



Perceived Barriers to Climate Change Activism Behaviors in the United States Among Individuals Highly Concerned about Climate Change

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Abstract

Background There is a tremendous gap between the proportion of the population expressing concern about climate change and those engaged in climate change activism. We examined barriers to climate change activism among respondents stating climate change was an important issue to them.

Methods Participants in a national online longitudinal study reported on 12 reasons for lack of involvement in climate change actions. Five months later, engagement in six climate change actions was assessed. The primary analyses focused on the 319 respondents who, out of 592 respondents who participated in both surveys, reported that the issue of global warming was extremely or very important to them.

Results Participants showed a range of engagement in climate change activism behaviors: 29.8% donated money to an organization to reduce climate change, 32.3% signed a petition, 69.0% voted for candidates who support measures to reduce climate change, 11.9% wrote letters, e-mailed, or phoned government officials to urge them to take action, and 9.4% volunteered with organizations working to curb climate change. The median number of barriers was 5. The most frequent reasons for lack of involvement in climate change activism were other people are better at it (57.4%), hadn't been trained (56.7%), hadn't been asked (50.8%), not knowing how to get involved (49.8%), activities like letter writing not appealing (49.8%), too busy (38.9%), organizations would ask them for money (39.8%), and not encouraged to become involved (38.2%). Several barriers were associated with engagement in climate change activism five months later. The most consistent association with activism was with talking about climate change in the prior month.

Conclusion Most respondents cited several barriers that impeded their involvement in climate change activism. Select barriers were associated with reduced engagement in activism. Organizations that address climate change should acknowledge barriers

but emphasize that individuals can engage in climate change activism regardless of barriers.

Keywords Climate change · activism · collective action · barriers · communication

The ability, or inability, to reduce greenhouse gas emissions and reduce anthropogenic climate change will profoundly affect health and well-being globally. Climate change mitigation can be considered primary prevention and adaptation as secondary prevention. In the United States, polls suggest that majority of the adult population (70%) is concerned about climate change (Leisorowitz et al., 2021). Yet, there is a tremendous gap between the level of concern and the proportion of the population engaged in collective actions to reduce climate change, such as supporting legislation to address climate change (Leisorowitz et al., 2021). In an extensive review of factors that may lead to collective action on global challenges, Thomas et al., 2022 noted, “There is little research addressing action and inaction among people who are committed to a desired change.” Reducing barriers to action is critical to strengthening the association between intentions and actions (Rothman et al., 2015). Prevention scientists, therefore, need to understand better the barriers to climate change action to develop effective interventions to promote engagement in climate change activism.

Research on pro-environmental behavior change has largely focused on individualistic environmental behaviors, such as using public transportation, using reusable shopping bags, reducing residential energy consumption, and recycling (Hurst et al., 2013; Legault et al., 2020; Geiger et al., 2019) and psychological factors, such as motivations, attitudes, and values, as predictors (Osbaldeston & Schott, 2012). Gifford (2011) provides an extensive list of theoretical perspectives on psychological barriers to climate change actions. Based on these perspectives, a scale was developed to assess such barriers and included the domains of Change Unnecessary, Conflicting Goals and Aspirations, Interpersonal Relations, Lacking Knowledge, and Tokenism (Lacroix et al., 2019). Different barriers were associated with different pro-environmental actions, such as food choices, transportation, energy use, water use, and purchasing. However, the authors did not examine climate change activism. Climate change activism, which is a subset of collective action, are pro-environmental behaviors with a focus on political actions and policy changes. Collective climate change activism is an important area of study as individual-level pro-environmental behaviors will not have a sufficient impact to mitigate climate change, and there is concern that an emphasis on individual-level pro-environmental behaviors may impede collective action (Werfel, 2017). Moreover, individual actions that are not coordinated may be at odds with the actions of other individuals and even counterproductive to subordinate goals of climate change mitigation and adaptation. Collective activism that is coordinated, such as connecting with elected representatives and working with climate-motivated organizations, can lead to major policy changes which are needed to promote meaningful reductions in greenhouse gas emissions.

The limited body of climate change activism research has often examined intentions to engage or support climate change actions to reduce greenhouse gas emis-

sions. Smith et al., (2021) found that social norms and perceived risk were linked to a willingness to vote against politicians who do not support policies that reduce climate change and support of a \$20 monthly tax to fund adaptation to climate change in their communities. Ballew et al., (2019) reported that social norms, collective political efficacy, egalitarianism, and contact by organizations were all strongly associated with climate change activism. Using the same set of measures, Feldman et al., (2017) documented that among liberals, hostile media perceptions promote activism, whereas, among conservatives, these perceptions decrease activism. An observational study of youth involvement in the #FridaysForFuture climate protests in Norway, using a Social Identity Model of Collective Action, found that self-identifying as an activist was linked to collective efficacy, participative efficacy, and participation social norms (Haugestad et al., 2021). Interestingly, another study found that self-reported familiarity with Greta Thunberg was associated with collective action intentions for addressing climate change (Sabherwal et al., 2021). Although these studies are promising, many of them rely on measures of behavioral intentions, but intentions do not necessarily lead to action (Sheeran et al., 2014). Thus, further investigation of barriers to actual engagement in climate activism is necessary.

Both pro-environmental behaviors and engagement in climate change activism behaviors can be difficult to enact due to individual and social-contextual barriers. A framework by Kollmuss & Agyeman (2002) delineates types of barriers to pro-environmental behaviors. Their model included barriers such as old behavior patterns, lack of internal and external incentives, insufficient feedback about behaviors, lack of knowledge, and current knowledge and values blocking new information. Kollmuss and Agyeman's analyses focused on barriers to pro-environmental individual-level behaviors rather than collective activism to address climate change. Brady and colleagues (1995) identified barriers to political participation. Their model included resources, including time, money, and skills; issue engagement, including involvement and the perceived effectiveness of actions; and social proximity to activist networks. The current study addresses this gap by assessing perceived barriers to engaging in collective climate change activism guided by Brady et al. and Kollmuss and Agyeman's frameworks.

Based on prior research, we assessed the following barriers that may be useful for developing a model for climate change activism: motivations to address climate change determined, in part, indirectly by importance and priority; social influence to engage in climate change activism, assessed by descriptive norms of perceptions of others' view of activism; the salience of the issue; skills to engage in climate change activism; sufficient time; and response efficacy. We also assess the frequency of talking about climate change, which can be a cue to action, saliency, and an indicator of social dynamics.

