



# Climate Change Marches as Motivators for Bystander Collective Action

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Political marches are one of the most public and vocal means of engaging in collective action and can potentially build social movements by increasing the likelihood that bystanders become engaged with the social movement. Here, we conduct a trend study to test the impacts of two back-to-back highly visible large-scale climate change related marches on bystanders, targeting psychological drivers of collective action: efficacy beliefs, perceptions of others' climate change activism and concerns, impressions of marchers, and behavioral intentions. Participants either completed a survey the day before the March for Science ( $n = 302$ ) or several days after the People's Climate March, which occurred a week after the first march ( $n = 285$ ). Results suggest that the marches were at least partially effective: bystanders' (a) collective efficacy beliefs and (b) impressions of marchers improved after the march. In contrast, marches were ineffective in increasing perceptions of others' engagement with concern about climate change. We anticipated that political leaning of bystanders' news sources would moderate effects of marches. Unexpectedly, collective efficacy beliefs improved among consumers of conservative, but not liberal, news. This unanticipated result is consistent with the notion that conservative news sources dedicated less coverage than liberal news sources to the marches prior to the marches (potentially leading to lower collective efficacy among those who consumed these sources), but that coverage afterwards was more equal across ideological bias of news sources. We also found that the more conservative the news sources consumed by an individual, the more negative impressions they had of marchers, and this relation was strongest among those that indicated, after the marches, that they had heard about the marches. These results on impressions are consistent with the notion that, when marches were covered, conservative news sources portrayed marchers relatively more negatively than liberal news sources. Overall, results suggest that marches can increase the likelihood that bystanders will participate in social movements via changes in psychological drivers of participation and the effects will likely depend upon political leanings of news sources via both whether sources mention the marches and how the sources cover the marches.

**Keywords:** collective action, protest, bystander, efficacy, group norm, meta-perceptions, stereotypes

## INTRODUCTION

Political marches are one of the most public and vocal means of engaging in collective action and a visible contributor to social movements. In the last few years the public has witnessed marches around the globe for many topics including protests about climate change inaction and lack of respect for science, with the latter including concerns about disrespecting scientific warnings about climate change (Fleur, 2017). Political marches are a method that a group can use to visibly and dramatically communicate their concerns about a topic, influence others, and contribute to a larger movement aimed at social change (Thomas and Louis, 2013). Marches emphasize the power of people to influence the power of *elites*—those in social, economic, and political positions that allow them to exert control on powerful institutions, laws, myths, traditions, and social norms and thereby have disproportionate control over societal outcomes (Moyer, 1987; Moyer et al., 2001). However, protests can also expand social movements by engage other members of the public to join their movement and create a stronger force for change (Moyer, 1987). Considering the goal of increasing participation in a social movement, some predictors of joining a social movement are linked to the consequences of marches on bystanders. For example, marches could inspire others to join a movement to address climate change by increasing the perceived efficacy of the public's ability to take action to address climate change (Wallace et al., 2014).

The present research studies the psychological impacts of two highly visible large-scale climate change related marches on *bystanders*—people in the general public who did not participate in the marches but had the opportunity to learn about the marches. The two events had their primary marches in Washington DC and sister marches across the nation and world. They were within 2 weeks of each other and both included a theme of a need to address climate change (Fleur, 2017; Levenson, 2017). Here, we examine psychological impacts that other research points to as predictors of engagement in collective action, specifically (a) efficacy beliefs, (b) beliefs about other people's engagement in the topic, (c) impressions of protestors, and (d) intentions to engage in collective action. The psychological impacts of marches on bystanders is likely linked to the information people receive about the marches. The news media, however, is a gatekeeper of information and, therefore, may be a key contributor to the success of marches (Koopmans, 2004). Thus, we examine whether bystanders' preferred news sources moderate the impact of marches on bystanders.

Much research on political marches and other forms of collective action has focused on predictors of participation in collective action rather than the consequences of collective action (Louis, 2009; Thomas and Louis, 2013). For instance, much research has studied the role of self-efficacy, group identity, ingroup norms, emotions, and perceived violation of moral standards on participation in collective action (van Zomeren et al., 2008; van Zomeren, 2013). In contrast, there is more limited research on the consequences of collective action on bystanders (e.g., their opposition to power elites and support for protestors; Thomas and Louis, 2014). Impacts of marches on bystanders (the

focus of the present work) are important because, as noted above, they can contribute to the success of marches.

Here, we examine potential outcomes of the marches on bystanders that have been shown by other research to be psychological predictors of participation in collective action. In doing so, we extend previous work examining sympathetic responses to protestors' causes (e.g., Branton et al., 2015; Andrews et al., 2016) in order to study outcomes which have been suggested to distally predict engagement in social movement activity and collective action. Specifically, this research tests whether the March for Science and the People's Climate March held in the spring of 2017 influenced (a) collective and personal efficacy to address climate change, (b) perceptions of others' engagement in the topic (i.e., perceived group norms and meta-perceptions), (c) impressions of marchers, and (d) intention to engage in subsequent collective action to address climate change.

We also test the moderating role of bystanders' preferred news sources on these outcomes. While some political marches are direct, observable, and explicit confrontations with powerful elites, in most cases confrontations and public awareness are mediated through news coverage (Koopmans, 2004). Goals of movements are often simply to become visible and large-scale marches may be deemed newsworthy and, thus, can garner such attention. Yet, the type of visibility they achieve depends upon how the marches are portrayed. For example, when providing visibility, media coverage of social movements may positively or negatively resonate with its audience and descriptions may or may not convey the movements' legitimacy (Koopmans, 2004). This suggests that the tenor of news coverage can influence the effectiveness of marches (Amenta et al., 2015; Jasper and Duyvendak, 2015; Karpf, 2018). Thus, psychological impacts of marches on bystanders may be filtered through the public's encounters with the movements via news sources providing different effects based upon one's preferred news sources.

## PSYCHOLOGICAL IMPACTS

### Efficacy

*Efficacy*, perceptions of one's ability to effect change, is a robust predictor of climate change action (van Zomeren et al., 2008; Lee, 2010; Doherty and Webler, 2016; Geiger et al., 2017). *Collective efficacy*, the degree to which an individual perceives they can work together with others to meet a goal, is a subfacet of efficacy that influences willingness to engage in collective action (Roser-Renouf et al., 2014) This is further subdivided into (a) the perceived ability of a group to engage in specific actions (*collective efficacy*) and (b) the perceived ability of those actions to produce the desired outcomes (*collective response efficacy*). Learning about others' collective action increases the belief that one's community can improve their situation (i.e., collective response efficacy; Bilali et al., 2017). Marches may increase collective efficacy by being salient examples of cooperation in service of a common goal; observing large numbers of people willing to engage in coordinated action to address climate change is evidence that groups of people can work together to address climate change and large-scale marches may convey confidence that social change is

possible. Thus, learning about marches in support of science and the need to address climate change may increase the expectation that the public can engage in collective efforts and collective efforts can effectively address climate change.

Collective efficacy contrasts with *personal efficacy*, which is made up of a) *self-efficacy*, individuals' perceived ability to personally engage in an action and b) *response efficacy*, whether that action would produce a desired outcome. Both forms of personal efficacy can promote many types of climate change action (Swim et al., 2014; Doherty and Webler, 2016; Geiger et al., 2017). In addition, marches can influence personal efficacy (Wallace et al., 2014), possibly by serving as role models for how to engage in collective action (e.g., Bandura, 1997). Although the above research suggests that marches could influence personal efficacy and the impact on personal efficacy is potentially important for future engagement in climate change action, marches may not influence personal efficacy. Marchers may be sufficiently different from an individual to not be ideal role models to address personal efficacy and may not address personal barriers to action.

Based upon these considerations, we make the following hypotheses.

*H1a: Large-scale climate change and science marches will increase perceived efficacy to address climate change.*

*H1b: These effects of marches will be present for collective efficacy and not personal efficacy.*

## Perceptions of Others' Engagement: Group Norms

*Descriptive norms* (perceptions of others' behavioral tendencies) are powerful predictors of behaviors (Cialdini, 2003), including climate change collective action (Doherty and Webler, 2016). Large-scale marches supporting action on climate change could alter perceived group norms about engagement in efforts to address climate change for at least two reasons. First, the People's Climate March and March for Science in 2017 drew thousands of people together across the nation and the globe, drawing particularly large numbers in large cities (Fleur, 2017; Levenson, 2017; Mooney et al., 2017). Thus, the marches provided strong visual images of many people taking action to address climate change. Second, exemplars of people concerned about climate change may be made salient and, via the availability heuristic, increase the perceived prevalence of participants in collective action pertinent to climate change (Manis et al., 1993).

However, the effects of marches on perceived group norms may be limited by the scale of the assessment: whether they are perceptions of national or community norms. Even with "sister marches" that provide additional attention to the marches in local communities (Fleur, 2017; Levenson, 2017; Science News Staff, 2018), many communities did not have marches. Thus, the marches may be more likely to affect perceived national norms than norms within one's own community. Based on these considerations, we make the following hypothesis.

