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The Greta Thunberg Effect: Familiarity with Greta Thunberg predicts intentions to engage in climate activism in the United States

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Abstract

Despite Greta Thunberg's popularity, research has yet to investigate her impact on the public's willingness to take collective action on climate change. Using cross-sectional data from a nationally representative survey of U.S. adults ($N = 1,303$), we investigate the "Greta Thunberg Effect," or whether exposure to Greta Thunberg predicts collective efficacy and intentions to engage in collective action. We find that those who are more familiar with Greta Thunberg have higher intentions of taking collective actions to reduce global warming and that stronger collective efficacy beliefs mediate this relationship. This association between familiarity with Greta Thunberg, collective efficacy beliefs, and collective action intentions is present even after accounting for respondents' overall support for climate activism. Moderated mediation models testing age and political ideology as moderators of the "Greta Thunberg Effect" indicate that although the indirect effect of familiarity with Greta Thunberg via collective efficacy is present across all age-groups, and across the political spectrum, it may be stronger among those who identify as more liberal (than conservative). Our findings suggest that young public figures like Greta Thunberg may motivate collective action across the U.S. public, but their effect may be stronger among those with a shared political ideology. Implications for future research and for broadening climate activists' appeals across the political spectrum are discussed.

1 | INTRODUCTION

> "I want you to act as if our house is on fire. Because it is"—Greta Thunberg. (Thunberg, 2019, p. 24)

Climate change is a critical global challenge that requires immediate action (IPCC, 2019). The fields of social and environmental psychology have made significant contributions to understanding how people think, feel, and act on climate change (Fielding et al., 2014; van der Linden, 2015). Research has identified key psychological barriers to climate action (Gifford, 2011), and the determinants of individuals' intentions to take action to mitigate climate change (Lubell et al., 2007; Roser-Renouf et al., 2014, 2016). For example, social factors such as social consensus among friends and family about anthropogenic

climate change (Geiger & Swim, 2016; Goldberg et al., 2020), knowledge about the scientific consensus on climate change (van der Linden et al., 2015, van der Linden et al., 2019), and policy endorsement by ingroup partisans (Fielding et al., 2020), can each raise individuals' support for pro-climate policies and action. Collective action is defined as action taken to improve the status of, or prevent injustice against, an entire group rather than an individual(s) (van Zomeren & Iyer, 2009). Collective action, including activism and advocacy, also motivates pro-climate attitudes. Displays of climate activism (like climate marches) increase observers' optimism about humans' ability to mitigate climate change (Swim et al., 2019), and environmental advocates who practice sustainable behaviors can raise individuals' interest in renewable energy programs (Sparkman & Attari, 2020).

Yet, to date, there has been little to no research on the impact of one of the most prominent new leaders of climate activism—Greta Thunberg—in motivating collective action on climate change. In the context of social change, a leader is an individual who equips, trains, and mobilizes followers to adopt a shared mission and bring about change (Reicher & Hopkins, 2000; Winston & Patterson, 2006). Typically, well-established authority figures and political elites take leadership on large-scale action (Cialdini & Goldstein, 2004; Zaller, 1992). For example, figures such as Pope Francis–due to his moral authority (Maibach et al., 2015), James Hansen–due to his academic credentials (Kolbert, 2018) and Jeff Bezos–due to his financial resources (Cohen, 2020), have each motivated efforts to mitigate climate change. However, Greta Thunberg is an atypical leader who has gained international recognition in a short period of time and has become a leading voice in contemporary climate activism despite her young age and nonelite status (Belam & Staff, 2019). Her viral Fridays for Future campaign and demand for inter-generational justice have established her as an inspirational youth figure. At the same time, she receives fierce criticism and ad-hominem attacks from figures like U.S. President Donald Trump and television personality Piers Morgan, as well as some members of the general public (McCarthy, 2019; "Piers Morgan Mocks Greta Thunberg," 2019). Given the public attention she receives, investigating the psychological mechanisms by which Greta Thunberg potentially mobilizes collective action and the social groups she influences is crucial to understanding how youth public figures can shape collective action on issues like climate change. We use the term "social groups" to refer to sets of individuals who share a social feature(s)––like political ideology, age, gender, etc.––and therefore, identify with a common social category (e.g., youth, liberal, conservative) (Turner, 1982).

The present study uses nationally representative survey data of U.S. adults to examine Greta Thunberg's potential role in motivating collective action on climate change, or what we refer to as the "Greta Thunberg Effect." Drawing from models of collective action, particularly the Social Identity Model of Pro-environmental Action (SIMPEA; Fritsche et al., 2018; van Zomeren et al., 2004), we examine if exposure to Greta Thunberg predicts individuals' intentions to take collective action on climate change, and whether this association is explained, at least in part, by an enhanced sense of collective efficacy. As a marker of exposure, we assess how familiar respondents are with Greta Thunberg. We also examine whether the association between familiarity with Greta Thunberg and collective action is stronger among audiences who share aspects of her social identity—younger adults and those with a more liberal political ideology.

Familiarity was used as a proxy for measuring Greta Thunberg's effect because it is suggestive of the attention respondents pay to her. Moreover, since familiarity in itself does not signal support for Greta Thunberg, it could be used as an indicator of Greta Thunberg's impact on individuals from across the ideological spectrum. Therefore, we consider familiarity with Greta Thunberg a fitting indicator for this nascent assessment of the "Greta Thunberg Effect" hypothesis.

However, it is also possible that familiarity with Greta Thunberg is related to, or even results from, individuals' overall support for climate activism. To isolate the effect of familiarity with a specific climate activist—Greta Thunberg—from the effect of general support for climate activism, we conduct a post hoc analysis testing whether our hypothesized mediation model would be significant when controlling for individuals' support for climate activists in general.

