

Supplemental materials

Study 1 Methods

Sampling and stratification details

For this study, we recruited participants who were at least 18 years of age, fluent in English, residing in the United States, had a Prolific approval rating of at least 95%, completed at least 50 Prolific submissions prior to this study, and reported any level of belief in climate change via a single-item pre-screening question, “Do you believe in climate change?” We used quota sampling to recruit evenly by binarized gender (50% men, 50% women; however, 2.8% of our final sample reported an alternative gender identity on our demographic survey), as well as to recruit participants across the adult lifespan (40% younger adults aged 18-35, 40% middle-aged adults aged 36-54, and 20% older adults aged 55-90). Younger and middle-aged adults were oversampled due to the skewed age distribution on Prolific; less than 10% of the platform participants are aged 55-90. Once recruitment slowed to less than 15 participants per day for middle-aged and older adults (17 days after data collection began), we removed quota sampling by age to allow for the full sample size to be collected.

Participants were excluded if they failed both of the attention checks within the survey ($n = 1$) which required responding as instructed (e.g., “If you are paying attention, select ‘somewhat agree’ below”). Though we only recruited participants who reported believing in climate change in a screening question, we also validated belief in climate change in our survey. Participants were excluded if they reported denial in anthropogenic climate change either by reporting that climate change is not occurring, attributing climate change to entirely natural causes, or indicating high uncertainty and skepticism about climate change ($n = 27$).

Other measures included in study

Current Action levels. For each action, participants reported their current frequency of engaging in the action. To describe current air travel habits, participants reported the number of flights taken in the past year, across six duration categories ranging from very short flights (under 2 hours) to extremely long flights (greater than 15 hours). To describe current donation behavior, participants input a number to approximate the total sum (in USD) that they donated in the past year to support organizations or candidates that aim to address climate change. To describe current payments for renewable energy, participants input an approximate amount (in USD), if any, that they currently pay to their electricity provider to power their home with renewable energy. For dietary actions, recycling, and driving, participants reported current frequency on a 9-point scale (1 = *Never*, 9 = *Multiple times per day*). For civic actions (with the exception of donations, described above), participants used a similar 9-point frequency scale (1 = *Never / Almost never*, 9 = *Every day*). Flights (count), paying for renewable energy (dollar amount), and donations (dollar amount) are winsorized to the 99th percentile.

News Headline Task. Participants were shown five news headlines related to climate change, each comprising a title and lede. These headlines were randomly selected from a larger pool of 26 headlines from the New York Times. For each article, participants rated their intention to share it—either broadly on social media or directly with someone they know—on a scale from 0 (strongly disagree) to 100 (strongly agree). Additionally, participants used the same 0-100 scale to evaluate perceived self-relevance and social relevance, as well as positive and negative affect and their interest in reading the article.

Petitions Task. Participants viewed three climate change petitions, displayed as screenshots of actual petitions from *change.org* with abbreviated text. These were chosen randomly from a set of 10 petitions. For each petition, participants rated their intent to share it—either widely on social media or directly with someone they know—on a scale from 0 to 100 (strongly disagree to strongly agree, respectively). They also rated their intentions of signing each petition. Next, participants were given a link to the full petition on *change.org*, which they could choose to click for more information and to sign if interested. Link clicks were recorded, and participants self-reported whether they signed the petition.

Self-efficacy regarding climate action (i.e., belief in the power of individuals and society to take action to address climate change) was assessed using four items from the Climate Change Attitude Survey developed and validated by Christensen & Knezek (2015), with responses on a 5-point agreement scale (1 = Strongly disagree, 5 = Strongly agree). Our data show sufficient internal validity using this scale (Cronbach's alpha = 0.78).

Emotions about climate change were also rated on 5-point agreement scales (1 = Strongly disagree, 5 = Strongly agree), including for: anxiety, hopefulness, hopelessness, determination, disengagement, uncertainty, anger, and sadness.

Perceived risk and concern were measured with four items, each using a 5-point agreement scale. **Knowledge** (2 items) and **uncertainty/skepticism** (4 items) were also assessed using 5-point agreement scales. These scales are taken from Spence et al. (2015). Our data show sufficient internal validity using each of these scales (Perceived risk/concern: Cronbach's alpha = 0.67, Uncertainty/skepticism: Cronbach's alpha = 0.90, Climate knowledge: Cronbach's alpha = 0.72).

For details on other measures collected in this study, please see the larger study report (Sinclair et al., 2025a) and set of operating procedures (<https://osf.io/x9c6j/overview>).

Study 2 Methods

All study recruitment, sampling, and exclusion criteria as well as all study measures were pre-registered for the overarching second-wave intervention tournament (<https://osf.io/fvd7c/overview>).

Participants

We conducted power analyses to determine the sample size per intervention group. A sample of $N = 350$ would yield 80% statistical power to detect a small effect size ($d = 0.15$) for a within-person change on a single-measure outcome variable. Based on a pilot study, we expected that approximately 10% of people would opt-out of the longitudinal part of the study after session 1 and that approximately 75% of the remaining participants would complete the study. Participants were recruited from Prolific in April, 2025, to meet the following criteria: currently residing in the United States, fluent in English, at

least 18 years of age, an approval rate (from prior Prolific tasks) of at least 95%, have completed at least 50 tasks on Prolific, and not have participated in other studies run by our team testing these psychological interventions. We also used an existing Prolific screening question “Do you believe in climate change? [yes/no]” to recruit participants who reported believing that climate change is occurring. We used quota sampling to set the distribution of demographic variables in our sample. We recruited a gender-balanced sample of 50% men and 50% women (as self-identified on Prolific’s demographic forms). Note that although the screening option provided by Prolific limited respondents to two gender options, we offered additional gender options on our own demographics surveys, and some participants reported non-binary identities. Study exclusion procedures are included in the main paper.

Procedure

Participants were assigned to either the CAI condition or the control condition. The CAI task was identical to the task used in Study 1, except for the language used when asking participants to choose their target action. In Study 1, we asked participants “”. In Study 2, we asked “,” to match the timeline of the longitudinal part of our study.

After completing the intervention, participants were asked to complete the questionnaires included below (Session 1 Outcome Measures). For 10 days, participants completed surveys every other day, including a longer survey on the final (10th) day. Details for measures included in the daily and final surveys are included below, including descriptions of any changes from measures repeated across both Study 1 and Study 2.

Session 1 Outcome Measures

Repeated and Modified Outcome Measures

Participants completed a battery of outcome measures that included several tasks that were adapted from the prior intervention tournament protocol. In the Climate Action Task, participants rated the same set of pro-environmental behaviors as used previously. We used the same procedures as in Study 1 for collecting current action levels. However, to increase the granularity of responses and increase consistency across action measures, we changed the rating scales for action intentions and emotions from discrete Likert scales to continuous sliders (paralleling the sliders that were already used for ratings of news headlines and petitions). Participants rated pro-environmental behaviors on 0-100 point scales to report future action intentions relative to current behavior (0 = a lot less, 50 = the same, 100 = a lot more), perceived environmental impact (0 = no impact, 50 = moderate impact, 100 = very large impact), perceived social approval (0 = all or nearly all would disapprove, 50 = mixed approval / unsure, 100 = all or nearly all would approve), and ease of increasing engagement in the pro-environmental behavior (0 = very difficult, 50 = neither easy nor difficult, 100 = very easy).

Likewise, we modified the Climate Emotions Task, in which participants rated discrete emotions related to climate change, such that participants iteratively responded to the prompt “When I think about climate change, I feel... [anxious, hopeful, determined, angry, sad, frustrated, curious]” and used sliding scales (0 = strongly disagree, 100 = strongly agree) to rate their agreement with the statement for

each emotion listed. The set of discrete emotions was also modified in the adapted paradigm; we removed hopelessness, disengagement, and uncertainty measures but added frustration and curiosity.

The News Headlines Task from the first intervention tournament was used with minor modifications. For the news stimulus sets, we randomly divided the stimuli into two sets (Set A and Set B). In Session 1, all participants viewed a random subset of items News Headlines Set A. In the final session, participants instead viewed a random subset of items from News Headlines Set B. This split was implemented to ensure that participants did not view the same news headlines or petitions repeatedly when completing the task again during the final session.

Lastly, measures of Self-Efficacy (4-item scale), Climate Change Uncertainty and Skepticism (4-item scale), and demographic variables were consistent with the prior intervention tournament study. Our data show internal consistency for the self-efficacy and uncertainty/skepticism scales (self-efficacy: Cronbach's $\alpha = 0.74$; Uncertainty/skepticism: Cronbach's $\alpha = 0.60$).

Additional Outcome Measures

In addition to modifying some of the prior outcome measures, as described above, we also included new measures in Session 1.

Policy support and information seeking. Participants were presented with 3 climate-related policy proposals in a randomized order: (1) a requirement for new buildings to be run only on electricity (with no gas lines), (2) a tax on corporations based on the amount of carbon emissions they produce, and (3) a tax credit to encourage businesses to capture and store carbon emissions so they do not enter the atmosphere, or to develop technology to do so. These specific policies were selected based on feasibility and potential environmental and human impact. For each policy, participants rated their support for the policy on a 101-point sliding scale (0 = Fully oppose, 100 = Fully support), then reported whether they were interested in learning more about the policy (yes/no). If they selected yes, they were then shown two to three paragraphs of information about the policy and were provided with three web links they could click to explore for more information about the policy. The external links were selected to provide more detail about the policy function, underlying systems affected by the policy, and/or case studies of policy implementation. Sources were selected based on accuracy, credibility, and readability. Details about the additional information and external links are included below. If participants were presented with this additional information, they were then asked again to rate their support for the policy on a 101-point sliding scale (0 = Fully oppose, 100 = Fully support). We also tracked link clicks to the external sites provided. Link clicks were summed into a total value (range 0-3) per policy.

In the Policy Support and Information Seeking task, the following additional information was provided for each policy proposal if participants selected to learn more about the policy.

- (1) A tax credit to encourage businesses to capture and store carbon emissions so they do not enter the atmosphere, or to develop technology to do so.

Carbon storage, also known as carbon capture, works by capturing carbon dioxide (CO₂) emissions from industrial processes or directly from the atmosphere and then transporting and storing them underground. Carbon storage prevents carbon dioxide from entering the atmosphere as a greenhouse gas. Greenhouse gas emissions contribute to environmental pollution and accelerate climate change.

In the U.S., there is currently a federal tax credit available to companies that safely store carbon. The existing credit is based on the volume of carbon stored, allowing companies to pay less in taxes the more carbon they store. One concern with this policy is that the current methods for carbon capture are costly, energy-intensive, and have limitations in scalability and efficiency. Policies could also be implemented to provide tax credits to companies developing *new* technology for carbon capture. Advancements in technology could enhance the effectiveness, efficiency, and affordability of carbon storage.

The current tax credit for carbon capture is known as “45Q,” which provides financial incentives for capturing and storing carbon dioxide from industrial and power sector emissions. There have been recent proposals to revoke or modify this federal tax credit, though it continues to receive bipartisan support, including from many Republican representatives who view it as a market-based approach to reducing emissions while supporting energy industries.

+ *Here are various external resources to learn more about this policy:*

<https://carboncapturecoalition.org/wp-content/uploads/2023/11/45Q-primer-Carbon-Capture-Coalition.pdf>

<https://ethanolproducer.com/articles/perry-introduces-bill-to-repeal-45q-tax-credit>

<https://insideclimatenews.org/news/10032025/some-republicans-defend-clean-energy-tax-credits/>

(2) A tax on corporations based on the amount of carbon emissions they produce

Taxes based on carbon emissions are called carbon taxes, which are one of many types of “carbon pricing” tools designed to incentivize businesses to reduce their greenhouse gas emissions. These emissions contribute to environmental pollution and accelerate climate change.

Carbon taxes work by imposing a fee on companies for each ton of carbon dioxide (CO₂) or equivalent greenhouse gases they emit. This creates a financial incentive for

businesses to adopt cleaner technologies and energy sources and improve energy efficiency. The tax can be applied to fossil fuel producers and/or to direct emitters such as factories and power plants.

One concern with carbon taxes is the potential for increased costs being passed on to consumers. However, this challenge could be addressed through regulation or implementation details that minimize price increases for household consumers, and by only applying taxes to high-profit companies and large corporations. Carbon taxes can also be reinvested into clean energy projects, which could allow companies to invest in cleaner technologies and operations.

+ *Here are various external resources to learn more about this policy:*

<https://www.c2es.org/content/carbon-tax-basics/>

<https://www.canr.msu.edu/fccp/FCCP-ORL/Carbon%20Pricing%20-%20Carbon%20Markets%20and%20Carbon%20Taxes.pdf>

<https://www.energypolicy.columbia.edu/publications/what-you-need-to-know-about-a-federal-carbon-tax-in-the-united-states/>

(3) Requirement for new buildings to be run only on electricity (with no gas lines)

Policies for building codes can require that most new buildings are fully electric, meaning that new residential and commercial buildings are constructed with only electricity for heating, cooking, and hot water, rather than using natural gas or other fossil fuels. This can help prevent new dependence on fossil fuels and curb greenhouse gas emissions, which contribute to environmental pollution and accelerate climate change. Electrified buildings also improve indoor air quality and can accelerate the transition to clean energy, as electricity can be generated from cleaner, renewable sources.

One concern with requiring all-electric buildings is the potential for higher costs, particularly for developers and builders who must invest in electric heating and appliance infrastructure. Electricity prices can vary from place to place, so there may be concerns about affordability for consumers as well. These challenges can be addressed through financial incentives such as tax credits, grants, or low-interest loans for developers transitioning to all-electric designs, and by investing in electric grid modernization and renewable energy expansion while offering tax credits to electric low-income households to ensure that electricity remains affordable.

All-electric building policies are already gaining traction. The federal government has committed to electrifying all new federal buildings, and states like New York and California have implemented or proposed similar policies for private-sector buildings.

+ *Here are various external resources to learn more about this policy:*

<https://rmi.org/the-federal-government-is-electrifying-all-new-buildings-states-and-cities-should-follow-suit/>

<https://manhattan.institute/article/should-cities-phase-out-gas-appliances-and-require-new-buildings-to-be-all-electric>

<https://www.urbangreencouncil.org/decoding-new-york-states-all-electric-new-buildings-law/>

Target personal actions. At end of the Session 1 survey, participants were provided with the following prompt: “Over the next 10 days, you will be asked about your engagement in various personal actions you could take to address climate change. If you had to choose one personal action to try to do or take steps towards over the next 10 days, which action would you choose?” Participants chose one personal action (Riding a bicycle, walking, or using public transportation instead of driving; Taking trains instead of flying when possible; Eating more vegetarian and/or vegan meals; Eating less red meat (like beef or lamb); Paying for green energy to power my home).