*H2a: Large-scale climate change and science marches will increase perceptions that it is normative to participate in collective action to address climate change.*

*H2b: This effect of marches will be present for perceptions about national norms and not perceptions of community norms.*

## Perceptions of Others' Engagement: Meta-Perceptions

*Meta-perceptions* (perceptions of other people's perceptions) can influence individuals' thoughts and actions (Noelle-Neumann, 1993; Geiger and Swim, 2016). Meta-perceptions are distinct from injunctive norms because injunctive norms are beliefs about what people's approval or disapproval of behaviors such as whether someone should engage in collective action (Cialdini, 2003) whereas meta-perceptions are perceptions of other people's positions on topic areas, such as perceptions about how concerned other people are about climate change (Geiger and Swim, 2016). Perceptions that a majority of society hold a given opinion can sway individuals toward that opinion (Moore, 1921; Prentice and Miller, 1993; Sechrist and Stangor, 2001). Further, people are more willing to talk about certain topics, such as climate change, when they perceive that a majority of other people's opinions and level of concern about the topic align with their own opinions and concerns (Noelle-Neumann, 1974; Geiger and Swim, 2016). Many people discuss climate change less frequently than they otherwise would due to systematic underestimation of the extent to which other people are concerned about climate change (i.e., pluralistic ignorance; Leviston et al., 2013; Geiger and Swim, 2016) and correcting this misinformation can promote discussion of the topic (Geiger and Swim, 2016).

Large marches supporting action on climate change could alter climate change meta-perceptions for the same reasons they may influence perceived group norms. The size of large scale marches provide strong visual images of many people who are concerned about climate change and more accessible exemplars of people concerned about climate change may be made salient and increase the perceived prevalence of those concerned about climate change via the availability heuristic (Manis et al., 1993). Thus, marches have the potential to encourage bystanders to also participate in collective action by increasing estimates of the extent to which others are concerned about human-caused climate change.

Similar to perceptions of group norms we examine different scales of meta-perceptions specifically, national, community, and interpersonal level. On one hand, meta-perceptions at an interpersonal level may be stronger predictors of climate change engagement than meta-perceptions at the scale of the U.S. and one's community (Geiger and Swim, 2016). However, similar to our predictions about perceived norms, the effects of marches on meta-perceptions may be limited to perceptions at a national scale. Further, most people may not know others who participated in the marches because four out of five Americans have not participated in any marches at all between 2016 and 2018 (Jordan and Clement, 2018) and even fewer are unlikely to have participated in these two marches in particular. Even if specific friends and family members did participate, the perceiver may have already been aware of that person's beliefs about climate change in advance because participation in rallies tends

to be predicted by strong beliefs (Bliuc et al., 2007; McGarty et al., 2009). Thus, the marches may be more likely to influence perceptions of the strength of climate change concerns in the US than among community members and personal contacts. Based on these considerations, we make the following hypothesis.

*H3a: Large-scale climate change and science marches will increase perceptions that others are concerned about climate change.*

*H3b: This effect of marches will be present for meta-perceptions of people in the United States and not for perceptions of one's community and personal contacts.*

## Impressions of the Concerned

Impressions of marchers can be an important contributor to willingness to engage in behaviors that support opinions expressed by participants in the march. Previous research has found that many ascribe negative traits to environmental activists, for example, perceiving them as eccentric, self-righteous, and over-reactive (Bashir et al., 2013). Environmental activists may be perceived particularly negatively when they engage in collective action behaviors such as marches (Bashir et al., 2013; Klas et al., 2018). In turn, these negative impressions are negatively associated with perceivers' willingness to engage in environmental activism. Marches have the potential to either make marchers seem prototypical or counter these expectations. This could be dependent in part on how the media covers the marches (e.g., whether they dedicate a high percentage of coverage to marchers who engage in negatively viewed extreme or militant behaviors).

It may also be informative to consider a range of types of impressions that may be associated with marchers. Impressions of those who are very concerned about climate change are not likely to simply vary in the extent to which they are seen positively or negatively (Swim and Geiger, 2018). They also vary in the extent to which they are perceived to have feminine and masculine traits. It may be important to include gendered traits and not just general activist traits to be able to capture different ways that marches may impact impressions of marchers.

Given the importance of negative impressions of activists on participating in collective action, it may be important to consider both positive and negative gendered traits. Feminine traits can be subdivided into (a) positive communal attributes such as being nurturing and (b) negative low status attributes such as being complainers. If activists are portrayed as being concerned about ethical consequences of climate change, they may be seen as feminine because these concerns reflect caring for others (Swim et al., 2018b). Raising concerns about the impact of climate change on others could be portrayed with positive feminine attributes such as caring about the planet or with negative feminine attributes such as being a complainer. Masculine traits can be subdivided into (a) positive agentic traits such as being a leader and (b) negative agentic traits such as being arrogant (Diekmann and Eagly, 2008). Activists may be portrayed as being agentic because of the effort it takes to engage in such behaviors, but the agency could be portrayed with positive masculine attributes such as assertively tackling a problem or with negative masculine traits such as being arrogant. Examining positive and

negative gendered traits may provide a nuanced understanding of the effects of marchers on impressions of marches because these impressions of activists along these dimensions can have differentially predictive effects on willingness for the perceivers to engage in activist behaviors. For example, research suggests that agentic-masculine portrayals may have a more potent impact on bystanders' likelihood of engaging in subsequent political action than communal-feminine portrayals, but negative masculine portrayals might discourage pro-climate action while positive masculine portrayals promote pro-climate action (Geiger and Swim, 2018).

Not knowing the full range of behavior that would be on display and how activists would be portrayed by the news media *a priori*, we did not make directional predictions about the effects of the marches on impressions on activist traits or gendered traits. Rather we were interested in documenting which traits were influenced because positivity and negativity and the gendered nature of impressions could have implications for whether the public is willing to join a climate change social movement (e.g., Bashir et al., 2013; Geiger and Swim, 2018; Swim et al., 2018b). Yet, as described below, we predicted that the portrayal of the protestors may differ dependent upon the news sources and the influence of news source would influence impressions.

## Subsequent Collective Action

A successful political march will be one that activates bystanders to take action (Moyer, 1987; Moyer et al., 2001). There is evidence that marches can have this effect with larger marches influencing the general public such as by increasing subsequent monetary contributions and voting (Madestam et al., 2013). Thus, large scale climate change and science marches may increase the likelihood that others will report intending to engage in collective action to address climate change after the marches. Based on these considerations, we make the following hypothesis.

*H4: Large-scale climate change and science marches will increase intent to engage in collective action to address climate change.*

## NEWS SOURCE

News sources have a reputation of dedicating little coverage to climate science and often fail to acknowledge the validity of the science (Akerlof et al., 2012). These omissions and failures are particularly prominent among conservative commentary outlets (Akerlof et al., 2012) to the point where some researchers state that these outlets are promoting climate denial (Dunlap and McCright, 2011). Some have argued that misleading coverage of climate science reflects vested and ideological interests by the owners of these news sources and conservative think tanks which motivate them to discourage large-scale action to address climate change (Dunlap and Jacques, 2013). Based on this perspective, we anticipated that conservative news sources might limit coverage of the two marches and, when covering the marches, present predominantly negative portrayals. The negative coverage could extend to unfavorable portrayals of marchers. For example, to journalists contributing to conservative news sources, marchers who express support for



climate science and climate action may be considered out-groups and, therefore, subject to out-group derogation that align with negative stereotypes about activists and those alarmed by climate change (e.g., Swim and Geiger, 2018).

In contrast, more liberal news sources might be more likely to cover the marches and portray the marches and marchers relatively more positively. The New York Times and Washington Post, two news sources that have been classified as relatively liberal (Budak et al., 2016; Otero, 2018), are more likely than relatively more conservative news sources to present scientific information about climate change (Akerlof et al., 2012). While including negative opinions, liberal news sources are more likely than conservative news sources to include text or opinions conveying the accuracy of climate science (Akerlof et al., 2012). Because of more attention to and positive portrayals of climate science, liberal news sources, relative to conservative ones, likely dedicate a greater percentage of coverage to climate-related marches and portray the marches more positively. The positive coverage could extend to favorable portrayals of marchers. For example, to journalists contributing to liberal news sources, marchers who express support for climate science and climate action may be considered ingroups and, therefore, subject to ingroup favoritism that align with positive stereotypes about those alarmed by climate change (e.g., Swim and Geiger, 2018).

As a consequence of differences in coverage of the marches, if people get their news from conservative news sources, they may be less likely to learn about the two climate related marches we examine in the present research. If they do encounter news about the marches from these conservative news sources, they may learn about negative aspects about the ability of marches to create a successful protest and information that dismisses the legitimacy of their causes (collective efficacy). They may also encounter news that downplays the number of people involved in the marches (descriptive group norms) and concern about their causes (meta-perceptions) and presents negative portrayals of protestors (impressions). As a result, the news may discourage subsequent efforts to address climate change (collective action). In contrast, people who get their news from liberal news sources may be relatively more likely to learn about the two climate related marches we examine here and, if they learn about the marches they may encounter information about the effectiveness of the marches to gather people and address climate change (collective efficacy). They may encounter information that indicates that engagement is common with many people participating in the two marches (descriptive group norms) and expressing concern about climate change (meta-perceptions). They may also encounter news that presents positive portrayals of protestors (impressions). As a result, the news may encourage subsequent efforts to address climate change (collective action). Based on these considerations, we make the following hypothesis.

*H5: Hypothesis 1 through 4 and impressions of marchers will be moderated by the source of news such that the hypotheses will be more likely to be supported and changes in impressions will be more positive and less negative among those who get their news from liberal sources and the opposite among those who get their news from conservative news sources.*

## Exploratory Analyses

We also explore the possibility that psychological impacts of information obtained from news sources on bystanders might be most potent on those who are most attuned to the marches. Those who heard about the event may be those most attuned to news, particularly news about climate change. As a result, news sources may have a stronger impact on those who heard about the marches than those who had not heard about the marches. The joint effect of being attuned to climate change information and the effect of news sources may illustrate a polarizing effect of news sources. For example, among those that obtain their news from conservative sources, those who report having heard about the marches may have more negative views of the marchers than those who did not hear about it. In contrast, among those that get their news from liberal sources, those who report having heard about the marches may have more positive views of the marchers than those who did not hear about it.

