissipation of the initial change).

There are a number of findings that are consistent with the arguments developed in the context/comparison model. For one, a meta-analysis conducted by Wood, Lundgren, Ouellette, Busceme, and Blackstone (1994) demonstrated that minority sources (i.e., those who hold the non-consensus opinion) have strong effects on indirect attitudes, even as compared to majority sources. A number of authors have also found evidence of the ability of in-group minority sources, in particular, to precipitate attitude change. For example, Alvaro and Crano (1997) demonstrated that subjects who read an in-group minority argument against permitting gays in the military showed no direct attitude change, but did change their attitudes toward the psychologically-related issue of gun control. Likewise, when subjects read an argument opposing gun control (again from an in-group minority source), their attitudes toward gays in the military changed, but their attitudes toward gun control did not. As another example, Aebischer, Hewstone, and Henderson (1984) found that subjects who learned about an in-group minority's preference for new wave over hard rock music were not influenced to choose new wave, but did become more likely to choose phonetically-similar contemporary music.

Lateral Attitude Change and the Climate Change Debate

In the context of the climate change debate, Glaser et al.'s (2015) framework suggests that generalization is most likely to occur when people are exposed to messages that are consistent in valence with their pre-existing attitudes and beliefs

about climate change. In other words, a pro-attitudinal message about climate change would be expected to make climate change attitudes more extreme (direct attitude change) and to move psychologically-related attitudes in the same direction (lateral attitude change). Based on the Wood et al. (1994) meta-analysis, this effect is expected to occur regardless of whether the source holds a minority or majority opinion, as either type of source can have a significant impact the focal attitude.

On the other hand, displacement is most likely to occur when people are exposed to messages that are inconsistent with their pre-existing attitudes and beliefs. In such circumstances, a counter-attitudinal message about climate change would not be expected to influence climate change attitudes (no direct attitude change), but would be predicted to move psychologically-related attitudes in a direction consistent with the advocated change (lateral attitude change). Furthermore, this effect is only anticipated to occur when the source of the message is an in-group minority (Wood et al., 1994; Alvaro & Crano, 1997).

Both generalization and displacement processes may also have implications for polarization on the issue of climate change and other, psychologically-related issues. First, generalization effects would be expected to result in more extreme attitude polarization. Indeed, generalization may help explain why polarization on a number of environmental issues—not just on climate change—has already been observed (Cruz, 2015; McCright & Dunlap, 2011; McCright et al., 2014). Specifically, people on both sides

of the debate can readily find messages that are pro-attitudinal and that advocate positions more extreme than their own. Messages that are both in favor of and opposed to action on climate change are common in political news coverage (Feldman, Maibach, Roser-Renouf, & Leiserowitz, 2011) and in debates (Glum, 2015; Schulman, 2015). Out of an attempt to maintain journalistic balance, news organizations also regularly report both consensus and contrarian perspectives on climate change (Boykoff, 2008; Feldman et al., 2012). Given that viewers also often choose to expose themselves to news that fits their own ideological viewpoint (Iyengar & Hahn, 2009), exposure to pro-attitudinal messages about climate change is probably quite common. The conditions for generalization, and the resulting polarization, are thus concomitantly common.

Alternatively, displacement would be expected to help reduce polarization; not on the issue of climate change, but on psychologically-related issues. However, unlike generalization, the conditions for displacement are probably uncommon. Specifically, most counter-attitudinal messages are likely to come from sources from an opposing political party (Boykoff, 2008; Feldman et al., 2012; Schuldt et al., 2011), meaning the source is unlikely to be seen as an in-group member. Still, it is possible that messages could be strategically designed to capitalize on the depolarizing power of displacement, meaning that examining displacement in the context of climate change is still worthwhile. For example, messages from Republicans who believe in climate change and feel strongly about taking action (i.e., an in-group minority; see, for example,

Schuldt et al., 2011), might effectively shift attitudes in a pro-environmental direction. Moreover, such messages might alter someone's definition of their in-group, making them more receptive to arguments from other pro-environmental sources in the future.

As such, the purpose of this investigation was to attempt to capture both generalization and displacement in response to persuasive messages about climate change, as well as to examine how these processes are related to polarization on both climate change and on psychologically-related issues.

STUDY 1

Method

Pilot study 1. To understand the full implications of the climate change debate on public opinion, it was necessary to identify which attitudes were psychologically related to climate change attitudes and were, therefore, strong candidates for lateral attitude change. To do so, three possible indicators of this attitude structure were considered.

The first indicator was the Pearson product-moment correlation between the two attitude measures. Presumably attitudes that are closely related psychologically will also be highly correlated with one another.

Second, it was reasoned that psychologically-related attitudes may share the same underlying values. Specifically, if the attitude structure is conceived of as a hierarchy (Hunter et al., 1976), and values constitute the highest-order attitudes in this hierarchy, then relationships between lower-order attitudes will be driven (directly or indirectly) by the values under which they are subsumed. Furthermore, attitudes more closely related in the attitude structure will presumably be those driven by the *same* underlying value; the relationship between the two attitudes would be spurious, a function of the fact that they share this underlying cause. Such a relationship would also be reduced to zero when controlling for the underlying value. In other words, attitudes for which the partial correlation with climate change attitudes is reduced to

zero when controlling for underlying values are likely to be closely related in the psychological attitude structure.

Third, Crano and his colleagues (Alvaro & Crano, 1997; Crano & Chen, 1998) argue that psychologically-related attitudes can be identified using multidimensional scaling (MDS), a method of exploring the relationships among a set of judgments (see Hout, Papesh, & Goldinger, 2013). More specifically, MDS can be used to generate a conceptual map of the objects based on a set of paired comparisons among them (called *similarities*). When successful, the distances estimated by MDS can then be used as indicators of psychological distances between the objects. In other words, attitudes located more closely to climate change attitudes in MDS space would be expected to be more closely related in the psychological attitude structure as well.

All three indicators were examined in a pilot study in order to identify the attitude objects that would be retained for the main experiments.

Sample. Sixty-nine students were recruited to participate in the study, from classes being conducted in the Department of Communication at Michigan State University. Participants in the study sample were predominantly female (62.3%) and White (78.3%), Asian (7.2%), or multi-ethnic or multi-racial (7.2%). Subjects also tended to be young (M = 21.91 years, SD = 5.55, range = 20 – 66 years), and all had at least junior status (M = 3.87 years in college, SD = 0.60). Almost all of the sample was also U. S.-born (87.0%), and very few were international students (5.8%).

On average, subjects reported paying little attention to politics (M = 2.82, SD = 0.99). Subjects also perceived themselves to be politically neutral, in general (M = 3.28, SD = 1.10), although their responses to more specific ideology items suggested that they tended to be both economically (M = 4.43, SD = 1.31) and socially liberal (M = 5.13, SD = 1.37). The sample was also evenly split on political party (32.4% each identifying as Democrat and Republican), with a substantial proportion of students reporting themselves to be Independents (29.4%).

Procedure. The survey instrument given to participants was composed of two parts. First, all subjects filled out items designed to measure their attitudes toward climate change and ten other issues: recycling, subsidies for alternative energy development, organic farming, preservation of natural areas, carpooling, vegetarianism, carbon credits, gay marriage, gun control, and mandatory childhood vaccination. These attitude objects were selected to provide a wide range of possible topics that could conceivably be psychologically related to climate change, either on environmental or political grounds. Each attitude was assessed with eight or nine items, each on 7-point Likert-type scales (1 = *strongly disagree*, 7 = *strongly agree*).[1] As described previously, calculating the correlations among these attitudes provided the first indicator of the psychological links among them.

Second, after filling out the attitude measures, subjects were randomly assigned to one of three conditions, such that they completed either the Schwartz (1992) values inventory (n = 24), a paired comparison task (n = 24), or a card sorting task (n = 21).

The values inventory (Schwartz, 1992) was composed of 56 items designed to capture 11 underlying values. For each item, subjects were asked to indicate the extent to which a particular value (e.g., "Forgiving (willing to pardon others)") was a "guiding principle in your life" on 9-point Likert-type scales (-1 = *opposed to my values*, 0 = *not at all important*, *7 = of supreme importance*).[2] As described previously, responses to these items provided the second indicator of psychological relationships among the attitudes; the underlying values.

The paired comparison task and card sorting task were both designed to capture the third indicator of psychological relationships among the attitudes; the MDS distances between them. First, the paired comparison task was designed based on the procedure suggested by Alvaro and Crano (1997). These subjects were asked to indicate the probability that changing their minds about each of the eleven attitude objects would also lead them to change their minds on the other ten objects (a total of 110 comparisons). The average probability estimates then served as the similarities used in the MDS analysis (see Appendix A, Table A4).

In the card sorting task, subjects were instead asked to sort the eleven attitude objects into anywhere from one to six groups, such that "issues that are similar to each

other go together". The similarities for the MDS analysis were then computed by calculating the percentage of subjects that placed each pair of attitude objects in the same group (see Appendix A, Table A6).

As alluded to in the description of the sample, subjects also concluded the survey by filling out a set of demographic questions. Their level of attention to politics was measured using a single 5-point Likert-type item (1 = *not at all*, 5 = *very much*). Political ideology was assessed using a general, one-item measure, a five-item economic measure (based on Buttel & Flinn, 1978), and a five-item social measure.[3] The general ideology item was captured using a 5-point Likert-type scale (1 = *strongly conservative*, 5 = *strongly liberal*), and the economic and social measures were captured using 7-point Likert type scales (1 = *strongly disagree*, 7 = *strongly agree*).

Results. Overall, students had favorable attitudes toward most of the issues covered on the survey, with only their attitudes toward vegetarianism falling below the scale midpoint (see Appendix A, Table A1). Many of the attitudes were also highly correlated with climate change attitudes (see Appendix A, Table A2 for the correlations corrected for error of measurement).

In general, the indicators of psychological relationships between the attitudes were consistent with one another. The two measures of distance in multidimensional space (see Appendix A, Tables A5, A7) were strongly correlated (r = .81), and both distance measures also had moderately strong negative relationships with the corrected

correlations between the attitude objects (card sort: r = -.37; paired comparisons: r = -.41).

The *universalism* value was most highly correlated with climate change attitudes (r = .53) and this value also included the "unity with nature" and "protecting the environment" items, making a logical candidate for the value underlying climate change attitudes. Controlling for universalism, however, did little to discriminate between the ten attitudes (see Appendix A, Table A3). The final determination of attitude objects to be included in the main study was thus made based on the correlations and distance measures alone. To reiterate, closer psychological distance was judged based on (1) high correlations and (2) low MDS distance.

Ultimately, a subset of four attitudes was chosen: recycling, gun control, vegetarianism, and mandatory vaccination. Recycling was selected as the strongest candidate for lateral attitude change, given that it had a both a high correlation with and low spatial distance from climate change attitudes (r' = .65, distances = .18 and .16). In other words, recycling attitudes fared well on all three indicators of psychological proximity to climate change attitudes. Mandatory vaccination, conversely, was selected as the weakest candidate for lateral attitude change, given that it had both a low correlation with and high spatial distance from climate change attitudes (r' = .35, distances = 1.42 and 1.41). Gun control and vegetarianism were selected because they fell in between, and because both exhibited a mismatch between the correlational data

and the MDS data. For gun control, the corrected correlation was quite high (r' = .52), but the spatial distance was also high (distances = 1.40 and 1.27). For vegetarianism, the corrected correlation was quite low (r' = .27), but the spatial distance was also somewhat low (distances = 0.58 and 0.93). Examining this range of attitudes provided the opportunity to examine the evidence of whether or not lateral attitude change occurred both when it would be expected to and when it would not.

Pilot study 2. The second pilot study was conducted as a preliminary assessment of the persuasive messages about climate change to be used in the main experiment. The in-group and out-group source inductions were also assessed at this time.

Sample. A total of 179 subjects were recruited to participate in the study, using the participant pool available to the Department of Communication at Michigan State University. The sample was predominantly female (67.0%) and white (83.2%). On average, participants were young (M = 20.15 years, SD = 2.52) and in their second or third year of college (M = 2.54, SD = 1.16), and only a few (9.5%) were international students. In general, subjects reported paying limited attention to politics (M = 2.78, SD = 0.96). Subjects also tended to rate themselves as having a neutral general political ideology (M = 3.07, SD = 1.03), although their responses to economic (M = 4.37, SD = 1.19) and social ideology items (M = 5.01, SD = 1.27) suggested that students tend to be somewhat liberal overall.

Procedure. The design of the study was a 2 (messages) x 2 (sources) independent groups design. Upon beginning the study, participants were told that they were being asked to assess a message about climate change written by a fellow college student. Next, subjects read the results of a fake poll of climate change attitudes among college students in the state of Michigan, a copy of the source's resume (based on Kruglanski & Thompson, 1999), and the message text. After reviewing this information, subjects then answered a series of questions about the message, the source, and their demographic information.

Source induction. Participants were given information to cultivate the impression that the source was either an in-group minority or an out-group minority. As described in the literature review, this manipulation is based on previous research suggesting that indirect attitude change (and thus displacement) is unlikely to occur unless the message comes from an in-group minority source, and that direct attitude change (and thus generalization) may occur when the source is either a majority or minority (Wood et al., 1994). Out-group minority sources, on the other hand, have been found to have little influence on either the target attitude or psychologically-related attitudes (e.g., Alvaro & Crano, 1997; Clark & Maass, 1988), making the out-group source condition an important comparison group.