Methods

We focused the analysis on the subset of individuals who reported that climate change was personally very important to them, as it may be less informative to assess engagement in climate activism among people who do not view climate change as an

important issue. In addition to assessing the proportion of respondents who endorsed specific barriers, we also examined if these barriers and other factors may be linked to actual climate change activism. The outcomes of interest were contacting elected officials about climate change, voting for candidates who support measures to reduce climate change, signing a petition to curb climate change, and volunteering with or donating to an organization that addressed climate change in the prior year. We did not assess the climate change actions of attending rallies or marches about climate change due to the COVID-19 pandemic impeding participation in such events. In addition to barriers, we examined political and religious ideology, income, education, and conversations about climate change. As Lange & Dewitte (2019) observed, measures of environmental behaviors are often ad hoc, and a goal of measures should be to inform the development of interventions to promote pro-environmental behaviors.

Study participants were drawn from the online longitudinal COVID-19 and Well-Being Study that began in March 2020. This study aimed to examine individual, social, and societal-level fluctuations associated with health and well-being amid the rapidly changing pandemic. Respondents were assessed every 3–4 months. Study participants were recruited through Amazon's Mechanical Turk (MTurk), an online platform frequently used by health and social researchers, as it allows for a diverse sample to be collected in a rapid and timely fashion (Créquit et al., 2018). Prior research suggests that MTurk provides better quality data than other methods for recruiting convenience samples (Chandler & Shapiro, 2016). Mturk samples are not representative but have been documented to outperform other opinion samples on several dimensions (Follmer et al., 2017). Studies using MTurk have also demonstrated high reliability (Huff & Tingley, 2015).

The study protocols followed best practices guidelines for MTurk, including ensuring participant confidentiality, generating unique completion codes, protecting study integrity, integrating attention and validity checks throughout the survey, repeating study-specific qualification questions, and removing ineligible participants (Chandler & Shapiro, 2016; Young & Young, 2019; Strickland & Stoops, 2019). In addition, despite COVID-19, the demographic characteristics of MTurk appear stable (Moss et al., 2020). Eligibility criteria included being age 18 or older, living in the United States, being able to speak and read English, having heard of the coronavirus or COVID-19, and providing written informed consent. Participants were also required to pass attention and validity checks in the survey (Rouse, 2015). These checks included survey questions with exceedingly low probabilities, such as if the participant has gone deep-sea fishing in Alaska and had appendages removed. We also repeated questions to ensure consistency. Finally, we examined completion time and verified survey completeness. As the number of individuals signed up for MTurk varies over time, it was impossible to determine how many individuals saw the information about this study and declined to participate.

The initial study waves focused on COVID-19, but as the pandemic continued, we assessed other global health issues linked to health and well-being. The primary analyses utilized survey items from waves 6 and 7. At wave 7, 55% of the original sample from wave 1, administered in March 2020, remained in the cohort. An analysis of attrition indicated few demographic differences between those who remained in the study and those who did not complete the wave 7 survey. However, those who

dropped out tended to be younger, with a mean age of 35 compared to a mean age of 41 for those who completed wave 7. Participants were compensated \$4.25 for the sixth wave data (June 14th–23rd, 2021) and the seventh wave (November 16th–29th, 2021), which was equivalent to approximately \$12 per hour. The study protocols were approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board.

Measures

At wave 7, we assessed five climate change activism behaviors as outcomes, which had been previously validated by Doherty and Webler (2016). These items asked about participation (yes/no) in the following actions in the last year: “Wrote letters, e-mailed, or phoned government officials to urge them to take action to reduce climate change;” “Voted for candidates who support measures to reduce climate change;” “Signed a petition to curb climate change;” “Volunteered with organizations working to curb climate change;” and “Donated money to organizations working to reduce climate change.” These items were individually modeled as it was hypothesized that variables associated with each item might differ.

For the primary analyses, all the independent variables were assessed at wave 6. We used the Yale Program on Climate Change Communication’s Short Climate Survey (Chryst et al., 2018; Leisorowitz et al., 2019) to assess the perceived importance of climate change. The brief survey includes the item “How important is the issue of global warming to you personally?” The response categories were “Extremely important,” “Very important,” “Somewhat important,” “Not too important,” and “Not at all important.” For the primary analyses, we restricted the sample to those who reported that global warming was personally “Extremely important” or “Very important” to them.

Based on the frameworks by Kollmuss & Agyeman (2002), Brady et al. (1995), and Blake (1999), a set of items was developed and piloted, and winnowed down to 12 items. The respondents were asked to indicate reasons for lack of involvement in climate change activism via the question, “Please rate the reasons you haven’t been involved in climate change advocacy.” The respondents then provide a yes or no answer to the following: (1) “Too busy,” (2) “Don’t know how to get involved,” (3) “Other people are better at it than me,” (4) “If I do get involved, organizations will ask me for money,” (5) “Haven’t been asked,” (6) “Activities like letter writing aren’t appealing,” (7) “I haven’t been trained,” (8) “Not encouraged to become involved,” (9) “Not something I think about a lot,” (10) “What I could do will not have an impact,” (11) “Other people might react negatively to my involvement,” and (12) “Not a priority for me.” The question “In the last month, have you talked to a friend or family member about climate change?” assessed the recency of talking about climate change.

The response categories for self-reported race/ethnicity included “White,” “Black,” “Asian,” “Hispanic,” “Mixed,” or “Other.” Due to small sample size, “Mixed,” “Other,” and “Asian” were collapsed into a single category. Political ideology was assessed with the question, “Where would you place yourself on a scale running from ‘Very liberal’ to ‘Very conservative’?” The response categories were

(1) “Very liberal,” (2) “Liberal,” (3) “Slightly liberal,” (4) “Moderate,” (5) “Slightly conservative,” (6) “Conservative,” (7) “Very conservative,” and (8) “Not applicable.” The 14 who reported “not applicable” were recoded to the median. The question “Do you consider yourself evangelical or born again?” was used to assess evangelicalism. Family income was assessed and dichotomized, based on the median, at less than \$60,000 versus \$60,000 or more. Educational attainment was dichotomized as a bachelor’s degree and higher versus an associate degree or less. Sex was assessed as biological sex assigned at birth as “female” and “male”.

At wave 6, we also assessed two climate change activism variables of donating money to an organization to address climate change and contacting an elected official about climate change in the prior year. In a post hoc analysis, we used these two variables to help validate the analyses.

Analysis

There were 807 respondents who completed the wave 6 survey, 776 completed wave 7, and 592 who completed both surveys. Of the 807 respondents who completed wave 6, 445 (55%) reported that global warming was “Extremely important” or “Very important” to them personally. There were missing data for two of these respondents. Of these 443, 320 completed the wave 7 survey. There were missing data from one respondent at wave 7, leading to a subsample of 319. The analyses focused on the respondents who indicated that climate change was an important issue to them as it may not be informative to examine correlates of climate change action among those who do not view it as an important issue.