## PRESENT RESEARCH

The present research used a trend study to test the impacts of large-scale climate change related marches on bystanders' efficacy beliefs (H1), perceived group norms (H2), meta-perceptions about climate change concerns (H3), impressions of protestors, and subsequent behaviors (H4). One group completed measures immediately before the March for Science and the People's Climate March held in the spring of 2017 and a different group completed measures immediately after the marches. These marches drew thousands of participants to the primary marches in Washington DC and sister marches across the nation and globe (Fleur, 2017; Levenson, 2017). For example, the March for Science organization reported that over 600 sister marches were held across the globe in April 2017 (Science News Staff, 2018). These marches are on par with other large scale liberal leaning marches that occurred between 2016 and 2017 held in response to President Trump and his administration (Jordan and Clement, 2018). The March for Science was held first and protested the US "government's misuse and rejection of scientific expertise" including climate science (Science News Staff, 2018). The People's Climate March, held a week later, protested the Trump administration's environmental policies (Levenson, 2017).

We test whether changes in the psychological impacts of marches on bystanders differ dependent upon the political leanings of the bystanders preferred news sources (H5). We also explore whether news sources influence these psychological impacts most strongly for those who heard about the event after the event. We acknowledge that selective attention to news sources that match one's political leanings (Mitchell and Weisel, 2014) may create confounds with our measures of preferred news sources and whether participants heard about the marches. Similarly, those most concerned being more likely to attend to climate change information than those least concerned about climate change (Swim and Geiger, 2017) potentially resulting in those concerned about climate change being more likely to have heard about the marches. Thus, we included political

ideology and degree of concern about climate change, as well as demographic information, as covariates in our analyses. Although including covariates cannot definitively rule out confounds, effects for news sources with the inclusion of these covariates are suggestive of the unique effects of political leanings of news sources.

## METHODS

### Participants and Procedure

We recruited 340 participants to complete a survey the day before the March for Science, which was held on April 22, 2017 (*pre-survey*) and 348 to complete the survey several days after the People's Climate March, which was held on April 29, 2017 (*post-survey*). Both surveys contained identical measures except the marches were described in future tense in the pre-survey and past tense on the post survey. All participants were recruited from Amazon's Mechanical Turk via Turkprime and paid \$1.00 for the completion of their surveys. After eliminating participants for duplicate IP addresses ( $n = 8$ ), failure to pass an instructional check included at the end of the survey before the demographic measures ( $n = 36$  and 48, pre and post survey, respectively) and participants that reported participating in the marches ( $n = 9$  post survey)<sup>1</sup>, there were a total of 587 participants (302 pre-survey participants and 285 post-survey participants). The data set analyzed for this survey can be found at Swim et al., 2018). Power analyses indicate that 485 participants are necessary to detect a small effect size ( $F^2 = 0.02$ ), for an increase in  $R^2$ , with  $\alpha = 0.05$ , and power = 0.80, and with two predictors and six covariates to test effects pre and post march effects and 395 participants are necessary with the same specification with one predictor and eight covariates to test interaction effects for pre and post march by news source (see results). Thus, our sample size had >0.80 power to detect small effects because we had more than this number of participants.

Demographics are reported in **Table 1**. Although the sample is a convenience sample, it is roughly representative of the population, albeit with the sample being slightly more liberal than the population as suggested by political party affiliation. Overall, participants' ages ranged from 18 to 77 with the median age being 35 years old which is close to the median age in the US in 2017 being 35.3 (U. S. Census Bureau, 2017a). On a socio-economic status (SES) ladder, that ranged from 1 (lowest SES) to 10 (highest SES), 10% of participants chose 1 and 2, 36% chose 3 and 4, and 41% chose 5 and 6, which is similar to self-reported social class in the US where 8% identify as lower class, 30% as working class, and 43% identify as middle class (Bird and Newport, 2017). About three-quarters of the participants identified as White (74%) and 5% as Latino/a (participants

<sup>1</sup>We excluded attendees because our research is on effects on bystanders. Although removing attendees could alter the comparability between the pre- and post-march samples, we found little differences with and without them. The differences were that excluding attendees made an interaction predicting pessimism about marches nonsignificant and an interaction predicting negative masculine impressions marginally significant at  $p = 0.052$ . We did not exclude people from the pre-march survey who planned (3 and 2%) or thought they might attend (17 and 19%) the marches because we could not tell if they acted on those plans.

**TABLE 1 |** Demographics.

	Pre ( $N = 302$ ) percent or mean (SD)	Post ( $N = 285$ ) percent or mean (SD)	$p$ -value <sup>a</sup>
Gender (Men)	47%	59%	<0.01
Age	37.93 (12.45)	37.51 (11.87)	0.67
SES Ladder (1 to 10)	4.83 (1.72)	4.54 (1.66)	0.04
ETHNICITY			
White	74%	77%	0.39
African American	10%	9%	
Latino/a	5%	5%	
Asian	7%	7%	
Other	5%	2%	
Liberal (-3) to conservative (+3)	-0.31 (1.12)	-0.33 (1.15)	0.87
POLITICAL PARTY			
Republican	23%	18%	0.13
Democrat	40%	36%	
Independent	32%	40%	
Not interested in politics	2%	4%	
Other	2%	3%	
Six Americas (Self-classification 1, very concerned; 6 dismissive)	2.21	2.39	0.12
Very concerned	35%	36%	0.82
Concerned	33%	30%	
Cautious	17%	15%	
Disengaged	8%	6%	
Doubtful	3%	6%	
Dismissive	3%	7%	

<sup>a</sup> $p$ -values are for  $t$ -tests when comparing means and chi-squares when comparing percentages.

were asked to choose a single category). In comparison, in the United States, 61% identify as White Non-hispanic and 18% as Hispanic of any race (U. S. Census Bureau, 2017b). This suggests a possible overrepresentation of Whites and underrepresentation of Hispanics in our sample, although it is difficult to tell conclusively because it is unclear whether some participants who identified as White or another race may have also identified as Hispanic. Most tended to express at least some concern about climate change as reflected by their self-classification into the Six Americas categories which is similar to what is reported in National surveys using the Six Americas screening tool (e.g., Roser-Renouf et al., 2016). The percent of Republicans in our sample (23% pre and 18% post) is less than that found in the United States (26%) and the percent in of Democrats our sample (40% pre and 36% post) is more than that found in the United States (28%) during the time the survey was taken (Gallop Poll, 2018).

### Measures

Participants completed measures in the order presented here. See **Supplemental Material** for items in multi-item measures.

## News Sources

In an open-ended question, participants indicated where they got their news about everyday events and were asked to be as specific as possible. Then they provided self-ratings on a five-point scale as to the political leanings of the news sources (“Very Liberal,” –2 to “Neither liberal or Conservative,” 0 to “Very Conservative,” 2). Next they indicated how closely they followed news about global climate change (“Not at all,” 0 to “Very,” 3). Then they answered an open-ended question about news sources about global climate change and a closed ended question about political leaning of these news sources using the same response options as for their ratings of general news sources. Detailed descriptions of the news sources and coding procedures can be found in the **Supplemental Materials**.

## Coding of News Sources

Because subjective evaluations of the political leaning of news sources may be influenced by a belief that one’s news sources do not have political biases, we created independent ratings of participants’ news sources. Seventy-six sources listed by participants could be found on the “Media Bias Chart” version 4 (Otero, 2018). Derived from this chart, each of the 76 out of 282 sources listed by participants was coded from liberal (–9) to conservative (+9). At the time we were coding the values, the chart values for “political bias” ranged from –42 to 42 and the ratings per source were not available. We determined values assigned to news sources based upon a visual inspection of the Media Bias Chart. We overlaid –9 (very liberal) to +9 (very conservative) grid on the chart with markers for every tenth of a digit on the chart and selected the value that fell at the midpoint of each graphic used to designate each of the media sources displayed on the chart. We assigned this value to each news source listed by participants for general news sources and climate change news sources. The media bias had ratings for what they labeled as local news sources with liberal and conservative cities. When our participants noted local news sources, we looked up the zip code for the city associated with the local news source they listed and looked up how the city voted in the previous national election. Based upon these characterizations we indicated that the local news sources as either being one with liberal or conservative leanings and used the ratings for these two categories from Media Bias. The correlation between the values we assigned to the sources and that now available from Media bias is  $r_{(73)} = 0.93$ .

Limitations associated with the Media Bias ratings include the following: the ratings were done by one person and that person also developed the coding protocol; the selection of articles per source may not be a good representation of the source; the precise algorithm used to combine ratings is not provided, although a general description is given. For critiques of content analysis related to coding media sources see Lacy and Riff (1996) and Lacy et al. (2015). Despite these limitations, we used this rating system for the following reasons: the ratings were done by someone other than ourselves; the ratings were systematically done with countable criteria (e.g., counting of positions taken in each sentence of each article); our participants provided many sources and Media Bias provided the largest number of codable sources that we could find; convergent validity of the ratings was indicated by correlations between the coded ratings

of news sources and participants’ subjective ratings of the political leanings of their general news and climate change news sources,  $r_{(439)} = 0.53, p < 0.001$ .