1.1 | Can Greta Thunberg's influence on collective action be explained by heightened collective efficacy?

Greta Thunberg has been credited with mobilizing over 10 million climate strikers (Strike Statistics, 2020; Taylor et al., 2019). Given the previously observed association between "hard" collective actions such as protesting and "soft" collective actions such as signing petitions and voting (Shi et al., 2015), we anticipate that she also influences a range of other collective actions such as voting, donating, and calling up government officials.

The social identity model of pro-environmental action (SIMPEA) posits that the social identity processes of in-group social identification, group norms, and collective efficacy interact to generate appraisals of environmental events and responses to address environmental crises (Fritsche et al., 2018). Consistent with the SIMPEA, research has shown that in order to take collective action on climate change, individuals must believe that they, along with their group, can work to reduce climate change (Roser-Renouf et al., 2014). Therefore, Greta Thunberg's effect on collective action could be rooted in the fact that she promotes collective efficacy—the belief that together, one's group can organize and implement action to attain a specific goal (Bandura, 1997). A prerequisite to collective efficacy is hope that change is possible (Cohen-Chen & Van Zomeren, 2018). Greta Thunberg's speeches communicate the possibility of social change by stating that "there is still time to change everything around" (Thunberg, 2019, pp. 16). Once individuals are hopeful about change, their collective efficacy is shaped by evidence of their group's past success (Bandura, 1997; Goddard et al., 2004; Watson et al., 2001) and their self-efficacy (Gibson, 2003; Watson et al., 2001). Greta Thunberg's presence at platforms like the United Nations and U.S. Congress, and the discussions she triggers about

transitioning to a zero-carbon economy (Johnson, 2019) provide evidence of her effective leadership and success in pressuring policy-makers to take steps to mitigate climate change. Moreover, her Fridays for Future campaign, which is founded on the very principle that young students can make a difference through civil action (*Take Action*, 2020), likely empowers individuals with self-efficacy—the belief that they can help reduce climate change.

Models of collective action such as SIMPEA outline that collective efficacy beliefs in turn promote intentions to take collective action (e.g., Fritsche et al., 2018; van Zomeren et al., 2008). In the environmental domain, collective efficacy can enhance intentions to engage in collective action by prompting individuals to feel moved or positively overwhelmed with evidence of their group's efforts to mitigate climate change (Landmann & Rohmann, 2020). Moreover, direct goal collective efficacy—or the belief that if they work together, one's group can take and promote climate action—is a stronger predictor of public and collective action on climate change than is self-efficacy (Hamann & Reese, 2020). Empirical research on climate activism found that beliefs about collective efficacy positively predicted individuals' tendency to take collective action on climate change (Roser-Renouf et al., 2014). Similarly, a study conducted on Americans who reported being "alarmed" about climate change showed that collective efficacy beliefs predicted their likelihood of engaging in important collective actions such as voting and volunteering for pro-climate initiatives (Doherty & Webler, 2016). We therefore expect that familiarity with Greta Thunberg positively predicts collective efficacy beliefs which in turn are associated with collective action intentions.

1.2 | Do age and political ideology moderate the "Greta Thunberg Effect"?

Individuals categorize themselves and others into social groups based on salient aspects of their social identity (Hogg & Turner, 1987). According to the SIMPEA, individuals form appraisals and take pro- or anti-environmental actions in accordance with the norms, interests, and goals of the groups they self-categorize into (Fritsche et al., 2018). Leaders of social groups may be particularly influential in shaping these group norms and goals. Leaders likely shape and promote norms among their followers because of the strong identification they express with their followers, because they are prototypical representatives of their group, and because they consistently emphasize an inclusive group identity (Reese et al., 2020; Seyranian, 2014; Steffens et al., 2015). As a prominent youth climate activist, Greta Thunberg appears prototypical of aware and engaged members of the youth and emphasizes a shared social identity with fellow young people by advocating to save her generation's future (Voytko, 2019). Therefore, Greta Thunberg may serve as a prototypical leader for the youth, shaping their norms of collective action on climate change. Recent trends show that, unlike a decade ago, younger adults now express greater intentions to take collective and political action on global warming than older adults (Ballew, Marlon, et al., 2019). These changes in engagement among younger populations may have been influenced, at least in part, by the voices of activist youth like Greta Thunberg.

Greta Thunberg's influence may also be stronger among those with a more liberal political ideology. Given the divide between U.S. liberals' and conservatives' support for climate change mitigation (Ballew et al., 2020; Leiserowitz et al., 2020; McCright et al., 2014) and prominent U.S. politicians' portrayal of Sweden as a socialist democracy (Zeballos-Roig, 2020), Greta Thunberg's message of radical climate mitigation and her Swedish national identity are more consistent with liberal rather than conservative political discourse. As a result, she might be perceived as "left-leaning" or liberal. Research on partisan evaluation has shown that Republicans and Democrats support climate policies proposed by members of their own political group and reject those proposed by members of their political outgroup (Van Boven et al., 2018). Moreover, conservatives may find Greta Thunberg to be less effective because they are exposed to more criticisms of her. For instance, politically right-wing elites including the U.S. president have publicly mocked her (McCarthy, 2019).

The above logic derived from SIMPEA suggests that social identities based on age and political ideology likely moderate the "Greta Thunberg Effect." Younger Americans and those with a more liberal political ideology are more likely to consider Greta Thunberg an ingroup member. Upon identifying with an ingroup, individuals align their environmental appraisals and actions with their group's norms and goals (Fritsche et al., 2018). Prototypical leaders like Greta Thunberg who emphasize a shared identity likely serve as salient social referents, shaping the social norms (in this case, of collective action on climate change) in their ingroup (Turner et al., 1989). Watching Greta Thunberg, a prototypic group member, successfully lead action on climate change may also increase the collective efficacy beliefs of those who self-categorize as part of her social group (Simon & Klandermans, 2001). Therefore, Greta Thunberg may be particularly potent at shaping social norms, motivating collective action and strengthening collective efficacy beliefs of younger Americans and those with a more liberal political ideology. Taken together, we expect that age and political ideology moderate the "Greta Thunberg Effect" both directly by strengthening the association between familiarity with Greta Thunberg and collective action intentions, and indirectly by strengthening the association between familiarity with Greta Thunberg and collective efficacy beliefs.