We used chi-square tests and logistic regression models to evaluate differences between respondents who did and did not report that they engaged in each of the five climate change actions in the prior year. We did not use the items as a scale since we were not assessing the intensity of activism. The models assessed the associations between the demographic characteristics and barriers to climate change activism reported in wave 6 with engagement in climate change actions at wave 7. For the multivariable logistic regression models, due to the number of variables that assessed barriers, we used a backward conditional stepwise regression approach to enhance the parsimony of the multivariable logistic regression model. Sociodemographic variables were included in the final multivariable models regardless of their level of statistical significance. The goals of the multivariable logistic regression models were to assess if any of the barriers, after adjusting for the other variables, continued to be significant independent predictors of climate change actions. Respondents who self-identified as Asian, mixed, or other were collapsed into one category due to small sample size. The statistical software Stata 17 and SPSS 28 were used for the analyses.

Results

The primary analyses focused on the subsample of 319 respondents who completed both surveys and reported that the issue of global warming was “Extremely important” or “Very important” to them. Among this subsample, 69.0% had voted for

Table 1 Demographic data among respondents who report that the issue of global warming is extremely or very important to them (N=319)

	n (%)
Age, mean (SD)	40.93 (11.81)
Race	
White	216 (67.71)
Non-Hispanic Black	44 (13.79)
Hispanic	36 (11.29)
Other	23 (7.21)
Sex	
Male	140 (43.89)
Female	179 (56.11)
Income	
Less than \$60K	180 (56.43)
Greater than \$60K	139 (43.57)
Education	
Associate degree or less	127 (39.81)
Bachelor's degree or higher	192 (60.19)
Political Ideology	
Very Liberal	64 (20.06)
Liberal	111 (34.80)
Slightly Liberal	40 (12.54)
Moderate	63 (19.75)
Slightly Conservative	16 (5.02)
Conservative	16 (5.02)
Very Conservative	7 (2.19)
Not Applicable	2 (0.63)

candidates who support measures to reduce climate change, 32.3% had signed a petition to curb climate change, 29.8% had donated money to organizations to reduce climate change, 11.9% had contacted elected officials to urge them to take action to reduce climate change, and 9.4% had volunteered with organizations working to curb climate change. The number of barriers to engaging in climate change activism reported by these participants ranged from 0 to 12. The median number of barriers reported was 5 (mean 4.7, SD=2.89). This sample was predominantly white (67.7%) but had a substantial representation of Black (13.8%) and Hispanic (11.3%) respondents (Table 1). The mean age was 40.9 (range 20–78), and 56.1% were born female. Most (60.2%) had a bachelor's degree or higher level of education, and 43.6% had an annual household income of \$60,000 or more.

As seen in Table 2, the most frequently cited reason for lack of involvement in climate change activism was the statement “Other people are better at it than me” (57.4%), which was followed by endorsing the statement “I haven’t been trained” (56.7%). Approximately half of the respondents also reported “They hadn’t been asked” (50.8%), “Did not know how to get involved” (49.8%), and “Activities like letter writing are not appealing” (49.8%). Almost two-fifths of the respondents indicated that they were “Too busy” (38.9%), if they became involved, “Organizations would ask them for money” (39.8%), and they were not “Encouraged to become involved” (38.2%). Less than a third reported that it was not something they thought about a lot (30.1%) and believed what they could do would not have an impact

Table 2 Chi-Square analysis of barriers to climate change activism and past year activism behaviors

Reasons haven't been involved in climate change advocacy	Total endorsing barrier	Past year climate change actions					
		Wrote letters, e-mailed, or phoned government officials to urge them to take action to reduce climate change			Voted for candidates who support measures to reduce climate change		
	N=319 (%)	Yes n=38 (%)	No n=281 (%)	p-value	Yes n=220 (%)	No n=99 (%)	p-value
Too busy	38.87	44.74	38.08	0.429	37.27	42.42	0.383
Don't know how to get involved	49.84	52.63	49.47	0.714	49.09	51.52	0.689
Other people are better at it than me	57.37	60.53	56.94	0.675	58.64	54.55	0.494
If I do get involved, organizations will ask me for money	39.81	39.47	39.86	0.964	38.18	43.43	0.375
Haven't been asked	50.78	47.37	51.25	0.654	50.45	51.52	0.861
Activities like letter writing aren't appealing	49.84	34.21	51.96	0.040	50.00	49.49	0.933
I haven't been trained	56.74	57.89	56.58	0.878	56.36	57.58	0.840
Not encouraged to become involved	38.24	42.11	37.72	0.602	33.18	49.49	0.006
Not something I think about a lot	30.09	26.32	30.60	0.588	25.45	40.40	0.007
What I could do, will not have an impact	31.03	26.32	31.67	0.503	26.82	40.40	0.015
Other people might react negatively to my involvement	10.34	7.89	10.68	0.597	6.82	18.18	0.002
Not a priority for me	21.32	7.89	23.13	0.031	20.00	24.24	0.392

(31.0%). Only 21.3% indicated that it was “Not a priority,” and 10.3% reported that “Others would react negatively to their involvement.” The correlations among the 12 items revealed modest associations among the items, ranging from 0.11 to 0.48, with a mean of 0.20.

In both the bivariate and multivariable models, select barriers had significant associations with engagement in climate change actions (Tables 3, 4, 5, 6 and 7). There were no barrier variables that were significantly associated with all five outcomes. However, there were two barriers that were each significantly associated with two outcomes in the adjusted models. Endorsing the barrier of “Not encouraged to become involved” was associated with a 52% decrease in the odds of voting for candidates who support measures to reduce climate change (aOR=0.48, 95% CI=0.28, 0.82) and a 60% decrease in the odds of signing a petition to curb climate change (aOR=0.40, 95% CI=0.22, 0.71). Endorsing the barrier of not being involved because “Organizations will ask me for money” was associated with a 76% increase in the odds of signing a petition to curb climate change (aOR=1.76, 95% CI=1.01, 3.07) and an 82% decrease in the odds of volunteering with organizations working to curb climate change (aOR=0.18, 95% CI=0.06, 0.56). The barrier of other people reacting negatively to involvement (reported among only 10% of valid respondents) was associated with over 4 times greater odds of volunteering with organizations working to curb climate change (aOR=4.02, 95% CI=1.11, 14.53). Additionally,

Table 3 Chi-Square analysis of barriers to climate change activism and past year activism behaviors