Solidarity and agency about climate change. Participants were asked to think about climate change and report their feelings of solidarity (“A sense of solidarity (unity, togetherness, interdependence) with others”), individual agency (“Like I have agency to make change”), and collective response efficacy (“Like people can achieve change by working together”) about climate change. Each item was reported using a 101-point sliding scale (0 = strongly disagree, 100 = strongly agree).

Daily Diary Measures

After completing the Session 1 survey, participants completed five Daily Diary surveys, every other day over a 10 day period. At the beginning of each Daily Diary survey, participants were reminded about which personal and civic action goals they selected (**Target Personal and Civic Actions** from Session 1). Participants were also provided with reminders about the intervention they completed: participants in the Civic Action Intervention condition were reminded of what prompts they had completed as well as their response regarding the “very first step” to taking the action from the initial intervention writing task.

Daily Actions. In each Daily Diary, participants reported whether they engaged in any personal pro-environmental actions from a list provided (personal actions: walked, biked, or took public transit where you would normally drive; traveled by train or bus where you might normally take a plane; chose

to not eat beef or lamb in a meal; chose to eat a vegetarian or vegan meal; paid for clean energy in the home) or any civic climate actions from a list provided (civic actions: signed a petition related to climate change; donated to an organization or campaign related to climate change; volunteered for an organization or campaign related to climate change; contacted a local, state, or federal representative about issues related to climate change; had a conversation with someone about climate change). For each action, participants reported whether they did nothing related to this action (0), took steps or made progress toward taking the action (1), completed the action once (2), or completed the action more than once (3).

Climate Thoughts and Media. In each Daily Diary survey, participants reported how frequently they had thoughts about climate change (Thoughts); how many times they shared information about climate change via social media, face to face, or direct message (Information sharing); how many times they read, listened to, or watched news or information about climate change (Information consumption); and how many times they actively sought out news or information about climate change (Information seeking). Each item was reported using a 5-point frequency scale (1 = Never, 5 = Many times).

Additional Daily Diary Measures. In each Daily Diary, participants repeated the **Emotions about Climate Change** and the **Solidarity and Agency about Climate Change** scales from the Session 1 survey.

Final Session

During the final survey session, participants answered the same items from the daily surveys, in addition to several tasks repeated and adapted from Session 1. Participants completed the Climate Action Task, rating the same pro-environmental behaviors as in Session 1. For the News Headlines Task, participants completed the tasks in the same format as Session 1, but viewed random subsets of the withheld halves of the stimulus sets (Set B) to ensure that no items were repeated from Session 1. Participants also completed the Policy Support Task again, but only rated policy support without reporting interest in seeking additional information or opportunities to click on external links. Lastly, participants also completed the Self-Efficacy Scale again.

Data quality exclusions for Studies 1 and 2

Participants were excluded if they provided poor-quality responses to open-ended writing components ($n = 6$ in Study 1, $n = 13$ in Study 2), defined as one or more of: entering random text that is not related to the prompt, copying and pasting the prompt itself, entering the same text for every prompt, or entering text that does not make logical or grammatical sense (e.g. “I have nothing to say about this”, “N/A i Recycle right”, “I think this pukes me so much”). These text quality assurances were performed using the large language model GPT-4. For each participant, we prompted the model with the writing prompts, the participants’ responses, and a set of instructions for evaluation. We first tested the reliability of our usage of GPT-4 by manually coding data from roughly 300 participants in Study 1. GPT-4 and human raters assigned each written response a quality score ranging from 1 (very low quality) to 10 (very high quality), considering the length, relevance, detail, and grammar of the responses. Using these continuous quality scores, we calculated the inter-rater intra-class correlation coefficient between GPT-4 and human ratings to assess reliability; ICC scores indicated “moderate” agreement ($ICC = 0.46$). However, the human-LLM discrepancies included only false positives (the LLM flagged responses as low-quality that human coders did not), and there were no cases of false negatives (the LLM missing low-quality responses that were flagged by human coders). Thus, overall moderate agreement was sufficient to identify cases for manual review. We thus used GPT-4 to screen for low-quality responses in the full dataset. We manually reviewed all responses that were flagged for exclusion or assigned low quality scores (≤ 3 of 10) by GPT-4 (n flagged = 27 in Study 1, n flagged = 16 in Study 2), as well as outliers with unusually high or low word count.

Model syntax for reported main analyses

Here we report on the model syntax for reported primary analyses in the main paper, as well as the preregistered models to note where there were deviations from the Study 1 preregistered models. For Study 2, we preregistered the model versions that are reported in the main paper. Details can be found in our preregistrations (Study 1: <https://osf.io/7rwbz/overview>, Study 2: <https://osf.io/q7sj8/overview>).

H1: target action intention effects:

H1a, CAI: $\text{action_intention_s} \sim [\text{CAI vs. control}]$

H1b, PAI: $\text{action_intention_s} \sim [\text{PAI vs. control}]$

Where H1a includes observations for only the civic action selected by participants in either CAI or control groups, and H1b includes observations for only the personal action selected by participants in either PAI or control groups.

H1 preregistered model:

$\text{action_intention_s} \sim [(\text{PAI or CAI}) \text{ vs. control}] + (1 | \text{SID})$

In this analysis, the action intentions for the target action in the intervention group are compared against the “target action” selected by participants in the control group. In the preregistered model, control participants are thus included twice, as they selected each of a target personal action and a target civic action. To reduce any confounds due to each control participant being represented twice in the data, we report a version of this analysis splitting the results per intervention in the main paper. The results for the preregistered model are included in Supplemental results.

H2: general intention effects:

H2: $\text{action_intention_s} \sim [(\text{PAI or CAI}) \text{ vs. control}] + \text{action_current_s} + (1|\text{SID})$

H2 exploratory – effects per distinct group:

$\text{action_intention_s} \sim \text{group} + \text{action_current_s} + (1|\text{SID})$

H3: within-category intention effects:

H3a, CAI, using only data for civic actions: $\text{action_intention_s} \sim [\text{CAI, PAI vs. control}] + \text{action_current_s} + (1|\text{SID})$

H3b, PAI, using only data for personal actions: $\text{action_intention_s} \sim [\text{CAI, PAI vs. control}] + \text{action_current_s} + (1|\text{SID})$

We report here the preregistered version of this model. When we were preparing to conduct analyses, it became clear that this model was difficult to interpret. Because results were comparable using the simplified models above, we report on the simplified versions in the main paper. The results for the preregistered model are included in Supplemental results.

H3 preregistered model: $\text{behav_intentions} \sim \text{condition} [\text{CAI vs. (PAI or control)}] * \text{action_category_type} [\text{personal or civic}] + \text{action_current_s} + (1 | \text{SID})$

H3 preregistered version of the model, for PAI: $\text{action_intention_s} \sim [\text{PAI vs. (CAI or control)}] * \text{action_category_type} [\text{civic or personal}] + \text{action_current_s} + (1|\text{SID})$

H3 exploratory follow-up: effects per distinct action item:

$\text{action_intention_s} \sim \text{group} * \text{item} + \text{action_current_s} + (1|\text{SID})$

Study 1 model outputs using preregistered model syntax

Results for H1 show that the intervention (collapsing across PAI and CAI) increased intentions to engage in the target action, using our preregistered model. Note that the group coefficient across both conditions is near the average of the coefficients in the split models reported in the main results.

Results for H3 show that there is a significant interaction between group and action category for both CAI and PAI. In the CAI model, this is seen in the interaction effect (that is, civic action intentions are higher for the CAI group than either PAI or control). In the PAI model, we look at the main effect of group (PAI), given that the reference action category is personal.

Table S1. Study 1 model summaries for preregistered model syntax (H1, H3)

<i>DV</i>		Marginal R^2 / Conditional R^2	<i>Variable</i>	<i>Estimate</i>	<i>CI</i>	<i>Statistic</i>	<i>p</i>
H1: target action intentions (single model)	1586	0.050 / 0.207	Intercept	0.18	0.12 – 0.23	6.65	<0.001
			Group (PAI or CAI)	0.31	0.22 – 0.40	6.94	<0.001
			Current action level	0.14	0.11 – 0.18	8.08	<0.001
H3: CAI vs. (PAI or control)	1586	0.019 / 0.180	Intercept	0.01	-0.02 – 0.04	0.70	0.242
			Group (CAI)	-0.05	-0.11 – 0.01	-1.54	0.062
			Action category (civic)	-0.05	-0.08 – -0.02	-3.31	<0.001
			Group (CAI) * action category (civic)	0.22	0.16 – 0.28	7.08	<0.001
			Current action level	0.13	0.11 – 0.14	18.10	<0.001
H3: PAI vs. (CAI or control)	1586	0.019 / 0.179	Intercept	-0.04	-0.07 – -0.01	-2.43	0.008
			Group (PAI)	0.15	0.09 – 0.21	4.90	<0.001
			Action category (civic)	0.04	0.02 – 0.07	2.95	0.002
			Group (PAI) * action category (civic)	-0.18	-0.24 – -0.12	-5.80	<0.001
			Current action level	0.13	0.11 – 0.14	18.29	<0.001

Note. Estimates are standardized regression coefficients and statistics are t-values. One-tailed p-values are reported.

Demographics per group

Table S2 shows Study 1 demographics per group (CAI, PAI, control). As per χ^2 tests, there were no significant differences between groups based on gender ($\chi^2 = 15.89$, $p = 0.31$), race ($\chi^2 = 18.15$, $p = 0.46$), ethnicity ($\chi^2 = 3.26$, $p = 0.53$), income ($\chi^2 = 18.15$, $p = 0.45$), education ($\chi^2 = 14.82$, $p = 0.39$), subjective socioeconomic status ($\chi^2 = 20.85$, $p = 0.29$), political ideology ($\chi^2 = 7.67$, $p = 0.81$), or political party affiliation ($\chi^2 = 11.97$, $p = 0.62$).

Table S2. Study 1 demographics per group

Variable	Control <i>N</i> (%)	PAI <i>N</i> (%)	CAI <i>N</i> (%)	Variable	Control <i>N</i> (%)	PAI <i>N</i> (%)	CAI <i>N</i> (%)
Gender				Education level			

Agender, gender fluid, or genderqueer	8 (0.9%)	4 (1.1%)	2 (0.6%)	Did not complete high school	7 (0.9%)	4 (1.1%)	1 (0.3%)
Man	402 (47%)	177 (45%)	172 (45%)	High school graduate (GED)	25 (3.2%)	10 (2.7%)	10 (2.9%)
Gender identity not listed	1 (0.1%)	1 (0.3%)	0 (0%)	Some college (1-4 years, no degree)	173 (22%)	74 (20%)	82 (24%)
Non-binary	15 (1.8%)	7 (1.8%)	7 (1.8%)	Associate's degree (including occupational or academic degrees)	83 (11%)	47 (13%)	26 (7.5%)
Woman	422 (50%)	201 (51%)	198 (52%)	Bachelor's degree (BA, BS, etc)	350 (45%)	156 (42%)	151 (44%)
Race/Ethnicity				Master's degree (MA, MS, MENG, MSW, etc)	109 (14%)	61 (17%)	56 (16%)
American Indian or Alaskan Native	3 (0.4%)	2 (0.5%)	1 (0.3%)	Professional school degree (MD, DDC, JD, etc)	17 (2.2%)	10 (2.7%)	7 (2.0%)
Black or African American	110 (13%)	51 (13%)	51 (13%)	Doctorate degree (PhD, EdD, etc)	14 (1.8%)	6 (1.6%)	13 (3.8%)
East Asian	26 (3.1%)	18 (4.6%)	13 (3.4%)	Income level			
Multiple races	43 (5.1%)	24 (6.1%)	33 (8.6%)	Less than \$5,000	13 (1.6%)	10 (2.6%)	9 (2.4%)
Native Hawaiian or Other Pacific Islander	1 (0.1%)	1 (0.3%)	1 (0.3%)	\$5,000 through \$11,999	27 (3.2%)	13 (3.4%)	8 (2.2%)
Racial/ethnic identity not listed	9 (1.1%)	8 (2.0%)	9 (2.4%)	\$12,000 through \$15,999	18 (2.2%)	10 (2.6%)	11 (3.0%)
South Asian	19 (2.2%)	9 (2.3%)	4 (1.0%)	\$16,000 through \$24,999	54 (6.5%)	11 (2.8%)	16 (4.3%)
Southeast Asian	17 (2.0%)	10 (2.5%)	10 (2.6%)	\$25,000 through \$34,999	71 (8.5%)	42 (11%)	34 (9.2%)
White	619 (73%)	267 (68%)	256 (67%)	\$35,000 through \$49,999	115 (14%)	46 (12%)	49 (13%)
Hispanic/Latine				\$50,000 through \$74,999	162 (19%)	84 (22%)	79 (21%)
No	759 (89%)	350 (89%)	332 (87%)	\$75,000 through \$99,999	139 (17%)	65 (17%)	67 (18%)
Yes	88 (10%)	43 (11%)	47 (12%)	\$100,000 through \$149,999	136 (16%)	57 (15%)	64 (17%)
				\$150,000 and greater	96 (12%)	48 (12%)	32 (8.7%)
Variable	Control Mean (SD)	PAI Mean (SD)	CAI Mean (SD)	Variable	Control Mean (SD)	PAI Mean (SD)	CAI Mean (SD)
Subjective social status (10-pt scale)	5.00 (3.00)	5.00 (2.00)	5.00 (2.00)	Age	40 (14)	40 (14)	39 (14)

Table S3 shows Study 2 demographics per group (CAI, PAI, control). As per χ^2 tests, there were no significant differences between groups based on gender ($\chi^2 = 5.63$, $p = 0.46$), race ($\chi^2 = 9.13$, $p = 0.34$), ethnicity ($\chi^2 = 2.56$, $p = 0.30$), income ($\chi^2 = 7.21$, $p = 0.61$), education ($\chi^2 = 11.05$, $p = 0.12$), subjective socioeconomic status ($\chi^2 = 11.11$, $p = 0.26$), or political party affiliation ($\chi^2 = 6.44$, $p = 0.51$). There was a significant difference in political ideology ($\chi^2 = 17.40$, $p = 0.009$).