1.3 | The current study

Using data from a nationally representative survey of U.S. adults, the current study investigates the "Greta Thunberg Effect." In line with the social identity model of pro-environmental action (SIMPEA), and extending work on collective efficacy and collective action (Fritsche et al., 2018; Mummendey et al., 1999), we hypothesized that familiarity with Greta Thunberg would positively predict collective action intentions, that stronger collective efficacy beliefs would mediate this

relationship, and that prominent social identifiers, such as age and political ideology, would moderate these direct and indirect effects.

Specifically, we first tested a simple mediation model, hypothesizing that familiarity with Greta Thunberg would predict higher collective action intentions, and that collective efficacy beliefs would mediate this relationship (Hypothesis 1; Figure 1). Additionally, we hypothesized that familiarity would more strongly predict collective action intentions among younger participants, compared to older participants because we expect age to moderate the effect of familiarity on collective action (Hypothesis 2a) and on collective efficacy (Hypothesis 2b). Finally, we hypothesized that the association between familiarity and collective action intentions would be stronger among more liberal respondents than more conservative respondents because political ideology likely moderates the effect of familiarity on collective action (Hypothesis 3a) and on collective efficacy (Hypothesis 3b).

We also conducted a post hoc analysis to test whether the hypothesized association between familiarity and collective action intentions would remain when taking into account, individuals' general support of climate activism.

2 | METHOD

This study was preregistered at https://osf.io/6wsjn/?view_only=fff3547fee84421baecfe76a56b01c04. See Supporting Information Section 5 for any deviations from the preregistration. Data were collected as part of the *Climate Change in the American Mind* series, a nationally representative survey of the U.S. population (aged 18 years or older), conducted in November 2019 by the Yale Program on Climate Change Communication and the George Mason University Center for Climate Change Communication (Leiserowitz, Rosenthal, et al., 2019). The survey was comprised of items measuring global warming-related beliefs, attitudes, action intentions, as well as respondents' demographic information. The probability sample was drawn from the Ipsos KnowledgePanel®. Data are available from the corresponding author upon request.

2.1 | Participants

Respondents were recruited using a combination of random digit dial and address-based sampling. The survey was self-administered online, and respondents who did not have access to the internet were loaned computers and provided with internet access. In order to match the sample to U.S. Census Bureau parameters (US Census Bureau, 2018) on important demographic variables (e.g., age, gender, race, income, education), a probability-proportional to size sampling procedure was used for sample selection.

The sample consisted of 1,303 U.S. adults (M_{age} = 47.86, SD_{age} = 17.63), 1,114 of which were registered voters (515 Democrats, 107 Independents, 441 Republicans). Approximately half the sample was female (n = 644 or 49%). The sample was 70% (917) Non-Hispanic White, 13% (165) Hispanic, 10% (124) Non-Hispanic Black, 4% (55) another race/ethnicity, and 3% (42) Non-Hispanic multiracial/biracial. Most of the sample reported having a Bachelor's degree or higher, and an annual income of $125K or more (See Supporting Information Section 1 for complete demographics). Based on a priori (preregistered) exclusion criteria, 34 participants were excluded from the analysis because they had 50% or more missing data across the items involved in our analysis (See Supporting Information Section 2 for exclusion criteria).

As the sample sizes for the *Climate Change in the American Mind* surveys are large and fixed, we did not conduct an a priori power analysis. A retrospective power estimation using G*Power revealed that conducting a linear multiple regression with 5 predictors on a sample size of 1,214 (final sample size after exclusions) gives a power (1-β) of 0.93 or a 93% chance of detecting a small (f^2 = 0.015) effect.

2.2 | Measures

All items can be found in Supporting Information Section 3, and descriptive statistics and intercorrelations in Table 1.

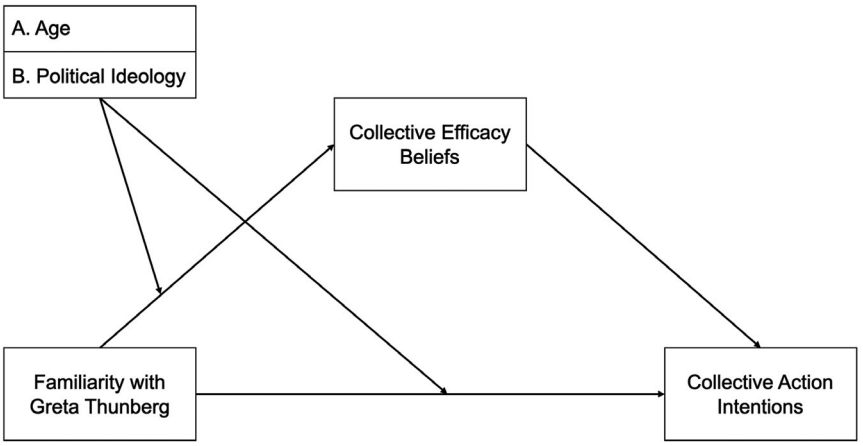

FIGURE 1 Conceptual model for hypotheses. Model tests the effect of familiarity with Greta Thunberg on intentions to take collective action through collective efficacy beliefs, as a simple mediation (Hypothesis 1), moderated by age (A; Hypotheses 2a and 2b), and moderated by political ideology (B; Hypotheses 3a and 3b), respectively

2.2.1 | Familiarity with Greta Thunberg

Participants rated how familiar they are with "Greta Thunberg (a teenage climate activist from Sweden)" on a 5-point Likert scale (1 = Extremely familiar to 5 = Not at all familiar; reverse-coded to 1 = Not at all, 5 = Extremely).