Some participants ( $n = 146$ ) provided news sources that were not listed on the Media Bias chart (e.g., “Reddit” or “Google News”) either because the sources were user-tailored, they aggregated news from a variety of sources or they were not specific news sources (e.g. “TV,” “friends,” and “family”). We devised an imputation method by regressing the ratings derived from Media Bias (among participants for whom we were able to calculate such ratings from the Media Bias chart) onto individuals’ subjective ratings and self-reported political ideology. We used this regression model, with each individuals’ subjective ratings and self-reported political ideology, to estimate ratings that would have been obtained from Media Bias. The resulting predicted values replaced missing values for participants without ratings provided by Media Bias.

Most participants had multiple news sources, particularly because they provided both their general news sources and their climate change news sources. Therefore, we averaged ratings across these news sources (see **Supplemental Materials**). Results are similar whether we use subjective ratings or the codes derived from Media Bias. We report analyses using the latter codes because of the reasons noted above as to why we used Media Bias ratings and they represent a more independent representation of the political leaning of participants’ news sources than participants’ subjective ratings.

## Climate Change Concern

We used the single-item measure of climate change concern developed by Swim and Geiger (2017) where participants were given one-sentence descriptors of each of the Six Americas climate change opinion groups (Maibach et al., 2011) that were labeled Very Concerned (to represent the Alarmed with a less pejorative label), Concerned, Cautious, Disengaged, Doubtful, and Non-believer (to represent the Dismissive with a less pejorative label).

## Meta-Perceptions

Using a seven point scale (“None,” 0 to “Almost everyone,” 6), Participants rated their perceptions of the proportion of people from each of 10 groups who were “Very Concerned” about climate change using a seven point ranging from “none” to “almost everyone.” Of interest for the present research were ratings of “the U.S. public,” “people in my community,” and “people I know personally (friends, family, coworkers, acquaintances, neighbors).”<sup>2</sup>

## Heard About Marches

On two separate scales, participants indicated how much they heard about the march for science and the people’s climate march

<sup>2</sup>Participants also rated perceptions of others’ beliefs about climate change. Results are similar for perceived concern. We report meta-perceptions for climate change concern based on the notion that those marching would be perceived not only to believe in climate change but to be highly concerned about the issue if they are motivated to participate in such an action.

**TABLE 2** | Observations about marches.

	Pre (N = 302) percent or mean (SD)	Post (N = 285) percent or mean (SD)	p-value <sup>a</sup>
Independent news source rating (−9 = liberal, 9 = conservative)	0.22 (2.48)	0.22 (2.56)	0.99
Self-reported news sources (−2 = liberal; 2 = conservative)	−0.41 (0.81)	−0.48 (0.84)	0.28
Closely follow news about global climate change (0 = not at all; 4 = very)	1.65 (0.77)	1.61 (0.83)	0.51
Self-reported sources of news about climate change (−2 = liberal; 2 = conservative)	−0.47 (0.91)	−0.59 (0.93)	0.10
Heard about march for science (% nothing vs. % very little vs. % a small amount, quite a bit, plus very much)	61%/10%/29%	34%/13%/53%	<0.001
Heard about people's climate change march (% nothing, vs. % very little, vs. % a small amount, quite a bit, plus very much)	71%/10%/19%	48%/17%/36%	<0.001
March for science near where p's live (Percent no, not sure, yes)	24%/66%/11%	33%/47%/19%	<0.001
People's climate March where p's live (Percent no, not sure, yes)	23%/71%/6%	33%/58%/08%	0.004
Know someone who [plans on attending/ attended] March for Science (Percent no, maybe, yes)	78%/9%/13%	75%/10%/15%	0.57
Know someone who [plans on attending/ attended] People's Climate march (Percent no, maybe, yes)	84%/10%/7%	82%/12%/6%	0.67

<sup>a</sup>p-values are for t-tests when comparing means and chi-squares when comparing percentages.

before they read about it in the survey on a five-point scale ranging from “Nothing at all” (0) to “Very much” (5). Because of the skewed data (see **Table 2**) and to avoid potential excessive influence of a minority who reported hearing a lot about the marches, we dichotomized this measure to represent those who had not heard about the marches (i.e., reporting that they had heard “Nothing” or “Very little”) vs. those who heard at least a small amount about the two marches (i.e., reported that they had heard “A small amount,” “A moderate amount,” “Quite a bit,” and “Very much”). Participants were also asked to provide descriptive information about what they heard which is not analyzed here.

### Location of Marches

Separately rating each march, participants indicated whether or not there were marches near them or whether they were unsure.

### Participation in Marches

Separately rating each march, participants indicated whether they knew someone and whether they themselves were attending or had attended the marches (“Yes,” “Maybe,” or “No”). See Footnote 1 for information about their own attendance.

### Impressions

Participants rated the extent to which people who participated in the rallies had 15 attributes on a five-point scale (0 = “Not at all” to 4 = “Very much”). Three of the attributes were obtained from previous research on stereotypes about activists (eccentric, self-righteous, overactive, Bashir et al., 2013, Cronbach  $\alpha = 0.81$ ). Twelve of these traits were derived from research assessing negative and positive gendered traits about climate change opinion groups (Swim and Geiger, 2018): negative masculine traits: aggressive, dictatorial, arrogant (Cronbach  $\alpha = 0.86$ ); negative feminine traits: nagging, whiny, complaining, (Cronbach  $\alpha = 0.92$ ); positive masculine traits: courageous, adventurous, stands-up under pressure, (Cronbach

$\alpha = 0.79$ ); positive feminine traits; nurturing, gentle, sympathetic, (Cronbach  $\alpha = 0.82$ ).

### Efficacy

All efficacy measures used seven-point scales ranging from −3 (Strongly disagree) to 3 (Strongly agree). Participants completed four items about *collective response efficacy* to address climate change (e.g., “Humans have the ability to reduce climate change”; Cronbach  $\alpha = 0.82$ ). They also completed two items to assessing being pessimistic about *collective efficacy* to take action to address climate change (“It is impossible to get large groups of people to work together on anything”; Cronbach  $\alpha = 0.71$ ) and the two items measuring being optimistic about collective efficacy (“People are capable of working together to solve big social problems”; Cronbach  $\alpha = 0.51$ ) (see **Supplemental Materials** for the reason for the distinction between pessimism and optimism in constructs of collective efficacy). It should be noted that we might have difficulty detecting effects with the optimism subscale because of its low reliability. The two measures were correlated at  $r_{(578)} = -0.49$ .

Using the same scale, participants also completed three items to assess self-efficacy to take action to address climate change (e.g., “I am capable of contacting government officials to share my views about climate change with them,” Cronbach  $\alpha = 0.74$ ) and three items to assess personal response efficacy (e.g., “When average people share their views on climate change with government officials, it can influence officials’ actions on climate change,” Cronbach  $\alpha = 0.88$ ).

### Group Norms

Using a seven point scale (“None,” 0 to “Almost all,” 6), participants indicated the number among the general public in the United States who had engaged in four different types of collective action over the previous 6 months (political behaviors, such as voting, contacting officials, signing petitions,



environmental activism related to climate change, talking to friends and family members about the importance of addressing climate change, using social media to educate friends, and family about climate change; Cronbach  $\alpha = 0.87$ ). They repeated this for estimates about people in their community (Cronbach  $\alpha = 0.92$ ).

### Collective Action Intentions

On a five point scale (“Definitely not,”  $-2$  to “Definitely will,”  $2$ ), participants indicated the likelihood that they would engage in the same behaviors noted for group norms plus two additional behaviors (“Learn more about climate change,” and “Start or increase my commitment to particular groups working to address climate change” Cronbach  $\alpha = 0.91$ ). They were asked to not include attendance at the rallies in their assessments.

## RESULTS

Confirming our assumption that those who completed the survey prior to the marches were likely to be similar to those who completed the survey after the marches, there were no differences on all key demographics variables (except gender and SES), political ideology, and concerns about climate change (see **Table 1**). Political leaning in news sources and how closely they followed news about climate change did not differ between the pre- and post-march groups (see **Table 2**). However, consistent with our use of pre-post survey as a measure of learning about the march, more people indicated hearing at least some information about the march after the march than before the march. Consistent with our expectations about low participation within particular communities and participants’ personal contacts, most participants reported that there was not a march near where they lived and few knew people who had participated. Pre- vs. post-march reports of locations of marches suggests that more people thought there would be a march near them than actually occurred.

### Overview of Analyses

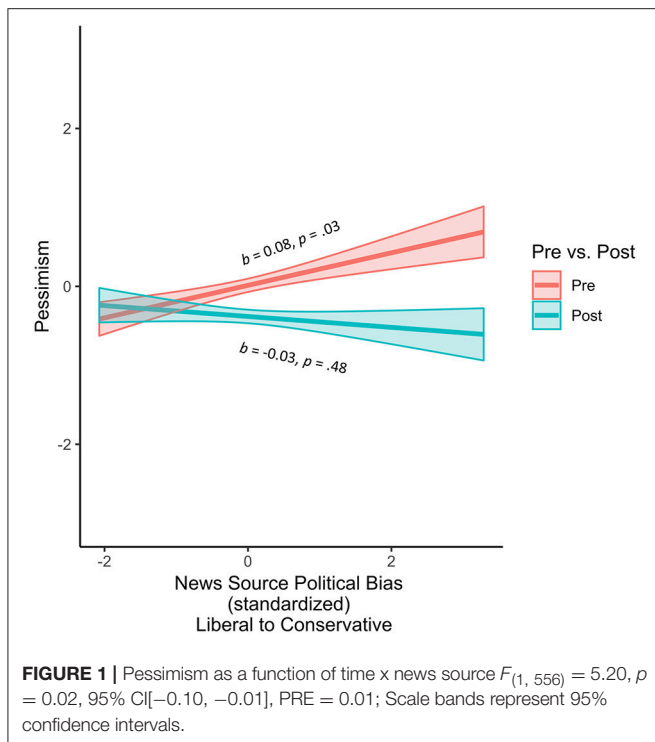
We regressed each of our possible outcome variables (collective efficacy, group norms, meta-perceptions, impressions of marchers, collective action intentions) on time of survey (Pre =  $-1$  vs. Post =  $1$ ) and political leaning of news source (liberal to conservative) at step 1, and the interaction between time of survey and news source at step 2. We also included covariates in step 1: SES, gender, age, ethnicity (i.e., whether or not White), climate change concern, and political ideology (see above for measure details). Including gender and SES allowed us to adjust for gender and SES difference in our pre- vs. post-march samples. Including participants’ climate change concern and political ideology as covariates allowed us to focus on the effects of political ideology of the news sources unique from the effects of participants’ views on climate change and political ideology. All continuous variables were centered and all categorical variables were coded at  $-1$  vs.  $1$ . For continuous measures and interactions with continuous measures, we present the proportional reduction of error (PRE) which is a measure of effect size identical to  $\eta_p^2$  (Judd et al., 2009). Follow-up analyses