To create this impression, the in-group source was depicted as a student at the subjects' own university (Michigan State University, MSU), whereas the out-group

source was depicted as a student at a rival university (the University of Michigan, UM). A large, full-color image of the matching university logo was also incorporated at the top of the source resume, to reinforce this information, and the resume also included details about participation in campus-specific groups and clubs (e.g., the Izzone, for MSU vs. the Maize Rage, for UM).

Aside from these details, the rest of the resume was identical for both sources. In particular, both were designed to convey high credibility and non-partisanship. The source was depicted as a political science major with an environmental minor, who had completed several environmental and non-partisan internships. The resume also indicated that the source had conducted undergraduate research on a related topic, and was writing the message as part of a forum held by a non-partisan campus group (see Appendix B for full resumes).

Message induction. The persuasive message read by subjects was either in favor of or opposed to taking action to address climate change. Prior to the study, both were constructed by the author on the basis of arguments that have been prevalent in stories and debates featured on political and news media. The arguments were assessed by an expert in social influence, and the messages were revised as necessary until both were judged to be strong (see Appendix C for full text).

In both cases, the fake poll was also used to convey the fact that the source held the minority opinion (i.e., the position held by the minority of college students in the

poll). Specifically, subjects reading the pro-action message were told that 36% of students supported action (64% opposed it), whereas subjects reading the anti-action message were told that 64% of students supported action (36% opposed it). The poll was also described as having been conducted by a trusted national polling source (the Quinnipiac University poll), to lend the results additional credibility.

Measures. After reading the message, subjects filled out a series of measures. The first set of measures was designed to test the message induction. Specifically, several authors have claimed that lateral attitude change will be most likely to occur when message elaboration is moderate or high, the message position is seen as reasonable and legitimate, and, particularly for displacement, when counter-arguing is limited (Crano & Alvaro, 1998; Glaser et al., 2015; Martin & Hewstone, 2008). To assess these outcomes, participants filled out an induction check to ensure they understood whether the message was pro- or anti-action, in addition to measures of argument recall, perceived argument quality, perceived legitimacy of the message position, and thoughts generated by the message (including whether or not each thought was favorable or unfavorable). Strong persuasive messages would be expected to be perceived as high in quality and legitimacy, and to generate many positive and few negative thoughts.

Other items were also used to assess perceptions of the source. First, subjects in each source condition filled out an induction check as to the source's attitudes toward taking action to reduce climate change, to ensure they had understood the source's

position on this issue, as well as recall questions about the information provided about the source. Next, the source induction was tested by asking subjects to indicate their perceived similarity to and liking of the source; in-group sources would be expected to be seen as more likable and more similar than out-group sources. Finally, subjects filled out measures of source credibility (derogation). To reiterate, despite differences in liking and similarity, both in-group and out-group sources were expected to be perceived as credible.[4]

Finally, a small set of questions examined the success of the poll in inducing perceptions of the minority position. These included recall questions about the poll, perceived accuracy of the poll, and how many students on their own campus (Michigan State University) they believed to be in favor of taking action to reduce climate change.

As reported above, demographic questions were the same as those collected in Pilot Study 1.[5]

Results. In general, participants tended to have positive attitudes toward taking steps to reduce climate change (M = 5.16, SD = 1.12), and only 5.9% of participants (n = 24) scored below the midpoint of the attitude scale.

In general, analyses indicated that the source induction was successful. First, results suggested that participants paid attention to the source information that they were given; on average, subjects were able to answer 4.69 of the six source recall questions correctly (SD = 1.24). As expected, subjects in both conditions also perceived

source credibility to be high (overall, $M = 5.24$, $SD = 0.99$). Moreover, subjects in the in-group source condition reported liking the source more than subjects in the out-group source condition, t (177) = 2.55, $p < .05$, $r = .19$; and also tended to report that they perceived the source to be more similar to themselves, t (177) = 1.62, $p = .11$, $r = .12$.

Results also indicated that the message induction worked as intended. On average, subjects were able to answer 4.82 of the six message recall questions correctly ($SD = 1.30$), and 83.8% of subjects correctly identified whether the message was arguing in favor of or against addressing climate change.[6] Participants who read a pro-attitudinal message (i.e., one with the same valence as their reported attitudes toward climate change, $n = 74$) rated the argument quality, t (82.93) = 2.65, $p < .05$, $r = .28$; and legitimacy of the message position, t (84.73) = 2.51, $p < .05$, $r = .26$, more highly than those who read a counter-attitudinal message ($n = 53$). The pro-attitudinal message also produce higher ratings of similarity, t (84.69) = 2.31, $p < .05$, $r = .24$; and liking, t (81.99) = 2.11, $p < .05$, $r = .23$; and also tended to be associated with higher ratings of source credibility, t (89.20) = 1.70, $p = .09$, $r = .18$.[7] The results of the thought listing task also indicated that people who read a pro-attitudinal message had substantially more positive thoughts, t (117) = 3.17, $p < .01$, $r = .28$; and substantially fewer negative thoughts, t (117) = 2.52, $p = .01$, $r = .23$, about it than those who read the counter-attitudinal message.

In sum, the results of the second pilot study indicated that both the source and message inductions produced the intended effect. These materials were thus retained for the main experiment.

Main experiment.

Sample. A total of 457 subjects were recruited to participate in the first study, using the participant pool available to the Department of Communication at Michigan State University. The average age of the sample was 20.12 years (*SD* = 1.94, range = 18-36), and participants were predominantly White (74.8%) and female (59.7%). Most of the students were sophomores in college (30.0%), and few were international students (12.3%).

Politically, the majority of subjects reported that they considered themselves members of the Republican Party (37.9%), although Democrats (33.9%) and Independents (24.3%) were also well represented. On average, participants also reported that they considered themselves to be ideologically neutral (*M* = 2.95, *SD* = 1.00), although their responses to more specific political ideology questions indicated that participants tended to be economically (*M* = 4.31, *SD* = 1.29) and socially (*M* = 5.03, *SD* = 1.19) liberal.[8] In general, participants reported paying limited attention to politics (*M* = 3.05, *SD* = 0.89).

Procedure. The study was conducted online over three time points: a pre-test, post-test, and delayed post-test. First, participants filled out a pretest survey on their

demographic characteristics and their initial attitudes toward climate change (the direct attitude) as well as toward recycling, vegetarianism, gun control, and mandatory vaccination (the candidate lateral attitudes).

Approximately two weeks later, participants were recruited to take part in the second phase of the experiment. Of the initial 457 subjects, 352 agreed to participate in this stage of the experiment (a 77.0% retention rate).[9] These subjects were randomly assigned to one of five conditions, using a 2 (messages) x 2 (sources) independent groups design with an offset control condition in which subjects received no source information or message (see Appendix E, Table E1). An additional 130 subjects were also recruited at this time to serve as a post-test only comparison, to control for any possible impact of taking the pre-test; these subjects were also randomly assigned to one of the five conditions.

In the experimental conditions, subjects received the same source, poll, and message information to read as in Pilot Study 2. To reiterate, the source information described either an in-group source (a fellow MSU student) or an out-group source (a UM student), and the message either promoted or repudiated taking action to reduce climate change. As before, the poll preceding this message also led participants to believe that the message advocated the minority position. After reviewing this information, subjects then filled out the second round of attitude measures. The order in which these measures was presented was also randomized, to examine whether or not

the order in which subjects filled out the direct and indirect attitude measures impacted the results.

Finally, approximately two weeks later, subjects were recruited to participate in the final phase of the experiment. Of the 352 original subjects who participated in the post-test, 214 agreed to participated in the final part of the experiment (a 60.8% retention rate from the post-test, 46.8% overall), as did 54 of the 130 post-test only subjects (a 41.5% retention rate). At this stage, subjects filled out a third set of direct and lateral attitude measures. Collecting a delayed post-test permitted examination of whether or not any attitude change seen from pre-post to post-test persisted long term, as well as whether or not any delayed changes in the direct or indirect attitudes occurred.

Measures. The demographic questions used in the main experiment were the same as those used during Pilot Study 1.

The final set of items measuring attitudes toward climate change, recycling, vegetarianism, gun control, and mandatory vaccination (see Table A1) were also retained from Pilot Study 1. An additional item was also developed for the climate change, vegetarianism, and gun control scales (e.g., "Strengthening gun laws would make the U. S. safer than it is now.") so that each attitude was measured with five items. As before, each item was measured on 7-point Likert-type scales (1 = *strongly disagree*, 7 = *strongly agree*).[10]

Results

Similar to the results of the first pilot study, participants initially had positive attitudes toward taking action to reduce climate change (M = 5.52, SD = 1.30). Linear regression analyses indicated no evidence of an effect of age, sex, international student status, or political party on initial climate change attitudes, although other demographic variables did have statistically significant effects. Specifically, students who had been in college longer (β = .12), paid greater attention to politics (β = .10), were White (β = .19), and were liberal economically (β = .25), socially (β = .16), or in general (β = .18) tended to have more positive attitudes toward taking action to address climate change.

Participants also had positive attitudes toward most of the lateral attitude objects (see Appendix E, Table E1), and linear regression analyses indicated that several demographic variables had substantial effects on these attitudes as well. Recycling attitudes tended to be higher among participants who were White (β = .17) and economically (β = .19) or socially liberal (β = .17). Gun control attitudes tended to be higher among females (β = .20), international students (β = .16), and participants who were liberal economically (β = .32) or in general (β = .19). Finally, mandatory vaccination attitudes tended to be higher among participants who were younger (β = -.18), paid greater attention to politics (β = .15), and were socially liberal (β = .15).

As before, vegetarianism was the only issue for which attitudes fell below the scale midpoint (M = 3.31, SD = 1.45). Vegetarianism attitudes tended to be higher among

participants who were female (β = .11) and who were liberal economically (β = .21) or in general (β = .15).

Attitude change occurring between the pretest and the post-test was examined with a series of 2 (question orders) x 2 (messages) x 2 (attitudes: pro- vs. counter-attitudinal) x 2 (sources) between-subjects ANOVAs, using the IBM SPSS Statistics 23 statistical package. Change scores were employed as the key dependent variable in the analysis, and the demographic variables identified in the previous paragraphs served as covariates.

Direct attitude change. The first analysis focused on change in the focal climate change attitude. There was no evidence that source had a main effect on attitudes, F (1, 291) = 1.13, p = .29, r = .06; nor was there evidence of a main effect of question order, F (1, 291) = 0.48, p = .49, r = .04. There was, however, some evidence to suggest a small main effect of the message, F (1, 291) = 2.82, p = .09, r = .09. Specifically, the anti-action message resulted in less positive climate change attitudes (M = -0.61, 95% CI [-.92, -.30]), whereas the pro-action message had little effect (M = -0.25, 95% CI [-.55, .05]). There was also evidence for a statistically significant message-by-source interaction effect, F (1, 291) = 6.48, p = .01. Examining the effect in more detail revealed that an anti-action message had a stronger effect when delivered by an in-group source (M = -1.00, 95% CI [-1.45, -.54]) than by an out-group source (M = -.22, 95% CI [-.63, .18]). On the other hand, the pro-action message had very little effect when delivered by an in-group

source (M = -0.09, 95% CI [-.50, .31]) and there was some indication that it may have resulted in a boomerang effect when delivered by an out-group source (M = -0.40, 95% CI [-.85, .04]).

There was also evidence of a strong message-by-attitude interaction effect, F (1, 291) = 19.71, p < .001. Specifically, those who were initially supportive of action to address climate change developed more extreme positive attitudes as a result of exposure to the pro-action message (M = 0.21, 95% CI [.01, .41]), but exhibited little attitude change as a result of the anti-action message (M = -0.06, 95% CI [-.24, .12]). On the other hand, those who were initially opposed to action to address climate change developed much more extreme negative attitudes as a result of exposure to the anti-action message (M = -1.16, 95% CI [-1.75, -0.57]) and also exhibited a boomerang effect in response to the pro-action message, developing more extreme negative attitudes in this condition as well (M = -0.71, 95% CI [-1.28, -0.14]) (see Figure 1).

Finally, there was evidence of a source-by-attitude interaction effect, F (1, 291) = 4.44, p = .04. Specifically, the in-group source tended to result in greater attitude change when delivering a pro-attitudinal message than a counter-attitudinal message, whereas the out-group source tended to result in greater attitude change when delivering a counter-attitudinal message. Further examination of the data suggested that this finding emerged due to the strength of the boomerang effect observed among participants who were initially anti-action; the greatest change occurred when the counter-attitudinal,

pro-action message came from an out-group source (M = -0.92, 95% CI [-1.78, -0.06] vs. M = -0.50, 95% CI [-1.24, 0.25] for the in-group source). On the other hand, the effects of the pro-attitudinal messages tended to be stronger when delivered by an in-group source, both for subjects who were initially anti-action (M = -1.94, 95% CI [-2.82, -1.06] vs. M = -0.38, 95% CI [-1.14, 0.38] for the out-group source) and for subjects who were initially pro-action (M = 0.31, 95% CI [0.00, 0.62] vs. M = 0.11, 95% CI [-0.15, 0.37]).