Table S3. Study 2 demographics per group

Variable	Control N (%)	CAI N (%)	Variable	Control N (%)	CAI N (%)
Gender			Education level		

Agender, gender fluid, or genderqueer	2 (0.4%)	1 (0.2%)	Did not complete high school	0 (0%)	2 (0.5%)
Man	269 (51%)	195 (47%)	High school graduate (GED)	20 (4.0%)	16 (4.1%)
Non-binary	8 (1.5%)	4 (1.0%)	Some college (1-4 years, no degree)	63 (13%)	56 (14%)
Woman	248 (47%)	211 (51%)	Associate's degree (including occupational or academic degrees)	35 (7.0%)	29 (7.4%)
Race/Ethnicity			Bachelor's degree (BA, BS, etc)	199 (40%)	169 (43%)
American Indian or Alaskan Native	7 (1.3%)	2 (0.5%)	Master's degree (MA, MS, MENG, MSW, etc)	160 (32%)	93 (24%)
Black or African American	108 (20%)	92 (22%)	Professional school degree (MD, DDC, JD, etc)	8 (1.6%)	12 (3.1%)
East Asian	8 (1.5%)	4 (1.0%)	Doctorate degree (PhD, EdD, etc)	18 (3.6%)	14 (3.6%)
Multiple races	13 (2.5%)	20 (4.9%)	Income level		
Racial/ethnic identity not listed	10 (1.9%)	4 (1.0%)	Less than \$5,000	11 (2.1%)	8 (2.0%)
South Asian	5 (0.9%)	3 (0.7%)	\$5,000 through \$11,999	13 (2.5%)	13 (3.2%)
Southeast Asian	6 (1.1%)	7 (1.7%)	\$12,000 through \$15,999	7 (1.3%)	10 (2.5%)
White	368 (70%)	278 (68%)	\$16,000 through \$24,999	14 (2.7%)	19 (4.7%)
Hispanic/Latine			\$25,000 through \$34,999	27 (5.2%)	23 (5.7%)
No	480 (91%)	375 (91%)	\$35,000 through \$49,999	45 (8.6%)	43 (11%)
Yes	46 (8.7%)	31 (7.5%)	\$50,000 through \$74,999	105 (20%)	81 (20%)
			\$75,000 through \$99,999	107 (20%)	71 (17%)
			\$100,000 through \$149,999	123 (24%)	87 (21%)
			\$150,000 and greater	70 (13%)	52 (13%)
Variable	Control Mean (SD)	CAI Mean (SD)	Variable	Control Mean (SD)	CAI Mean (SD)
Subjective social status (10-pt scale)	6.00 (2.00)	6.00 (3.00)	Age	38.00 (13.00)	38.00 (12.00)

Comparison of demographics and key variables between samples

The samples in Study 1 and Study 2 differ in several ways:

Demographically, the Study 2 sample has more Black participants ($\chi^2 = 55.62$, $p < 0.001$; Standardized Residual = 5.35) and fewer East Asian participants (Std. Res. = -3.70), and fewer Hispanic/Latine participants ($\chi^2 = 8.51$, $p = 0.01$, Std. Res. = -2.26). All other race and ethnicity demographic groups are not significantly different. The Study 2 sample is also significantly different in income distribution ($\chi^2 = 39.98$, $p\text{-value} < 0.001$); the Study 2 sample has lower proportions of middle income (\$25–35k) and higher proportions of high income (\$100–150k) participants. The Study 2 sample also has a significantly different education level distribution ($\chi^2 = 87.19$, $p < 0.001$). In particular, there are fewer participants in Study 2 with some college but no degree (Std. Res. = -5.23) and more participants with Master's (Std. Res. = 7.77) and Doctoral (Std. Res. = 2.05) degrees. Finally, Study 2 has a higher subjective socioeconomic status (SES), as rated on a 10-point ladder scale (ANOVA: $F = 46.57$, $p <$

0.0001): the mean (SD) of Study 1 is 5.00 (3.00), and is 6.00 (2.00) for Study 2. Thus, overall, the Study 2 sample is somewhat racially and ethnically different, more educated, higher income, and higher SES.

The samples are also notably different in political and ideological distributions. The Study 2 sample is more evenly balanced across liberal and conservative ideologies (see Figure S1), and is significantly more conservative in Study 2 (ANOVA: $F = 239.3$, $p < 0.0001$). The Study 2 sample likewise differs in political party affiliation ($\chi^2 = 308.17$, $p < 0.001$), whereby Study 2 has more Republican participants (Std. Res. = -11.67) and fewer Democratic participants (Std. Res. = 16.99) than Study 1 (see Figure S2).

Finally, in terms of climate change beliefs, the Study 2 sample has slightly lower belief in human-caused climate change (ANOVA: $F = 10.13$, $p = 0.001$; Study 1 mean = 4.05, sd = 0.72; Study 2 mean = 3.95, sd = 0.74). Likewise, the Study 2 sample has slightly higher uncertainty about climate change (ANOVA: $F = 40.64$, $p < 0.0001$; Study 1 mean = 1.89, sd = 0.73; Study 2 mean = 2.08, sd = 0.76).

Figure S1. Ideology by sample (i.e., “wave”)

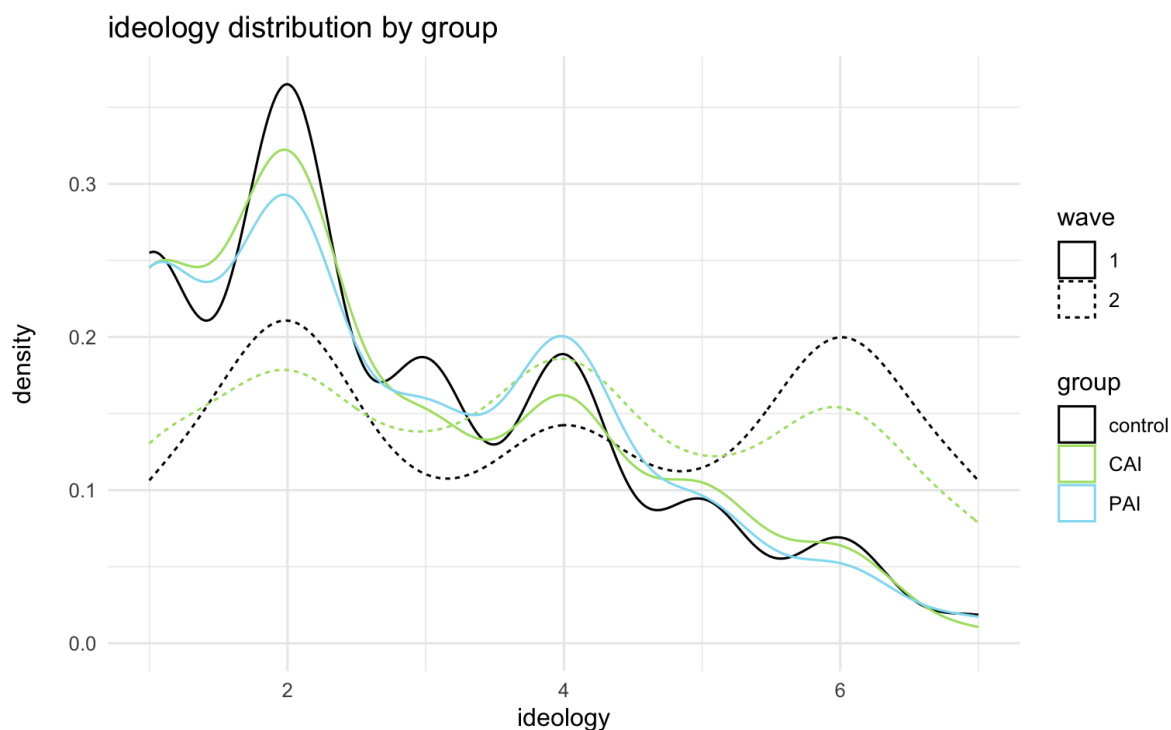
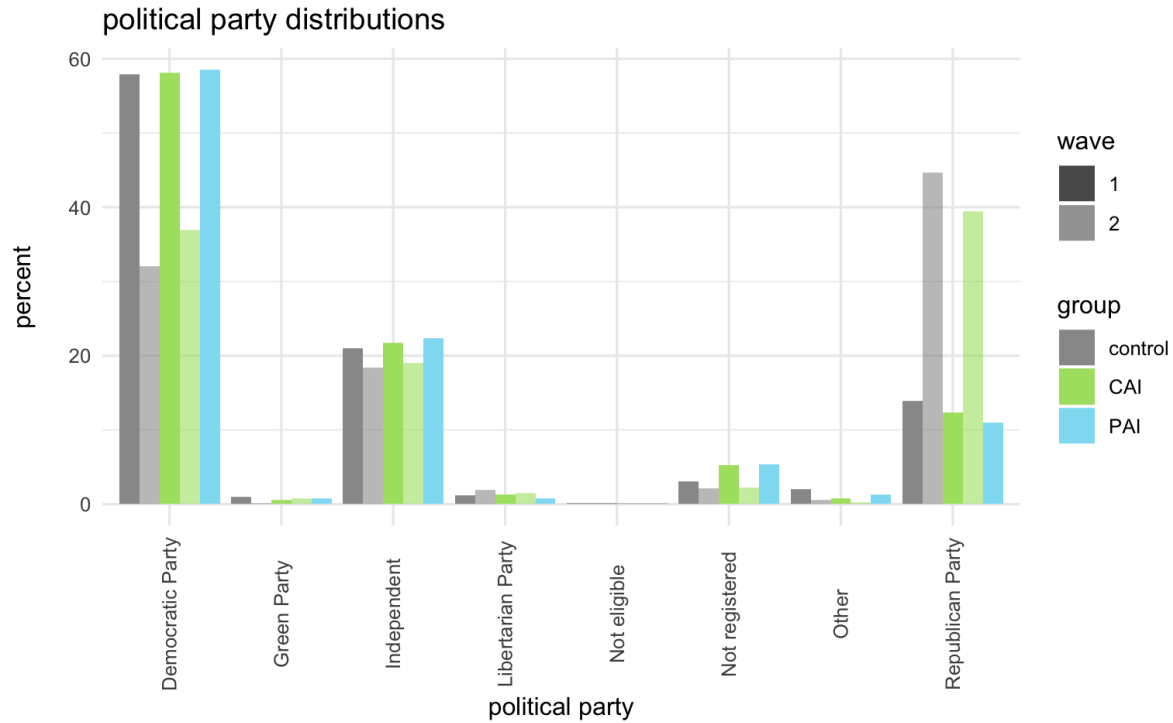


Figure S2. Political party affiliation by sample (i.e., “wave”)



Key variable distributions per group

For each group (CAI, PAI, and control), Figures S3 and S4 visualize the mean and SEM of current action levels (Figure S3) and future intentions (Figure S4) for each pro-environmental action measured in Study 1.

For Study 2, we show, per group (CAI and control), the mean and SEM of current action levels (Figure S5) and future intentions (Figure S6) for each pro-environmental action measured in the study. In our main analyses (H2 and H3 in the main manuscript) we control for current action levels.

There is notable variability in group means for current action levels: in the PAI group, current levels of personal actions tend to be higher than control or CAI; and in the CAI group, current levels of civic actions tend to be higher than control (in Studies 1 and 2) or PAI (in Study 1). In our main analyses (H2 and H3) we control for current action levels. However, since people rate both current action levels and future intentions *following* the intervention task, it is possible that these differences in means reflect an intervention effect on not only future intention levels (the outcome variable of our main analyses), but also current action levels. It is unlikely that these differences reflect inherent group differences in the absence of an intervention. Thus, our analyses may give a conservative estimate of intervention effects, since some of the intervention effects may be reflected in reported current action levels. We control for these effects to reduce the impact of group differences on our interpretation of intervention effects on intentions.