of differences between timing of the survey for significant interactions were conducted using simple slopes at  $\pm 1$  SD from the mean of news source (Aiken et al., 1991). When comparing pre-march and post-march ratings both as main effects and within interactions, we report the corresponding  $t$ -tests and Cohen’s  $d$  in order to convey the strength of the effects in standard deviation units which could help with the interpretation of the effect size. In order to understand the interactions, follow-up tests of the effects of political leaning of news sources were done with the pre and post survey responses. For all analyses, significant interactions and their corresponding simple slope analyses for effects of news sources are presented in Figures. All non-significant effects noted below are at  $p > 0.050$ .

About a third of those completing the survey after marches reported not hearing about the marches, potentially diminishing our ability to detect pre vs. post effects of the marches because of a dilution of the treatment. A comparison between hearing and not hearing about the marches after the marches could potentially detect effects not found comparing pre- vs. post-data. Additionally, comparing those who heard vs. not heard about the marches after the marches allowed us to test for potential polarizing impacts of news source on those most vs. least attuned to information about the marches. Thus, following the analyses comparing responses before and after the marches, we tested differences between those who heard vs. had not heard about the marches and the interaction between hearing about marches and news sources only among those that completed the survey after the marches. We regressed each of our outcome variables on time of survey having heard about the march ( $-1$  = not heard,  $1$  = heard) and political leaning news source (liberal to conservative) at step 1, and the interaction between time of survey and news source at step 2. As before, we also included covariates in step 1: We included gender, age, SES, ethnicity, climate change concern, and political ideology. All continuous variables were centered all categorical variables were coded at  $-1$  and  $1$ . Follow-up analyses of differences between those who heard and did not hear about the march were conducted using simple slopes at  $\pm 1$  SD from the mean of news source (Aiken et al., 1991). As with the first set of analyses, for continuous predictors and interactions with continuous measures we present PRE and for binary predictor variables, we report the corresponding  $t$ -tests and Cohen’s  $d$  values. Also, in order to understand the interactions, follow-up tests of the effects of political leaning of news sources were done within those who heard and those who had not heard about the marches.

### Efficacy

Consistent with predictions (H1), people were less pessimistic about people’s ability to work together to address climate change after the march ( $M = -0.38$ ) than before the march ( $M = 0.02$ ),  $t_{(557)} = -3.23$ ,  $p = 0.001$ , 95% CI $[-0.32, -0.08]$ ,  $d = -0.27$ , and more optimistic about their ability to work together to address climate change after the march ( $M = 1.03$ ) than before the march ( $M = 0.80$ ),  $t_{(557)} = 2.59$ ,  $p = 0.01$ , 95% CI $[0.03, 0.21]$ ,  $d = 0.22$ . In contrast, there were no effects for time of survey for collective response efficacy  $t_{(563)} = -0.96$ ,  $p = 0.336$ , 95% CI $[-0.12, 0.04]$ ,  $d = -0.08$ , and, per predictions (H1b) no effects of timing of



survey on personal self-efficacy,  $t_{(563)} = 0.37, p = 0.710, 95\% \text{ CI}[-0.08, 0.12], d = 0.03$ , and personal response self-efficacy,  $t_{(563)} = 1.12, p = 0.264, 95\% \text{ CI}[-0.04, 0.16], d = 0.09$ .

However, opposite to predictions that effects of the marches would be particularly strong among participants who got their news from liberal news sources (H5), follow-up tests for an interaction between time of the survey and news sources indicated that the increase in efficacy from before to after the marches was strongest for those who received their news from more conservative news sources (see **Figure 1**). Those who obtained their news from conservative sources were less pessimistic after the march ( $M = -0.45$ ) than before the march ( $M = 0.22$ ),  $t_{(556)} = -3.90, p < 0.001, 95\% \text{ CI}[-0.50, -0.17], d = -0.33$ . There was no effect of time of survey (i.e., pre-marches vs. post-marches) on pessimism for those who received their news from liberal sources. Follow-up tests within timing of the survey revealed a relation between news sources and pessimism before the marches and not after the marches.

### Hearing About Marches

In contrast to the interactive effect between ideology of news source and timing on collective efficacy beliefs, exploratory analyses on post-march responses suggest a polarizing effect of news sources on personal and collective response efficacy beliefs (see **Figure 2**). Among those that obtained their news from liberal sources, those that had heard about the marches perceived greater collective response efficacy ( $M_{\text{heard}} = 1.12$  vs.  $M_{\text{noheard}} = 0.76$ ),  $t_{(272)} = 2.06, p = 0.04, 95\% \text{ CI}[0.02, 0.69], d = 0.25$ , and personal response efficacy ( $M_{\text{heard}} = 0.90$  vs.

$M_{\text{noheard}} = 0.48$ ),  $t_{(272)} = 2.03, p = 0.04, 95\% \text{ CI}[0.01, 0.81], d = 0.25$ , than those that did not hear about the marches. The reverse was true for those that obtained their news from conservative sources, but the means were not significantly different from each other on collective efficacy, ( $M_{\text{heard}} = 0.88$  vs.  $M_{\text{noheard}} = 1.06$ ),  $t_{(272)} = -1.03, p = 0.30, 95\% \text{ CI}[-0.25, 0.08], d = -0.12$ , and personal response efficacy ( $M_{\text{heard}} = 0.67$  vs.  $M_{\text{noheard}} = 1.03$ ),  $t_{(272)} = -1.74, p = 0.08, 95\% \text{ CI}[-0.74, 0.05], d = -0.21$ ). Other follow-up tests indicated that the relation between political leaning of news sources and response efficacy beliefs were not significant within those that heard about the marches and significant within those that had not heard about the marches. The interactions between hearing about the marches and news sources after the marches were not significant for optimism or pessimism about people's ability to work together or personal self-efficacy.