2.2.2 | Collective efficacy beliefs

Five items asked respondents to rate how likely "People like you, working together" were to affect what (a) federal government, (b) state government, (c) local government, (d) corporations, and (e) local businesses do about global warming (1 = Not at all, 5 = Extremely). A collective efficacy beliefs score, derived by averaging across items ($\alpha = 0.94$), was allotted to respondents who answered at least four out of five items (Preregistered exclusion criteria, see Supporting Information Section 2). A principal component analysis supported the composite: One factor (eigenvalue = 4.09) explained 81.70% of the variance, eigenvalues of all other components were below the Kaiser criterion (<1), and component loadings ranged from 0.89 to 0.94.

2.2.3 | Collective action intentions

Thirteen items asked respondents how likely they were to "do each of the following things if a person you like and respect asked you to?" (1 = Definitely would not do, 5 = Definitely would do; Do not know response option coded as scale mid-point). Actions included, "Vote for a candidate…because of their position on global warming," and "Attend a political rally, speech, or organized protest about global warming." A collective action intentions score, derived by averaging across items ($\alpha = 0.96$), was allotted to respondents who answered at least 10 of 13 items (Preregistered exclusion criteria, see Supporting Information Section 2). The composite was supported by principal component analysis: A single factor emerged to explain 69.94% of the variance (eigenvalue = 9.02), eigenvalues of all other components were below the Kaiser criterion (<1), and component loadings ranged from 0.79 to 0.88.

Items measuring collective efficacy and collective action intentions were developed as part of the Climate Change in the American Mind project which began in 2008 and has since been jointly conducted by the Yale Program on Climate Change Communication and the Mason University Center for Climate Change Communication. These items have been used in many surveys and experiments related to collective action on climate change (Ballew, Goldberg, et al., 2019; Feldman et al., 2017; Leiserowitz, Maibach, et al., 2019; Marlon et al., 2019; Roser-Renouf et al., 2014).

2.2.4 | Moderators and covariates

Respondents reported their *age* in years and their *political ideology* on a self-placement item asking, "In general do you think of yourself as…" (1 = Very liberal, 5 = Very conservative). *Support for climate activists* was measured through one item asking participants, "generally how much do you support or oppose climate activists who urge elected officials to take action to reduce global warming?" (1 = Strongly oppose to 5 = Strongly support).

TABLE 1 Intercorrelations, descriptive statistics, and scale reliabilities ($N = 1{,}214$)

	Familiarity with Greta Thunberg	Collective efficacy	Collective action intentions	Support climate activists	Political ideology	*M* (*SD*)	Cronbach's alpha
Familiarity with Greta Thunberg						2.33 (1.30)	–
Collective efficacy	0.24***					2.34 (0.91)	0.94
Collective action intentions	0.28***	0.61***				2.81 (1.20)	0.96
Support for climate activists	0.23***	0.48***	0.72***			3.56 (1.31)	–
Political ideology	−0.25***	−0.33***	−0.49***	−0.57***		2.99 (1.07)	–
Age	−0.08**	−0.22***	−0.16***	−0.16***	0.22***	47.74 (17.60)	–

Note: Correlation computed using Pearson-method with list-wise deletion.

List-wise deletion was used to calculate these statistics because PROCESS analysis uses list-wise deletion.

See Supporting Information Section 2 for information about missing data.

Means, standard deviations, and scale reliabilities of collective efficacy and collective action intentions calculated using composite scores; only calculated for participants who answered at least 4 of the 5 collective efficacy items and 10 of the 13 collective action intentions items.

*$p < .05$; **$p < .01$; ***$p < .001$.

3 | RESULTS

3.1 | Analytic strategy

To test the three hypotheses and the post hoc model, we used Hayes' PROCESS (Hayes, 2017) modeling software (models 4 and 8) with 5,000 bootstrapped resamples, 95% confidence intervals, and mean-centered continuous variables (see Figure 1 for conceptual model). Because age and political ideology are related to climate activism (Ballew, Marlon, et al., 2019; McCright et al., 2014) and correlate with familiarity (Table 1), we statistically controlled for these in our primary analyses (unless they were moderators).

As preregistered, we also conducted two robustness check analyses for each model: first, dropping all covariates from the model, second, a sensitivity analysis comparing the results of the same PROCESS models when "Don't know" responses were re-coded as missing values (instead of the scale mid-point). We conducted two additional analyses for our models: first, a reverse mediation in model 1, and second, replacing political ideology with political party as a moderator in model 3.

3.2 | Do collective efficacy beliefs mediate the association between familiarity with Greta Thunberg and collective action intentions?

First, we found that familiarity with Greta Thunberg positively predicted collective action intentions (total effect: b [unstandardized] = 0.15, SE = 0.02, t = 6.53, $p < .001$; direct effect: b = 0.08, SE = 0.02, t = 4.12, $p < .001$) and collective efficacy beliefs (b = 0.11, SE = 0.02, t = 5.72, $p < .001$). Collective efficacy beliefs (b = 0.63, SE = 0.03, t = 20.85, $p < .001$) also had a direct effect on collective action intentions. Then, we tested whether collective efficacy beliefs mediate the effect of familiarity with Greta Thunberg on collective action intentions (Hypothesis 1; see Figure 1).[1] Collective efficacy beliefs mediated the effect of familiarity with Greta Thunberg on collective action intentions (indirect effect: b = 0.07, β = 0.07, SE_{boot} = 0.01, 95% Boot*CI*s [0.04, 0.09]; see Table 2). The results remained consistent when removing covariates from the model and when conducting sensitivity analysis (see Supporting Information Section 4).