Across conditions, the message effects tended to decay between the post-test and the delayed post-test, such that climate change attitudes at the delayed post-test did not differ significantly from those at the pretest, t (189) = -0.96, p = .34, r = .07.[11]

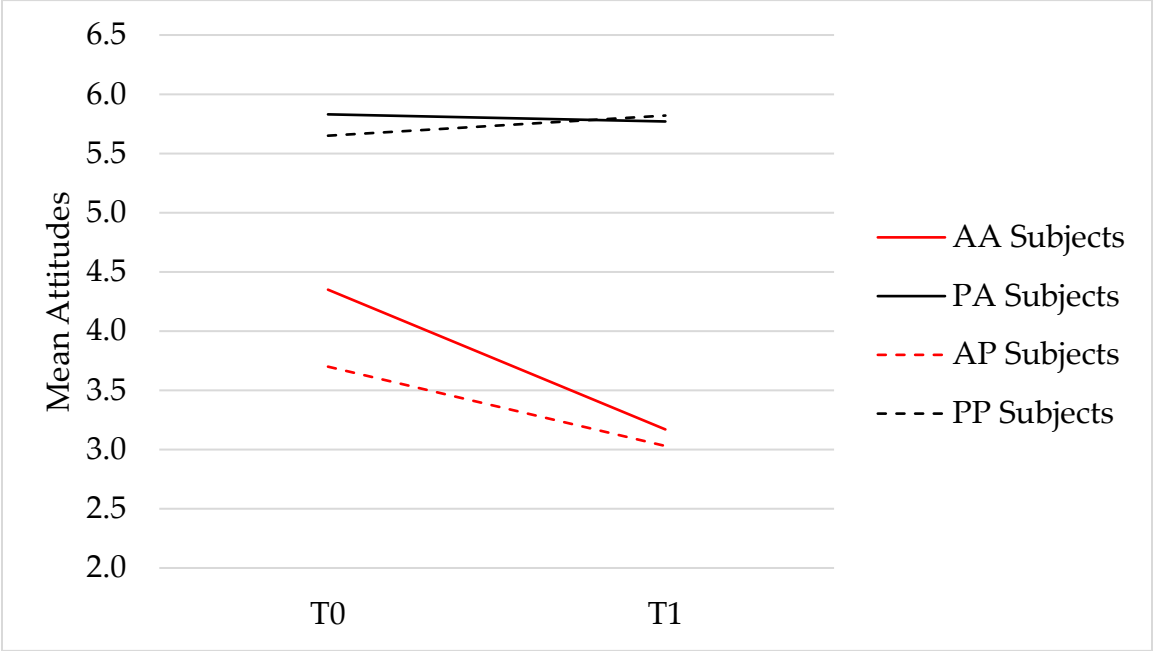

Figure 1. **Study 1: Message effects on climate change attitudes**. Dashed lines represent effects of the pro-action message, solid lines represent effects of the anti-action message. Subjects who were initially pro-action are represented by the black lines; anti-action by the red.

Lateral attitude change. Based on the findings regarding direct attitude change, evidence for lateral attitude change was examined in four specific conditions. First, generalization was examined among subjects who were initially anti-action and who also received the anti-action message (AA subjects). These subjects' climate change attitudes became more strongly negative after message exposure, and negative lateral attitude change in this condition would thus constitute generalization of the effect. Second, generalization was examined among subjects who were initially pro-action and who also received the pro-action message (PP subjects). These subjects' climate change attitudes became more strongly positive after message exposure, and positive lateral attitude change in this condition would thus also constitute generalization.

Third, displacement was examined among subjects who were initially anti-action and were exposed to a pro-action message (AP subjects). These subjects exhibited a boomerang effect, whereby their attitudes became more strongly negative following message exposure. If lateral attitudes, in contrast, exhibited positive attitude change, it would thus constitute displacement. Finally, displacement was examined among subjects who were initially pro-action and were exposed to an anti-action message (PA subjects). These subjects exhibited no attitude change following message exposure, so negative attitude change on lateral attitudes would also constitute displacement.

Recycling. The analysis of the lateral attitudes began with recycling; as described previously, recycling was expected to be the most likely candidate for lateral attitude

change. Overall, there was a substantial main effect of the message, F (1, 291) = 6.41, p = .01, r = .15. Recycling attitudes tended to become more negative following exposure to the anti-action message (M = -0.47, 95% CI [-0.79, -0.16]), but remain the same following exposure to the pro-action message (M = 0.09, 95% CI [-0.22, 0.40]. Examining this effect in more detail revealed evidence that, consistent with expectations, generalization did occur among AA subjects (M = -0.88, 95% CI [-1.49, -0.28]). In other words, the anti-climate change message resulted in lower climate change attitudes and lower recycling attitudes among these subjects. On the other hand, there was little evidence of generalization among PP subjects (M < .01, 95% CI [-0.21, 0.21]). In other words, the pro-climate change message promoted more positive climate change attitudes but not more positive recycling attitudes among these subjects (see Figure 2).[12]

There was also little evidence of displacement. Among PA subjects, very little attitude change occurred (M = -0.06, 95% CI [-0.24, 0.13]). When the message came from an in-group source, there was some evidence of attitude change in a direction consistent with displacement (M = -0.23, 95% CI [-0.47, 0.02]), but the amount of change was not statistically different from zero. There was also limited attitude change among AP subjects (M = 0.18, 95% CI [-0.40, 0.77]). Moreover, the strongest evidence of displacement was found when the message came from an out-group source (M = 0.83, 95% CI [-0.06, 1.71]), rather than the expected in-group source (M = -0.46, 95% CI [-1.22, 0.30]).

Similar to the pattern observed with climate change attitudes, the changes in recycling attitudes tended to decay over time, with no significant differences in between the pre-test and the delayed post-test in any of the conditions. Instead, there was a general negative trend in recycling attitudes across the three time points, t (189) = -2.27, p = .02, r = .16, likely the result of regression to the mean, an artifact of the high initial attitudes toward recycling across conditions.

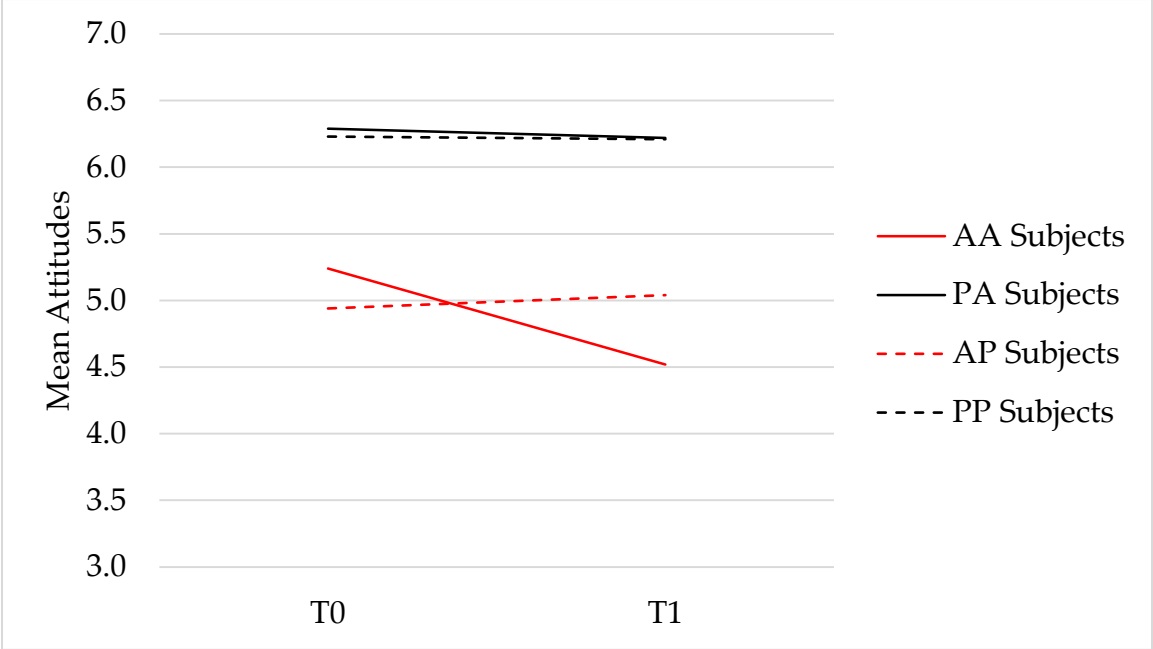

Figure 2. **Study 1: Message effects on recycling attitudes**. Dashed lines represent effects of the pro-action message, solid lines represent effects of the anti-action message. Subjects who were initially pro-action on climate change are represented by the black lines; anti-action by the red.

Vegetarianism. The analysis proceeded with vegetarianism, which was one of the weaker candidates for lateral attitude change. Unlike the previous analysis, the results indicated no evidence of a message effect, F (1, 291) = 0.28, p = .60, r = .03. Unexpectedly,

there was evidence for generalization among the PP subjects (M = 0.22, 95% CI [0.00, 0.45], suggesting that the pro-action message tended to have a positive effect on climate change attitudes as well as on vegetarianism attitudes among these subjects. On the other hand, there was no evidence of a generalization effect among the AA subjects (M = -0.32, 95% CI [-0.96, 0.32]), indicating that the effects of the anti-action message did not extend to vegetarianism. There was also no evidence of displacement for either the PA subjects (M = 0.04, 95% CI [-.16, .24]) or the AP subjects (M = -0.26, 95% CI [-0.89, 0.37]), in either the in-group or out-group source conditions. Overall, there was some evidence of generalization but no evidence of displacement for vegetarianism attitudes.

Gun control. Like vegetarianism, gun control was considered one of the weaker candidates for lateral change. As before, the analysis indicated no effect of the message on gun control attitudes, F (1, 291) = 0.04, p = .84, r = .01. In addition, there was no evidence for generalization among AA subjects (M = -0.30, 95% CI [-0.90, 0.29]) or among PP subjects (M = -0.20, 95% CI [-0.41, 0.01]), nor was there evidence of displacement among PA subjects (M < .01, 95% CI [-0.18, 0.19]) or AP subjects (M = -0.20, 95% CI [-0.78, .39]) in either the out-group or in-group conditions. In sum, there was no evidence of lateral attitude change on gun control attitudes.

Mandatory vaccination. The final analysis addressed mandatory vaccination, which was considered the weakest candidate for lateral attitude change. Once again, there was no evidence for a main effect of message, F (1, 291) = 1.10, p = .30, r = .06.

There was also no evidence of generalization among the AA subjects (*M* = -0.40, 95% CI [-1.07, 0.26]) or among the PP subjects (*M* = -0.09, 95% CI [-0.32, .14]), nor was there evidence of a displacement effect for the PA subjects (*M* = 0.06, 95% CI [-0.15, 0.27]). However, there was substantial attitude change among the AP subjects, although it was not in the direction consistent with displacement. Instead, there was evidence to suggest that the boomerang effect generalized to vaccination attitudes (*M* = -0.78, 95% CI [-1.43, -0.12]). In other words, exposure to a pro-action message among these subjects appeared to lead not only to a boomerang on climate change attitudes, but on lateral vaccination attitudes as well.

Discussion

Overall, the first study suggested that the pro- and anti-action messages about climate change had a substantial impact on attitudes. The pro-action message resulted in more extreme positive attitudes among subjects who were already favorably disposed toward climate change, but resulted in more extreme negative attitudes among subjects with initially unfavorable attitudes (a boomerang effect). The anti-action message, on the other hand, resulted in more extreme negative attitudes among subjects who were already unfavorably disposed toward climate change, but had little impact on those with initially positive attitudes.

Some evidence for generalization was also uncovered; the positive effect of the pro-action message tended to generalize to vegetarianism attitudes, and the negative

effect of the anti-action message tended to generalize to recycling attitudes. There was also some indication that the boomerang effect generalized to mandatory vaccination attitudes. On the other hand, there was very limited evidence for displacement. The strongest evidence of this effect was uncovered for recycling attitudes, but even then the results were far from convincing.

Because the effects uncovered in this study were only partially as expected, a second study was conducted to attempt to replicate the effects of the message. An additional goal was to examine the generalizability of these effects by utilizing a national sample. Given the limited effects of the source on direct and lateral attitude change, this variable was not examined in the second study.

STUDY 2

Method

Sample. Subjects for the second study were recruited using Amazon Mechanical Turk (mTurk), a crowd-sourcing platform through which researchers or businesses can pay workers small amounts of money to complete a variety of *human intelligence tasks* (Amazon Mechanical Turk, n. d.). One thousand subjects were recruited to participate in the pre-test, with the incentive that they would receive $1.00 for completing the pretest, an additional $1.50 for completing the post-test, and an additional $2.50 for completing the delayed post-test.

The average age of the sample was 34.96 years (*SD* = 11.14, range = 18-72). A majority of the sample was White (75.4%) and male (52.4%) and the average participant had some college education (*M* = 15.56 years of formal education, *SD* = 2.49). The sample was also restricted to people living in the United States, and almost all participants identified as native U. S. citizens; only 14 participants indicated that their primary citizenship was in another country.