Reasons haven't been involved in climate change advocacy	Past year climate change actions					
	Signed a petition to curb climate change			Volunteered with organizations working to curb climate change		
	Yes n = 103 (%)	No n = 216 (%)	p-value	Yes n = 30 (%)	No n = 289 (%)	p-value
Too busy	39.81	38.43	0.813	36.67	39.10	0.795
Don't know how to get involved	50.49	49.54	0.874	50.00	49.83	0.986
Other people are better at it than me	52.43	59.72	0.218	53.33	57.79	0.639
If I do get involved, organizations will ask me for money	41.75	38.89	0.626	16.67	42.21	0.007
Haven't been asked	45.63	53.24	0.204	33.33	52.60	0.045
Activities like letter writing aren't appealing	40.78	54.17	0.025	46.67	50.17	0.715
I haven't been trained	57.28	56.48	0.893	40.00	58.48	0.052
Not encouraged to become involved	26.21	43.98	0.002	20.00	40.14	0.031
Not something I think about a lot	19.42	35.19	0.004	23.33	30.80	0.396
What I could do, will not have an impact	26.21	33.33	0.199	20.00	32.18	0.170
Other people might react negatively to my involvement	6.80	12.04	0.151	16.67	9.69	0.232
Not a priority for me	8.74	27.31	0.000	13.33	22.15	0.262

Table 4 Chi-Square analysis of barriers to climate change activism and past year activism behaviors

Reasons haven't been involved in climate change advocacy	Past year climate change actions		
	Donated money to organizations working to reduce climate change		
	Yes n = 95 (%)	No n = 224 (%)	p-value
Too busy	43.16	37.05	0.306
Don't know how to get involved	49.47	50.00	0.931
Other people are better at it than me	54.74	58.48	0.536
If I do get involved, organizations will ask me for money	32.63	42.86	0.088
Haven't been asked	48.42	51.79	0.583
Activities like letter writing aren't appealing	49.47	50.00	0.931
I haven't been trained	56.84	56.70	0.981
Not encouraged to become involved	32.63	40.62	0.179
Not something I think about a lot	22.11	33.48	0.043
What I could do, will not have an impact	26.32	33.04	0.235
Other people might react negatively to my involvement	8.42	11.16	0.462
Not a priority for me	18.95	22.32	0.501

endorsing the barrier of not being a priority was associated with a 74% decrease in

Table 5 Multivariable logistic regression models of climate change actions among respondents who report that the issue of global warming is very or extremely important to them

	Wrote letters, e-mailed, or phoned government officials to urge them to take action to reduce climate change (n=319)		Voted for candidates who support measures to reduce climate change (n=319)	
	OR (95% CI)	aOR (95% CI)	OR (95% CI)	aOR (95% CI)
Education (Ref: Associate degree or less)	1.15 (0.57, 2.32)	1.43 (0.66, 3.09)	1.40 (0.87, 2.27)	1.23 (0.69, 2.19)
Income (Ref: \$60K or less)	0.73 (0.36, 1.47)	0.65 (0.30, 1.41)	1.36 (0.84, 2.21)	1.44 (0.81, 2.57)
Sex (Ref: Male)	2.41 (1.13, 5.15)	2.05 (0.93, 4.54)	0.97 (0.60, 1.57)	0.90 (0.53, 1.54)
Age (years)	1.01 (0.98, 1.04)	1.00 (0.97, 1.02)	1.03 (1.01, 1.06)	1.04 (1.01, 1.06)
Race (Ref: White)	REF	REF	REF	REF
Non-Hispanic Black	1.27 (0.52, 3.12)	1.44 (0.55, 3.81)	1.00 (0.49, 2.04)	1.07 (0.49, 2.31)
Hispanic	0.39 (0.09, 1.74)	0.45 (0.10, 2.15)	0.74 (0.36, 1.56)	1.13 (0.49, 2.63)
Other	0.31 (0.04, 2.35)	0.48 (0.06, 4.03)	0.65 (0.27, 1.59)	0.68 (0.25, 1.85)
Political orientation (liberal to conservative)	0.74 (0.56, 0.96)	0.76 (0.58, 1.00)	0.71 (0.61, 0.83)	0.70 (0.59, 0.83)
Evangelical or born again (Ref: No)	1.06 (0.35, 3.22)	1.06 (0.32, 3.53)	0.84 (0.39, 1.83)	0.93 (0.38, 2.23)
Reasons haven't been involved in climate change/barriers to climate action				
Too busy	1.32 (0.66, 2.61)	--	0.81 (0.50, 1.31)	--
Don't know how to get involved	1.14 (0.58, 2.24)	--	0.91 (0.56, 1.46)	--
Other people are better at it than me	1.16 (0.58, 2.32)	--	1.18 (0.73, 1.91)	--
If I do get involved, organizations will ask me for money	0.98 (0.49, 1.97)	--	0.80 (0.50, 1.30)	--
Haven't been asked	0.86 (0.43, 1.69)	--	0.96 (0.60, 1.54)	--
Activities like letter writing aren't appealing	0.48 (0.24, 0.98)	--	1.02 (0.63, 1.64)	--
I haven't been trained	1.06 (0.53, 2.09)	--	0.95 (0.59, 1.54)	--
Not encouraged to become involved	1.20 (0.60, 2.39)	--	0.51 (0.31, 0.82)	0.48 (0.28, 0.82)
Not something I think about a lot	0.81 (0.38, 1.74)	--	0.50 (0.30, 0.83)	--
What I could do, will not have an impact	0.77 (0.36, 1.65)	--	0.54 (0.33, 0.89)	--
Other people might react negatively to my involvement	0.72 (0.21, 2.47)	--	0.33 (0.16, 0.68)	--
Not a priority for me	0.28 (0.08, 0.96)	--	0.78 (0.44, 1.38)	--
Talked to peer about climate change in past month (Ref: no)	3.59 (1.64, 7.85)	3.07 (1.36, 6.93)	2.35 (1.44, 3.82)	2.06 (1.22, 3.50)

--variable not included in the model

Table 6 Multivariable logistic regression models of climate change actions among respondents who report that the issue of global warming is very or extremely important to them