To test the possibility that an alternative path model could fit the data, we also tested a reverse mediation model using maximum likelihood structural equation modeling, with collective action intentions as predictor, efficacy beliefs as mediator, and familiarity with Greta Thunberg as the dependent variable. Across a range of model specifications, our hypothesized mediation model (model 1) systematically outperformed the reverse mediation model with regards to model fit (See Supporting Information Section 4). The hypothesized mediation (model 1) also explained greater variance in the dependent variable (48%) than did the reverse mediation (which explained only 9% of the variance).

Findings from this model support our first hypothesis suggesting that those who are more familiar with Greta Thunberg are more likely to have a higher intent to take collective action to reduce global warming, and this effect is explained, in part (47% mediated), by stronger collective efficacy beliefs.

TABLE 2 Coefficients [95% CI] of mediation (Model 1) measuring association between familiarity with Greta Thunberg and collection action intentions

	Collective efficacy	Collective action intentions
Direct effects		
Familiarity with Greta Thunberg	0.11*** [0.07, 0.15]	0.08*** [0.04, 0.12]
Collective efficacy		0.63*** [0.57, 0.69]
Indirect effect		
Familiarity through efficacy		0.07*** [0.04, 0.09]
Covariates		
Age	−0.01*** [−0.01, −0.004]	0.002 [−0.001, 0.01]
Political ideology	−0.22*** [−0.26, −0.18]	−0.38*** [−0.43, −0.33]

Note: Values represent unstandardized regression coefficients with 95% confidence intervals.

Model is a simple mediation model with familiarity with Greta Thunberg as predictor, collective efficacy as mediator, collective action intentions as the dependent measure, and political ideology and age as covariates.

Collective action intentions: R^2 = 0.48, MSE = 0.75, $F(4, 1{,}209)$ = 275.28, $p < .0001$

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

3.3 | Does age moderate the association between familiarity with Greta Thunberg and collective action intentions via collective efficacy beliefs?

As preregistered, our second hypothesis tested a moderated mediation model: we expected that familiarity with Greta Thunberg would predict collective action intentions, that collective efficacy beliefs would mediate this effect, and that age would moderate the direct and indirect effects of familiarity such that the association between familiarity and collective action intentions, and familiarity and collective efficacy beliefs would be stronger among younger respondents (than older respondents). PROCESS model 8 with familiarity as predictor (X), age as moderator (W), collective efficacy beliefs as mediator (M), collective action intentions as the outcome variable

[1]This was not preregistered as a separate model. See Supporting Information Section 5 for reasons for deviation.

TABLE 3 Coefficients [95% CI] of models testing if age (Model 2) and political ideology (Model 3) moderate the association between familiarity with Greta Thunberg and collective action intentions, through collective efficacy

	Model 2: Age as moderator		Model 3: Ideology as moderator	
	Collective efficacy	Collective action intentions	Collective efficacy	Collective action intentions
Direct effect				
Familiarity with Greta Thunberg	0.11*** [0.07,0.15]	0.08*** [0.04, 0.12]	0.11*** [0.07, 0.14]	0.08*** [0.04, 0.11]
Collective efficacy		0.63*** [0.57, 0.69]		0.62*** [0.56, 0.68]
Age	−0.01*** [−0.01, −0.004]	0.002 [−0.001, 0.005]	−0.01*** [−0.01, −0.003]	0.002^{+} [−0.0004, 0.005]
Political ideology	−0.22*** [−0.26, −0.17]	−0.38*** [−0.43, −0.33]	−0.22*** [−0.26, −0.17]	−0.37*** [−0.42, −0.32]
Familiarity × moderator	0.001 [−0.001,0.003]	−0.001 [−0.003, 0.001]	−0.03^{+} [−0.07, 0.002]	−0.08*** [−0.11, −0.04]
Moderated mediation				
Familiarity × moderator through efficacy		0.0005 [−0.001, 0.002]		−0.02^{+} [−0.04, 0.003]
Indirect effect				
At low value (mean − 1SD) of moderator		0.06*** [0.02, 0.09]		0.09*** [0.05, 0.12]
At high value (mean + 1SD) of moderator		0.08*** [0.04, 0.11]		0.04* [0.01, 0.08]

Note: Values represent unstandardized regression coefficients with 95% confidence intervals.

Models are moderated mediation models: predictor = Familiarity with Greta Thunberg, mediator = collective efficacy, moderator = age (model 2), political ideology (model 3), outcome measure = collective action intentions, covariate: political ideology (model 2), age (model 3).

Model 2: Collective action intentions: $R^2 = 0.48$, $MSE = 0.75$, $F(5, 1{,}208) = 220.36$, $p < .0001$.

Model 3 Collective action intentions: $R^2 = 0.48$, $MSE = 0.74$, $F(5, 1{,}208) = 227.29$, $p < .0001$.

$^{+}p < .10$; $^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$.