Politically, participants identified themselves as slightly liberal on average (*M* = 3.41, *SD* = 1.14), and their responses to more specific ideological questions also suggested that participants tended to be both economically (*M* = 5.18, *SD* = 1.58) and socially (*M* = 5.10, *SD* = 1.59) liberal. Furthermore, the majority of the sample reported that they considered themselves members of the Democratic Party (44.3%); most of the

remaining participants identified as Independents (32.2%), followed by Republicans (20.4%) and those identifying with some other party (3.1%).[13] On average, participants also reported paying moderately close attention to politics (M = 3.69, SD = 0.97).

Procedure. As before, the study was conducted online at three different time points, a pretest, post-test, and delayed post-test. First, subjects filled out the same pretest survey as in Study 1, including questions on their attitudes toward climate change, recycling, vegetarianism, gun control, and mandatory vaccination, as well as their demographic characteristics.

Approximately two weeks later, subjects were emailed to inform them that the post-test study was available. Of the 1000 original subjects, 804 completed this stage of the experiment (an 80.4% retention rate). Subjects were randomly assigned to one of three conditions, in which they read an anti-action message, a pro-action message, or no message (see Appendix F, Table F1). Both the pro- and anti-action message were retained from Study 1. Participants were also told that the message was an opinion letter that had been sent to *USA Today*, and they were provided information that the writer was a credible source on this topic. Specifically, subjects were told that the writer had degrees in political science and journalism, was a contributor to several politically neutral and environmental newspapers, and had published a book on a relevant topic. After reading the message, participants filled another set of attitude measures. As in the first study, the order of the questions was randomized to examine possible order effects.

Another two weeks later, participants in the post-test were emailed to inform them that the delayed post-test was available. Of the 804 subjects who completed the post test, 718 of completed the delayed post-test (an 89.3% retention rate from the post-test, 71.8% overall). Eight subjects also failed to provide enough information to match their responses across time points, producing a final sample of $N = 710$.[14] At this stage, subjects filled out a third and final set of attitude measures.

Measures. The demographic and attitude measures were identical to those used in Study 1. To reiterate, social liberalism was measured using five items, economic liberalism was measured with three items, and each of the attitude scales was measured with five items. All of these measures were evaluated on 7-point Likert-type scales (1 = *strongly disagree*, 7 = *strongly agree*).[15]

Results

Similar to the previous study, participants initially had positive attitudes toward taking action to address climate change ($M = 5.50$, $SD = 1.48$). Attitudes also tended to be more positive among subjects who were younger ($\beta = -.07$, $p = .02$), more educated ($\beta = .09$, $p < .01$) and economically ($\beta = .48$, $p < .001$) and socially ($\beta = .22$, $p < .001$) liberal.

Attitudes toward the lateral attitude objects also tended to be positive (see Appendix F, Table F1), with only vegetarianism attitudes ($M = 3.99$, $SD = 1.59$) falling below the midpoint of the scale. Recycling attitudes tended to be more positive among subjects who were economically ($\beta = .36$, $p < .001$) and socially ($\beta = .10$, $p < .001$) liberal.

Attitudes toward vegetarianism tended to be higher among subjects who were older (β = .11, $p < .01$), female (β = .07, $p < .05$), more educated (β = .09, $p < .01$), and liberal both economically (β = .19, $p < .001$) and in general (β = .13, $p < .01$). Gun control attitudes tended to be more positive among subjects who were more educated (β = .08, $p < .05$), non-White (β = -.07, $p < .05$), Democrats (β = .17), and liberal both economically (β = .31, $p < .001$) and in general (β = .28, $p < .001$). Finally, mandatory vaccination attitudes tended to be more positive among subjects who were more educated (β = .18, $p < .001$) and economically (β = .14, $p < .001$) and socially (β = .18, $p < .001$) liberal.

Attitude change from the pretest and the post-test was examined with a series of 2 (question orders) x 2 (messages: pro- vs. anti-action) x 2 (attitudes: pro- vs. counter-attitudinal) between-subjects ANOVAs, using the IBM SPSS Statistics 23 statistical package. Change scores were once again the key dependent variable in the analysis, and the demographic variables identified in the previous paragraphs served as covariates.

Direct attitude change. The first analysis focused on the effect of the message on climate change attitudes. Results revealed that there was a substantial main effect of the message, F (1, 543) = 16.17, $p < .001$, $r = .16$. Specifically, the pro-action message resulted in more positive attitudes toward climate change ($M = 0.43$, 95% CI [0.25, 0.61], whereas the anti-action message had a limited impact on attitudes ($M = -0.07$, 95% CI [-.25, .12].[16] Furthermore, there was evidence of a message-by-attitude interaction effect, F (1, 543) = 27.49, $p < .001$. In contrast to the findings in Study 1, the results suggested that the

messages were effective in changing the attitudes of subjects for whom they were counter-attitudinal, but not those for whom it was pro-attitudinal. Specifically, subjects who were initially pro-action became less positive when exposed to an anti-action message (M = -0.44, 95% CI [-0.57,-0.31]), but were unaffected by a pro-action message (M = 0.03, 95% CI [-0.09, 0.16]). On the other hand, subjects who were initially anti-action became more positive when exposed to a pro-action message (M = 0.83, 95% CI [0.48, 1.17]), but exhibited no statistically significant attitude change when exposed to an anti-action message (M = 0.31, 95% CI [-0.04, 0.66]. In sum, both messages tended to be effective in persuading subjects who initially held the opposite point of view, but not subjects who already held the same perspective (see Figure 3).

The delayed post-test data were also examined to identify any long-term message effects. First, results indicated that effect of the anti-action message tended to decay over time; although exposure did result in temporarily less positive attitudes among initially pro-action subjects, these subjects' attitudes returned to their previous levels at the delayed post-test, t (225) = -1.79, p = .07, r = .12. On the other hand, the effect of the pro-action message did not appear to decay; the subjects who were initially anti-action became more favorable towards climate change after message exposure and retained these positive attitudes at the delayed post-test, t (37) = 3.92, p < .001, r = .54.[17]

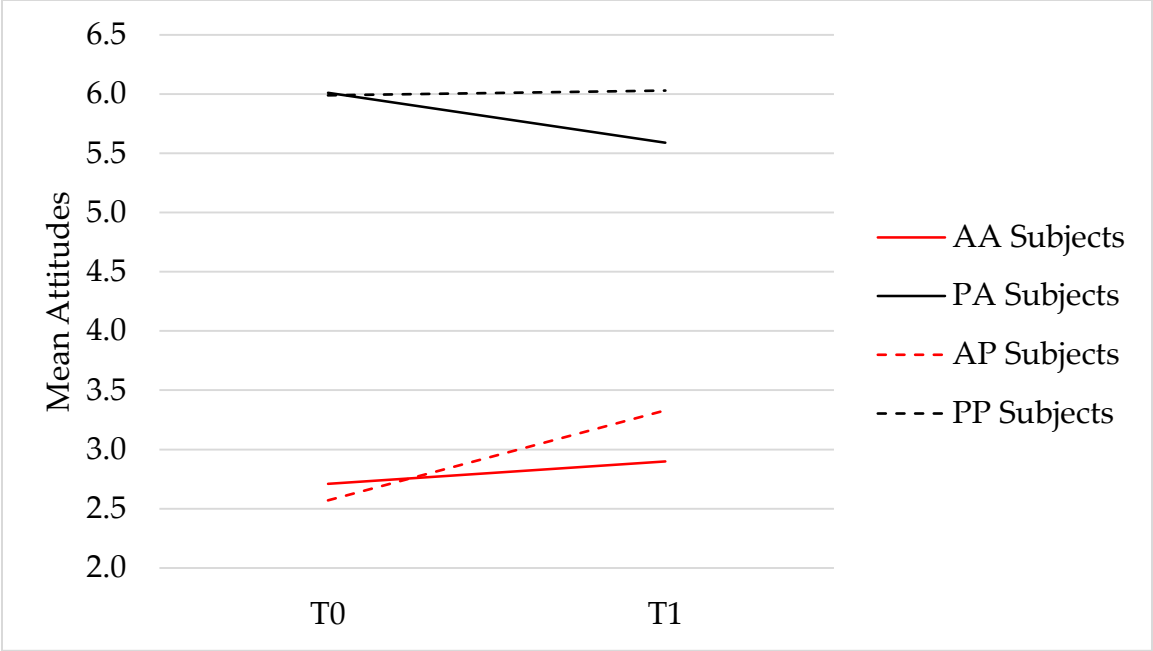

Figure 3. **Study 2: Message effects on climate change attitudes**. Dashed lines represent effects of the pro-action message, solid lines represent effects of the anti-action message. Subjects who were initially pro-action on climate change are represented by the black lines; anti-action by the red.

Lateral attitude change. Based on the findings on direct attitude change, lateral attitude change was again examined in four specific conditions. First, evidence for generalization was examined among subjects who were initially anti-action and received a pro-action message (AP subjects). These subjects' attitudes toward taking action to address climate change became more positive after message exposure; if their recycling attitudes also became more positive, it would indicate that generalization occurred. Likewise, evidence for generalization was examined among subjects who were initially pro-action and received an anti-action message (PA subjects). These subjects' attitudes toward taking action to address climate change became more

negative following message exposure; if their recycling attitudes also become more negative, it would also constitute evidence for generalization.

Evidence for displacement was examined among subjects who were initially anti-action and received an anti-action message (AA subjects), as well as subjects who were initially pro-action and received a pro-action message (PP subjects). Although displacement would not typically be expected in these conditions, given that the message received is pro-attitudinal, it was still possible to investigate this possibility. Neither of these groups of subjects exhibited direct attitude change, meaning any indirect climate change would be evidence of a displacement effect, if a counterintuitive one.

Recycling. The analysis of lateral attitude change began with recycling attitudes. Similar to the previous study, there was evidence of a main effect of the message on recycling attitudes, F (1, 544) = 15.14, $p < .001$, r = 16. Recycling attitudes tended to become more positive after exposure to the pro-action message (M = 0.18, 95% CI [0.05, 0.30]) and more negative after exposure to the anti-action message (M = -0.16, 95% CI [-0.29, -0.03]). Examining the patterns of change in more detail revealed evidence that generalization occurred for both the AP subjects and the PA subjects. Specifically, AP subjects' attitudes toward recycling became more favorable as a result of message exposure (M = 0.28, 95% CI [0.04, 0.52]), and PA subjects' attitudes became less favorable (M = -0.14, 95% CI [-0.23, -0.05]) (see Figure 4).[18]

On the other hand, the evidence for displacement was limited. Although AA subjects did tend to become less positive toward recycling after message exposure (*M* = -0.19, 95% CI [-0.43, 0.06]), this difference was not statistically different from zero. Similarly, PP subjects tended to become slightly more positive toward recycling (*M* = 0.07, 95% CI [-0.02, 0.16], but not statistically significantly so. Overall, the results provided good evidence of generalization, but not of displacement.

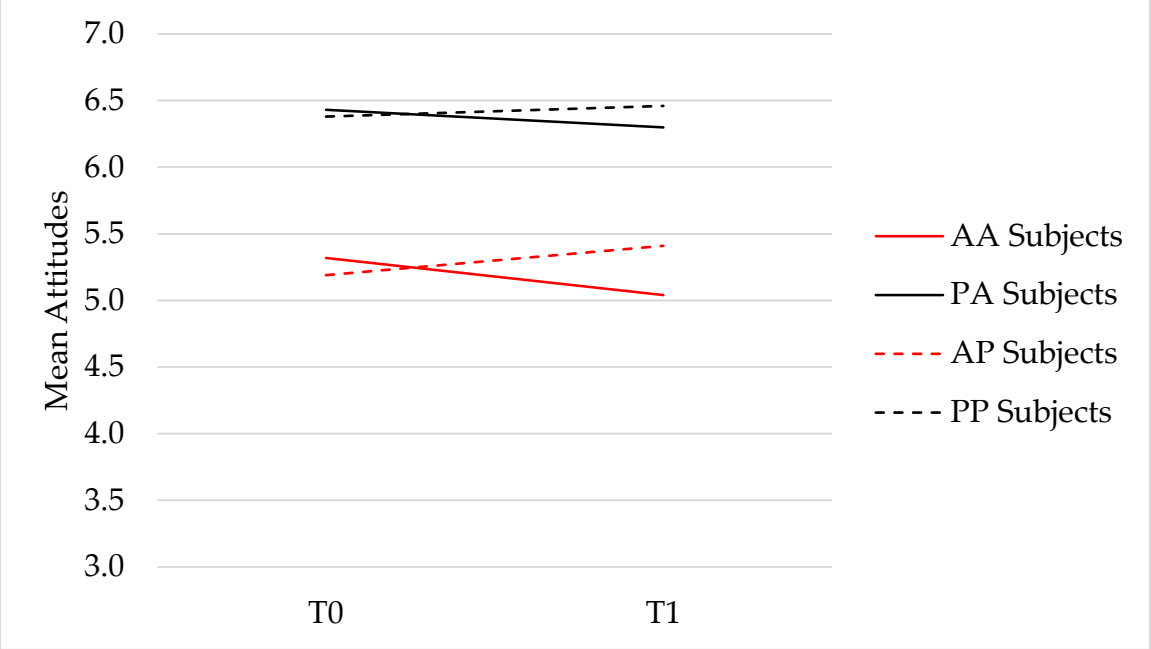

Figure 4. **Study 2: Message effects on recycling attitudes**. Dashed lines represent effects of the pro-action message, solid lines represent effects of the anti-action message. Subjects who were initially pro-action on climate change are represented by the black lines; anti-action by the red.