	Signed a petition to curb climate change (n=319)		Volunteered with organizations working to curb climate change (n=319)	
	OR (95% CI)	aOR (95% CI)	OR (95% CI)	aOR (95% CI)
Education (Ref: Associate degree or less)	0.59 (0.36, 0.95)	0.50 (0.28, 0.89)	2.88 (1.14, 7.26)	3.16 (1.07, 9.33)
Income (Ref: \$60K or less)	0.67 (0.41, 1.08)	0.97 (0.54, 1.72)	1.79 (0.84, 3.82)	1.05 (0.42, 2.62)
Sex (Ref: Male)	1.53 (0.95, 2.48)	1.53 (0.88, 2.65)	1.93 (0.86, 4.37)	2.33 (0.91, 5.95)
Age (years)	0.99 (0.97, 1.01)	0.99 (0.96, 1.01)	0.95 (0.92, 0.99)	0.95 (0.91, 0.99)
Race (Ref: White)	REF	REF	REF	REF
Non-Hispanic Black	1.24 (0.63, 2.45)	1.19 (0.56, 2.53)	1.41 (0.49, 4.02)	1.03 (0.31, 3.41)
Hispanic	1.55 (0.76, 3.20)	2.59 (1.11, 6.05)	0.65 (0.14, 2.92)	0.52 (0.10, 2.63)
Other	0.46 (0.15, 1.40)	0.69 (0.20, 2.38)	3.06 (1.02, 9.20)	3.33 (0.88, 12.52)
Political orientation (liberal to conservative)	0.83 (0.71, 0.98)	0.84 (0.70, 1.00)	0.99 (0.77, 1.27)	1.06 (0.80, 1.41)
Evangelical or born again (Ref: No)	1.50 (0.71, 3.16)	2.08 (0.90, 4.83)	2.53 (0.95, 6.75)	2.99 (0.91, 9.76)
Reasons haven't been involved in climate change/barriers to climate action				
Too busy	1.06 (0.66, 1.71)	--	0.90 (0.41, 1.97)	--
Don't know how to get involved	1.04 (0.65, 1.66)	--	1.01 (0.47, 2.14)	--
Other people are better at it than me	0.74 (0.46, 1.19)	--	0.83 (0.39, 1.78)	--
If I do get involved, organizations will ask me for money	1.13 (0.70, 1.82)	1.76 (1.01, 3.07)	0.27 (0.10, 0.74)	0.18 (0.06, 0.56)
Haven't been asked	0.74 (0.46, 1.18)	--	0.45 (0.20, 1.00)	--
Activities like letter writing aren't appealing	0.58 (0.36, 0.94)	--	0.87 (0.41, 1.85)	--
I haven't been trained	1.03 (0.64, 1.66)	--	0.47 (0.22, 1.02)	--
Not encouraged to become involved	0.45 (0.27, 0.76)	0.40 (0.22, 0.71)	0.37 (0.15, 0.94)	--
Not something I think about a lot	0.44 (0.25, 0.78)	--	0.68 (0.28, 1.65)	--
What I could do, will not have an impact	0.71 (0.42, 1.20)	--	0.53 (0.21, 1.33)	--
Other people might react negatively to my involvement	0.53 (0.22, 1.27)	--	1.86 (0.66, 5.25)	4.02 (1.11, 14.53)
Not a priority for me	0.25 (0.12, 0.54)	0.26 (0.11, 0.57)	0.54 (0.18, 1.61)	--
Talked to peer about climate change in past month (Ref: no)	1.98 (1.22, 3.19)	1.94 (1.14, 3.31)	1.51 (0.70, 3.25)	2.12 (0.88, 5.10)

--variable not included in the model

Table 7 Multivariable logistic regression models of climate change actions among respondents who report that the issue of global warming is very or extremely important to them

	Donated money to organizations working to reduce climate change (n=319)	
	OR (95% CI)	aOR (95% CI)
Education (Ref: Associate degree or less)	0.99 (0.61, 1.61)	0.77 (0.44, 1.34)
Income (Ref: \$60K or less)	1.79 (1.10, 2.91)	1.96 (1.14, 3.37)
Sex (Ref: Male)	1.25 (0.77, 2.04)	1.25 (0.74, 2.11)
Age (years)	0.99 (0.97, 1.02)	0.99 (0.97, 1.01)
Race (Ref: White)	REF	REF
Non-Hispanic Black	0.76 (0.36, 1.59)	0.71 (0.32, 1.55)
Hispanic	0.87 (0.40, 1.92)	1.23 (0.52, 2.88)
Other	1.21 (0.49, 3.00)	1.29 (0.48, 3.46)
Political orientation (liberal to conservative)	0.90 (0.77, 1.06)	0.90 (0.76, 1.07)
Evangelical or born again (Ref: No)	1.71 (0.81, 3.62)	2.18 (0.96, 4.95)
Reasons haven't been involved in climate change/barriers to climate action		
Too busy	1.29 (0.79, 2.10)	--
Don't know how to get involved	0.98 (0.61, 1.58)	--
Other people are better at it than me	0.86 (0.53, 1.39)	--
If I do get involved, organizations will ask me for money	0.65 (0.39, 1.07)	--
Haven't been asked	0.87 (0.54, 1.41)	--
Activities like letter writing aren't appealing	0.98 (0.61, 1.58)	--
I haven't been trained	1.01 (0.62, 1.63)	--
Not encouraged to become involved	0.71 (0.43, 1.17)	--
Not something I think about a lot	0.56 (0.32, 0.99)	--
What I could do, will not have an impact	0.72 (0.42, 1.24)	--
Other people might react negatively to my involvement	0.73 (0.32, 1.69)	--
Not a priority for me	0.81 (0.45, 1.49)	--
Talked to peer about climate change in past month (Ref: no)	2.49 (1.51, 4.10)	2.57 (1.52, 4.35)

-- variable not included in the model

the odds of signing a petition to curb climate change (aOR=0.26, 95% CI=0.11, 0.57).

Talking to friends or family members in the prior month about climate change was positively associated with four of the five climate change engagement behav-

iors. Recent communication about climate change was associated with contacting an elected official (aOR=3.07, 95% CI=1.36, 6.93), voting for candidates who support measures to reduce climate change (aOR=2.06, 95% CI=1.22, 3.50), signing a petition to curb climate change (aOR=1.94, 95% CI=1.14, 3.31), and donating money to organizations working to reduce climate change (aOR=2.57, 95% CI=1.52, 4.35).

In the adjusted model, sociodemographics were associated with select climate change engagement behaviors. Every one year increase in age was significantly associated with a 4% increase in the odds of voting for candidates who support measures to reduce climate change (aOR=1.04, 95% CI=1.01, 1.06) and a 5% decrease in the odds of volunteering with organizations working to curb climate change (aOR=0.95, 95% CI=0.91, 0.99). Additionally, having a bachelor's degree or higher level of education was associated with decreased odds of signing a petition to curb climate change (aOR=0.50, 95% CI=0.28, 0.89) and increased odds of volunteering with organizations working to curb climate change (aOR=3.16, 95% CI=1.07, 9.33). Having an income of \$60,000 or more was also associated with a 96% increase in the odds of donating money to organizations working to reduce climate change (aOR=1.96, 95% CI=1.14, 3.37). Those who report being more conservative also had significantly lower odds of voting for candidates who support measures to reduce climate change (aOR=0.70, 95% CI=0.59, 0.83). Hispanics, compared to whites, were much more likely to sign a petition to curb climate change (aOR=2.59, 95% CI=1.11, 6.05).