Figure S3. Study 1: Current action levels per group and per action item

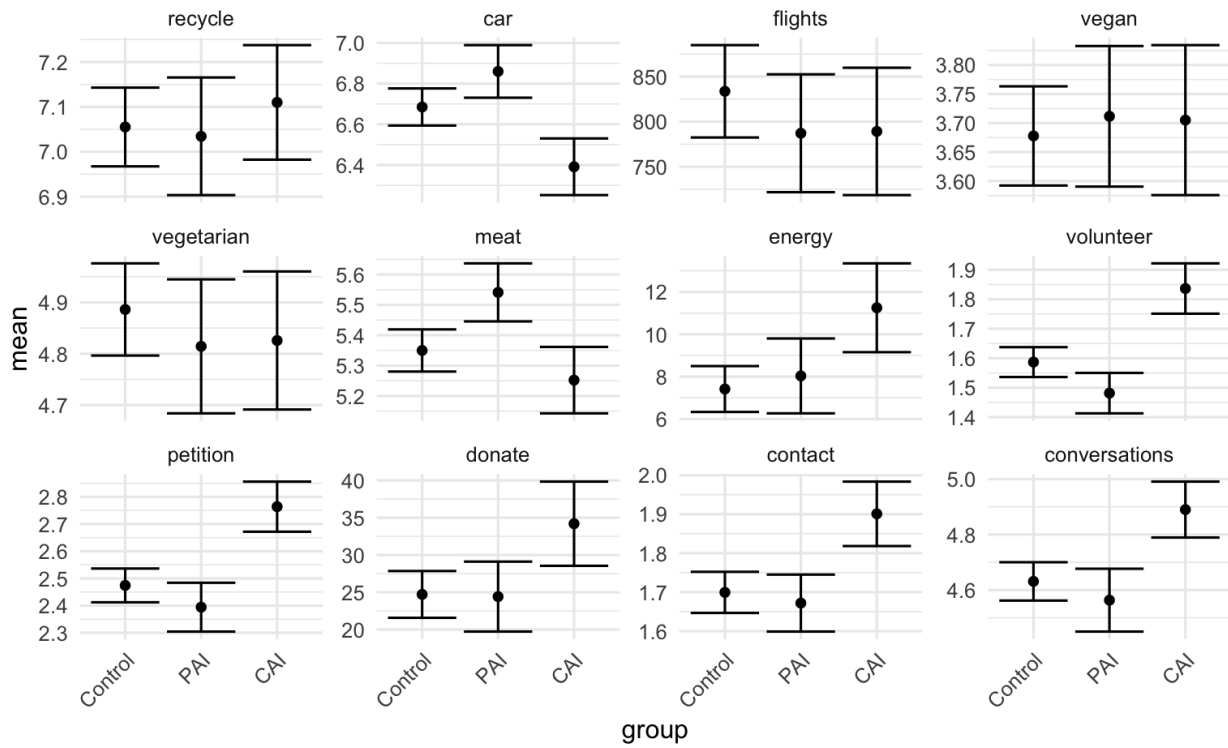
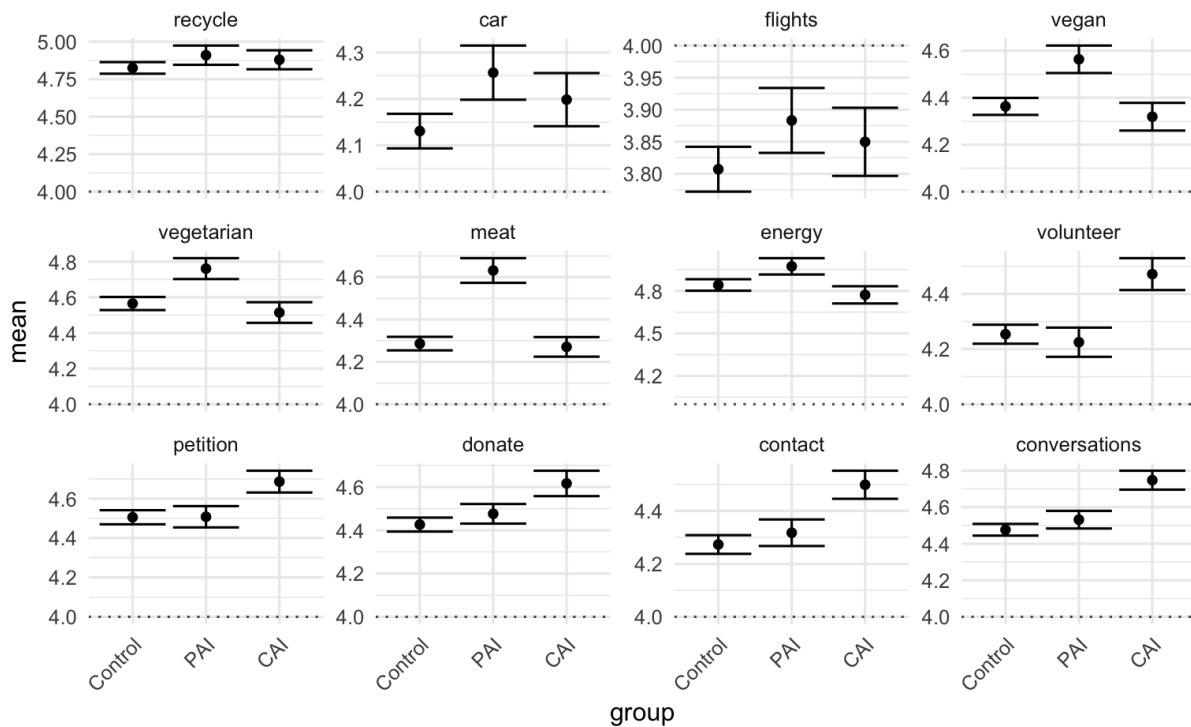


Figure S4. Study 1: Future intention levels per group and per action item



Note. Current action level = 4. Numbers > 4 indicate doing more of the relevant pro-environmental action (e.g., for “car” this means “driving less”), and numbers < 4 indicate doing less of the relevant pro-environmental action.

Figure S5. Study 2: Current action levels per group and per action item

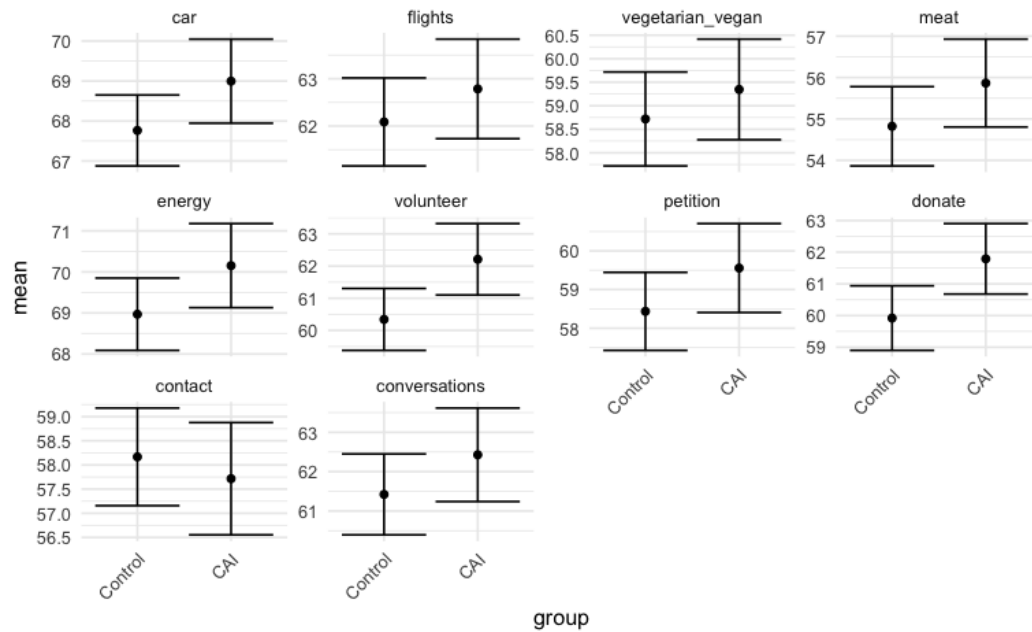
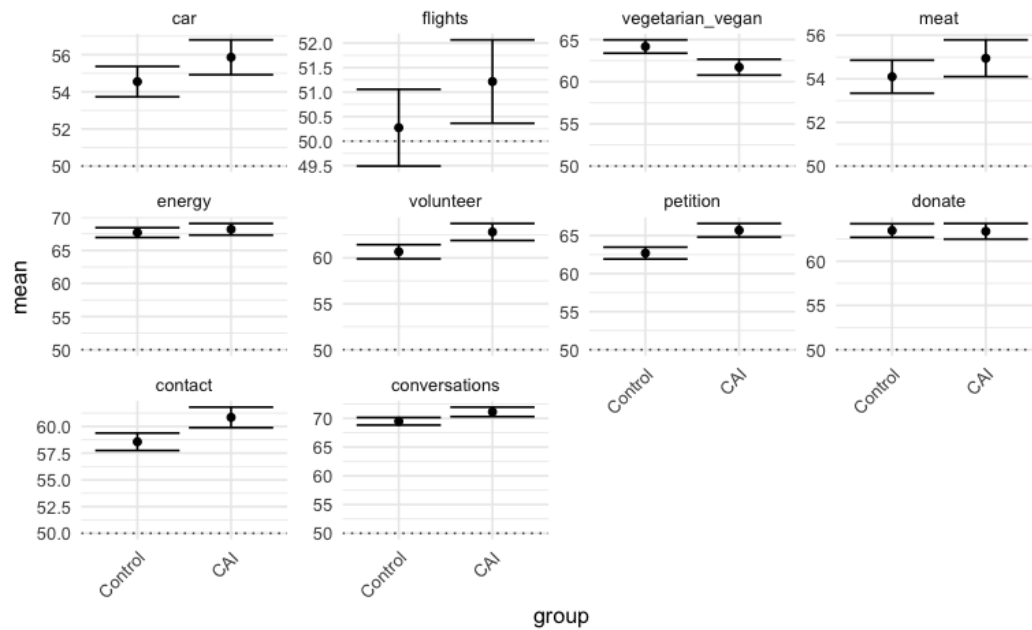


Figure S6. Study 2: Future intention levels per group and per action item

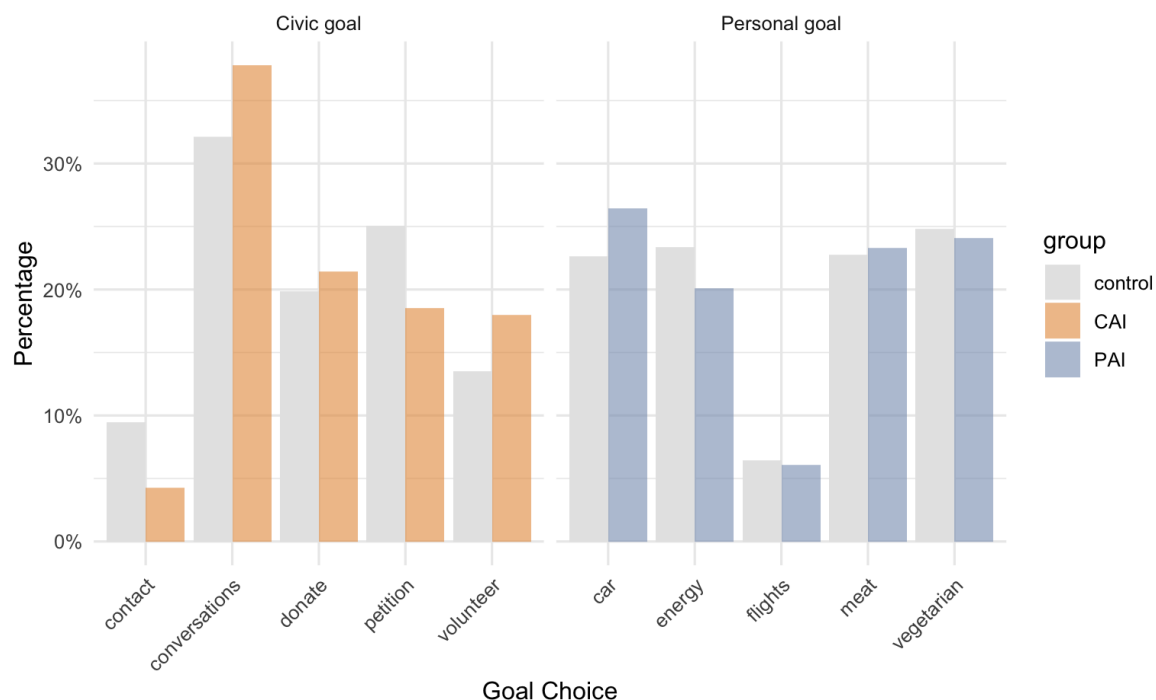


Note. Current action level = 50; all items rated on a 0-100 scale. Numbers > 50 indicate doing more of the relevant pro-environmental action (e.g., for “car” this means “driving less”), and numbers < 50 indicate doing less of the relevant pro-environmental action.

Which behaviors did participants choose?

Study 1

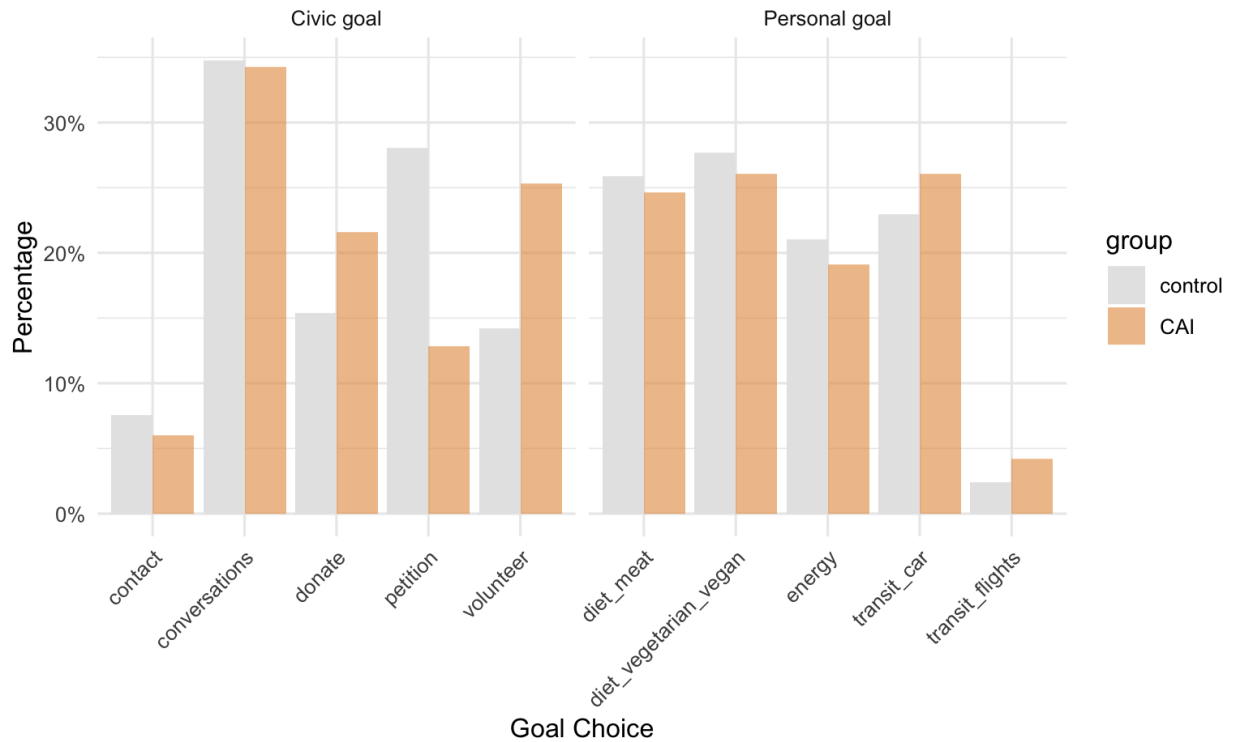
Figure S7. Target actions selected by participants



First, we explore differences across conditions regarding which action participants selected that they could most see themselves starting to do or do more of. Overall, the pattern of choices across options were similar between control and experimental groups. For civic action behaviors, the fewest people selected contacting representatives. The most frequently selected action is having conversations with others about climate change. Participants who selected personal actions chose flying less the least frequently, but choices were fairly distributed across other personal actions. We used a Pearson's chi-squared test to determine whether control and experimental conditions differed for each pair of control and personal, and control and civic conditions. There is no significant difference in the actions participants chose between personal action intervention and control groups ($\chi^2 = 3.02$, $p = 0.56$), but there was a significant difference between civic action intervention and control groups ($\chi^2 = 19.73$, $p = 0.001$). Using adjusted Pearson residuals (civic action intervention > control), we find that this difference is significant ($p < 0.05$) for choosing contacting representatives ($r = -3.08$), signing petitions ($r = -2.49$), and volunteering ($r = 1.99$).

Study 2

Figure S8. Target actions chosen by participants in Study 2.