Delayed post-test data were also examined to explore the longevity of the generalization effects among the AP and PA subjects. For the PA subjects, the effect tended to endure over time; these subjects' attitudes remained more negative than their

initial attitudes at the delayed post-test, t (225) = -2.02, $p < .05$, $r = .13$. On the other hand, for the AP subjects, the message effect tended to decay over time; there was limited evidence that these subjects' delayed post-test attitudes toward recycling differed from their initial attitudes, t (37) = 0.79, $p = .44$, $r = .13$.

Vegetarianism. The analysis proceeded with vegetarianism attitudes. In this case, there was no evidence of a message effect, F (1, 543) = 0.04, $p = .85$, $r = .01$. Overall, there was very little evidence of attitude change following exposure to either the anti-action (M = -0.03, 95% CI [-0.22, 0.16]) or pro-action message (M = -0.01, 95% CI [-0.19, 0.18]), regardless of whether the subjects' initial attitudes. As a result, there was no evidence that either generalization or displacement occurred for vegetarianism attitudes.

Gun control. The next analysis focused on gun control attitudes. As with vegetarianism, there was little evidence of a message effect, F (1, 544) = 2.52, $p = .11$, $r = .07$. The amount of attitude change was not statistically different from zero following exposure to either the anti-action (M = -0.09, 95% CI [-0.24, 0.06]) or pro-action message (M = 0.07, 95% CI [-0.08, 0.22]), regardless of the subjects' initial attitudes. Once again, there was little evidence that either generalization or displacement occurred for gun control attitudes.

Mandatory vaccination. The final analysis focused on attitudes toward mandatory vaccination. Result revealed no evidence whatsoever of a message effect, F (1, 544) = 0.01, $p = .91$, $r < .01$. Instead, attitudes toward vaccination became more

positive among all subjects (anti-action condition: M = 0.20, 95% CI [0.01, 0.39]; pro-action condition: M = 0.21, 95% CI [0.03, 0.40]). Because this change was unrelated to the study, it provided no evidence of generalization or displacement effects for mandatory vaccination attitudes.

GENERAL DISCUSSION

Overall, these studies provided evidence of both direct and lateral attitude change, although the conditions under which these effects occurred were not always as expected. In terms of direct attitude change, the results of the first study were generally as predicted; pro-attitudinal messages were effective, whereas counter-attitudinal messages resulted in either no change or a boomerang effect. In the second study, on the other hand, the opposite result was found; counter-attitudinal messages were effective, whereas pro-attitudinal messages had little effect.

In terms of lateral attitude change, evidence for generalization was generally consistent with predictions. In particular, the message effects tended to generalize to closely-related recycling attitudes in both studies, whereas limited evidence was found for generalization to more distantly-related vegetarianism, gun control, or mandatory vaccination attitudes. On the other hand, there was little or no evidence of displacement in either study. In conditions in which no direct attitude change (or a boomerang) was observed, there also tended to be no lateral attitude change. Moreover, the predicted source effect, whereby an in-group source results in displacement but an outgroup source does not, was not evident in the first study; neither an in-group source nor an out-group source resulted in any displacement that was statistically different from zero.

In sum, the results of these studies suggest that generalization can and does occur for environmental issues. Exposure to persuasive messages about taking action to

reduce climate change affected not only climate change attitudes, but recycling attitudes as well. Thinking in terms of the climate change debate, this finding indicates that the messages people regularly hear in the media may indeed affect their broader environmental attitudes.

Conclusions about the resultant effect on public opinion, however, are more difficult to glean from these findings. Specifically, in the first study, message exposure was found to result in polarization on both climate change and recycling. Exposure to either the pro- or anti-action message led to more extreme negative attitudes for initially anti-action subjects, and exposure to the pro-action message led to more extreme positive attitudes for initially pro-action subjects. In either case, the attitudinal discrepancy between the two groups grew between the pre-test and post-test. Because these direct effects also generalized to recycling attitudes, so too did the polarization. In contrast, in the second study, message exposure was found to result in depolarization on both climate change and recycling. Exposure to the pro-action message led to less negative attitudes among initially anti-action subjects, and exposure to the anti-action message led to less positive attitudes among the initially pro-action subjects; in both cases, the attitudinal discrepancy between the two groups shrank between the pre-test and post-test. In this case, generalization to recycling attitudes led to depolarization on this issue as well. In sum, although generalization occurred in both studies, the ultimate effects on public opinion differed as a function of the varying direct effects.

In practice, given that people often selectively expose themselves to messages that fit their existing viewpoints (Iyengar & Hahn, 2009), the polarizing effects of generalization are likely to be more common than the depolarizing effects. Across both studies, pro-attitudinal messages caused either no attitude change or polarization. Depolarization, on the other hand, was only found to occur following exposure to a counter-attitudinal message. Furthermore, a counter-attitudinal message did not guarantee depolarization; in the first study, a counter-attitudinal message directed at anti-action subjects resulted in a boomerang effect, also producing greater polarization on climate change attitudes.

The patterns of polarization and depolarization may also be complicated by findings that Republicans and conservatives have greater tendencies toward partisan selective exposure than do Democrats and liberals (e.g., Iyengar, Hahn, & Walker, 2008), which has in turn been found to result in greater polarization (Stroud, 2010). Specifically, Republicans and conservatives may be more likely to hear pro-attitudinal messages than Democrats and liberals are, and they would be expected to evince greater polarization as a result. In contrast, if Democrats and liberals seek out both counter-attitudinal and pro-attitudinal messages, their attitudes may remain relatively stable over time.

To build on these findings, it would be beneficial to explore the reasons why the direct effects differed between the first and second study. Given that the same messages were used in both studies and that the procedure remained the same, it is surprising

that the pattern of effects differed so greatly. It may be that there were important differences between the two samples that resulted in the disparate reactions; if so, this finding would suggest that researchers should be leery of the generalizability of conclusions about attitude change studies based on student samples, at least for this particular topic.

For example, it is possible that messages about politically-charged issues such as climate change are more reactive for students than for the general public. Students who oppose action to address climate change were found to be a small minority in Study 1, and they may be well aware of their position as such; because so many of their fellow students are pro-action, their views may often be challenged or even derogated by those around them. Such an environment may then encourage these anti-action students to develop strong and highly accessible counterarguments to pro-action messages, contributing to the boomerang observed in Study 1. On the other hand, members of the general public have access to political discussants with a wider range of political views. Given that people tend to discuss politics with those who share their views (Ikeda & Huckfeldt, 2001) and that they also tend to become ideologically similar to those they have close relationships with (Lazer, Rubineau, Chetkovich, Katz, & Neblo, 2010), members of the general public may only rarely need to defend their views on issues such as climate change. As a result, they may have less accessible counterarguments

prepared for counter-attitudinal messages, leading to the effects of these messages that were observed in Study 2.

It would also be beneficial to explore the breadth of the generalization effects uncovered here by investigating other psychologically-related environmental attitudes. Given the restriction in range on recycling attitudes (all subjects had strongly positive attitudes toward this topic, resulting in much less variance than for the other attitude objects), even stronger effects may be evident for other issues. Identifying these other attitudes would also contribute to understanding of the extent to which the climate change debate may be affecting environmentalism in general.

Finally, another fruitful direction for future research would be to change the attitude targeted by the persuasive message. Given the importance of changing attitudes toward taking action to address climate change (IPCC, 2014), and the risk of boomerang identified in Study 1, it may be more productive to target an attitude that will generalize to climate change attitudes. Conducting a study to identify possible candidate attitudes might therefore provide productive avenues for future message campaigns that indirectly work to improve attitudes toward climate change.

Despite the interesting findings uncovered in these studies, there are a few important limitations. First, in both samples utilized in this study, the number of pro-action subjects greatly outnumbered anti-action subjects, creating uneven cell sizes in the tests of the effects of pre-existing attitudes. In the future, it may be desirable to

ameliorate this issue by oversampling anti-action subjects, at least when data collection is conducted with student samples or on mTurk.

Second, the conclusions about these findings are tempered somewhat by the fact that many of the effects decayed between the post-test and the delayed post-test. As a result, it is difficult to make conclusions about the long-term effects of the climate change debate based on these results. It is important to note, however, that these studies focused on the effect of a one-time exposure to a single message. In practice, people are exposed to numerous messages about climate change on a regular basis (Boykoff, 2007; Hart & Feldman, 2014; Jang & Hart, 2015). Such repeated exposures may serve to reinforce the direct and lateral effects observed here, producing more long-term changes in public opinion. It would be beneficial to examine the effects of repeated message exposure in the future to examine this possibility.

ENDNOTES

ENDNOTES

[1] A confirmatory factor analysis (CFA, Hunter & Gerbing, 1982) was conducted to examine the fit of the attitude data to the proposed 11-factor structure. The initial test of the model indicated unsatisfactory fit, including numerous errors larger than would be expected to occur by chance. Acceptable fit (given the small sample size, N = 69; Hu & Bentler, 1999) was obtained by removing several items from each factor (RMSE = .09, CFI = .71), and the remaining items were averaged to produce an overall index for each attitude. The final factor structure and descriptive statistics for the items and factors can be found in Appendix A (see Table A1).

[2] A CFA was not conducted on the values data because the items and factors were not proposed by Schwartz (1992) to fit a linear measurement model. Instead, the items within each factor were simply summed to produce an overall index of each value. For the most part, the scales exhibited good reliability: self-direction (α = .89, ω = .89), stimulation (α = .68, ω = .71), hedonism (α = .88, ω = .88), achievement (α = .86, ω = .87), power (α = .79, ω = .79), security (α = .85, ω = .85), conformity (α = .82, ω = .82), traditionalism (α = .56, ω = .64), spirituality (α = .67, ω = .72), benevolence (α = .89, ω = .89), and universalism (α = . 92, ω = .92).

[3] Confirmatory factor analysis suggested good fit of the ideology data to a two-factor structure, following removal of two economic items and two social items (RMSE = .03, CFI = 1.00). Both the economic and social factors also exhibited acceptable reliabilities (α = .73 and .77, respectively).

[4] A CFA was conducted to examine the attitude, quality, legitimacy, credibility, similarity, likability, and author attitude factors. The initial test indicated that there were a few items associated with several residuals larger than would be expected to occur by chance alone. After removing these items, the factor structure exhibited good fit to the data (RMSE = .96, CFI = .94). The final factor structure and descriptive statistic items and factors can be found in Appendix D (see Table D1).

[5] Using CFA, the same factor structure for the that was uncovered for the political ideology data from Pilot 1 was retested on the Pilot 2 data. The fit was similar, (RMSE = .06, CFI = .96, economic α = .65, social α = .69), and there were no errors larger than would be expected to occur by chance alone.

[6] All conclusions about the source and message remained the same if the subjects who incorrectly interpreted the purpose of the argument were removed.

[7] There was greater variance in scores for subjects reading a counter-attitudinal message than a pro-attitudinal message, so the adjusted degrees of freedom are reported for the *t*-tests in this paragraph.

[8] Although the findings that the majority of students were Republican appeared to conflict with the finding that students were generally liberal, additional analyses indicated that party (0 = *Republican*, 1 = *Democrat*) was still strongly correlated with self-reported ideology (r = .64), economic ideology (r = .60), and social ideology (r = .34).

[9] Attrition analyses were performed to check for any differential attrition based on initial attitudes or demographic variables, including sex, age, grade in school, race, international student status, political party identification, self-reported ideology, economic ideology, social ideology, and attention to politics. Of these variables, self-reported ideology was the only one for which there was a statistically significant effect, r = .12, whereby retention was slightly higher among conservatives than liberals. Given that the number of tests performed and the modest size of the effect, however, it is not unreasonable to conclude that this finding was due to chance.

[10] Confirmatory factor analyses were used to test the fit of the political ideology data to a two-factor structure. The initial test of the model indicated that there was one social ideology item associated with several large residuals; after removing this item, the model exhibited good fit to the data (CFI = .99, RMSE = .04, economic α = .76, social α = .66). Another CFA was also employed to test the fit of the attitude data to a five-factor structure at each of the three time points. At the pretest, the initial test of the model indicated moderate fit of the data to the proposed factor structure (CFI = .93, RMSE = .07), but there were numerous residuals larger than would be expected to occur due to chance alone. Good fit was obtained by removing one climate change item, two recycling items, one vegetarianism item, two gun control items, and two mandatory vaccination items (CFI = .98, RMSE = .04). This same factor structure was then retested using the data at the remaining time points. Fit was similarly good at both the post-test (CFI = .98, RMSE = .05) and the delayed post-test (CFI = .97, RMSE = .05). See Appendix E, Table E2-E4 for factor loadings and descriptive statistics from each time point.

[11] There was no evidence of differences between the post-test only conditions and the other conditions at either the post-test or the delayed post-test for any of the attitude

measures. As a result, these conditions were collapsed when examining changes between the second and third time points.

[12] The lack of evidence for generalization in this condition, however, should be interpreted cautiously. The average recycling attitudes in this condition were extremely high to begin with (M = 6.23, SD = 0.99), meaning there is likely substantial restriction in range in these data.