(Y), and political ideology as a covariate was used to test the moderated mediation (see Figure 1) ($n = 1{,}214$).[2]

Greater familiarity with Greta Thunberg ($b = 0.08$, $SE = 0.02$, $t = 4.08$, $p < .001$) and stronger collective efficacy beliefs ($b = 0.63$, $SE = 0.03$, $t = 20.86$, $p < .001$) directly predicted higher collective action intentions. However, neither respondents' age ($b = 0.002$, $SE = 0.002$, $t = 1.56$, $p = 0.12$), nor the hypothesized interaction of age and familiarity ($b = -0.001$, $SE = 0.001$, $t = -0.92$, $p = 0.36$) had significant direct effects on collective action intentions (see Table 3). Additionally, while greater familiarity with Greta Thunberg ($b = 0.11$, $SE = 0.02$, $t = 5.75$, $p < .001$) and lower age ($b = -0.01$, $SE = 0.001$, $t = -4.49$, $p < .001$) significantly predicted stronger collective efficacy beliefs, their interaction did not significantly predict collective efficacy beliefs ($b = 0.001$, $SE = 0.001$, $t = 0.82$, $p = 0.41$). Consistent with the lack of significant interactions with age, the hypothesized moderated mediation was not significant (moderated mediation index was 0.0005, $SE_{boot} = 0.001$, 95% bootstrapped [*Boot*] *CI* [−0.001, 0.002]).The pattern of results remained consistent when removing covariates and when conducting a sensitivity analysis (see Supporting Information Section 4).

These results do not support our hypothesized moderated direct effects or moderated indirect effects, instead suggesting that effects of familiarity on collective action—both direct and mediated via collective efficacy—do not differ based on respondents' age.

3.4 | Does political ideology moderate the association between familiarity with Greta Thunberg and collective action intentions via collective efficacy beliefs?

We also investigated whether or not political ideology moderated the effects observed in model 1. We hypothesized that the direct and indirect relationship (via collective efficacy) between familiarity with Greta Thunberg and collective action intentions would be stronger among respondents who were more liberal than those who were more conservative. We tested this moderated mediation through PROCESS model 8 ($n = 1{,}214$), with age as covariate (see Figure 1).[3]

Greater familiarity with Greta Thunberg ($b = 0.08$, $SE = 0.02$, $t = 3.74$, $p < .001$), stronger collective efficacy beliefs ($b = 0.62$,

[2]This analysis was quantitatively similar to our preregistered model, but we interchanged positions of the two predictors: Familiarity with Greta Thunberg and age. See Supporting Information Section 5 for reasons for this deviation.

[3]This analysis deviates from preregistered exploratory analysis by using political ideology (instead of political party) as a moderator. See Supporting Information Section 4 for analyses with party as moderator, Section 5 for reasons for deviation.

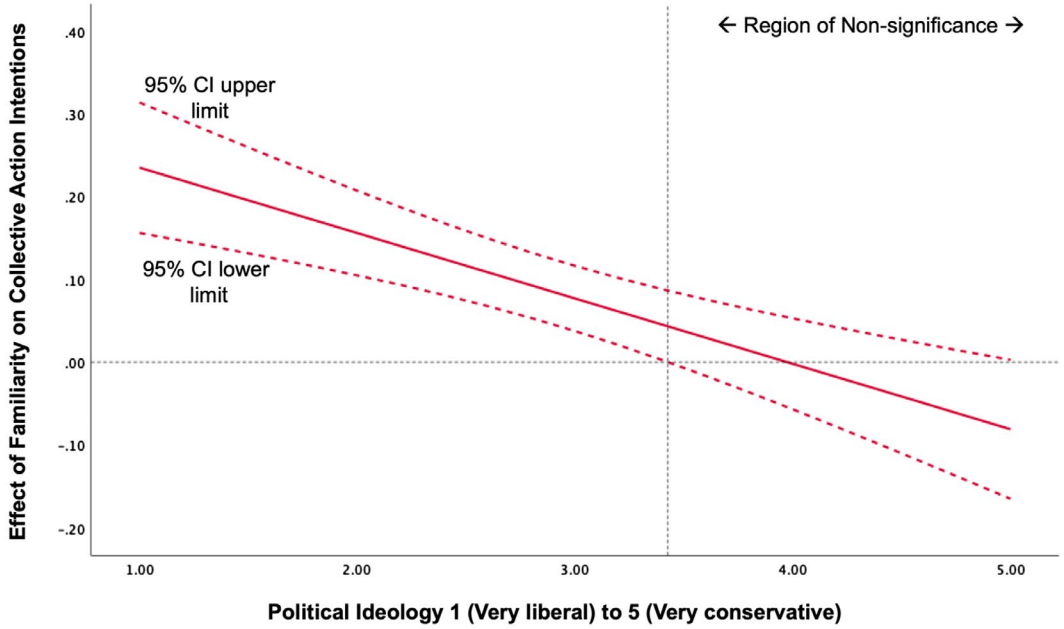

FIGURE 2 Conditional effects of familiarity with Greta Thunberg on collective action intentions at values of the moderator political ideology. Graphed using the Johnson-Neyman method

SE = 0.03, *t* = 20.74, *p* < .001) and more liberal political ideology (*b* = −0.37, *SE* = 0.02, *t* = −14.97, *p* < .001) predicted higher collective action intentions. Further, as hypothesized, the interaction between familiarity and political ideology significantly predicted collective action intentions (direct effect: *b* = −0.08, *SE* = 0.02, *t* = −4.36, *p* < .001). Probing this significant interaction using the Johnson-Neyman procedure (Hayes & Matthes, 2009; Johnson & Neyman, 1936) suggested that as expected, familiarity with Greta Thunberg had a stronger association with collective action intentions among those who are more liberal (at 1.94 [mean-*SD*]: *b* = 0.16, *p* < .001) than those who are more conservative (at 4.11 [mean + *SD*]: *b* = −0.01, *p* = 0.072), indicating a lack of a direct association between familiarity with Greta Thunberg and collective action intentions for conservatives (See Figure 2).