### Perceptions of Others' Engagement: Group Norms

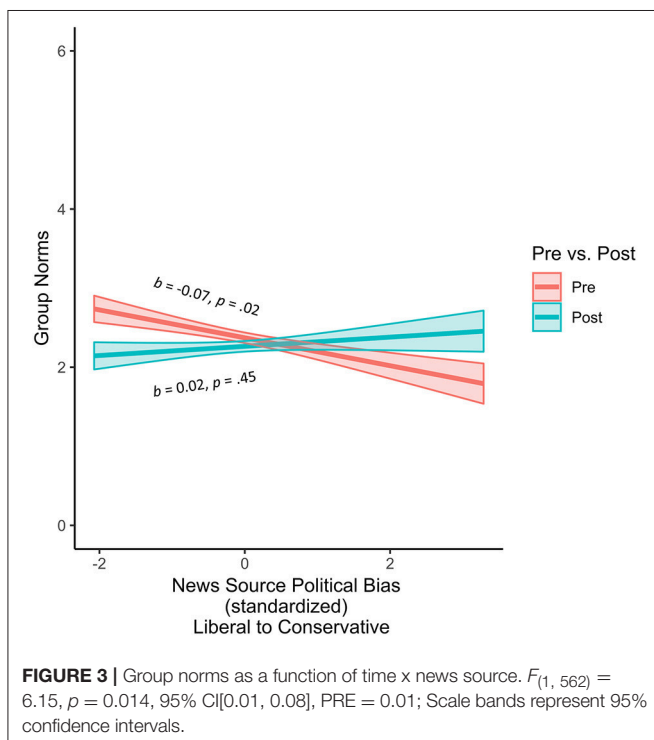
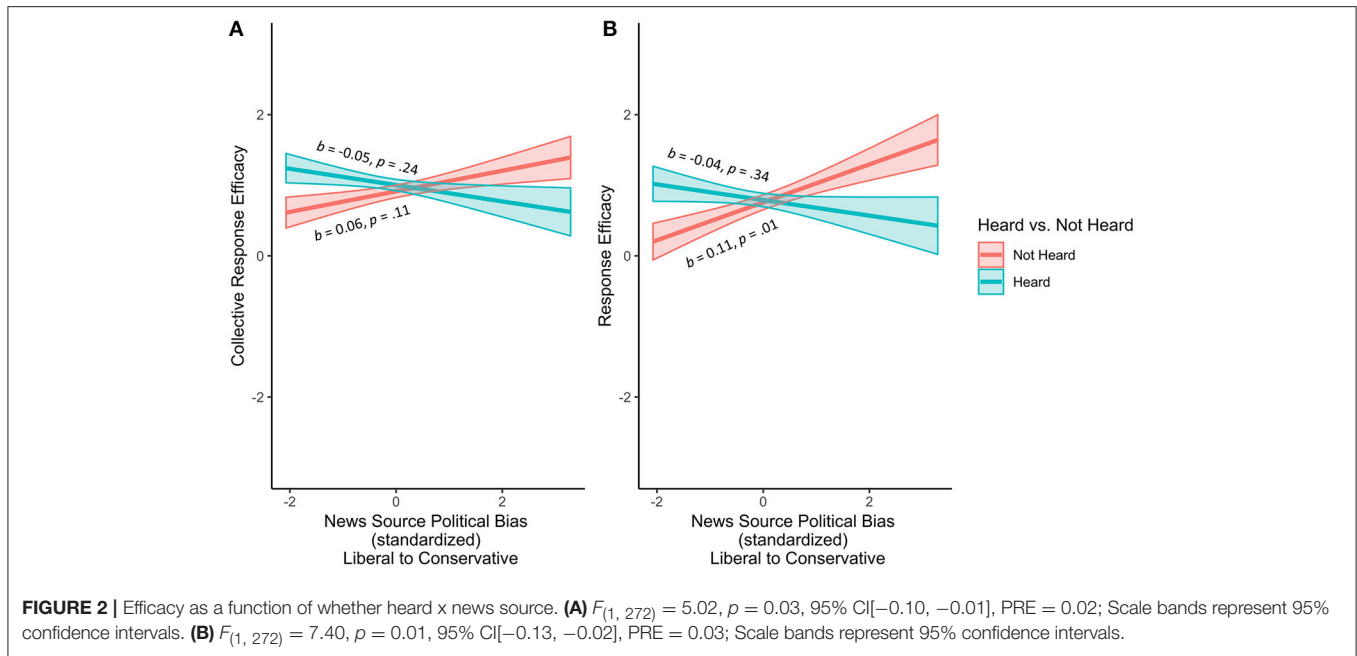
Contrary to predictions that perceived group norms would be greater among participants who completed a survey post-marches (relative to pre-marches, H2), there were no main effects of time of survey, on perceptions of group norms in the US as well as participants' own community. Opposite to predictions that effects of the marches on bystanders would be particularly strong among participants who reported consuming liberal news sources (H5), individuals who received their news from liberal news perceived it was less normative to take action on climate change at the national level after the march ( $M = 2.20$ ) than before the march ( $M = 2.54$ ),  $t_{(562)} = -2.56, p = 0.01, 95\% \text{ CI}[-0.30, -0.04], d = -0.22$  (see **Figure 3**). In contrast, for those who reported consuming conservative sources, there was no difference in perceived norms before ( $M = 2.32$ ) vs. after the march ( $M = 2.19$ ),  $t_{(562)} = 0.94, p = 0.35, 95\% \text{ CI}[-0.07, 0.20], d = 0.08$ . Like the interaction effects between news source and timing of the survey on collective efficacy, follow-up tests within timing of the survey indicated a relation between political leaning of news sources and personal response efficacy before the marches but not after the marches.

### Hearing About the Marches

Examining perceived norms after the march indicated no effects of whether or not participants had heard about the marches after the march, news source, and interactions between these two variables.

### Perceptions of Others' Engagement: Meta-Perceptions

Contrary to predictions that meta-perceptions would be greater among participants who completed a survey post-marches (relative to pre-marches, H3), there were no effects of timing of survey on any of our three meta-perception measures: meta-perceptions of "the U.S. public," "people in my community," and "people I know personally." Contrary to predictions that this effect would be moderated by political leaning of news sources (H5), there was also no interaction between timing



of the survey and our or media effects on any of these three meta-perceptions.

### Hearing About the Marches

Examining meta-perceptions after the march indicated no effects of whether or not participants had heard about the marches after the march, political leaning of news source, and the interaction between these two variables.

## Impressions

While a goal of the marches would be to improve perceptions of those very concerned about climate change, we did not make predictions about the effects of the marches on perceptions of those very concerned about climate change because we did not know whether there would be controversies about the marches. However, we predicted in Hypothesis 5, that, if there was an effect of the marches on perceptions of those very concerned about climate change, perceptions of the marchers would be more positive and less negative following the march if people got their news from liberal sources and the reverse for those who got their news from conservative sources.

Consistent with a desired effect of the marches, participants ascribed fewer negative masculine traits to marchers after the march ( $M = 1.12$ ) relative to before the march ( $M = 1.35$ ),  $t_{(563)} = -3.01, p = 0.003, 95\% \text{ CI}[-0.19, -0.04], d = -0.25$ . Consistent with news sources conveying different portrayals of the marchers, the results also revealed that, relative to receiving news from liberal sources, receiving news from more conservative news sources was associated with ascribing more negative impressions of marchers, specifically, negative masculine traits,  $b = 0.05, t_{(563)} = 2.86, p = 0.004, 95\% \text{ CI}[0.02, 0.09], \text{PRE} = 0.01$ , negative feminine traits,  $b = 0.07, t_{(563)} = 3.37, p = 0.001, 95\% \text{ CI}[0.03, 0.11], \text{PRE} = 0.02$ , and negative activist traits,  $b = 0.05, t_{(563)} = 2.60, p = 0.009, 95\% \text{ CI}[0.01, 0.08], \text{PRE} = 0.01$ . However, there were no significant interactions between time of the survey and news source on impressions.

### Hearing About the Marches

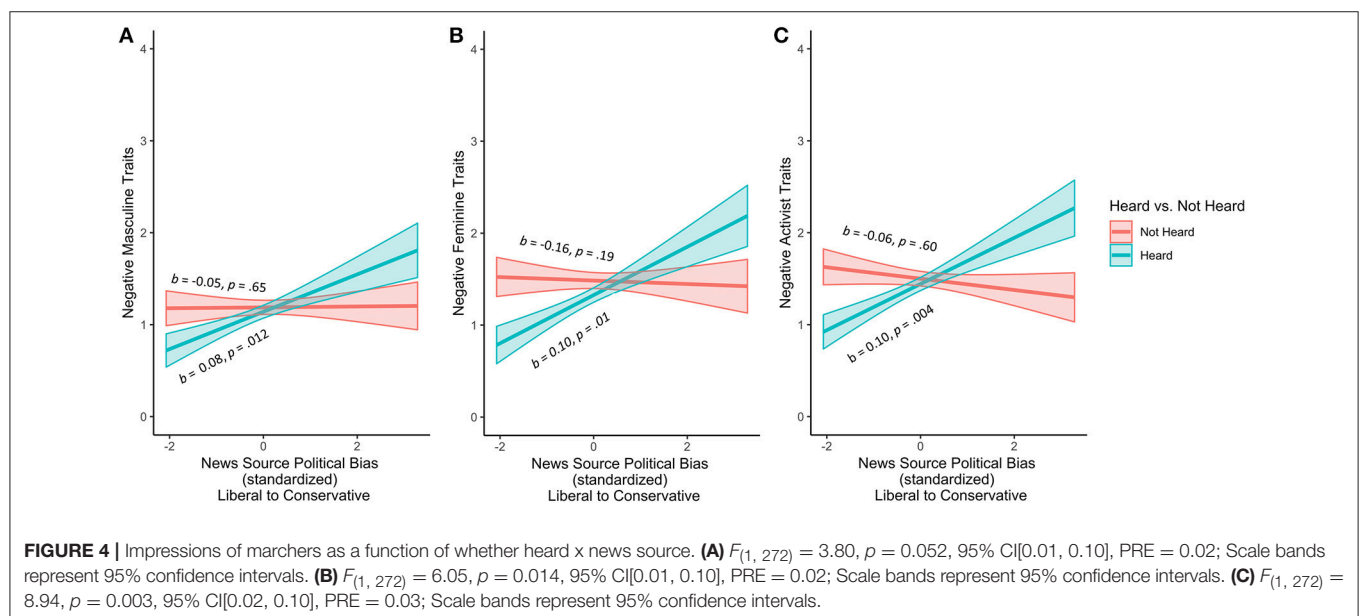
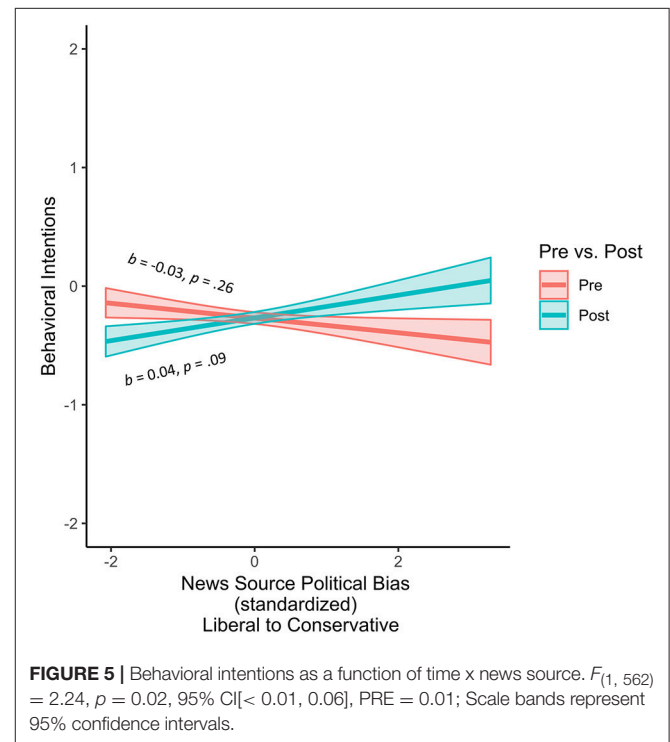
Exploratory analyses with those who completed the survey after the march suggested that there was a polarizing effect of news sources on negative impressions of marchers. Simple slopes analyses for the significant interactions revealed that