[13] In this sample, party identification was more closely linked to indicators of political ideology than for the student sample. Specifically, party (0 = *Republican*, 1 = *Democrat*) was strongly correlated with self-reported political ideology (r = .80), economic ideology (r = .66), and social ideology (r = .49).

[14] The demographics reported for the sample pertain to this final group of N = 718 subjects. Attrition analyses were performed to examine whether or not there was differential attrition based on initial attitudes or demographic variables, including age, education, political party, self-reported ideology, economic ideology, social ideology, sex, race, and attention to politics. Age was the only variable for which there was a statistically significant effect, r = .18, resulting from the fact that retention was slightly higher among older participants than younger participants. Given the number of tests performed and the modest size of the correlation, however, this effect may be simply a chance finding, similar to that found in the first study.

[15] Confirmatory factor analyses were used to test the fit of the political ideology data to a two-factor structure. The initial test of the model indicated that there was one social ideology item associated with several large residuals; after removing this item, the model exhibited good fit to the data (CFI = .99, RMSE = .03, economic α = .85, social α = .80). Another CFA was also employed to test the fit of the attitude data to a five-factor structure at each of the three time points. At the pretest, the initial test of the model indicated good fit of the data to the proposed factor structure (CFI = .97, RMSE = .05), but there were numerous residuals larger than would be expected to occur due to chance alone. Good fit was obtained by removing one recycling item, one vegetarianism item, and two mandatory vaccination items (CFI = .99, RMSE = .02). This same factor structure was then retested using the data at the remaining time points. Fit was similarly good at both the post-test (CFI = .99, RMSE = .03) and the delayed post-test (CFI = .99, RMSE = .03). See Appendix F, Table F2-F4 for factor loadings and descriptive statistics from each time point.

[16] Notably, the size of this effect also replicated the size of the effect in Study 1 (Study 1: B = .35, Study 2: B = .35, Z = 0.21, p = .83).

[17] However, this effect may also have been due to a more general trend for the anti-action participants to develop more favorable attitudes over time. Even among anti-action subjects who read an anti-action message, there was a tendency to develop more positive attitudes toward climate change between the pretest and the post-test, t (37) = 3.69, $p < .01$, $r = .52$.

[18] There was also a marginally significant message-by-order interaction effect, F (1, 544) = 3.73, p = 0.5. Greater attitude change tended to occur when the lateral attitude questions were asked before the direct attitude change (for the anti-action message: M = -0.25, 95% CI [-0.42, -0.08] vs. M = -0.07, 95% CI [-0.25, 0.11]); for the pro-action message: M = 0.25, 95% CI [0.07, 0.43] vs. M = 0.10, 95% CI [-0.07, 0.27].

APPENDICES

APPENDIX A
PILOT 1 RESULTS

Table A1.
Pilot 1: Confirmatory Factor Analysis – Attitudes

	Loading	*M*	*SD*
Gay marriage (α = .91, ω = .92)		*5.84*	*1.47*
I support the U. S. Supreme Court decision to legalize gay marriage.	.94	6.04	1.66
The legalization of gay marriage will be beneficial for the U. S. economy.	.59	5.29	1.72
Homosexual couples should be entitled to the same tax benefits as heterosexual couples.	.77	5.99	1.62
Homosexual couples should have the same right to marry as heterosexual couples.	.92	6.01	1.75
Legalizing gay marriage was a positive step for the U. S.	.91	5.88	1.80
Recycling (α = .92, ω = .92)		*6.13*	*0.99*
I am in favor of programs that encourage people to recycle.	.94	6.16	1.05
It would be a good idea to expand recycling programs in the U. S.	.87	6.13	1.12
Recycling is a waste of public resources.*	.69	6.00	1.43
Recycling is good for the environment.	.66	6.32	1.11
It is important that people make an effort to recycle.	.96	6.03	1.10

Table A1 (cont'd).

	Loading	*M*	*SD*
Climate change (α = .90, ω = .91)		*5.70*	*1.14*
I am in favor of adopting policies that will help reduce climate change.	.90	5.75	1.21
Taking steps to reduce climate change is a social responsibility.	.81	5.62	1.21
Taking steps to reduce climate change is a good idea.	.93	5.83	1.25
It would be irresponsible <u>not</u> to take steps to reduce climate change.	.72	5.61	1.53
Gun control (α = .85, ω = .86)		*4.77*	*1.49*
The U. S. needs stronger restrictions on gun ownership.	.78	5.29	1.66
No changes to current U. S. gun laws should be made.*	.77	5.13	1.82
I support stronger U. S. gun laws.	.96	4.88	1.86
Spending taxpayer dollars to reduce gun ownership (e.g., through federal buyback programs) would be a good idea.	.55	3.78	1.83
Alternative energy (α = .85, ω = .85)		*5.57*	*1.17*
The U. S. government should provide tax credits for companies developing alternative energy technologies.	.66	5.14	1.45
I support policies that encourage more development of technologies such as solar and wind power.	.91	5.77	1.23
Converting from fossil fuels to alternative energies would be a positive step for the U. S.	.85	5.78	1.34

Table A1 (cont'd).

	Loading	*M*	*SD*
Vegetarianism (α = .86, ω = .87)		*3.89*	*1.17*
Having a vegetarian diet is more economical than having a diet that includes meat.	.58	3.61	1.49
I am in favor of more people adopting a vegetarian lifestyle.	.84	3.78	1.43
More people should consider becoming vegetarians.	.92	3.88	1.39
When people choose to become vegetarians, it is generally a good decision.	.77	4.28	1.29
Carpooling (α = .65, ω = .68)		*5.41*	*1.04*
Encouraging more people to carpool to work or school is <u>not</u> a very good idea.*	.92	5.54	1.38
Adding carpool lanes to more roads would be unfair to many drivers.*	.54	4.96	1.53
Carpooling is a good thing to do.	.44	5.72	1.15
Preservation (α = .92, ω = .92)		*5.83*	*1.15*
The U. S. government should continue programs to protect wilderness and wildlife areas.	.93	6.07	1.17
The U. S. needs to do more to protect natural areas from human development.	.92	5.83	1.20
Spending money to protect wilderness and wildlife areas is a good use of taxpayer dollars.	.81	5.59	1.35

Table A1 (cont'd).

	Loading	*M*	*SD*
Organic farming (α = .85, ω = .86)		*5.01*	*1.29*
The U. S. government should encourage farmers to adopt organic farming practices.	.67	5.41	1.29
Providing subsidies for organic farmers would be a good use of taxpayer dollars.	.96	4.77	1.55
It is worthwhile to pay the higher prices for organic meat and produce.	.81	4.86	1.57
Mandatory vaccination (α = .88, ω = .88)		*5.03*	*1.40*
Parents should <u>not</u> be required to vaccinate their children.*	.82	4.78	1.93
Requiring parents to pay for mandatory vaccinations is an unfair economic burden.*	.70	4.42	1.75
Mandatory vaccination is good for public health in the U.S.	.80	5.55	1.44
It would be a good thing for all children in the U. S. to be required to receive some vaccines.	.75	5.33	1.58
I am <u>not</u> in favor of mandatory vaccination.*	.78	5.09	1.85

Table A1 (cont'd).

	Loading	*M*	*SD*
Carbon credits (α = .71, ω = .73)		*4.97*	*1.00*
The U. S. government should require polluting companies to purchase carbon credits.	.88	5.04	1.59
A carbon credit system would be an unfair economic burden on companies.*	.59	5.04	1.54
Adopting a mandatory carbon credit system in the U. S. would have more benefits than drawbacks.	.58	4.90	1.36
Encouraging U. S. companies and citizens to purchase carbon credits would be help improve environmental quality.	.55	5.13	1.45
Requiring polluting companies to purchase carbon credits would lead to higher rates of unemployment.*	.34	4.72	1.36

Note. Asterisks indicate reverse-coded items. Reported means for those items were calculated after reverse coding. For the overall model, N = 69, RMSE = .09, CFI = .71.

Table A2.

Pilot 1: Corrected Correlations among Attitude Factors

	CC	REC	EN	ORG	PRES	CAR	VEG	CARB	GAY	GUN
CC										
REC	.65									
EN	.71	.65								
ORG	.41	.43	.59							
PRES	.68	.81	.69	.49						
CAR	.56	.53	.53	.19	.45					
VEG	.27	.02	.13	.11	.17	.21				
CARB	.57	.54	.55	.50	.65	.43	.30			
GAY	.48	.41	.41	.33	.47	.35	.14	.36		
GUN	.52	.30	.30	.34	.44	.27	.05	.48	.38	
VAC	.35	.36	.38	.33	.42	.34	-.18	.41	.46	.29

Note. CC = climate change, REC = recycling, EN = alternative energy, ORG = organic farming, PRES = preservation, CAR = carpooling, VEG = vegetarianism, CARB = carbon credits, GAY = gay marriage, GUN = gun control, VAC = mandatory vaccination. Correlations are corrected for error of measurement in both variables.

Table A3.
Pilot 1: Results when Controlling for Universalism

	r	$r_{ab.c}$
Recycling	.58	.37
Alternative energy	.62	.50
Organic farming	.36	.20
Preservation	.61	.28
Carpooling	.44	.55
Vegetarianism	.24	-.22
Carbon credits	.46	.23
Gay marriage	.43	.23
Gun control	.45	.21
Mandatory vaccination	.31	.14

Note. In the left-hand column are the uncorrected correlations between climate change attitudes and each of the other attitudes. In the right-hand column are the partial correlations between climate change attitudes and each of the other attitudes when controlling for universalism. Based on $n = 24$.

Table A4.

Pilot 1: Paired Comparisons Results

	CC	REC	EN	ORG	PRES	CAR	VEG	CARB	GAY	GUN	VAC
CC	--	60.91	66.73	52.91	56.91	56.35	37.41	64.83	25.77	26.27	28.73
REC	57.52	--	52.39	48.57	55.30	40.43	37.09	44.26	23.52	24.41	25.86
EN	59.87	54.91	--	49.70	53.78	51.39	37.48	51.79	26.65	26.48	26.78
ORG	56.88	57.87	56.62	--	60.62	43.70	58.29	53.83	34.57	31.30	32.22
PRES	63.57	56.96	58.50	57.13	--	43.95	48.30	53.77	27.82	28.73	28.05
CAR	60.04	58.26	56.04	41.91	46.96	--	33.52	51.87	26.17	26.00	28.39
VEG	53.96	51.67	52.78	70.04	61.92	43.61	--	49.70	31.61	29.48	30.65
CARB	67.22	61.00	66.96	48.95	58.05	48.95	35.27	--	27.09	28.45	30.27
GAY	34.61	34.09	36.04	34.09	33.96	34.09	31.87	34.09	--	35.83	32.54
GUN	23.25	22.71	22.87	21.46	27.17	19.42	18.75	20.58	23.50	--	21.96
VAC	24.87	25.78	25.13	34.13	22.83	23.65	31.22	25.13	28.87	26.83	--

Note. CC = climate change, REC = recycling, EN = alternative energy, ORG = organic farming, PRES = preservation, CAR = carpooling, VEG = vegetarianism, CARB = carbon credits, GAY = gay marriage, GUN = gun control, VAC = mandatory vaccination. Subjects (*n* = 24) were asked to indicate the probability that a change in one attitude would affect another attitude. Rows report the mean probability when a given attitude served as the question stem ("If someone changed their mind regarding their position on X..."), columns report the mean probability when a given attitude served as the question object ("…what do you think the probability is that they would also change their position on X"). In other words, rows indicate the perceived probability that an attitude will *affect* other attitudes; columns indicate the perceived probability that an attitude will *be affected by* other attitudes.

Table A5.

Pilot 1: Distances Estimated from Paired Comparisons

	CC	REC	EN	ORG	PRES	CAR	VEG	CARB	GAY	GUN	VAC
CC											
REC	0.18										
EN	0.15	0.20									
ORG	0.40	0.58	0.48								
PRES	0.23	0.39	0.23	0.27							
CAR	0.37	0.34	0.49	0.61	0.57						
VEG	0.58	0.76	0.67	0.20	0.47	0.72					
CARB	0.02	0.19	0.13	0.40	0.21	0.39	0.58				
GAY	1.27	1.43	1.23	1.01	1.05	1.60	1.03	1.25			
GUN	1.40	1.46	1.27	1.24	1.24	1.76	1.53	1.37	0.91		
VAC	1.42	1.60	1.47	1.25	1.25	1.57	0.86	1.41	0.93	1.80	

Note. CC = climate change, REC = recycling, EN = alternative energy, ORG = organic farming, PRES = preservation, CAR = carpooling, VEG = vegetarianism, CARB = carbon credits, GAY = gay marriage, GUN = gun control, VAC = mandatory vaccination. Distances were estimated using the PROXSCAL multidimensional scaling algorithm. The data exhibited good fit to a two-dimensional model (Stress-I = .16, DAF = .97).