Overall, the pattern of choices across options were similar between control and CAI groups. For civic action behaviors, the fewest people selected contacting representatives, as in Study 1. The most frequently selected action is having conversations with others about climate change, also as in Study 1. Participants also selected a “target” personal action, but did not engage in any task related to these actions in either the control or CAI group. We used a Pearson’s chi-squared test to determine whether control and CAI conditions differed. Among civic action goals, was a significant difference in the actions participants chose between personal action intervention and control groups ($\chi^2 = 76.80$, $p < 0.001$). Using adjusted Pearson residuals (civic action intervention > control), we find that this difference is significant ($p < 0.05$) for donations ($r = 3.14$), signing petitions ($r = -7.34$), and volunteering ($r = 5.54$). Among personal action goals, there was no difference in choice between CAI and control groups ($\chi^2 = 6.58$, $p = 0.161$).

General intention effects (H2) excluding target action

Tables S4 (Study 1) and S5 (Study 2) show the summaries from models of the general (H2) and within-category (H3) intervention effects, excluding the target action for each participant (that is, only non-targeted pro-environmental behaviors). All results were qualitatively similar in regards to the direction of effect, though quantitatively weaker. All results except a significant general effect of CAI relative to the Control condition (across both personal and civic actions) were also similar in regards to statistical significance.

Even excluding the target action, we saw a positive category-specific spillover effect of interventions. That is, we found a significant effect of PAI on personal but not civic action intentions and a significant effect of CAI on civic but not personal action intentions.

Table S4. Study 1 Model summaries for H2 and H3 tests, excluding the target action

<i>DV</i>	<i>N</i>	Marginal R^2 / Conditional R^2	<i>Variable</i>	<i>Estimate</i>	<i>CI</i>	<i>Statistic</i>	<i>p</i>
H2: general intentions	1586	0.008 / 0.185	Intercept	-0.06	-0.10 – -0.03	-4.11	<0.001
			Group (PAI or CAI)	0.07	0.02 – 0.11	2.75	0.006
			Current action level	0.09	0.07 – 0.10	13.62	<0.001
H3: civic action intentions	1586	0.032 / 0.474	Intercept	-0.07	-0.11 – -0.03	-3.22	0.001
			PAI	0.05	-0.03 – 0.13	1.18	0.238
			CAI	0.10	0.02 – 0.18	2.45	0.014
			Current action level	0.16	0.14 – 0.18	18.41	<0.001
H3: personal action intentions	1586	0.003 / 0.152	Intercept	-0.06	-0.09 – -0.03	-3.61	<0.001
			PAI	0.10	0.03 – 0.16	2.84	0.004
			CAI	0.03	-0.03 – 0.09	0.90	0.368
			Current action level	0.00	-0.02 – 0.02	0.24	0.809

Note. Estimates are standardized regression coefficients and statistics are t-values. Models were not pre-registered and so are reported with two-tailed p-values.

Table S5. Study 2 Model summaries for H3 test, excluding the target action

<i>DV</i>	<i>N</i>	Marginal R^2 / Conditional R^2	<i>Variable</i>	<i>Estimate</i>	<i>CI</i>	<i>Statistic</i>	<i>p</i>
H3a*: civic action intentions (excluding target action)	848	0.007 / 0.590	Intercept	-0.09	-0.16 – -0.02	-2.61	0.009
			Group (CAI)	0.13	0.03 – 0.22	2.47	0.014
			Current action level	0.28	0.25 – 0.32	16.92	<0.001

Note. Estimates are standardized regression coefficients and statistics are t-values. Models were not pre-registered and so are reported with two-tailed p-values.

Action ease

Since participants chose conversations most frequently across both samples, we ran exploratory analyses to determine whether participants rated conversation as the easiest action. Among civic action behaviors, conversations were overall second to petition-signing. That is, participants on average seem to find signing petitions to be easier than having conversations about climate change, though both of these were seen as easier than the other civic action behaviors we included.

Table S6. Action Ease Mean and SD by item, per study sample

Item	Study 1		Study 2	
	Mean	SD	Mean	SD
recycle	0.63	0.91	-	-
car	-0.60	1.01	-0.41	1.07
flights	0.15	1.03	-0.03	1.02
vegan	-0.29	0.99	-	-
vegetarian	0.08	0.95	-	-
vegetarian/vegan	-	-	-0.01	1.00
meat	0.13	0.93	0.01	0.96
energy	-0.30	0.93	-0.09	1.01
volunteer	-0.50	0.87	-0.19	0.99
petition	0.52	0.80	0.37	0.86
donate	-0.29	0.95	-0.08	1.03
contact	0.00	0.88	-0.08	0.94
conversations	0.45	0.78	0.49	0.79

Table S7. Study 1 Action Ease by item, accounting for current action level

Predictors	Estimates	CI	Statistic	p
(Intercept)	0.45	0.41 – 0.49	22.02	<0.001
item [contact]	-0.45	-0.50 – -0.40	-18.13	<0.001
item [petition]	0.07	0.02 – 0.12	2.69	0.007
item [donate]	-0.75	-0.80 – -0.70	-30.11	<0.001
item [volunteer]	-0.95	-1.00 – -0.90	-38.30	<0.001
action current s	0.23	0.21 – 0.25	23.97	<0.001

Note. Baseline action = conversations. N = 1586, Marginal R^2 = 0.242, Conditional R^2 = 0.449. The model was not pre-registered and so is reported with two-tailed p-values.

Table S8. Study 2: Action Ease by item, accounting for current action level

Predictors	Estimates	CI	Statistic	p
(Intercept)	0.44	0.39 – 0.50	15.80	<0.001
item [contact]	-0.52	-0.59 – -0.46	-15.61	<0.001
item [petition]	-0.09	-0.15 – -0.02	-2.58	0.010

item [donate]	-0.49	-0.55 – -0.42	-14.59	<0.001
item [volunteer]	-0.63	-0.70 – -0.57	-18.89	<0.001
action current s	0.24	0.22 – 0.27	18.03	<0.001

Note. Baseline action = conversations. N = 939, Marginal $R^2 = 0.144$, Conditional $R^2 = 0.390$. The model was not pre-registered and so is reported with two-tailed p-values.

Item-wise Estimated Marginal Means for action intentions

Tables S9 (Study 1) and S10 (Study 2) show the estimated marginal means (marginal effects) on action intentions, including all contrasts. The model also controls for current action level and includes a random intercept per participant. These results are visualized in the Results section of the main paper. We found that civic action intentions are significantly higher for participants who completed the CAI task, relative to both PAI and control groups, for every civic action measured, except for donating in Study 2. In Study 1, we also found that PAI action intentions are significantly higher for participants who completed the PAI task, relative to both CAI and control groups, for eating more vegetarian and vegan meals, eating less red meat, and paying for clean energy at home, but not recycling, flying less, or driving less.

Table S9. Study 1 Marginal effects of interventions on action intentions, per action item

Contrast	Estimate	SE	Z ratio	p value	Contrast	Estimate	SE	Z ratio	p value
recycle					volunteer				
PAI - control	0.08	0.06	1.34	0.18	PAI - control	-0.02	0.06	-0.30	0.76
CAI - control	0.05	0.06	0.79	0.43	CAI - control	0.18	0.06	3.02	< 0.001*
CAI - PAI	-0.03	0.07	-0.46	0.65	CAI - PAI	0.20	0.07	2.83	< 0.001*
car					petition				
PAI - control	0.11	0.06	1.82	0.07	PAI - control	0.01	0.06	0.13	0.97
CAI - control	0.08	0.06	1.29	0.2	CAI - control	0.15	0.06	2.46	0.01*
CAI - PAI	-0.03	0.07	-0.45	0.65	CAI - PAI	0.14	0.07	1.98	0.05*
flights					donate				
PAI - control	0.08	0.06	1.29	0.20	PAI - control	0.05	0.06	0.78	0.43
CAI - control	0.04	0.06	0.73	0.47	CAI - control	0.16	0.06	2.74	< 0.001*
CAI - PAI	-0.03	0.07	-0.47	0.64	CAI - PAI	0.12	0.07	1.67	0.09
vegan					contact				
PAI - control	0.18	0.06	3.09	< 0.001*	PAI - control	0.04	0.06	0.73	0.47
CAI - control	-0.04	0.06	-0.70	0.48	CAI - control	0.19	0.06	3.21	< 0.001*
CAI - PAI	-0.22	0.07	-3.23	< 0.001*	CAI - PAI	0.15	0.07	2.12	0.03*
vegetarian					conversations				
PAI - control	0.19	0.06	3.14	< 0.001*	PAI - control	0.05	0.06	0.93	0.35
CAI - control	-0.04	0.06	-0.73	0.46	CAI - control	0.23	0.06	3.93	< 0.001*
CAI - PAI	-0.23	0.07	-3.29	< 0.001*	CAI - PAI	0.18	0.07	2.57	0.01*

meat

PAI - control	0.31	0.06	5.19	< 0.001*
CAI - control	-0.01	0.06	-0.14	0.89
CAI - PAI	-0.31	0.07	-4.53	< 0.001*

energy

PAI - control	0.12	0.06	2.01	0.04*
CAI - control	-0.08	0.06	-1.32	0.19
CAI - PAI	-0.20	0.07	-2.83	< 0.001*

Note. This model was not pre-registered and so is reported with two-tailed p-values.

Table S10. Study 2 Marginal effects of interventions on action intentions, per action item

Contrast	Estimate	SE	Z ratio	p value
car	0.05	0.06	0.78	0.43
flights	0.03	0.06	0.56	0.58
vegetarian_vegan	-0.04	0.06	-0.66	0.51
meat	0.00	0.06	0.03	0.97
energy	0.08	0.06	1.27	0.2
volunteer	0.13	0.06	2.16	0.03*
petition	0.18	0.06	2.88	< 0.001*
donate	0.01	0.06	0.18	0.85
contact	0.17	0.06	2.80	0.01*
conversations	0.17	0.06	2.74	0.01*

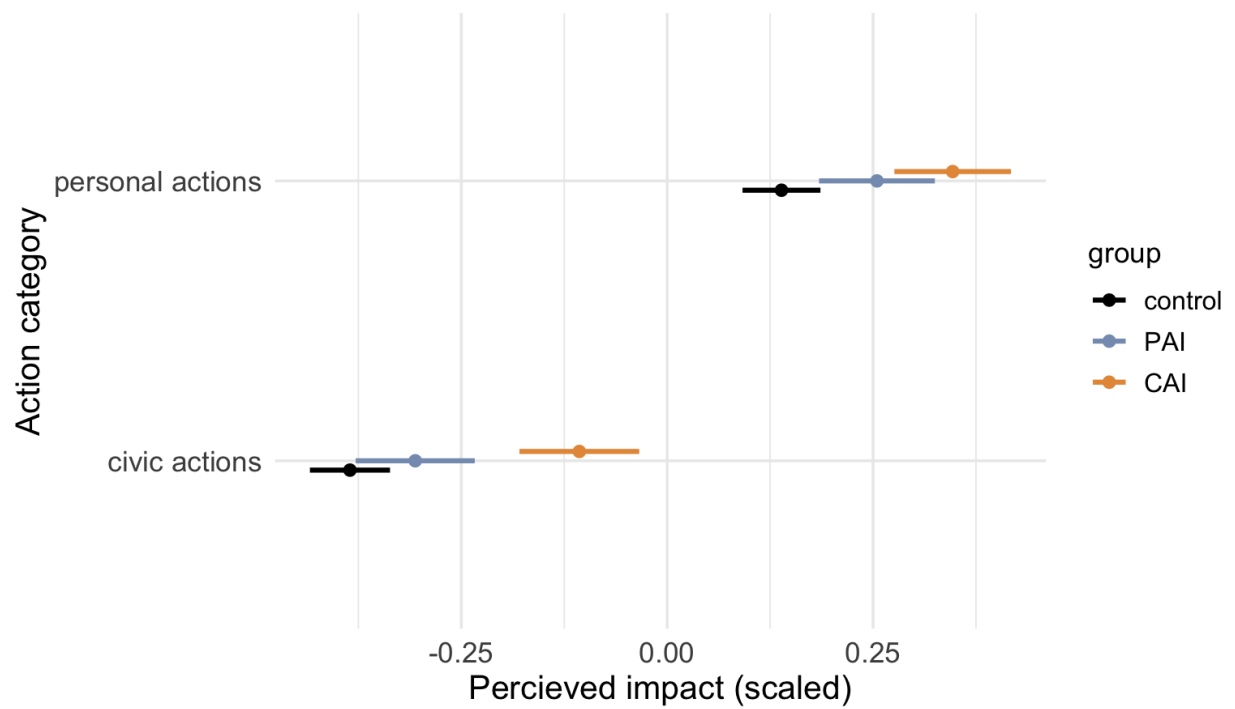
Note. Model estimates intentions from the interaction between condition (CAI v. control) and item (personal-level items: car = drive less, flights = fly less, meat = eat less red meat, vegetarian_vegan = eat more vegetarian or vegan meals, energy = pay for clean energy; civic-level items: petition = sign petitions, contact = contact representatives, conversations = have conversations about climate change, volunteer = volunteer for climate organization or cause, donate = donate to climate organization or cause). The model includes a random intercept per participant. Shown in the table are estimated marginal means for the contrast of CAI - control. This model was not pre-registered and so is reported with two-tailed p-values.

Perceived impact spillover effects

We found in Study 1 that interventions also increased the perceived impact of other pro-environmental action types (effects of intervention on the average across all actions: PAI: $\beta = 0.10$, CI = 0.02–0.18, two-tailed $p = 0.017$; CAI: $\beta = 0.24$, CI = 0.15–0.32, two-tailed $p < 0.001$). Again, this measure indicates how impactful a participant believes an action would be if many people did it, offering a proxy for collective response efficacy.