Additionally, greater familiarity with Greta Thunberg (*b* = 0.11, *SE* = 0.02, *t* = 5.51, *p* < .001) and more liberal political ideology (*b* = −0.22, *SE* = 0.02, *t* = −9.37, *p* < .001) predicted stronger collective efficacy beliefs. Moreover, and pertinent to our hypotheses, the interaction between familiarity and political ideology also marginally predicted collective efficacy beliefs (*b* = −0.03, *SE* = 0.02, *t* = −1.83, *p* = 0.07). Although marginally significant, probing this interaction revealed that, albeit present for both liberals and conservatives, familiarity with Greta Thunberg had a stronger association with collective efficacy beliefs among those who are more liberal (at 1.94 [mean-*SD*]: *b* = 0.14, *p* < .001) than those who are more conservative (at 4.11 [mean + *SD*]: *b* = 0.07, *p* = 0.01).

Though nonsignificant, the moderated mediation index: −0.02, SE_{boot} = 0.01, 95% *BootCI*[−0.04, 0.003]) suggested a pattern of results consistent with our hypothesized model (Figure 1). The indirect effect of familiarity with Greta Thunberg on collective action intentions, through collective efficacy, was stronger among more liberal (indirect effect at 1.94 [mean-*SD*]: *b* = 0.09, SE_{boot} = 0.02, 95% Boot*CI* (-0.04, 0.003), than more conservative respondents (indirect effect at 4.11 [mean + *SD*]: *b* = 0.04, SE_{boot} = 0.02, 95% Boot*CI* [0.006, 0.08]) (See Table 3).

The pattern of findings remained consistent when removing the covariate, when conducting a sensitivity analysis, and when interchanging political ideology with political party (See Supporting Information Section 4). These results support our hypotheses, suggesting that the association between familiarity with Greta Thunberg and collective action—both direct and mediated via collective efficacy—is stronger among liberals than conservatives.

3.5 | Do collective efficacy beliefs mediate the association between familiarity with Greta Thunberg and collective action intentions when controlling for support for climate activism?

As an additional test of the "Greta Thunberg Effect," we tested whether familiarity with a specific climate activist, namely Greta Thunberg, could predict participants' collective action intentions, after taking into consideration their support for climate activists in general. In particular, we tested whether the associations between familiarity with Greta Thunberg, collective efficacy beliefs, and collective action intentions would be present even after statistically controlling for respondents' support for climate activism. This post hoc analysis allowed us to situate the effect of familiarity with Greta Thunberg within respondents' overall engagement with and support of climate activism in general.

We tested the robustness of familiarity in our mediation model through PROCESS model 4 (*n* = 1,210), with support for climate

TABLE 4 Coefficients [95% CI] of mediation (Model 1) measuring association between familiarity with Greta Thunberg and collection action intentions, controlling for support for climate activism

	Collective efficacy	Collective action intentions
Direct effects		
Familiarity with Greta Thunberg	0.08*** [0.05, 0.12]	0.07*** [0.03, 0.10]
Collective efficacy		0.41*** [0.35, 0.46]
Indirect effect		
Familiarity through efficacy		0.03*** [0.02, 0.05]
Covariates		
Support for climate activism	0.27*** [0.23, 0.31]	0.59*** [0.55, 0.63]
Age	−0.01*** [−0.01, −0.003]	−0.003 [−0.003, 0.002]
Political ideology	−0.03 [−0.08, 0.03]	−0.10*** [−0.15, −0.05]

Note: Values represent unstandardized regression coefficients with 95% confidence intervals.

Model is a simple mediation model with familiarity with Greta Thunberg as predictor, collective efficacy as mediator, collective action intentions as the dependent measure, and support for climate activists, political ideology and age as covariates.

Collective action intentions: $R^2 = 0.57$, $MSE = 0.62$, $F(5, 1{,}205) = 423.16$, $p < .0001$

*$p < .05$; **$p < .01$; ***$p < .001$.

activists, age, and political ideology as covariates.[4] Familiarity with Greta Thunberg positively predicted collective action intentions (total effect: b [unstandardized] = 0.10, $SE = 0.02$, $t = 5.50$, $p < .001$; direct effect: $b = 0.07$, $SE = 0.02$, $t = 3.91$, $p < .001$) and collective efficacy beliefs ($b = 0.08$, $SE = 0.02$, $t = 4.71$, $p < .001$). Collective efficacy beliefs ($b = 0.41$, $SE = 0.03$, $t = 15.14$, $p < .001$) also had a direct effect on collective action intentions. Moreover, collective efficacy beliefs mediated the effect of familiarity with Greta Thunberg on collective action intentions (indirect effect: $b = 0.03$, $\beta = 0.04$, $SE_{boot} = 0.01$, 95% Boot*CIs* [0.02, 0.05]; see Table 4). The results remained consistent when removing political ideology and age from the model and when conducting sensitivity analysis (see Supporting Information Section 4).

Results from this post hoc mediation controlling for support suggest that those who are more familiar with Greta Thunberg have stronger collective efficacy beliefs and (in turn) greater collective action intentions even when accounting for their general support for climate activism.

4 | DISCUSSION

Taken together, our results provide preliminary evidence in support of the "Greta Thunberg Effect." Those who were more familiar with Greta Thunberg were more likely than those who were less familiar to intend to take collective action to reduce global warming. Also, in support of our hypotheses, collective efficacy mediated this effect. This suggests that familiarity with Greta Thunberg is related to individuals' greater sense of collective efficacy—the belief that, by working together with like-minded others, they can reduce global warming—and, may in turn motivate them to take collective actions to reduce global warming. The post hoc analysis underscored the role of familiarity in potentially predicting collective action on climate change by showing that familiarity with Greta Thunberg was associated individuals' collective efficacy beliefs and collective action intentions even after accounting for their support for climate activists.

Consistent with the SIMPEA's hypothesized association between collective efficacy and collective action (Fritsche et al., 2018; Roser-Renouf et al., 2014), we find that collective efficacy positively predicts collective action. Extending previous research that has identified psychological mechanisms including appraisal of injustice, collective efficacy, affect, and social identification as factors that predict collective action intentions (Becker & Tausch, 2015; van Zomeren & Iyer, 2009), our findings suggest that exposure to inspirational young public figures like Greta Thunberg is associated with stronger collective efficacy beliefs, and greater intentions to take collective action.