In a final analysis, to help validate the measures, we used the whole sample from wave 6 to examine the association between self-reported concern about climate change and climate change activism. Among those who, in response to the question "How important is the issue of global warming to you personally?", indicated that it was "Somewhat important," "Not too important," or "Not important"; only 3.3% reported that they had donated money to an organization to address climate change, and only 2.5% reported that they had contacted an elected official about climate change. The level of climate change importance was significantly associated with contacting elected officials about climate change ($\chi^2=28.57$, $p<.001$) and donating money to an organization to address climate change ($\chi^2=79.70$, $p<.001$).

Discussion

In the current study, most of the respondents who were highly concerned about climate change had not been involved in climate change activism behaviors except for voting. This finding replicates previous research that indicates much higher levels of concern about climate change than engagement in climate change activism (Leiserowitz et al., 2021). The large average number of barriers endorsed suggests that efforts to increase awareness and education about climate change may not necessarily lead to climate change actions.

Most respondents cited several barriers that impeded their involvement in climate change activism. As reducing barriers to action can strengthen the association between intentions and actions (Rothman et al., 2015), it would be beneficial for organizations working to address climate change to address these barriers and emphasize the range of activities available for people who report barriers.

The barriers identified in this study overlap, to some degree, with a multinational study on physicians (Kotcher et al., 2021). Among that sample, time was the major reported barrier that reduced willingness to communicate with the public about climate change and health. The current study also found that time, not knowing how to get involved, and not being trained were reported barriers to engagement in climate change advocacy.

Among this sample of individuals who were highly concerned about climate change, half reported not knowing how to become involved in climate change advocacy. To facilitate concerned individuals' engagement in climate change activism, it is critical to provide training on how to get involved in climate change activism. This training could include simple automated flowcharts on the websites of environmental organizations to guide people to appropriate activities, for example. Messaging about climate change activism can also emphasize that some activities are not time intensive.

Similar to Lacroix et al., (2019) who examined pro-environmental behaviors, different behaviors were found to be associated with different barriers, suggesting that people should be provided with different options for climate activism based, in part, on their reported barriers. Interestingly, reporting the barrier of other people being better than the respondent was positively associated with signing petitions but negatively associated with volunteering. Signing petitions may be viewed as an activity that takes little skill, and volunteering may be seen as an activity that requires more skill. Therefore, organizations should promote volunteer opportunities that require little skill and build up their skills as they become more engaged.

Another reported major barrier to lack of involvement in climate change activism was low response efficacy, i.e., the belief that their actions would not have an impact. To address this, environmental organizations should focus on both long and short-term goals. Short-term goals may include activities that focus on state and local policymakers which may yield more immediate positive results and help catalyze actions on state, federal, and international levels. Yet even local policy changes may take years or decades to enact. To increase response efficacy, organizations should highlight prior successes in the environmental movement, such as international efforts to reduce chlorofluorocarbons used for refrigerants and aerosol propellants. Additionally, organizations should communicate how and why their efforts are impactful and teach members how to be most effective (e.g., how to work with their representatives productively).

Organizations who work to address climate change should also be aware that two barriers to involvement were reporting not being asked to be involved and concern that organizations would ask for money. Many participants reported that they had not been asked to become involved in climate change activism. We do not know what percent of respondents received emails, phone, or social media posts requesting participation in climate change activism from organizations or trusted individuals in their social networks. Future research could examine what methods are currently used to increase involvement and the most effective ways to encourage and ask people to become involved. The present work found that those who reported the barrier of concern about others reacting negatively to involvement were much more likely to volunteer. Perhaps the volunteer network provided a sense of community to combat

this perceived barrier. As such, organizations could consider emphasizing community and togetherness in their volunteering opportunity promotions.

Organizations must be aware of their outreach approach as a substantial number of individuals also mentioned that they were concerned that the organization would ask them for money. While many organizations operate on small budgets supported by members, constantly asking for funds may put off potential activists. Organizations can reduce disengagement caused by oversaturation by providing individuals more control over donation requests and asking about the desired frequency of contact in emails and letters.

Study findings also suggest that there is a clear need to make the anticipated impacts of climate change more continuously salient in people's lives. Among this sample of respondents who reported that the topic of climate change was "extremely important" or "very important," about one-fifth (21%) of participants indicated that climate change was not a priority, and almost one-third (30%) said that climate change was not a topic that they frequently think about. One strategy to increase the saliency of climate change is to promote peer communication about climate change. This strategy is supported by the finding from this study that talking to family and friends in the previous month was strongly associated with engaging in four of the five climate change actions.

Recent communication about climate change showed a strong and consistent association with engagement in climate change action. This item may capture the salience of the issue, social norms about the acceptability of climate change conversations within one's social network, and cues to action. Prior research indicates that family and friends are key sources of climate change information, but climate change is often an infrequent topic of discussion (Leisorowitz et al., 2019; Geiger & Swim 2016). However, increased peer communication about climate change can lead to greater acceptance of climate science (Goldberg et al., 2019). It may be that talking about climate change amplifies and normalizes it within networks making people more likely to act. A key issue is how to facilitate people moving beyond climate change conversations to concrete actions. Future research should examine the dynamics of how talking with network members is associated with climate change activism.

It is likely that the relationship between climate change discussions and actions is bidirectional. Yet, many people in the sample were highly concerned about climate change and had recently talked about it but had not taken any of the assessed actions to address it. The finding suggests that it may be useful to encourage conversations about what people can do about it in terms of advocacy. This communication behavior would also help address the barrier of not being asked or encouraged to engage in climate change activism. Individuals who more frequently talk to family and friends about climate change might be ideal for training on how to involve their network members.

In addition, to reach diverse audiences, individuals should be encouraged to identify social network members who may be able to influence diverse audiences. For example, they may live in a politically liberal legislative district but have family members or friends who live in conservative districts and could encourage those network members to lobby the conservative legislators. From a social network perspective, it often only takes a few steps in a social network to reach diverse audiences

(Travers & Milgram, 1969). Hence, training people to evaluate and influence network members strategically may help diffuse messages to diverse audiences.

Engaging people directly in the desired behaviors is an alternative approach to attempting to motivate people in the hopes of ultimately achieving behavior change. Focusing on engaging people in the behaviors can lead participants to have a more favorable view of that behavior, increase their self-efficacy (and minimize the barriers of “Other people are better at it than me” and “I haven’t been trained”), and lead to a corresponding social identity. For example, going to a climate change rally with friends might lead individuals to view themselves as activists or engaged citizens. Consequently, encouraging and accompanying social network members to climate change activism events such as lobbying, educational events, and meetings of environmental organizations may be an effective method to increase climate change activism in the overall population.