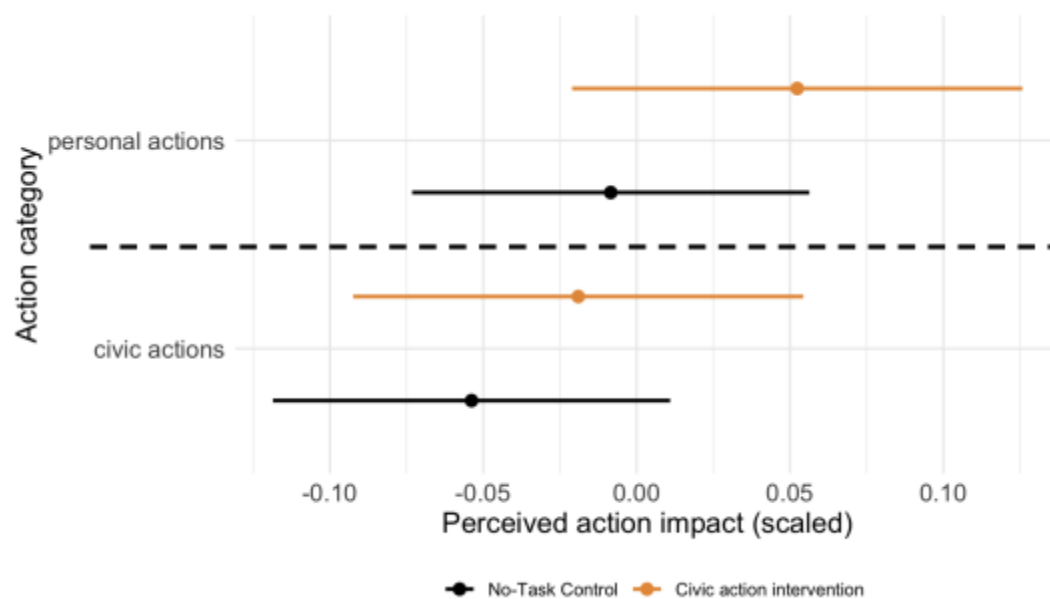
In Study 2, however, this general spillover effect did not replicate (CAI: $\beta = 0.05$, CI = -0.05–0.14, two-tailed $p = 0.319$) These results are summarized in Figures S9 (Study 1) and S10 (Study 2).

Figure S9. Study 1 intervention effects on perceived impact of action, by action category



Note. Model estimates of the perceived impact of an action if many people did it, per civic action intervention (orange), personal action intervention (blue), and control (black) conditions, from a mixed effects regression model. Plot shows estimated mean and 95% CIs for action intentions per each condition, per personal (top) and civic (bottom) action categories.

Figure S10. Study 2 intervention effects on perceived impact of action, by action category



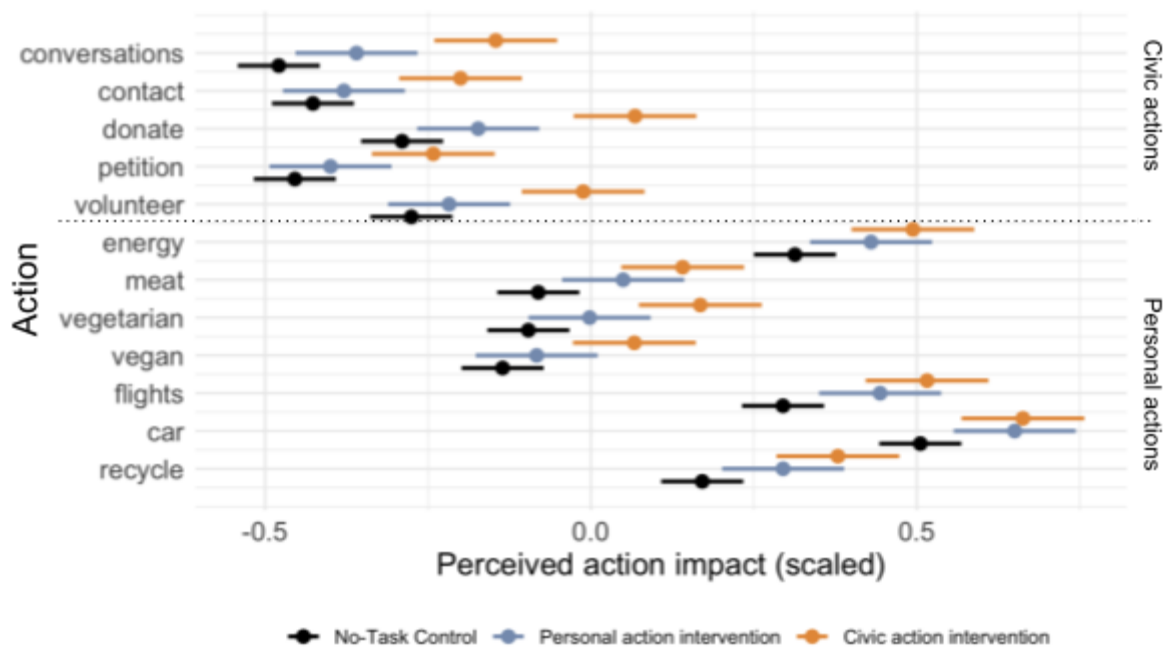
Note. Study 2 model estimates of the perceived impact of an action if many people did it, per civic action intervention (orange) and control (black) conditions, from a mixed effects regression model. Plot shows estimated mean and 95% CIs for action intentions per each condition, per personal (top) and civic (bottom) action categories.

Perceived impact per item

Study 1: Item-wise Estimated Marginal Means for perceived environmental impact

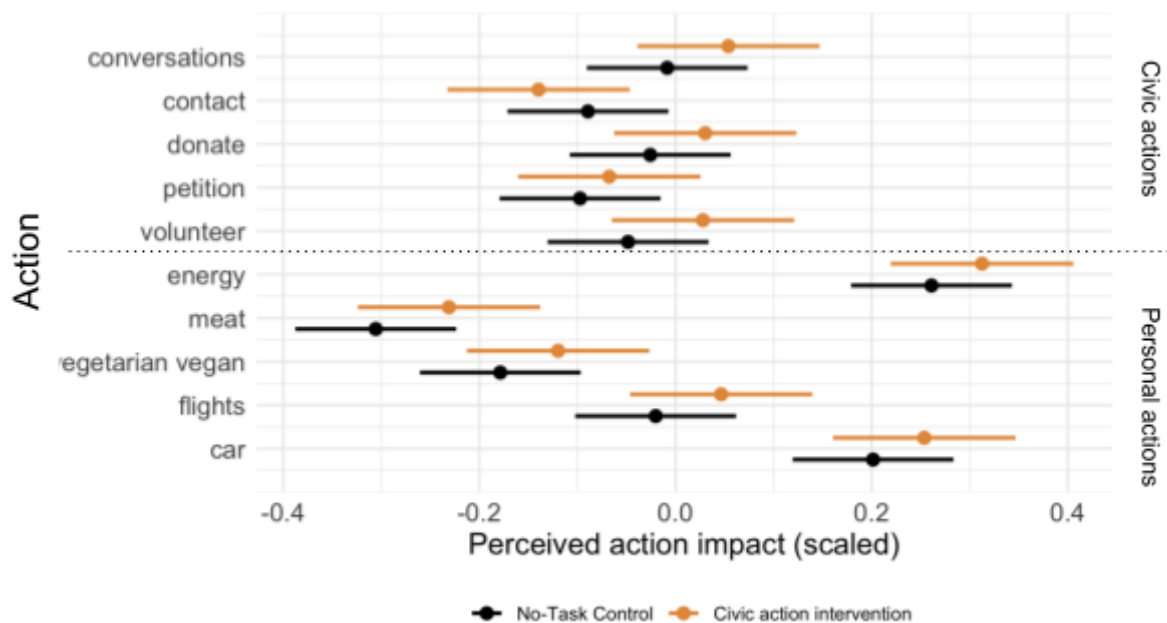
Table S11 shows the estimated marginal means (marginal effects) on the perceived impact of actions, including all contrasts, from Study 1. The perceived impact measure reflects how impactful participants believe the action would be if many people did it. The model also controls for current action level and includes a random intercept per participant. We found that the perceived impact of civic actions is significantly higher for participants who completed the CAI task, relative to both PAI and control groups, for every civic action measured. We also found that the perceived impact of personal actions are significantly higher for participants who completed both the PAI and CAI tasks, relative to the control group, for recycling, driving less, flying less, eating less red meat, and paying for clean energy at home. Only CAI was effective at increasing the perceived impact of eating more vegan and vegetarian meals. There were no personal actions where only PAI but not CAI increased the perceived action impact.

Figure S11. Study 1 intervention effects on perceived impact of actions per action item



Note. Model estimates of the perceived impact of an action if many people did it, per each action and per civic action intervention (orange), personal action intervention (blue), and control (black) conditions, from the mixed effects regression model. Plot shows estimated mean and 95% CIs of perceived impact per each condition, per each action item. Actions are grouped per civic (top) and personal (bottom) by dotted line.

Figure S12. Study 2 intervention effects on perceived impact of actions per action item



Note. Study 2 model estimates of the perceived impact of an action if many people did it, per each action and per civic action intervention (orange) and control (black) conditions, from the mixed effects regression model. Plot shows estimated mean and 95% CIs of perceived impact per each condition, per each action item. Actions are grouped per civic (top) and personal (bottom) by dotted line.

Table S11. Study 1 marginal effects of interventions on perceived action impact, per action item

Contrast	Estimate	SE	z.ratio	p.value	Contrast	Estimate	SE	z.ratio	p.value
recycle					volunteer				
PAI - control	0.12	0.06	2.16	0.03*	PAI - control	0.06	0.06	1.01	0.31
CAI - control	0.21	0.06	3.60	< 0.001*	CAI - control	0.26	0.06	4.56	< 0.001*
CAI - PAI	0.08	0.07	1.24	0.21	CAI - PAI	0.21	0.07	3.04	< 0.001*
car					petition				
PAI - control	0.14	0.06	2.52	0.01*	PAI - control	0.05	0.06	0.95	0.34
CAI - control	0.16	0.06	2.72	0.01*	CAI - control	0.21	0.06	3.67	< 0.001*
CAI - PAI	0.01	0.07	0.07	0.85	CAI - PAI	0.16	0.07	2.33	0.02*
flights					donate				
PAI - control	0.15	0.06	2.59	0.01*	PAI - control	0.12	0.06	2.03	0.04 *
CAI - control	0.22	0.06	3.82	< 0.001*	CAI - control	0.36	0.06	6.18	< 0.001*
CAI - PAI	0.07	0.07	1.06	0.29	CAI - PAI	0.24	0.07	3.55	< 0.001*
vegan					contact				
PAI - control	0.05	0.06	0.91	0.36	PAI - control	0.05	0.06	0.82	0.41
CAI - control	0.20	0.06	3.50	< 0.001*	CAI - control	0.23	0.06	3.92	< 0.001*
CAI - PAI	0.15	0.07	2.21	0.03*	CAI - PAI	0.18	0.07	2.64	0.01 *
vegetarian					conversations				
PAI - control	0.09	0.06	1.63	0.10	PAI - control	0.12	0.06	2.07	0.04 *
CAI - control	0.26	0.06	4.56	< 0.001*	CAI - control	0.33	0.06	5.76	< 0.001*
CAI - PAI	0.17	0.07	2.51	0.01*	CAI - PAI	0.21	0.07	3.15	< 0.001*
meat									
PAI - control	0.13	0.06	2.26	0.02*					
CAI - control	0.22	0.06	3.83	< 0.001*					
CAI - PAI	0.09	0.07	1.35	0.18					
energy									
PAI - control	0.12	0.06	2.03	0.04*					
CAI - control	0.18	0.06	3.13	< 0.001*					

CAI - PAI	0.06	0.07	0.95	0.34
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Note. This model was not pre-registered and so is reported with two-tailed p-values.

Overall, in these exploratory analyses, we found that the intervention effects on the perceived impact of an action was generalized to pro-environmental behaviors other than the target behavior, and that this effect was stronger for the civic versus personal action intervention. However, we did not replicate these findings in Study 2 (see the Supplemental Materials for Study 2 for details). Furthermore, we found in the first sample that although the civic action intervention increased the perceived impact of personal actions, the personal action intervention did not increase the perceived impact of civic actions (this was not testable in Study 2 because we did not include a personal action intervention). Overall, perceived impact was higher for personal actions than civic actions across all conditions, but the intervention, and in particular the civic action intervention, was effective at increasing the perceived impact of the civic target behavior.

Importantly, our measure for perceived impact measured *collective* impact—that is, how impactful an action would be if many people did it. This is related to the concept of collective response efficacy (Swim et al., 2019), i.e., belief in a group’s ability to achieve desired outcomes through collective actions. Relatedly, we showed preliminary evidence that civic action planning can increase the perceived collective impact of both civic and personal pro-environmental behaviors. These results were inconsistent across our two studies, however, and require further research.

Study 1 pre-registered secondary analyses

In addition to action intentions, we predicted secondary psychological effects of our interventions. Namely, we expected that the task would increase people’s sense of efficacy regarding climate change, hope and determination regarding climate change, in-study petition signing, and intentions to share climate-related news.

We also tested several pre-registered secondary hypotheses regarding the effects of our interventions, including climate change related self-efficacy, emotions like hope and determination about climate change, climate change news sharing, and in-study environmental petition signing behavior. We found mixed effects across these secondary outcome measures. Neither intervention (PAI or CAI) had an effect on hope, petition signing, social relevance of climate-related news headlines, negative affective responses to headlines, or overall petition sharing. CAI and PAI both had an effect on determination. CAI but not PAI had an effect on self-efficacy, self-relevance of climate-related news headlines, overall headline sharing, and positive affective responses to headlines. The details of all pre-registered secondary analyses are included in Supplemental Materials.

In Study 2, we replicated the effect of CAI on self-efficacy (pre-registered), but not on determination (pre-registered) or hope (exploratory). We also included measures related to support for three specific climate policies and information-seeking about these policies, and we found no effect of CAI on these measures.

Tables S12 and S13 show the model summaries for secondary analyses. Table S12 shows the person-level secondary analyses, including statistical tests of the effect of our interventions on sense of hope, determination, and efficacy around climate change, as well as intentions to sign and share five petitions on climate-related issues. We found that neither PAI nor CAI had an effect on hope or overall petition sharing. CAI but not PAI had a small positive effect on petition signing. CAI and PAI both had an effect on determination. CAI but not PAI also had an effect on self-efficacy.

Table S13 shows secondary analyses for outcome variables related to climate-change related news headlines. We found that neither intervention had an effect on the social relevance of headlines or on negative affective responses to headlines. CAI but not PAI had an effect on the self-relevance of headlines, overall headline sharing, and positive affective responses to headlines.

