Discussing global warming leads to greater acceptance of climate science

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Climate change is an urgent global issue, with demands for personal, collective, and governmental action. Although a large body of research has investigated the influence of communication on public engagement with climate change, few studies have investigated the role of interpersonal discussion. Here we use panel data with 2 time points to investigate the role of climate conversations in shaping beliefs and feelings about global warming. We find evidence of reciprocal causality. That is, discussing global warming with friends and family leads people to learn influential facts, such as the scientific consensus that human-caused global warming is happening. In turn, stronger perceptions of scientific agreement increase beliefs that climate change is happening and human-caused, as well as worry about climate change. When assessing the reverse causal direction, we find that knowing the scientific consensus further leads to increases in global warming discussion. These findings suggest that climate conversations with friends and family enter people into a proclimate social feedback loop.

Results from the cross-lagged panel analysis and downstream effects on global warming beliefs and worry are shown in Fig. 1. The results provide evidence for reciprocal causality. That is, discussion of global warming at time 1 led to increased perceptions of scientific agreement at time 2 (β = 0.080, 95% CI [0.029, 0.131]), and equally, perceptions of scientific agreement at time 1 led to increases in global warming discussion at time 2 (β = 0.100, 95% CI [0.042, 0.156]). These findings demonstrate a change in each variable at time 2 because the model controls for scores of the same variables at time 1 (see ref. 9).

Increases in perceptions of scientific agreement over time, in turn, led to significant increases in the belief that global warming is happening and human-caused, as well as worry about global warming. Increases in discussion over time did not lead to downstream increases in the belief that global warming is happening or human-caused, but did lead to increases in worry (Fig. 1).

The indirect effect of discussion via an increase in perceptions of scientific agreement was significant for the belief that global warming is happening (β = 0.015, 95% CI [0.013, 0.016]), the belief that global warming is human-caused (β = 0.025, 95% CI [0.021, 0.030]), and worry (β = 0.018, 95% CI [0.013, 0.023]). Likewise, the indirect effect of perceptions of scientific agreement via an increase in global warming discussion was significant for the belief that global warming is happening (β = 0.004, 95% CI [0.003, 0.004]), the belief that global warming is human-caused (β = 0.003, 95% CI [0.002, 0.004]), and worry (β = 0.007, 95% CI [0.001, 0.012]). Compared with the indirect effects of perceived scientific agreement, the indirect effects of discussion were significantly stronger for the belief that global warming

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is happening ($Z = 13.879, P < 0.001$), the belief that global warming is human-caused ($Z = 8.787, P < 0.001$), and worry ($Z = 2.992, P = 0.003$).

**Discussion**

Despite the influence of social networks on individual beliefs and behaviors, the role of climate change discussions with friends and family has received little research attention. Here we find that discussion can generate a feedback loop where people who discuss global warming become more likely to learn influential facts such as the scientific consensus that humans are causing global warming, which encourages further discussion. Importantly, indirect effects of discussion were significantly stronger than those of the scientific consensus, suggesting that encouraging people to discuss global warming with their friends and family may be a productive way to initiate the social feedback loop, but that the actual content of the discussion itself (e.g., scientific agreement) plays a key role in changing relevant beliefs.

The role of global warming discussion among one’s own social network may be especially important given the powerful influence of messengers on message effects (2, 3). For example, when the message comes from close friends and family, people less engaged with the issue may be more receptive than when an identical message comes from close friends and family, people less engaged with the issue may be more receptive than when an identical message is communicated by someone not part of their close social network.

Moreover, the politicization of climate science is likely exacerbated by the increasing fragmentation of media consumption (11). Discussion with others in one’s close social network, on the other hand, appears to be an important route by which people might be engaged by the increasing fragmentation of media consumption and worry autocorrelations are depicted below the figure to preserve legibility. **P < 0.01, ***P < 0.001. T1, time 1; T2, time 2; RMSEA, root mean square error of approximation; CFI, comparative fit index; AIC, Akaike information criterion; BIC, Bayesian information criterion.

**Materials and Methods**

Participants. In the first wave of data collection (fielded 27 February to 10 March 2015), a nationally representative probability sample of respondents was recruited through Growth from Knowledge’s Knowledge Panel ($n = 1,263$). Respondents were contacted again approximately 7 mo later (completion rate = 72%; $n = 905$). To avoid potential biases resulting from missing data, missing values were estimated using full information maximum likelihood (12).

Procedure and Materials. Respondents were recruited as part of the Climate Change in the American Mind project to participate in a survey on global warming beliefs, attitudes, and policy preferences. To measure global warming discussion, we asked, “How often do you discuss global warming with your family and friends?” (1 = Never, 4 = Often). Respondents reported their estimates of scientific agreement by answering, “To the best of your knowledge, what percentage of climate scientists think that human-caused global warming is happening?” (0–100%). The question gauging whether respondents believe global warming is happening was “...Do you believe that global warming is or is not happening?” (1 = No, 2 = Don’t Know, 3 = Yes). For human-causation, respondents answered, “Asuming global warming is happening, do you think it is...” (1 = None of the above because global warming is not happening, 2 = Caused mostly by natural changes in the environment, 3 = Caused mostly by human activities). To measure worry about global warming, respondents were asked, “How worried are you about global warming?” (1 = Not at all worried, 4 = Very worried). Questions were identical at both time points.

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