Table A6.
Pilot 1: Results of Card Sorting Task

	CC	REC	EN	ORG	PRES	CAR	VEG	CARB	GAY	GUN	VAC
CC											
REC	.67										
EN	.52	.48									
ORG	.33	.43	.29								
PRES	.33	.48	.52	.48							
CAR	.67	.62	.43	.24	.29						
VEG	.24	.29	.14	.71	.33	.29					
CARB	.62	.43	.67	.29	.48	.52	.24				
GAY	.00	.00	.05	.05	.00	.05	.10	.00			
GUN	.05	.05	.00	.05	.05	.05	.10	.00	.48		
VAC	.05	.00	.00	.05	.00	.00	.10	.00	.33	.43	

Note. CC = climate change, REC = recycling, EN = alternative energy, ORG = organic farming, PRES = preservation, CAR = carpooling, VEG = vegetarianism, CARB = carbon credits, GAY = gay marriage, GUN = gun control, VAC = mandatory vaccination. Values represent the probability that two attitudes were placed in the sorted into the same group (i.e., the proportion of subjects sorting them into the same group, $n = 21$).

Table A7.
Pilot 1: Distances Estimated from Card Sorting

	CC	REC	EN	ORG	PRES	CAR	VEG	CARB	GAY	GUN	VAC
CC											
REC	0.16										
EN	0.30	0.31									
ORG	0.82	0.66	0.79								
PRES	0.58	0.46	0.43	0.41							
CAR	0.12	0.25	0.40	0.90	0.70						
VEG	0.93	0.77	0.93	0.15	0.56	1.00					
CARB	0.23	0.27	0.07	0.80	0.47	0.33	0.94				
GAY	1.22	1.20	1.50	1.38	1.53	1.16	1.33	1.44			
GUN	1.27	1.20	1.51	1.23	1.46	1.23	1.15	1.47	0.31		
VAC	1.41	1.31	1.60	1.11	1.43	1.40	0.99	1.57	0.73	0.42	

Note. CC = climate change, REC = recycling, EN = alternative energy, ORG = organic farming, PRES = preservation, CAR = carpooling, VEG = vegetarianism, CARB = carbon credits, GAY = gay marriage, GUN = gun control, VAC = mandatory vaccination. Distances were estimated using the PROXSCAL multidimensional scaling algorithm. The data exhibited good fit to a two-dimensional model (Stress-I = .12, DAF = .99).

APPENDIX B
SOURCE MATERIALS

OUT-GROUP RESUME

Thomas Gibson

1300 S. University Ave., Apt. 23
Ann Arbor, MI 48104
gibso394@umich.edu

EDUCATION

Bachelor of Arts, Political Science — Anticipated May 2017
University of Michigan, Ann Arbor, MI
Minor: Science, Technology, and Society
Clubs and Memberships

- Wolverines for Informed Action — 2015 – present
  - Elected Vice President for coming 2016 – 2017 year
- Honors College — 2014 – present
- UM Debate Team — 2014 – present
- Maize Rage — 2014 – present

EXPERIENCE

Emissary, Michigan Nature Association — 2015 – present
Okemos, MI

- Promote and share information about events and new initiatives
- Recruit new members in support of association's conservation mission

Intern, Michigan United Conservation Clubs — 2015
Lansing, MI

- Assisted policy and legislative team
- Facilitated outreach and information gathering related to new On the Ground wildlife habitat conservation program

Research Assistant, Department of Political Science — 2014 – 2015
University of Michigan, Ann Arbor, MI

- Member of the Undergraduate Research Opportunity Program
- Presented final independent research project at the 2015 Michigan Research Community Spring Research Symposium:
  Environmental Quality as a Source of Political and Civic Unrest

Intern, Independent Voter Project — 2014
San Diego, CA

- Helped with efforts to engage non-partisan voters to improve voter turnout
- Assisted with voter education initiatives

IN-GROUP RESUME

Thomas Gibson

6090 Carriage Hill Dr., Apt. 23
East Lansing, MI 48823
gibso394@msu.edu

EDUCATION

Bachelor of Arts, Political Science — Anticipated May 2017
Michigan State University, East Lansing, MI
Minor: Science, Technology, Environment, and Public Policy

Clubs and Memberships

Spartans for Informed Action — 2015 – present
- Elected Vice President for coming 2016 – 2017 year

Honors College — 2014 – present
MSU Debate Team — 2014 – present
Izzone — 2014 – present

EXPERIENCE

Emissary, Michigan Nature Association — 2015 – present
Okemos, MI
- Promote and share information about events and new initiatives
- Recruit new members in support of association's conservation mission

Intern, Michigan United Conservation Clubs — 2015
Lansing, MI
- Assisted policy and legislative team
- Facilitated outreach and information gathering related to new On the Ground wildlife habitat conservation program

Research Assistant, Department of Political Science — 2014 – 2015
Michigan State University, East Lansing, MI
- Carried out background research and other related tasks as needed
- Presented final independent research project at the 2015 University Undergraduate Research and Arts Forum:
  Environmental Quality as a Source of Political and Civic Unrest

Intern, Independent Voter Project — 2014
San Diego, CA
- Helped with efforts to engage non-partisan voters to improve voter turnout
- Assisted with voter education initiatives

APPENDIX C
MESSAGE MATERIALS

PRO-ACTION MESSAGE

To My Fellow Students:

People from all walks of life are becoming increasingly vocal about the need for the United States to take steps to reduce climate change, and for good reason. There is overwhelming evidence that climate change is already having negative effects on humans and on the environment, and we need to take action now in order to stop things from getting worse.

One major reason to be concerned about climate change is its effects on plant and animal species. According to the 2014 Intergovernmental Panel on Climate Change (IPCC), for example, changes are already being seen in the geographical ranges, behavior, and population size of many species. Climate change has also been linked to more dramatic examples of harm as well. For example, the mass die-off of almost 3,000 dolphins off the coast of Peru in 2012 has been linked to high levels of stress in response to climate change.

There are also several reasons to be concerned about the effects of climate change on human populations. For one, evidence suggests that climate change has already led to lower crop yields and to shortages of high-quality drinking water. If climate change continues to worsen, people in many parts of the world will be faced with difficulties in finding enough food and water to survive. According to the IPCC, climate change is also expected to lead to higher rates of human and plant disease, further threatening human health, wellbeing, and our ability to grow an adequate food supply.

Beyond health, there are also concerns that climate change will have other harmful impacts on human society. For example, a recent study conducted by authors at top universities in China showed that changes in climate during the 1600-1700s were related to social disturbances, migration, and even war. Moreover, climate change is expected to lead to more extreme weather, which often results in costly damage to the U. S. infrastructure. For example, Superstorm Sandy, the hurricane that hit the East Coast in 2013, caused an estimated $65 billion in damages.

Finally, taking steps to reduce climate change could also provide economic benefits. For one, the number of "green" jobs that are available is growing rapidly. According to the McClatchy news bureau, the growth of jobs in areas such as solar power and wind

power reached record highs in 2015. Continuing to support environmentally-friendly energy companies will thus help provide employment for many Americans. Beyond jobs, people can also save themselves money by adopting behaviors that help reduce climate change. For example, setting the thermostat just a few degrees lower in the winter helps reduce the emissions that lead to climate change, and it also saves people money on home heating bills.

In sum, working to reduce climate change just makes sense. If climate change continues at its current rate, there will be negative effects on the environment, human health, and our society and infrastructure; and we will also miss out on opportunities for economic growth. Support efforts to reduce climate change!

Sincerely,

Thomas Gibson

ANTI-ACTION MESSAGE

To My Fellow Students:

People from all walks of life are becoming increasingly vocal about the need for the United States to take steps to reduce climate change, but there are many reasons not to accept these arguments. There is still scientific uncertainty about the possible effects of climate change, and taking steps to reduce climate change may have serious negative consequences. At least at the present time, we need to oppose proposed efforts to reduce climate change.

For one, there are many issues that are more pressing than climate change. Lead poisoning, for example, remains a serious health issue in the United States. According to the Centers for Disease Control and Prevention, thousands of children are diagnosed with blood poisoning each year, leaving them vulnerable to a number of health and developmental problems. Here in Michigan, Governor Rick Snyder has even declared a state of emergency due to the growing rates of lead poisoning in Flint. Rather than devoting time and money to reduce climate change—an issue for which the health effects are uncertain and would occur years into the future (if at all)—the country would be better served by focusing on issues that are already affecting people's lives.

Devoting resources to reducing climate change would also mean that fewer resources could be devoted to other environmental issues. Overharvesting of food sources and poaching, for example, are urgent environmental problems that are unrelated to climate change. For some species, delaying or reducing efforts to combat poaching would also mean certain extinction. For example, there are currently fewer than five Northern white rhinos left on earth. Are the uncertain benefits of addressing climate change really more worthwhile than the certain benefits of protecting endangered species like these?

Even if taking steps to reduce climate change had certain benefits, the risks are also far too great to justify action. For one, most of the policies that would reduce climate change would cause direct harm to the U. S. economy. Requiring companies to meet certain emission standards, for example, would be extremely costly, and would likely lead to lower profits and higher rates of unemployment. Furthermore, there is no guarantee that other major economies would adopt the same policies. If China and India refuse to take steps to reduce climate change, then any action that the U. S. takes will matter very little. Moreover, U. S. companies will be placed at a competitive disadvantage.

In sum, taking steps to reduce climate change just doesn't make sense at this time. There are more pressing health an environmental issues, and the risk to the U. S. economy is just too high. Oppose efforts to reduce climate change!

Sincerely,

Thomas Gibson

APPENDIX D
PILOT 2 RESULTS

Table D1.
Pilot 2: Confirmatory Factor Analysis – All Measures

	Loading	*M*	*SD*
Climate change attitudes (α = .94, ω = .94)		*5.33*	*1.25*
I am in favor of adopting policies that will help reduce climate change.	.92	5.36	1.36
Taking steps to reduce climate change is a social responsibility.	.91	5.38	1.25
Taking steps to reduce climate change is a good idea.	.91	5.60	1.32
It would be irresponsible <u>not</u> to take steps to reduce climate change.	.81	4.99	1.52
Argument quality (α = .92, ω = .92)		*4.83*	*1.23*
The information provided in the message is believable.	.78	4.93	1.32
The message is convincing.	.91	4.77	1.48
I find the message to be compelling.	.85	4.57	1.47
The information presented in the message seems logical.	.90	5.03	1.31
Legitimacy of message position (α = .92, ω = .92)		*5.15*	*1.13*
The message argued for a sensible position.	.88	5.01	1.29
The message's arguments were rational.	.92	5.03	1.26
The message took on a legitimate point of view.	.87	5.20	1.24
The position argued for in the message was completely unreasonable.*	.78	5.26	1.43
I can understand where the message was coming from.	.73	5.23	1.31

Table D1 (cont'd).

	Loading	*M*	*SD*
Source credibility (α = .91, ω = .91)		*5.24*	*0.99*
Knowledgeable	.78	5.38	1.25
Trustworthy	.74	5.06	1.13
Intelligent	.84	5.51	1.13
Honest	.74	5.22	1.14
Competent	.89	5.10	1.24
Ethical	.76	5.19	1.21
Similarity to source (α = .78, ω = .80)		*3.39*	*1.07*
The author and I have many things in common.	.77	3.45	1.21
The author and I have probably had similar experiences in college.	.59	3.48	1.29
The author and I are a lot alike.	.90	3.23	1.21
Likability of source (α = .92, ω = .92)		*4.01*	*1.14*
I think I would like the author if I met them.	.93	3.94	1.23
The author seems like a likable person.	.89	4.15	1.25
I could see myself being friends with the author.	.86	3.94	1.24

Table D1 (cont'd).

	Loading	*M*	*SD*
Perceived author attitude (α = .96, ω = .96)		*4.36*	*1.90*
The author is in favor of adopting policies that will help reduce climate change.	.95	4.41	2.20
The author feels that adopting policies to reduce climate change will do more harm than good.*	.73	4.28	2.17
The author feels that taking steps to reduce climate change is a social responsibility.	.85	4.47	1.86
The author feels that taking steps to reduce climate change is a good idea.	.97	4.46	2.11
The author feels that it would be irresponsible <u>not</u> to take steps to reduce climate change.	.91	4.36	1.95
The author feels that adopting policies to reduce climate change would be good for the economy.	.93	4.18	2.15

Note. Asterisks indicate reverse-coded items. Reported means for those items were calculated after reverse coding. For the overall model, N = 135, RMSE = .06, CFI = .94.

APPENDIX E
STUDY 1 RESULTS

Table E1.
Study 1: Subjects per Condition

	Anti-action message		Pro-action message		Control
	Counter-attitudinal	Pro-attitudinal	Counter-attitudinal	Pro-attitudinal	
In-group source	$n = 77$	$n = 9$	$n = 10$	$n = 50$	-
Out-group source	$n = 62$	$n = 9$	$n = 6$	$n = 68$	-
Control	-	-	-	-	$n = 66$

Table E2.
Study 1: Confirmatory Factor Analysis – Pretest Attitudes

	Loading	*M*	*SD*
Climate change (α = .93, ω = .93)		*5.52*	*1.30*
I am in favor of adopting policies that will help reduce climate change.	.90	5.52	1.43
Taking steps to reduce climate change is a social responsibility.	.88	5.45	1.45
Taking steps to reduce climate change is a good idea.	.93	5.72	1.32
It would be irresponsible NOT to take steps to reduce climate change.	.81	5.39	1.51
Recycling (α = .93, ω = .93)		*6.10*	*1.08*
I am in favor of programs that encourage people to recycle.	.93	6.03	1.21
It would be a good idea to expand recycling programs in the U. S.	.94	6.09	1.20
It is important that people make an effort to recycle.	.85	6.17	1.04
Vegetarianism (α = .91, ω = .91)		*3.31*	*1.45*
Having a vegetarian diet is more economical than having a diet that includes meat.	.70	3.32	1.66
I am in favor of more people adopting a vegetarian lifestyle.	.93	3.18	1.69
More people should consider becoming vegetarians.	.93	3.12	1.65
When people choose to become vegetarians, it is generally a good decision.	.81	3.61	1.56

Table E2 (cont'd).