Table S12. Study 1: model summaries for person-level secondary outcome measures

DV	N	Marginal R ² / Conditional R ²	Variable	Estimate	CI	Statistic	p
Hope	1625	0.002 / 0.001	Intercept	-0.04	-0.11 – 0.03	-1.15	0.124
			Group (PAI)	0.08	-0.04 – 0.20	1.24	0.108
			Group (CAI)	0.09	-0.03 – 0.21	1.47	0.071
Determination	1625	0.006 / 0.005	Intercept	-0.07	-0.14 – -0.00	-2.10	0.018
			Group (PAI)	0.18	0.06 – 0.30	2.90	0.002
			Group (CAI)	0.12	0.00 – 0.24	2.02	0.022
Self-efficacy	1625	0.003 / 0.002	Intercept	-0.06	-0.12 – 0.01	-1.61	0.054
			Group (PAI)	0.10	-0.02 – 0.22	1.61	0.054
			Group (CAI)	0.13	0.01 – 0.25	2.17	0.015
Petition signing	1624	0.002 / 0.748	Intercept	-0.02	-0.11 – 0.07	-0.47	0.320
			Group (PAI)	-0.00	-0.11 – 0.10	-0.08	0.468
			Group (CAI)	0.09	-0.01 – 0.20	1.69	0.046
Petition sharing	1624	0.007 / 0.701	Intercept	-0.09	-0.16 – -0.02	-2.61	0.005
			Group (PAI)	0.02	-0.08 – 0.13	0.43	0.334
			Group (CAI)	0.05	-0.05 – 0.16	1.00	0.159
			Share type (narrow)	0.17	0.13 – 0.20	10.75	<0.001
			PAI * Share type (narrow)	-0.07	-0.13 – -0.02	-2.72	0.004
			CAI * Share type (narrow)	0.02	-0.04 – 0.07	0.66	0.254

Note. Estimates are standardized regression coefficients and statistics are t-values.

Table S13. Study 1 Model summaries for headline-level secondary outcome measures

DV	N	Marginal R ² / Conditional R ²	Variable	Estimate	CI	Statistic	p
Headline self-relevance	1624	0.001 / 0.585	Intercept	-0.03	-0.13 – 0.08	-0.47	0.318
			Group (PAI)	0.02	-0.07 – 0.11	0.51	0.304
			Group (CAI)	0.09	0.00 – 0.18	2.00	0.023

Headline social relevance	1624	0.001 / 0.594	Intercept	-0.02	-0.13 – 0.09	-0.34	0.369
			Group (PAI)	0.01	-0.08 – 0.11	0.32	0.376
			Group (CAI)	0.07	-0.02 – 0.16	1.48	0.069
Headline negative affect	1624	0.001 / 0.634	Intercept	-0.03	-0.23 – 0.18	-0.27	0.393
			Group (PAI)	0.07	-0.01 – 0.14	1.76	0.039
			Group (CAI)	0.03	-0.04 – 0.11	0.89	0.037
Headline positive affect	1624	0.003 / 0.590	Intercept	-0.03	-0.23 – 0.16	-0.33	0.370
			Group (PAI)	0.03	-0.04 – 0.10	0.80	0.211
			Group (CAI)	0.12	0.05 – 0.20	3.28	<0.001
Headline sharing	1624	0.007 / 0.701	Intercept	-0.12	-0.20 – -0.05	-3.21	<0.001
			Group (PAI)	0.07	-0.03 – 0.17	1.39	0.083
			Group (CAI)	0.11	0.01 – 0.21	2.20	0.014
			Share type (narrow)	0.17	0.15 – 0.20	12.94	<0.001
			PAI * Share type (narrow)	-0.06	-0.11 – -0.02	-2.73	0.003
			CAI * Share type (narrow)	0.01	-0.04 – 0.05	0.24	0.405

Note. Estimates are standardized regression coefficients and statistics are t-values.

Study 2: Pre-registered secondary analyses

Table S14 shows the pre-registered secondary analyses from Study 2 that had a counterpart preregistered analysis in Study 1. In Study 2, we replicated the effect of CAI on self-efficacy, but not determination. Tables S15-S19 report the additional preregistered secondary analyses from Study 2.

Table S14. Study 2: Model summaries for replicated person-level secondary analyses

DV	N	Marginal R ² / Conditional R ²	Variable	Estimate	CI	Statistic	p
Self-efficacy	939	0.005 / 0.004	Intercept	-0.06	-0.15 – 0.03	-1.38	0.084
			Group (CAI)	0.14	0.01 – 0.27	2.09	0.019
Determination	939	0.000 / -0.001	Intercept	-0.01	-0.10 – 0.07	-0.31	0.379
			Group (CAI)	0.03	-0.10 – 0.16	0.47	0.321

Note. Estimates are standardized regression coefficients and statistics are t-values.

Table S15. Model summaries for Study 2 secondary analyses

DV	N	Marginal R ² / Conditional R ²	Variable	Estimate	CI	Statistic	p
Policy support	939	0.000 / 0.138	Intercept	-0.01	-0.95 – 0.93	-0.06	0.478
			Group (CAI)	0.03	-0.04 – 0.10	0.87	0.192
Policy info-seeking	939	0.001 / NA	Intercept	0.03	-0.02 – 0.08	1.17	0.122
			Group (CAI)	-0.07	-0.14 – 0.01	-1.77	0.039
Collective response efficacy	939	0.003 / 0.002	Intercept	-0.05	-0.13 – 0.04	-1.08	0.140
			Group (CAI)	0.11	-0.02 – 0.24	1.64	0.051

Note. Details about each measure are included in the Methods section reported in Supplemental Materials. Estimates are standardized regression coefficients and statistics are t-values.

Table S16. Study 2 Daily Diary: Behavioral engagement summary

Item	CAI group			Control group		
	Mean behavior rate	SD behavior rate	Proportion engaged	Mean behavior rate	SD behavior rate	Proportion engaged
Contact representative	1.40	1.82	0.47	1.89	1.95	0.52
Donate	1.68	1.90	0.53	1.97	1.86	0.59
Sign petition	1.74	1.80	0.62	1.82	1.97	0.66
Volunteer	1.63	1.90	0.52	2.98	1.76	0.56
Have conversation	2.69	1.72	0.88	3.24	1.64	0.86
Skip meat	2.87	1.76	0.87	3.20	1.75	0.90
Eat vegetarian/vegan	2.77	1.81	0.83	2.02	2.03	0.88
Pay for clean energy	1.69	1.94	0.54	2.76	1.86	0.59
Avoid driving	2.48	1.91	0.77	1.75	1.90	0.81
Avoid flying	1.45	1.80	0.49	1.89	1.95	0.57

Note. Table shows average (and SD) within-participant sum of days engaging in each action, across the Daily Diary period. The table also includes the proportion of participants, per condition, who engaged in each action on any day within the Daily Diary period.

Table S17. Model summaries for Study 2 Daily Diary behavior rates

DV	N	Marginal R ² / Conditional R ²	Variable	Estimate	CI	Statistic	p
Target civic action	800	0.002 / 0.676	Intercept	-0.12	-0.23 – -0.01	-2.10	0.018
			Group (CAI)	-0.00	-0.18 – 0.17	-0.04	0.484
			Session	0.03	0.01 – 0.05	3.14	0.001
			Group (CAI) * session	0.00	-0.03 – 0.03	0.21	0.416
Civic actions	800	0.002 / 0.507	Intercept	-0.12	-0.20 – -0.04	-2.93	0.002
			Group (CAI)	0.01	-0.11 – 0.13	0.13	0.448
			Session	0.03	0.02 – 0.04	5.93	<0.001
			Group (CAI) * session	-0.00	-0.02 – 0.01	-0.43	0.336
Personal actions	800	0.006 / 0.325	Intercept	-0.19	-0.27 – -0.12	-4.97	<0.001
			Group (CAI)	-0.04	-0.16 – 0.07	-0.76	0.223
			Session	0.05	0.04 – 0.06	8.00	<0.001
			Group (CAI) * session	-0.00	-0.02 – 0.02	-0.09	0.466

Note. Details about each measure are included in the Methods section reported in Supplemental Materials. Estimates are standardized regression coefficients and statistics are t-values.

Table S18. Model summaries for Study 2 Daily Diary information analyses

DV	N	Marginal R ² /	Variable	Estimate	CI	Statistic	p
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Conditional R ²							
Thinking about climate change	800	0.001 / 0.791	Intercept	-0.12	-0.23 – -0.02	-2.27	0.012
			Group (CAI)	0.06	-0.10 – 0.22	0.72	0.236
			Session	0.03	0.01 – 0.04	3.68	<0.001
			Group (CAI) * session	-0.01	-0.04 – 0.01	-1.02	0.155
Climate change media consumption	800	0.001 / 0.749	Intercept	-0.10	-0.21 – 0.00	-1.88	0.030
			Group (CAI)	0.05	-0.11 – 0.22	0.62	0.266
			Session	0.03	0.01 – 0.04	3.10	0.001
			Group (CAI) * session	-0.01	-0.04 – 0.01	-0.99	0.162
Climate information sharing	800	0.004 / 0.794	Intercept	-0.18	-0.28 – -0.07	-3.26	<0.001
			Group (CAI)	-0.01	-0.17 – 0.15	-0.07	0.472
			Session	0.05	0.03 – 0.06	5.88	<0.001
			Group (CAI) * session	-0.01	-0.03 – 0.02	-0.68	0.250

Note. Details about each measure are included in the Methods section reported in Supplemental Materials. Estimates are standardized regression coefficients and statistics are t-values.

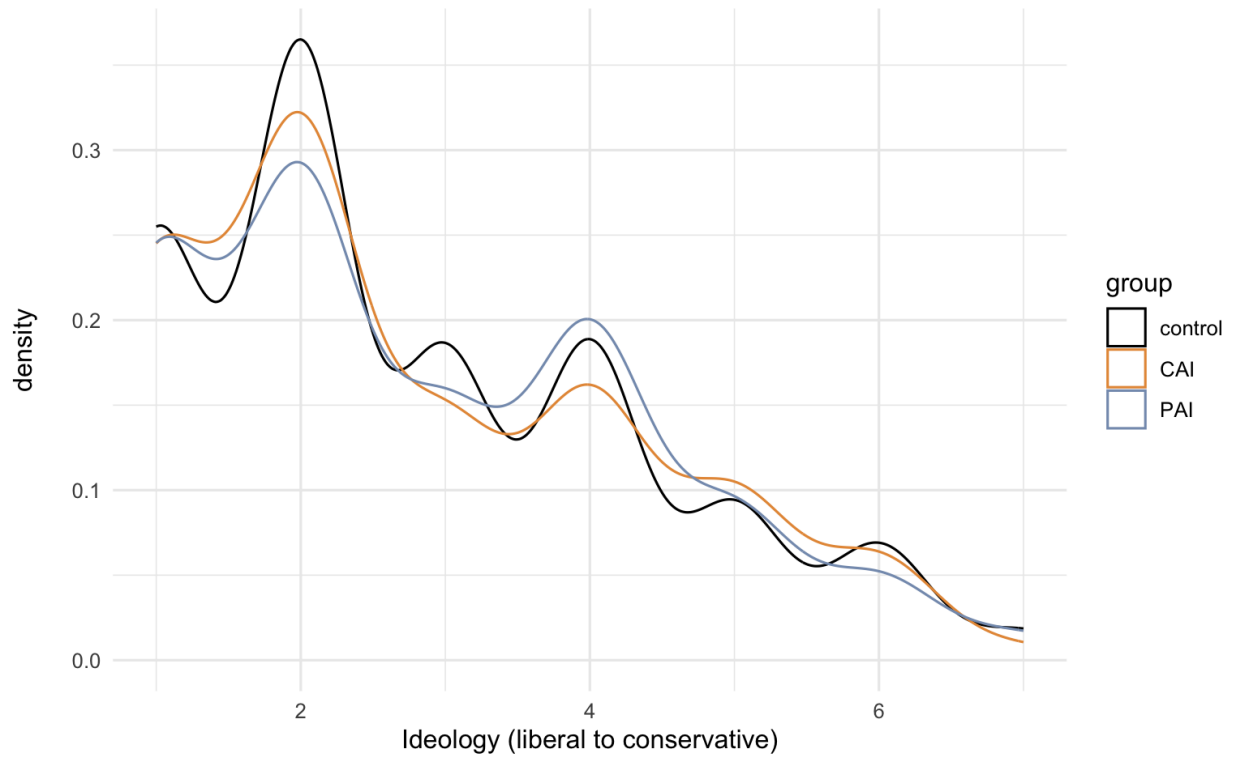
Table S19. Model summaries for longitudinal intervention effects on intentions and perceived impact

DV	N	Marginal R ² / Conditional R ²	Variable	Estimate	CI	Statistic	p
S2 target action intentions	701	0.000 / -0.001	Intercept	0.37	0.28 – 0.46	7.92	<0.001
			Group (CAI)	0.01	-0.13 – 0.15	0.18	0.430
S2 perceived impact of target action	701	0.003 / 0.002	Intercept	-0.03	-0.13 – 0.08	-0.51	0.305
			Group (CAI)	0.12	-0.04 – 0.27	1.51	0.066

Note. **S2** refers to “Survey 2,” taken 10 days after the first survey. Details are included in the Methods section reported in Supplemental Materials. Estimates are standardized regression coefficients and statistics are t-values.