associations between political leaning of news sources and negative impressions of marchers noted above was present among those who obtained their news from conservative sources but not among those that had not heard about the marches (see **Figure 4**; albeit the interaction for negative masculine traits was marginally significant at  $p = 0.052$ ). The result was that, among those who viewed more liberal news sources, participants who reported hearing about the march perceived the marchers as having fewer negative masculine traits ( $M_{heard} = 0.94$  vs.  $M_{noheard} = 1.19$ ),  $t_{(272)} = -1.66$ ,  $p = 0.098$ , 95% CI[-0.27, 0.02],  $d = -0.20$ , negative feminine traits ( $M_{heard} = 1.06$  vs.  $M_{noheard} = 1.51$ ),  $t_{(272)} = -2.64$ ,  $p = 0.009$ , 95% CI[-0.77, -0.11],  $d = 0.31$ , and negative activist traits ( $M_{heard} = 1.06$  vs.  $M_{noheard} = 1.51$ ),  $t_{(272)} = -2.44$ ,  $p = 0.02$ , 95% CI[-0.67, -0.07],  $d = 0.28$ . Among those who got their news from conservative sources (+1 SD), the effects were trending in the opposite direction with a marginally significant effect of having heard about the march for negative activist traits, ( $M_{heard} = 1.60$  vs.  $M_{noheard} = 1.47$ ),  $t_{(272)} = 1.70$ ,  $p = 0.090$ , 95% CI[-0.04, 0.55],  $d = 0.22$ .

## Collective Action Intentions

We predicted, but did not find, that marches would increase collective action intentions (H4),  $t_{(563)} = -0.01$ ,  $p = 0.99$ , 95% CI[-0.07, 0.07],  $d < 0.01$ . Further, in contrast to predictions that indicated that this effect would be strongest for those who obtain their news from liberal sources (H5), a significant interaction between timing of survey and news sources suggested that marches increased collective action intention among those who obtained their news from conservative news sources (see **Figure 5**). Simple slope analyses for the significant interactions indicated that, among those who got their news from conservative sources, intentions to engage in collective action increased following the march ( $M = -0.18$ ) relative to before the

march ( $M = -0.34$ ),  $t_{(562)} = 1.58$ ,  $p = 0.11$ , 95% CI[-0.02, 0.18],  $d = -0.13$ , granted this effect was only marginally significant at +1 SD. Yet, for those who received news from liberal sources, follow-up tests were not significant at -1 SD,  $t_{(562)} = -1.58$ ,  $p = 0.12$ , 95% CI[-0.18, 0.02],  $d = -0.13$ . Consistent with these weak effects, neither of the slopes for political leaning of news sources within those that heard and not heard about the marches were significant.





## Hearing About the Marches

Examining impressions after the march indicated no effects of whether or not participants had heard about the marches after the march, news source, and interactions between these two variables on collective action intentions.

## DISCUSSION

The purpose of the present research was to consider the potential impact of large-scale marches as a catalyst for engaging the public in a larger social movement to contribute to a public demand for policymakers to take into account climate science and the public's views on climate change. A measure of success of the marches would be to influence bystanders to marches beyond affecting bystanders' concerns or beliefs about the topic by inspiring people to become members of a movement demanding action to ensure a habitable planet for present and future generations. In the present research we tested the effects of large-scale climate change related marches on bystanders to the marches, specifically in terms of psychological outcomes that previous research indicates could be useful stepping stones to overcome psychological barriers to engagement and encourage collective action consistent with the goals of this social movement. The ability to create the success desired by those participating in the marches was considered within the context of bystanders' preferred news sources that could influence their views about the marches and marchers.

The results suggest some successful outcomes of the marches on bystanders in terms of increased collective efficacy and decreased negative impressions of marchers. However, effects for the role of politicized media sources in moderating these effects were not completely as predicted. First, opposite to predictions, the marches appeared to have favorable effects on collective efficacy beliefs and collective action intentions among those who reported consuming *conservative* news and diminished perceptions that it was normative to engage in collective action among those who reported consuming *liberal* news. Second, political leaning of news sources did not predict *changes* in impressions of marchers from before to after the marches. However, more favorable impressions of marchers were found among those who obtained news from liberal sources relative to those who obtained news from conservative sources before and after the marches suggesting that media may have contributed to polarization at both time periods. As detailed below, we suggest that results for news sources on efficacy beliefs that were opposite to predictions may be a result of whether or not information is presented about the marches while results suggestive of polarization in impressions may be a result of how the marchers were portrayed.

We note that many of the effects that we identify occurred despite many having reported hearing "very little" or "nothing" about the marches. Although most of our reported effect sizes fall in the range of what is typically considered small for psychological research (Cohen, 1988), observing these effects across a sample that is roughly representative of the entire US population suggests that these marches may have had sizable impacts when considering the sheer number of people who were

exposed to these marches. Indeed, the marches may have had even larger effects on key outcomes upon those who more closely follow climate change news or happened to spend time being exposed to such news in this particular situation.

## Efficacy

Consistent with overarching goals of marches (Moyer, 1987; Moyer et al., 2001), participants were more positive about people's ability to work together to address climate change after (vs. before) the marches, both being less pessimistic and more optimistic about people's ability to cooperate with each other to solve large problems. One explanation for these effects is the possible role of the marches as concrete demonstrations of collective efficacy. In contrast, the marches did not affect collective response efficacy, possibly due to our assessment timing of several days after the marches. It may require more time and the accumulation of impacts of multiple marches and other forms of collective action to demonstrate changes indicative of collective response efficacy (see Wallace et al., 2014). We predicted weaker or no effects pre- vs. post-marches on personal measures of efficacy and this was borne out in our results. As noted in the introduction, our participants may not have seen themselves as similar to the marchers and the marches may not have addressed personal barriers for engaging in collective action that would be necessary to alter personal efficacy.

News source effects on collective efficacy were opposite to predictions. We speculate that conservative news sources may have been more likely to mention the marches after, than before, the marches. Prior to the marches, the more conservative one's news source, the more pessimistic people were about people's ability to work together to address climate change. These relation with news sources may be because conservative news sources may have given less attention to the marches than more liberal sources. After the march, there was no relation between political leaning of news sources and collective efficacy beliefs. This suggests that after marches news sources across the ideological spectrum may have all provided basic visibility to the marches and illustrated the large numbers attending them, which may have provided sufficient information to demonstrate collective efficacy. Thus, increased visibility in conservative news may have increased collective efficacy beliefs among readers of conservative news sources, whereas visibility may have been present for readers of liberal news sources prior to and after the marches.

In contrast to the interactive pattern of effects of ideology of news source and timing of survey on collective efficacy, analyses of post-march data suggest that those who heard about the marches and read liberal news sources increased personal and collective response efficacy relative to those that did not hear about them, an effect not found among those who read conservative news sources. More positive analysis of the efficacy of marches by liberal than conservative news sources may have created this effect. However, the relation between news sources and response efficacy beliefs was not significant for those who heard about the marches. The null effect here also provides evidence that liberal and conservative news sources may have similarly recognized the marches after the march. The present

study cannot determine why political leaning of news sources was related to perceived response efficacy among those who had not heard about the marches. However, the presence of an effect for news sources among those presumably less attentive to the marches (i.e., they had not heard of the marches) and not present among those who were attentive (i.e., they had heard of the marches), suggest that the assessments of response efficacy among those who had not actually heard about the marches were, perhaps, a result of those individuals' default assumptions about the ability of marches to influence others or from sources other than their preferred news sources.

## Impressions

The marches improved impressions of those who participated in the marches. Although there were no effects of the marches on positive traits, post-marches impressions of marches on negative masculine traits (i.e., aggressive, dictatorial, and arrogant) were less negative than pre-march impressions. The effect of marches on negative masculine traits can be important in understanding why people might choose to engage in climate activism. For example, the less people perceive that those most concerned about climate change have negative traits, and particularly masculine traits, the less likely they are to engage in activism that opposes such action (Geiger and Swim, 2018). Thus, because the present marches diminished impressions on negative masculine traits, the marches may diminish reactance against climate change action. However, because traits ascribed to those most concerned about climate change, especially positive masculine traits, are associated with willingness to engage in pro-climate action (Geiger and Swim, 2018), the lack of effects on positive traits suggests that the marches would not necessarily increase willingness to participate in action that is consistent with the themes of the marches examined here.

These analyses also revealed that those who got their news from more liberal news sources, independent of their own political views and concerns about climate change, reported fewer negative views of the marchers on negative masculine, feminine, and activist traits than those who got their news from more conservative sources. The lack of interaction between timing of completing the survey and political slant of news source on impressions suggests that news source's portrayal of the marchers may have contributed to these impressions both before and after the marches. Consistent with the argument that news sources contribute to impressions, the relation between political leaning and news sources on negative impressions was significant among those who reported hearing about the marches and not among those who reported not having heard about the marches. Thus, attention to different news sources may accentuate different impressions of marchers. The resulting effect of these associations was that, among those who got their news source from more liberal sources, those that reported hearing about the marches ascribed fewer negative traits to marchers than those that reported not hearing about the marches. In contrast, while comparisons between having heard vs. not heard about the marches was not significant at one standard deviation above the mean on political leaning of media sources, the results suggest that among those who got their news source from very conservative sources (i.e.,

two or more standard deviations from the mean), those that reported hearing about the marches ascribed more negative traits to marchers than those that reported not hearing about the marches.