Study limitations should be noted. Respondents may have been engaged in climate change actions that were not measured. As this survey was administered during the COVID-19 pandemic, we did not assess other collective actions such as protests. We also did not measure barriers to individual actions to reduce carbon footprints, which may be similar or different to barriers to climate change activism. It is also likely that other unmeasured barriers reduce participation in climate change activism, and the outcomes did not assess the amount of time the respondents engaged in climate change activism. Moreover, engaging in climate change activism is a dynamic and longitudinal process, which may not be readily assessed in surveys. From a diffusion of innovation perspective, factors that predict the early adoption of climate change activism behaviors may not predict those who are later adopters of the behaviors (Young et al., 2010).

Although the study was prospective, we cannot adequately infer causality. In fact, people who are trying to address climate change may be more aware of the barriers for them to act than those who are not interested in climate change activism. Given the low levels of reported contact with legislators and volunteering, we may have had insufficient statistical power to detect certain associations. It is also possible that respondents provided *post hoc* reasons for their lack of involvement in climate change activism, which may explain, for example, the theoretical disconnect between the “Organizations will ask me for money” barrier and its correlates (i.e., being related to odds of signing a petition, but not of donating money to organizations). The COVID-19 pandemic may have led respondents to view climate change as less pertinent. However, severe weather events and major fires on the U.S. west coast continued to occur throughout the pandemic, which were likely to have made the issue of climate change more salient. On the other hand, the salience of these events may quickly fade once these events are out of the news headlines.

There are many avenues of future research which warrant attention. Intervention studies should test whether addressing barriers increased climate change activism. Future research should also examine the causal pathway between talking about climate change and climate change activism. Furthermore, the label of environmentalists or activists may have a negative connotation for some individuals (Laidley, 2013; Hoffarth & Hodson, 2016); hence, future research needs to assess how to best frame the role of climate change activism and what types of social identities would be

appealing to potential climate change activists. Continued research should also assess how to match climate activism, which varies from highly social activities to more solitary ventures, such as letter writing, to individual preferences and how people move from less to more intense activism. Delineating the effectiveness of different modes of activism is also important.

In this paper, we found that among a group of individuals highly concerned about climate change, most indicated several barriers to involvement in climate change activism. Efforts to increase the involvement of the public should address these impediments and assess other potential barriers. However, as most of the barriers did not impede climate change actions, organizations can highlight that it is possible to engage in climate change action even in the face of these barriers. Nevertheless, the consistent finding of talking about climate change linked to action suggests the importance of providing guidance on how to broach the topic of climate change and climate change activism with members of a social network. Through developing and systematically evaluating research programs on climate change activism, we can better understand which strategies to prioritize and which have the greatest impact.

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References

- Ballew, M. T., Goldberg, M. H., Rosenthal, S. A., Cutler, M. J., & Leiserowitz, A. (2019). Climate Change Activism Among Latino and White Americans. *Frontiers in Communication*, 3(58), <https://doi.org/10.3389/fcomm.2018.00058>
- Blake, J. (1999). Overcoming the ‘value-action gap’ in environmental policy: Tensions between national policy and local experience. *Local Environment*, 4(3), 257–278. <https://doi.org/10.1080/13549839908725599>
- Brady, H. E., Verba, S., & Schlozman, K. L. (1995). Beyond ses: A resource model of political participation. *American Political Science Review*, 89(2), 271–294. <https://doi.org/10.2307/2082425>
- Chandler, J., & Shapiro, D. (2016). Conducting Clinical Research Using Crowdsourced Convenience Samples. *Annual Review of Clinical Psychology*, 12(1), 53–81. <https://doi.org/10.1146/annurev-clinpsy-021815-093623>
- Chryst, B., Marlon, J., van der Linden, S., Leiserowitz, A., Maibach, E., & Roser-Renouf, C. (2018). Global Warming’s “Six Americas Short Survey”: Audience Segmentation of Climate Change Views Using a Four Question Instrument. *Environmental Communication*, 12(8), 1109–1122. <https://doi.org/10.1080/17524032.2018.1508047>
- Créquit, P., Mansouri, G., Benchoufi, M., Vivot, A., & Ravaud, P. (2018). Mapping of Crowdsourcing in Health: Systematic Review. *Journal Of Medical Internet Research*, 20(5), e187. <https://doi.org/10.2196/jmir.9330>
- Feldman, L., Hart, P. S., Leiserowitz, A., Maibach, E., & Roser-Renouf, C. (2017). Do Hostile Media Perceptions Lead to Action? The Role of Hostile Media Perceptions, Political Efficacy, and Ideology in Predicting Climate Change Activism. *Communication Research*, 44(8), 1099–1124. <https://doi.org/10.1177/0093650214565914>