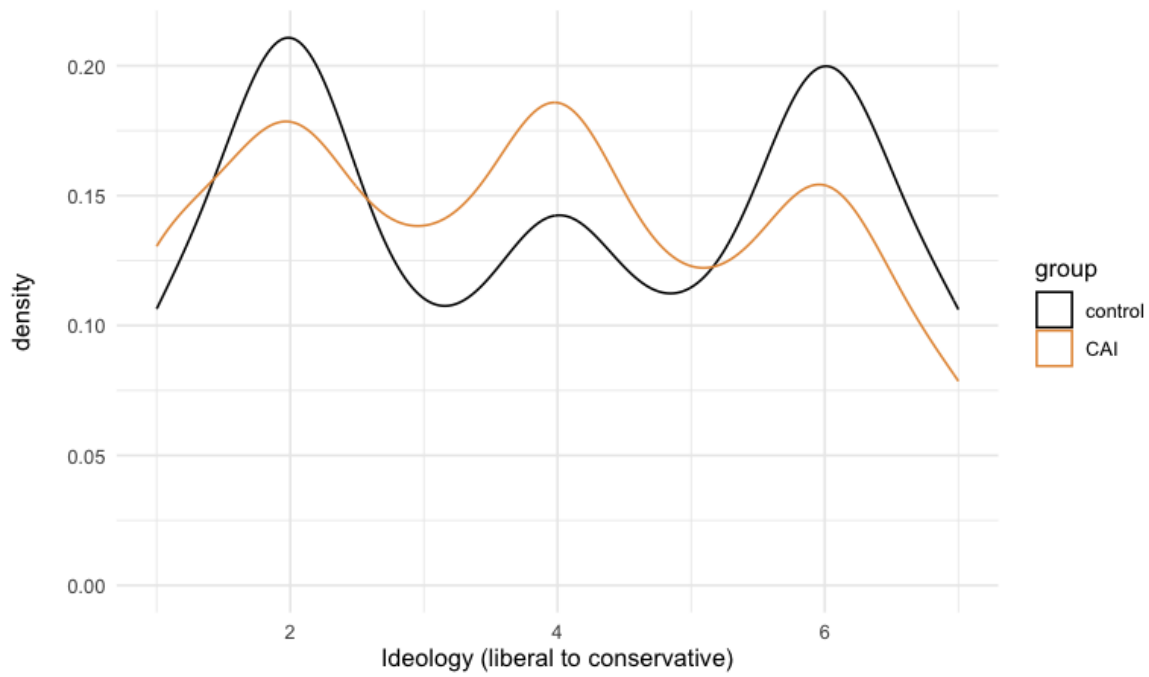
Intervention effects by political ideology

Figure S13. Study 1 distribution of ideology per group



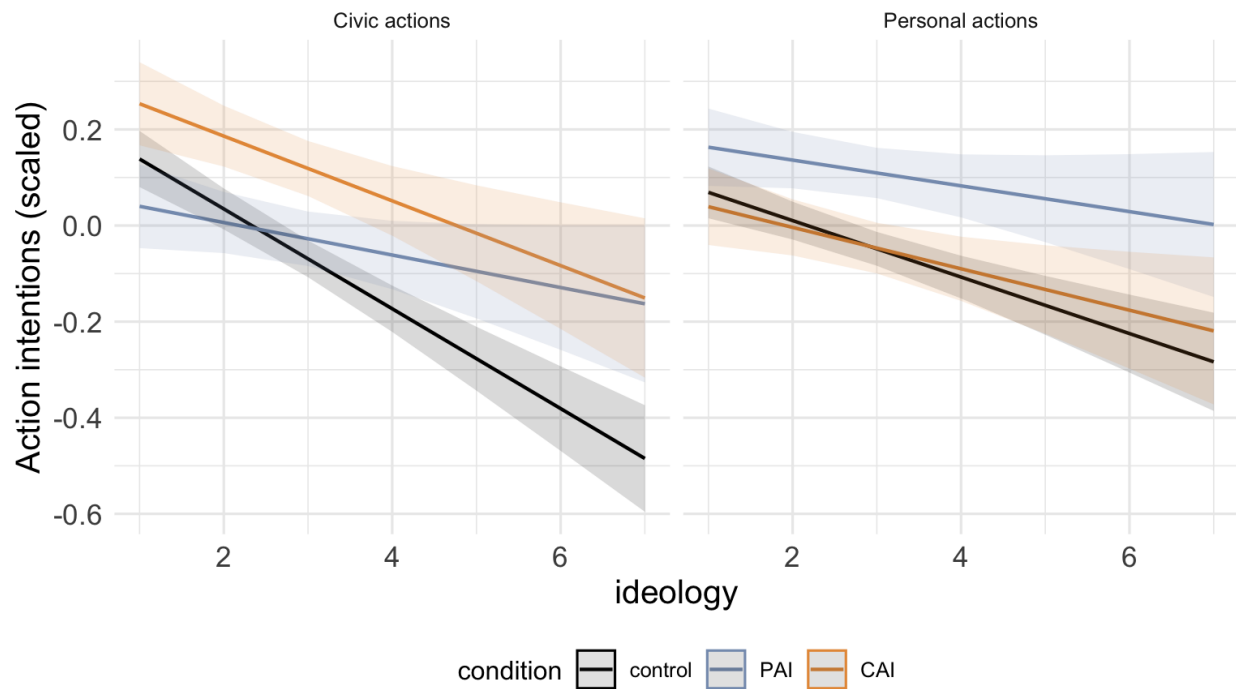
Note. Ideology is measured on a 7-point scale from extremely liberal (1) to extremely conservative (7). There was no significant difference in ideology between groups ($\chi^2 = 7.67$, $p = 0.81$).

Figure S14. Study 2 distribution of ideology per group



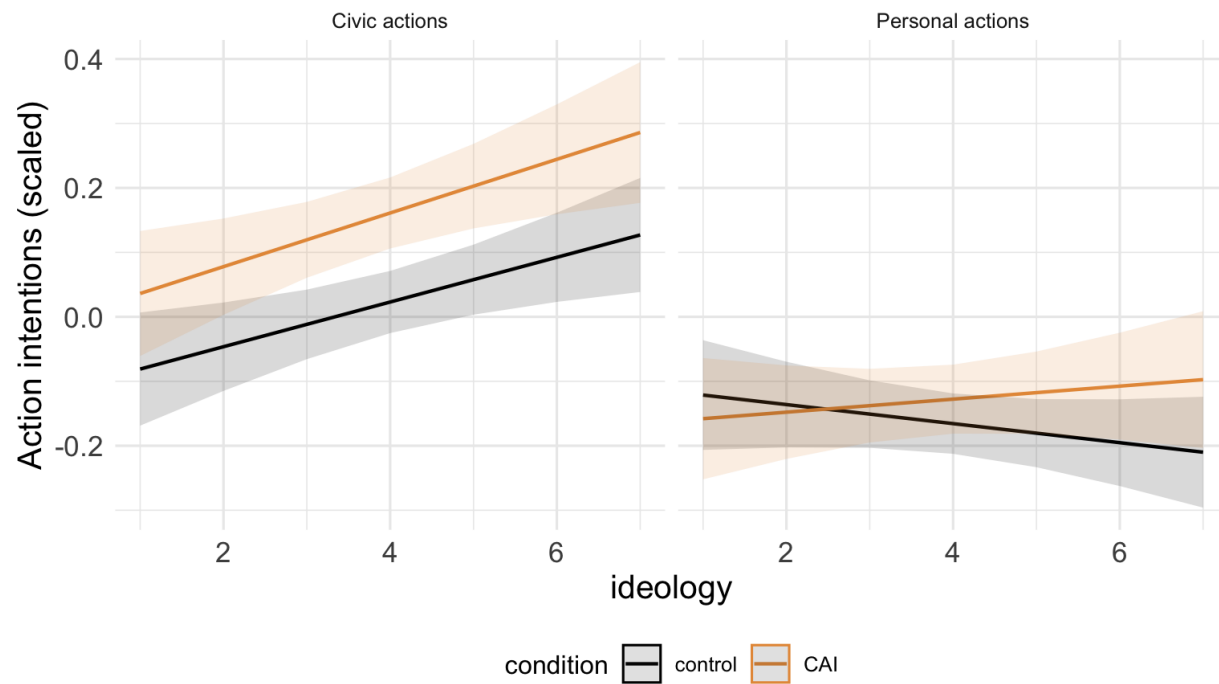
Note. Ideology is measured on a 7-point scale from extremely liberal (1) to extremely conservative (7). There was a significant difference in ideology between groups ($\chi^2 = 17.41$, $p = 0.008$).

Figure S15. Category-specific intervention effects on action intentions by ideology (Study 1)



Note. Left plot shows ideology x condition interaction for civic action intentions; right plot shows ideology x condition interaction for personal action intentions. Ideology is measured on a 7-point scale from extremely liberal (1) to extremely conservative (7).

Figure S16. Category-specific intervention effects on action intentions by ideology (Study 2)



Note. Left plot shows ideology x condition interaction for civic action intentions; right plot shows ideology x condition interaction for personal action intentions. Ideology is measured on a 7-point scale from extremely liberal (1) to extremely conservative (7).

Table S20. Study 1: Simple slopes for ideology per condition and action category

Condition	Action category	Ideology trend	SE	Lower 95% CI limit	Upper 95% CI limit
Control	Civic actions	-0.10	0.01	-0.13	-0.08
CAI	Civic actions	-0.07	0.02	-0.10	-0.03
PAI	Civic actions	-0.03	0.02	-0.07	-0.00
Control	Personal actions	-0.06	0.01	-0.08	-0.04
CAI	Personal actions	-0.04	0.02	-0.08	-0.01
PAI	Personal actions	-0.03	0.02	-0.06	0.01

Table S21. Simple slopes for ideology per condition

Condition	Action category	Ideology trend	SE	Lower 95% CI limit	Upper 95% CI limit
CAI	Civic actions	0.042	0.015	0.013	0.071
CAI	Personal actions	0.010	0.014	-0.018	0.038
Control	Civic actions	0.035	0.013	0.010	0.059
Control	Personal actions	-0.015	0.012	-0.039	0.009

In an exploratory simple slopes analysis, we look at the relationship between ideology and intervention effects. Figures S13 and S14 show the distribution of ideology ratings in each condition for Study 1 and Study 2, respectively. Tables S20 and S21 show, for each study, the simple slope for ideology, per condition and action category, based on a multi-level model testing a three-way interaction between ideology, condition (control, PAI, or CAI), and action category (civic, personal). Model-estimated action per condition and action category, across levels of ideology, are also visualized in Figure S15 and S16 for Studies 1 and 2, respectively.

In Study 1, we found that there is a significant negative effect of ideology on action intentions for both personal action intentions and civic action intentions in the CAI and control groups, for both civic and personal actions. In Study 2— which had a more ideologically balanced sample— we found the opposite; there was a significant *positive* effect of ideology for both CAI and control groups, but only for civic action. That is, more conservative participants reported higher intentions to engage in civic climate actions but not personal-level actions.

In Study 2, there was a significant difference in ideology between CAI and control groups. In exploratory analyses controlling for ideology, all results are qualitatively similar. In Table S22 we report the details of this three-way interaction model. The three-way interaction was not significant; though more conservative participants reported higher civic action intentions, the difference in slopes between CAI and control are not significant. Ultimately, we found contradicting evidence regarding the relationship between ideology and action intentions between our first and second studies. However, As noted previously, the Study 2 sample was more politically balanced, with a higher proportion of conservative participants than the Study 1 sample. However, the Study 2 sample has more highly educated, high-SES, high-income, and slightly younger conservatives than Study 1; therefore, these two samples may capture distinctive subsets of the conservative population, yielding different patterns in the relationship between ideology, action intentions, and intervention effects. Ultimately, further studies are needed to determine what other factors influence how these interventions intersect with political ideology.

Table S22. Three-way interaction model: Condition, action category, and ideology

<i>Predictors</i>	<i>Estimates</i>	<i>CI</i>	<i>p</i>
Intercept	-0.12	-0.22 – -0.01	0.038
Group (CAI)	0.11	-0.05 – 0.27	0.186
Action category (personal)	0.01	-0.09 – 0.11	0.857
Ideology	0.03	0.01 – 0.06	0.006
Current action level	0.16	0.14 – 0.18	<0.001
Group (CAI) * Action category (personal)	-0.17	-0.32 – -0.02	0.024
Group (CAI) * Ideology	0.01	-0.03 – 0.04	0.720
Action category (personal) * Ideology	-0.05	-0.07 – -0.03	<0.001

Group (CAI) *			
Action category (personal) × Ideology	0.02	-0.02 – 0.05	0.313

Note. N = 938. Marginal R² / Conditional R² = 0.049 / 0.238. This model was not pre-registered and so is reported with two-tailed p-values.

Study 2 exploratory analyses described in main paper

Table S23. Model summary: CAI effects on personal “target” action intentions

DV	N	Marginal R ² / Conditional R ²	Variable	Estimate	CI	Statistic	p
Personal-level ‘target’ action intentions	846	0.001 / -0.000	Intercept	-0.11	-0.19 – -0.02	-2.33	0.020
			Group (CAI)	0.05	-0.08 – 0.17	0.76	0.449
			Current action level	0.09	0.02 – 0.16	2.57	0.010

Note. Personal-level “target” action is the personal-level action the participant chose as that which they could most see themselves doing (e.g., driving less). Unlike the civic target action, participants did not complete any intervention task related to the personal action they chose. Estimates are standardized regression coefficients and statistics are t-values. This model was not pre-registered and so is reported with two-tailed p-values.

Study 2: Exploratory structural equation models

We conducted exploratory structural equation models with Session 1 reported intentions to engage in the participant-selected target action, and reported behavior from the Final Session (Session 6) to identify whether there were indirect effects of the intervention on target behavior, operating through intervention effects on intentions. We fit two structural equation models. Model 1 included only civic actions, from participants in both control and CAI groups, including only the civic behavior the participant selected that they were most likely to engage in. Model 2 included only personal actions, from participants in both CAI groups, including only the personal behavior each participant selected. Thus, we would expect that if there are intervention effects, we would only identify an indirect effect of condition on behavior, through intentions, in Model 1 (the target action for the intervention), but not Model 2 (participant-selected personal actions that were not the target of the intervention). All variables were modeled as observed variables. The models were fit using the *sem* function from the *lavaan* package (Rosseel, 2012) in R and both exhibited an excellent fit (CFI = 1.000, TLI = 1.000, RMSEA = 0.000). Parameter estimates were standardized and confidence intervals and p-values were bootstrapped (N iterations = 1000) using the *standardizedSolution_boot* function from the *semboottools* package (Yang & Cheung, 2026) in R. Model statistics are reported in Table S24.

Table S24

Structural equation model for condition → intentions → behavior, per personal and civic actions

Model	Path	β	<i>CI</i>	<i>SE</i>	<i>z</i>	<i>p</i>
Personal actions	a: Condition [CAI] → Action intention	0.20	-0.62 – 0.45	0.13	1.56	0.120
	b: Action intention → Reported behavior	0.48	0.23 – 0.69	0.12	3.94	<0.001
	a*b: Condition [CAI] → Action Intention → Reported behavior	0.10	-0.03 – 0.24	0.07	1.40	0.163
	c': Condition [CAI] → Reported behavior	0.09	-0.26 – 0.46	0.19	0.46	0.647
	c: Condition [CAI] total (indirect + direct) effect	0.18	-0.18 – 0.55	0.19	0.95	0.344
Civic actions	a: Condition [CAI] → Action intention	0.32	0.13 – 0.50	0.09	3.44	0.001
	b: Action intention → Reported behavior	0.62	0.46 – 0.80	0.09	7.08	<0.001
	a*b: Condition [CAI] → Action Intention → Reported behavior	0.20	0.09 – 0.34	0.07	3.06	0.002
	c': Condition [CAI] → Reported behavior	-0.24	-0.52 – 0.05	0.15	-1.66	0.097
	c: Condition [CAI] total (indirect + direct) effect	-0.04	-0.35 – 0.25	0.16	-0.26	0.792