## Perceptions of Others' Engagement: Group Norms and Meta-Perceptions

We did not find evidence of favorable effects of marches on perceptions of other people's engagement in the topic (i.e., group norms and meta-perceptions). The marches may have, however, contributed to doubt about other people's engagement among participants that obtained their news from liberal sources; contradicting our hypotheses, after the marches (vs. before the marches) survey participants who got their news from liberal sources were less likely to perceive that it was normative for the general U.S. public to engage in activist behaviors. Yet, like our assessment of effects of news sources on efficacy beliefs, an examination of these patterns suggests that biases in news sources may have had more influence prior to the marches than after the marches. Prior to the marches, the more conservative one's news sources, the weaker participants' perceived the national collective action norms. In contrast, after the marches, there was no relation between political slant of news sources and perceived national and community group norms. Again, we speculate that effects of news sources prior to the marches may be because liberal news sources dedicated a greater percentage of pre-march coverage to the marches than conservative news sources, making group participation more salient to those who got their news from liberal sources. After the marches, in contrast, news sources across the political spectrum may have dedicated an equal proportion of coverage to the marches, making exemplars similarly salient.

Our results also suggest that the marches did little to influence survey participants' perceptions of other people's engagement in the topic (i.e., meta-perceptions). We had predicted effects would be stronger for perceptions about concern in the US than concern in one's community or among one's personal contacts. Yet we found no effects for any of these meta-perceptions. The lack of effect may be because those who engage in the marches are not only seen as unrepresentative of one's community and personal contacts but also seen as unrepresentative of the general public. This suggests that marches may want to consider how some actions may get attention but potentially have a disadvantage of making them seem less representative of the general public. It also suggests that it would be informative to attend to how the media chooses to present information about marchers, for example, whether they are presented in a way that makes them seem like prototypic activists who are not seen favorably (e.g., Bashir et al., 2013). These impressions may then influence the likelihood that assumptions about bystanders will generalize to assumptions about different groups of people (e.g., local community or nation as a whole).

## Subsequent Collective Action

Directly opposing predictions, after the march, those who got their news from conservative sources were more likely to report being more likely to engage in collective action than they reported prior to the marches and this effect was not present for those

who got their news from liberal news sources. The effect is consistent with our findings that conservatives report greater collective efficacy (i.e., less pessimism about people's ability to work together) after (vs. before) the marches and other research indicating that collective efficacy is associated with participating in collective action (Roser-Renouf et al., 2014). Importantly for engaging the public, however, the means were at or below the midpoint of the scale indicating that all participants had no intention of engaging in collective action. Thus, although some of the effects we found might nudge people toward joining a climate change social movement immediately after the march, more is likely needed for these nudges to transpire into actual behaviors.

## LIMITATIONS AND FUTURE DIRECTIONS

There are limitations to conclusions that can be drawn from our measure of political leaning in news sources. First, our analyses do not differentiate between getting news from mixed sources of information (e.g., viewing some liberal and some conservative sources) vs. getting news from sources that present moderate information (e.g., neither strongly liberal or strongly conservative). Future research may wish to differentiate between these two different reasons for having relatively more moderate news sources than very liberal and very conservative news sources. Second, we cannot determine whether the news sources were the most influential source of their information about the marches. A few people may have gotten their information from direct observation. Others may have learned about the marches via conversations in their social networks and via social media, sources which can be more effective at changing opinion than formal media (Swim et al., 2018a). Third, although we included covariates in our analyses that would help rule out effects confounded with preferring liberal vs. conservative news sources, we cannot rule out the possibility the effects of news sources rest in characteristics of audiences that we were unable to control for with our covariates and not due to effects of the political leanings of news sources. Last, we do not have a measure of the amount of participant engagement (e.g., time) with their news sources. Differences between those who heard vs. not heard about the marches are suggestive of difference in engagement, but they are not a direct measure of these differences.

Our results suggest that it would be informative to do content analyses of news coverage of climate change marches in order to determine, for example, differences in amount of attention given to the marches as well as differences in portrayals of the marches across various news sources. Consistent with Koopmans (2004) analysis of news coverage of social movements, assessing differences in quantity and quality of coverage about the marches could be relevant to understanding whether the marchers positively or negatively resonate with audiences and the perceived legitimacy of the marches. As we suggest above, the visibility of the marches may be responsible for increasing collective efficacy whereas the favorability of portrayals of the marches could diminish negative impressions of marchers. Thus, it may

be valuable for future research to examine the content of the coverage's of marches and test the impact of different types of coverage on different types of outcomes.

Here, we used a trend analysis comparing one set of participants' ratings prior to the marches and a second set of participants' responses after the marches. This design creates some limitations in our ability to detect effects of the march on the public because we cannot fully rule out other potential explanations for pre-post differences that were not related to the marches themselves. We attempted to rule out potentially confounding variables by controlling for demographic characteristics and other relevant covariates (political ideology and sources of information) as covariates in our analyses. Further, although it is possible that an unrelated event could have occurred between the pre- and post-surveys that could have influenced the outcome measures, the short timeframe between the two (<2 weeks) suggests that this is unlikely to have occurred.

A more relevant weakness of our study design might be because we conducted assessments at only two time points: immediately before and immediately after the marches. Future work could consider collecting a larger set of measurements over a broader period before and after the marches. This could capture a variety of additional effects, including the potential that different news sources may provide different information about the marches prior to the marches, creating differences in their audiences even before the marches occur. Further, it may take more time to be able to detect effects of marches and it may take an accumulation of effects from different marches and other types of collective action to influence collective response efficacy as well as meta-perceptions and perceived group norms. Yet, capturing the unique effects of marches over a longer period of time within a broader context of unfolding current events is difficult due to the potential for other intervening effects to occur. The challenge of assessing long term effects of marches and cumulative effects of marches, however, is worth pursuing because these effects may be important for understanding social movements as a whole (Moyer et al., 2001).

We also note limitations in our ability to reliably detect effects due to the extreme variability in information that various individuals were exposed to regarding the march. For example, even after the marches about a third of our sample reported that they had heard "nothing" or "very little" about either march. We examined whether reporting hearing more than "a little" about marches predicted various outcome measures but these analyses had additional limitations. Specifically, comparing those who heard about the marches vs. those who did not hear about them does not take into account a variety of reasons for why they heard or did not hear about the marches. We assumed that it reflected greater attunement to information about climate change and public response to it. This is confirmed by a correlation between having heard about the marches and generally paying attention to news about climate change<sup>3</sup>. Analyses also revealed that effects of reporting hearing about the marches could not be explained by differences in participants' SES, gender, age, concern about

<sup>3</sup> $r_{(591)} = 0.32, p < 0.001$

climate change, or political ideology. Yet, engagement could involve other factors such as whether one lives in a city where the marches occurred and whether bystanders know people who participated in the marches.

Last, the generalizability of our data is limited because they were from a convenience sample rather than a randomly selected sample. Several of our demographic findings roughly match those in the US population. However, the sample may over represent those who identify as White and underrepresent those who identify as Hispanic so the research may be more applicable to the former than the latter. The sample also has more Democrats and fewer Republicans than found in the general population, suggesting that the sample may be more liberal than the general population. This suggests that, although political ideology was used as covariate in the analyses, we may not adequately represent results in a sample with more individuals who are politically conservative. More particularly, given selective attention to news sources that match one's political leanings (Mitchell and Weisel, 2014), we may have underrepresented the impact of conservative news sources. However, if one assumes that the Media Bias chart we used to assess political leanings of news sources is accurate, it is interesting to note that participants' self-ratings of their news sources suggests that their news sources may be more conservative than they perceive them to be. Thus, our findings may more accurately represent the impacts of conservative news sources than one might assume given the underrepresentation of conservatives in the sample.

## CONCLUSION

Marches are an important component of social movements. Our results suggest that large, highly visible marches have the potential to enhance public participation in social movements by increasing perceived collective efficacy and diminishing negative impressions of marchers among the general public and possibly inspiring collective action. Yet, our results also suggest that by some metrics the marches had limited effects on promoting public engagement with climate change: the marches did not affect perceptions of whether it is normative to participate in collective action and others' concern about climate change and we found that few people willing to engage in collective action either before or after the marches. Our results indicate that media biases may influence effects of marchers on bystanders. First, our results are consistent with the possibility that liberal and conservative news sources provided similar visibility of the marchers after the march (but not before the march). This

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possible greater coverage of marchers by conservative news sources could explain increased perceptions of collective efficacy among conservatives. Second, our results are consistent with the notion that liberal and conservative news sources may provide different images of marchers and, by doing so, they may polarize the impression of marchers. Specifically, our results are consistent with the notion that conservative news sources may provide more negative portrayals of marchers than liberal news sources. The importance of news sources on moderating the psychological impacts of marches points to the need for more research on coverage of marches, how marches are portrayed, how people respond to the information, and the effects they can have prior to marches.

## ETHICS STATEMENT

This study was carried out in accordance with the recommendations of The Pennsylvania State University Office for Research Protections. The protocol was approved by the Pennsylvania State University Office for Research Protections Internal Review Board. All participants were provided a consent form in accordance with the Declaration of Helsinki. We received a waiver for written consent because the study was conducted online and it allowed participation to remain anonymous. This was allowed because the research presented minimal risk to participants and involved no procedures that would require written consent outside of the research context. Participants were informed that completion of the survey was an indication of consent.

## AUTHOR CONTRIBUTIONS

JS and NG contributed jointly to the generation of the idea for the study. NG constructed the survey and monitored the data collection. ML did the analyses. JS supervised the analyses and wrote the document. NG and ML helped edit the paper.

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## SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fcomm.2019.00004/full#supplementary-material>

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**Conflict of Interest Statement:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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