- Follmer, D. J., Sperling, R. A., & Suen, H. K. (2017). The Role of MTurk in Education Research: Advantages, Issues, and Future Directions. *Educational Researcher*, 46(6), 329–334. <https://doi.org/10.3102/0013189X17725519>
- Geiger, J. L., Steg, L., van der Werff, E., & Ünal, A. B. (2019). A meta-analysis of factors related to recycling. *Journal of Environmental Psychology*, 64, 78–97. <https://doi.org/10.1016/j.jenvp.2019.05.004>. Scopus
- Geiger, N., & Swim, J. K. (2016). Climate of silence: Pluralistic ignorance as a barrier to climate change discussion. *Journal of Environmental Psychology*, 47, 79–90. <https://doi.org/10.1016/j.jenvp.2016.05.002>
- Gifford, R. (2011). The Dragons of inaction: Psychological barriers that limit climate change mitigation and adaptation. *American Psychologist*, 66(4), 290–302. <https://doi.org/10.1037/a0023566>
- Goldberg, M., van der Linden, S., Maibach, E., & Leiserowitz, A. (2019). Discussing Global Warming Leads to Greater Acceptance of Climate Science. *Proceedings Of The National Academy Of Sciences Of The United States Of America*, 116(20), 14804–14805. <https://doi.org/10.1073/pnas.1906589116>
- Haugestad, C. A. P., Skaug, A. D., Kunst, J. R., & Power, S. A. (2021). Why do youth participate in climate activism? A mixed-methods investigation of the #FridaysForFuture climate protests. *Journal of Environmental Psychology*, 76, 101647. <https://doi.org/10.1016/j.jenvp.2021.101647>
- Hoffarth, M. R., & Hodson, G. (2016). Green on the outside, red on the inside: Perceived environmentalist threat as a factor explaining political polarization of climate change. *Journal of Environmental Psychology*, 45, 40–49. <https://doi.org/10.1016/j.jenvp.2015.11.002>
- Huff, C., & Tingley, D. (2015). “Who are these people?” Evaluating the demographic characteristics and political preferences of MTurk survey respondents. *Research & Politics*, 2(3), 2053168015604648. <https://doi.org/10.1177/2053168015604648>
- Hurst, M., Dittmar, H., Bond, R., & Kasser, T. (2013). The relationship between materialistic values and environmental attitudes and behaviors: A meta-analysis. *Journal of Environmental Psychology*, 36, 257–269. <https://doi.org/10.1016/j.jenvp.2013.09.003>. Scopus
- Kollmuss, A., & Agyeman, J. (2002). Mind the Gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research*, 8(3), 239–260. <https://doi.org/10.1080/13504620220145401>
- Kotcher, J., Maibach, E., Miller, J., Campbell, E., Alqodmani, L., Maiero, M., & Wyns, A. (2021). Views of health professionals on climate change and health: A multinational survey study. *The Lancet Planetary Health*, 5(5), e316–e323. [https://doi.org/10.1016/S2542-5196\(21\)00053-X](https://doi.org/10.1016/S2542-5196(21)00053-X)
- Laidley, T. (2013). Climate, Class and Culture: Political Issues as Cultural Signifiers in the US. *The Sociological Review*, 61(1), 153–171. <https://doi.org/10.1111/1467-954X.12008>
- Lange, F., & Dewitte, S. (2019). Measuring pro-environmental behavior: Review and recommendations. *Journal of Environmental Psychology*, 63, 92–100. <https://doi.org/10.1016/j.jenvp.2019.04.009>
- Lacroix, K., Gifford, R., & Chen, A. (2019). Developing and validating the Dragons of Inaction Psychological Barriers (DIPB) scale. *Journal of Environmental Psychology*, 63, 9–18. <https://doi.org/10.1016/j.jenvp.2019.03.001>
- Legault, L., Bird, S., Powers, S. E., Scahy, A., Hou, D., & Janoyan, K. (2020). Impact of a Motivational Interventions and Interactive Feedback on Electricity and Water Consumption: A Smart Housing Field Experiment. *Environment and Behavior*, 52(6), 666–692
- Leiserowitz, A., Maibach, E., Rosenthal, S., Kotcher, J., Bergquist, P., Ballew, M., Goldberg, M., & Gustafson, A. (2019). *Climate Change in the American Mind*. Yale and George Mason University. Yale Program on Climate Change Communication
- Leiserowitz, A., Maibach, E., Rosenthal, S., Kotcher, J., Wang, X., Carman, J., Goldberg, M., Lacroix, K., & Marlon, J. (2021). *Climate Activism: A Six-Americas Analysis, December 2020*. Yale Program on Climate Change Communication. <https://climatecommunication.yale.edu/publications/climate-activism-a-six-americas-analysis-december-2020/>
- Moss, A. J., Rosenzweig, C., Robinson, J., & Litman, L. (2020). Demographic Stability on Mechanical Turk Despite COVID-19. *Trends in Cognitive Sciences*, 24(9), 678–680. <https://doi.org/10.1016/j.tics.2020.05.014>
- Osbaldiston, R., & Schott, J. P. (2012). *Environmental sustainability and behavioral science*. Meta-analysis of pro-environmental behavior experiments. *Environment and Behavior*, 44(2), 257–299. <https://doi.org/10.1177/0013916511402673>
- Rothman, A. J., Gollwitzer, P. M., Grant, A. M., Neal, D. T., Sheeran, P., & Wood, W. (2015). Hale and Hearty Policies: How Psychological Science Can Create and Maintain Healthy Habits. *Perspectives on Psychological Science*, 10(6), 701–705. <https://doi.org/10.1177/1745691615598515>

- Rouse, S. V. (2015). A reliability analysis of Mechanical Turk data. *Computers in Human Behavior*, 43, 304–307. <https://doi.org/10.1016/j.chb.2014.11.004>
- Sabherwal, A., Ballew, M. T., van der Linden, S., Gustafson, A., Goldberg, M. H., Maibach, E. W., Kotcher, J. E., Swim, J. K., Rosenthal, S. A., & Leiserowitz, A. (2021). The Greta Thunberg Effect: Familiarity with Greta Thunberg predicts intentions to engage in climate activism in the United States. *Journal of Applied Social Psychology*, 51(4), 321–333. <https://doi.org/10.1111/jasp.12737>
- Sheeran, P., Harris, P. R., & Epton, T. (2014). Does heightening risk appraisals change people's intention and behavior? A meta-analysis of experimental studies. *Psychological Bulletin*, 140(2), 511–543. <https://doi.org/10.1037/a0033065>
- Smith, C. J., Dupré, K. E., McEvoy, A., & Kenny, S. (2021). Community perceptions and pro-environmental behavior: The mediating roles of social norms and climate change risk. *Canadian Journal of Behavioural Science / Revue Canadienne Des Sciences Du Comportement*, 53(2), 200–210. <https://doi.org/10.1037/cbs0000229>
- Strickland, J. C., & Stoops, W. (2019). The Use of Crowdsourcing in Addiction Science Research: Amazon Mechanical Turk. *Experimental and Clinical Psychopharmacology*, 27(1), 1–18. <https://doi.org/10.1037/pha0000235>
- Travers, J., & Milgram, S. (1969). An Experimental Study of the Small World Problem. *Sociometry*, 32(4), 425–443
- Thomas, E. F., Duncan, L., McGarty, C., Louis, W. R., & Smith, L. G. E. (2022). MOBILISE: A Higher-Order Integration of Collective Action Research to Address Global Challenges. *Political Psychology*. Scopus. <https://doi.org/10.1111/pops.12811>
- Werfel, S. H. (2017). Household behaviour crowds out support for climate change policy when sufficient progress is perceived. *Nat Clim Chang*, 7, 512–515. <https://doi.org/10.1038/nclimate3316>
- Young, D., Borland, R., & Coghill, K. (2010). An Actor-Network Theory Analysis of Policy Innovation for Smoke-Free Places: Understanding Change in Complex Systems. *American Journal of Public Health*, 100(7), 1208–1217. <https://doi.org/10.2105/AJPH.2009.184705>
- Young, J., & Young, K. (2019). Don't Get Lost in the Crowd: Best Practices for Using Amazon's Mechanical Turk in Behavioral Research. *JMWAI*S. <https://doi.org/10.17705/3jmwa.000050>

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