	Loading	*M*	*SD*
Gun control (α = .88, ω = .88)		*4.15*	*1.59*
Strengthening gun laws would make the U. S. safer than it is now.	.90	4.31	1.80
I support stronger U. S. gun laws.	.88	4.56	1.79
Spending taxpayer dollars to reduce gun ownership (e.g., through federal buyback programs) would be a good idea.	.73	3.60	1.74
Mandatory vaccination (α = .71, ω = .72)		*4.93*	*1.38*
Parents should not be required to vaccinate their children.*	.72	5.11	1.83
Requiring parents to pay for mandatory vaccinations is unfair.*	.52	4.38	1.73
I am not in favor of mandatory vaccination.*	.79	5.29	1.66

Note. Asterisks indicate reverse-coded items. Reported means for those items were calculated after reverse coding. For the overall model, N = 457, RMSE = .04, CFI = .98.

Table E3.
Study 1: Confirmatory Factor Analysis – Post-test Attitudes

	Loading	*M*	*SD*
Climate change (α = .92, ω = .92)		*5.38*	*1.32*
I am in favor of adopting policies that will help reduce climate change.	.89	5.40	1.43
Taking steps to reduce climate change is a social responsibility.	.89	5.39	1.43
Taking steps to reduce climate change is a good idea.	.90	5.53	1.40
It would be irresponsible NOT to take steps to reduce climate change.	.76	5.19	1.62
Recycling (α = .91, ω = .91)		*6.00*	*1.09*
I am in favor of programs that encourage people to recycle.	.91	6.01	1.18
It would be a good idea to expand recycling programs in the U. S.	.90	5.99	1.19
It is important that people make an effort to recycle.	.84	6.00	1.16
Vegetarianism (α = .90, ω = .91)		*3.35*	*1.40*
Having a vegetarian diet is more economical than having a diet that includes meat.	.68	3.43	1.63
I am in favor of more people adopting a vegetarian lifestyle.	.92	3.18	1.59
More people should consider becoming vegetarians.	.94	3.17	1.60
When people choose to become vegetarians, it is generally a good decision.	.80	3.64	1.56

Table E3 (cont'd).

	Loading	*M*	*SD*
Gun control (α = .87, ω = .87)		*3.97*	*1.54*
Strengthening gun laws would make the U. S. safer than it is now.	.85	4.10	1.73
I support stronger U. S. gun laws.	.89	4.29	1.76
Spending taxpayer dollars to reduce gun ownership (e.g., through federal buyback programs) would be a good idea.	.77	3.53	1.69
Mandatory vaccination (α = .75, ω = .75)		*4.80*	*1.47*
Parents should not be required to vaccinate their children.*	.76	4.90	1.88
Requiring parents to pay for mandatory vaccinations is unfair.*	.62	4.37	1.81
I am not in favor of mandatory vaccination.*	.73	5.13	1.71

Note. Asterisks indicate reverse-coded items. Reported means for those items were calculated after reverse coding. For the overall model, N = 480, RMSE = .05, CFI = .98.

Table E4.
Study 1: Confirmatory Factor Analysis – Delayed Post-test Attitudes

	Loading	*M*	*SD*
Climate change (α = .93, ω = .93)		*5.58*	*1.25*
I am in favor of adopting policies that will help reduce climate change.	.89	5.62	1.41
Taking steps to reduce climate change is a social responsibility.	.91	5.60	1.31
Taking steps to reduce climate change is a good idea.	.85	5.74	1.33
It would be irresponsible NOT to take steps to reduce climate change.	.83	5.36	1.48
Recycling (α = .91, ω = .92)		*5.95*	*1.05*
I am in favor of programs that encourage people to recycle.	.90	5.97	1.19
It would be a good idea to expand recycling programs in the U. S.	.94	5.91	1.15
It is important that people make an effort to recycle.	.81	5.96	1.06
Vegetarianism (α = .92, ω = .92)		*3.58*	*1.34*
Having a vegetarian diet is more economical than having a diet that includes meat.	.74	3.49	1.63
I am in favor of more people adopting a vegetarian lifestyle.	.92	3.49	1.50
More people should consider becoming vegetarians.	.95	3.45	1.47
When people choose to become vegetarians, it is generally a good decision.	.83	3.90	1.41

Table E4 (cont'd).

	Loading	*M*	*SD*
Gun control (α = .90, ω = .90)		*4.22*	*1.54*
Strengthening gun laws would make the U. S. safer than it is now.	.93	4.39	1.70
I support stronger U. S. gun laws.	.84	4.43	1.70
Spending taxpayer dollars to reduce gun ownership (e.g., through federal buyback programs) would be a good idea.	.81	3.84	1.68
Mandatory vaccination (α = .72, ω = .73)		*4.83*	*1.41*
Parents should not be required to vaccinate their children.*	.77	4.94	1.85
Requiring parents to pay for mandatory vaccinations is unfair.*	.57	4.30	1.79
I am not in favor of mandatory vaccination.*	.72	5.25	1.60

Note. Asterisks indicate reverse-coded items. Reported means for those items were calculated after reverse coding. For the overall model, N = 268, RMSE = .05, CFI = .97.

APPENDIX F
STUDY 2 RESULTS

Table F1.
Study 2: Subjects per Condition

	Counter-attitudinal	Pro-attitudinal	Control
Pro-action message	$n = 38$	$n = 242$	-
Anti-action message	$n = 226$	$n = 38$	-
Control	-	-	$n = 147$

Table F2.
Study 2: Confirmatory Factor Analysis – Pretest Attitudes

	Loading	*M*	*SD*
Climate change (α = .90, ω = .92)		*5.52*	*1.44*
I am in favor of adopting policies that will help reduce climate change.	.94	5.69	1.64
Adopting policies to reduce climate change will do more good than harm.	.32	4.75	2.20
Taking steps to reduce climate change is a social responsibility.	.94	5.68	1.62
Taking steps to reduce climate change is a good idea.	.96	5.83	1.56
It would be irresponsible NOT to take steps to reduce climate change.	.88	5.65	1.76
Gun control (α = .95, ω = .95)		*4.54*	*1.97*
The U. S. needs stronger restrictions on gun ownership.	.96	4.64	2.20
No changes to current U. S. gun laws should be made.*	.78	5.06	2.02
Strengthening gun laws would make the U. S. safer than it is now.	.92	4.42	2.16
I support stronger U. S. gun laws.	.97	4.66	2.22
Spending taxpayer dollars to reduce gun ownership (e.g., through federal buyback programs) would be a good idea.	.82	3.92	2.15

Table F2 (cont'd).

	Loading	*M*	*SD*
Vegetarianism (α = .92, ω = .92)		*4.01*	*1.60*
Having a vegetarian diet is more economical than having a diet that includes meat.	.70	3.96	1.89
I am in favor of more people adopting a vegetarian lifestyle.	.93	3.92	1.79
More people should consider becoming vegetarians.	.96	3.89	1.78
When people choose to become vegetarians, it is generally a good decision.	.87	4.29	1.67
Recycling (α = .92, ω = .92)		*6.22*	*0.96*
I am in favor of programs that encourage people to recycle.	.88	6.23	1.08
It would be a good idea to expand recycling programs in the U. S.	.88	6.19	1.10
Recycling is good for the environment.	.80	6.29	1.01
It is important that people make an effort to recycle.	.91	6.18	1.09
Mandatory vaccination (α = .88, ω = .88)		*5.58*	*1.57*
Parents should not be required to vaccinate their children.*	.67	5.18	2.02
Mandatory vaccination is good for public health in the U.S.	.91	5.82	1.61
It would be a good thing for all children in the U. S. to be required to receive some vaccines.	.94	5.74	1.64

Note. Asterisks indicate reverse-coded items. Reported means for those items were calculated after reverse coding. For the overall model, N = 999, RMSE = .02, CFI = .99.

Table F3.
Study 2: Confirmatory Factor Analysis – Post-test Attitudes

	Loading	*M*	*SD*
Climate change (α = .88, ω = .91)		*5.45*	*1.42*
I am in favor of adopting policies that will help reduce climate change.	.94	5.57	1.65
Adopting policies to reduce climate change will do more good than harm.	.27	4.77	2.13
Taking steps to reduce climate change is a social responsibility.	.94	5.66	1.60
Taking steps to reduce climate change is a good idea.	.90	5.73	1.63
It would be irresponsible NOT to take steps to reduce climate change.	.88	5.53	1.76
Gun control (α = .95, ω = .95)		*4.50*	*1.99*
The U. S. needs stronger restrictions on gun ownership.	.96	4.64	2.21
No changes to current U. S. gun laws should be made.*	.78	4.98	2.06
Strengthening gun laws would make the U. S. safer than it is now.	.94	4.34	2.20
I support stronger U. S. gun laws.	.96	4.60	2.23
Spending taxpayer dollars to reduce gun ownership (e.g., through federal buyback programs) would be a good idea.	.83	3.95	2.17

Table F3 (cont'd).

	Loading	*M*	*SD*
Vegetarianism (α = .92, ω = .93)		*4.05*	*1.61*
Having a vegetarian diet is more economical than having a diet that includes meat.	.72	4.05	1.87
I am in favor of more people adopting a vegetarian lifestyle.	.94	3.94	1.81
More people should consider becoming vegetarians.	.96	3.89	1.81
When people choose to become vegetarians, it is generally a good decision.	.86	4.34	1.67
Recycling (α = .93, ω = .93)		*6.20*	*1.01*
I am in favor of programs that encourage people to recycle.	.90	6.25	1.07
It would be a good idea to expand recycling programs in the U. S.	.89	6.18	1.15
Recycling is good for the environment.	.78	6.22	1.10
It is important that people make an effort to recycle.	.93	6.17	1.12
Mandatory vaccination (α = .86, ω = .87)		*5.60*	*1.51*
Parents should not be required to vaccinate their children.*	.63	5.16	2.03
Mandatory vaccination is good for public health in the U.S.	.89	5.86	1.54
It would be a good thing for all children in the U. S. to be required to receive some vaccines.	.94	5.79	1.60

Note. Asterisks indicate reverse-coded items. Reported means for those items were calculated after reverse coding. For the overall model, N = 806, RMSE = .03, CFI = .99.

Table F4.
Confirmatory Factor Analysis – Delayed Post-test Attitudes

	Loading	*M*	*SD*
Climate change (α = .90, ω = .92)		*5.59*	*1.38*
I am in favor of adopting policies that will help reduce climate change.	.92	5.68	1.54
Adopting policies to reduce climate change will do more good than harm.	.38	4.95	2.06
Taking steps to reduce climate change is a social responsibility.	.93	5.73	1.51
Taking steps to reduce climate change is a good idea.	.92	5.88	1.52
It would be irresponsible NOT to take steps to reduce climate change.	.91	5.69	1.65
Gun control (α = .95, ω = .95)		*4.54*	*1.99*
The U. S. needs stronger restrictions on gun ownership.	.97	4.69	2.22
No changes to current U. S. gun laws should be made.*	.76	4.94	2.06
Strengthening gun laws would make the U. S. safer than it is now.	.94	4.40	2.19
I support stronger U. S. gun laws.	.98	4.63	2.23
Spending taxpayer dollars to reduce gun ownership (e.g., through federal buyback programs) would be a good idea.	.82	4.03	2.18

Table F4 (cont'd).

	Loading	*M*	*SD*
Vegetarianism (α = .92, ω = .93)		*4.17*	*1.53*
Having a vegetarian diet is more economical than having a diet that includes meat.	.71	4.15	1.80
I am in favor of more people adopting a vegetarian lifestyle.	.94	4.07	1.71
More people should consider becoming vegetarians.	.94	4.04	1.72
When people choose to become vegetarians, it is generally a good decision.	.86	4.44	1.59
Recycling (α = .93, ω = .93)		*6.19*	*1.01*
I am in favor of programs that encourage people to recycle.	.89	6.22	1.12
It would be a good idea to expand recycling programs in the U. S.	.90	6.17	1.16
Recycling is good for the environment.	.82	6.20	1.08
It is important that people make an effort to recycle.	.91	6.18	1.08
Mandatory vaccination (α = .88, ω = .88)		*5.66*	*1.48*
Parents should not be required to vaccinate their children.*	.67	5.18	2.00
Mandatory vaccination is good for public health in the U.S.	.92	5.94	1.45
It would be a good thing for all children in the U. S. to be required to receive some vaccines.	.93	5.87	1.52

Note. Asterisks indicate reverse-coded items. Reported means for those items were calculated after reverse coding. For the overall model, N = 723, RMSE = .03, CFI = .99.

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