Contrary to our hypothesis, we find that familiarity with Greta Thunberg predicts collective action intentions at a similar magnitude across all ages. Although overall, younger adults have stronger collective efficacy beliefs and collective action intentions, familiarity with Greta Thunberg did not affect younger and older adults differently. This finding suggests that Greta Thunberg may be able to motivate collective action among individuals of all ages. However, since our findings are correlational and contingent only on familiarity, we cannot rule out the possibility that Greta Thunberg indirectly contributes to the stronger collective efficacy and collective action intentions among younger (than older) adults. Accounts of millions of youth joining Fridays for Future, and students becoming climate activists (Nevett, 2019; Wood, 2020) highlight Greta Thunberg's role in motivating climate activism among youth. It is possible that due to her identity as a "teenager," teenagers (a group that was largely not included in our sample) might feel the strongest social identification with her, whereas adults of all ages (18+)—including young adults—experience a lower level of social identification with her than teenagers, but the same level as other adults. Age-based differences may also vary across countries, with individuals identifying more strongly with other aspects of social identity in some contexts. For example, in the United States, where support for climate change mitigation is politically polarized (Ballew et al., 2020; McCright et al., 2014), politicized identities may have a stronger influence in moderating the "Greta Thunberg Effect" among adults.

In contrast to age, political ideology moderated the (direct) "Greta Thunberg Effect" such that familiarity with Greta Thunberg was related to higher collective action intentions among liberals but not conservatives. The moderated direct effect is consistent

[4]This analysis deviates from preregistered analysis because it was planned and conducted post hoc after assessing findings from models 1, 2, and 3.

with studies showing that groups with politicized identities feel greater motivation for collective action than those with nonpoliticized identities (Simon & Klandermans, 2001; van Zomeren et al., 2008). In the case of identification with Greta Thunberg, those who associate with her due to their shared political ideology may be more motivated to act on behalf of their group than those who share demographic features like age. Interestingly, although stronger among liberals, the indirect effect of familiarity on collective action via collective efficacy was present among both liberals and conservatives. Thus, unlike climate change-related partisan messengers who are accepted by their political ingroup but rejected by their outgroup (Van Boven et al., 2018), Greta Thunberg may be able to heighten collective efficacy beliefs and inspire collective action across the political spectrum. However, greater familiarity with Greta Thunberg may be more strongly associated with greater collective action intentions among individuals who are more liberal (than conservative).

Although alternative explanations are possible, we have some statistical and theoretical evidence against alternative paths, that is, that collective action intentions (directly and mediated by collective efficacy)—would predict familiarity with Greta Thunberg. We find that a reversed mediation, that is, that collective action intentions would predict familiarity with Greta Thunberg and that collective efficacy beliefs would mediate this relationship, explains only 9% of the variance in familiarity whereas our original simple mediation model (model 1) explains 48% of the variance in collective action intentions (See Supporting Information Section 4). Moreover, maximum likelihood structural equation modeling showed that our hypothesized mediation had a superior model fit than did the reverse mediation. There is also much theoretical work to support our hypothesized claims that by instilling hope for social change and raising individuals' sense of self-efficacy, Greta Thunberg can raise collective action intentions and efficacy (Fritsche et al., 2018; Mummendey et al., 1999; van Zomeren et al., 2008). In sum, the reverse effect of collective action intentions on familiarity with Greta Thunberg is not corroborated by statistical or theoretical evidence.

Our findings have implications for understanding and enhancing young inspirational leaders' impact. We find that familiarity with Greta Thunberg is related to stronger collective efficacy and higher collective action intentions. This finding is preliminary evidence that youth public figures like Greta Thunberg who highlight intergenerational injustice (in calls to action) may be able to shape collective efficacy and motivate individuals to participate in collective action on global warming. We also find that, as predicted based on SIMPEA, the association between familiarity with Greta Thunberg and collective action intentions was stronger among adults who share Greta Thunberg's liberal political ideology. However, this interaction between familiarity with Greta Thunberg and political ideology might not be present among youth and adolescents because their political identities are less crystalized than adults (Merelman, 1969). Greta Thunberg and other public figures could potentially enhance their impact across the political spectrum by appealing to aspects of their social identity—other than their political ideology—that they are likely to share with the wider public.

4.1 | Limitations and Future directions

The study has some limitations that future research could address. First, because we rely on an observational design, we cannot confidently offer any causal conclusions, account for alternative explanations (Fiedler et al., 2011), or discount the possibility of an exogenous variable driving the observed relationships. In particular, our study did not homogenize respondents' exposure to Greta Thunberg which can differ in its content (e.g., positive or negative), frequency, and delivery (e.g., news, speeches, memes etc.). Nonetheless, our findings offer evidence which is suggestive of the "Greta Thunberg Effect," and explain unique variance over and above general support for climate activism. Future research can confirm these findings with experimental data. For example, research could experimentally manipulate the content participants consume about Greta Thunberg and control for the kind of content they have consumed previously.

Second, familiarity with Greta Thunberg could be correlated with exposure to climate-related content and overall media consumption. We mitigated this limitation in part by controlling for political ideology, which correlates with (but does not fully account for) the type of climate change content individuals encounter (Bolin & Hamilton, 2018). Future studies can compare the effect of direct exposure to Greta Thunberg's message against vicarious exposure to her influence.

Third, we found that age was negatively correlated with familiarity (Table 1). Future research could test whether age influences the "Greta Thunberg Effect" at a different point in the model. For example, age might predict familiarity with Greta Thunberg. Additionally, according to SIMPEA, a sense of identification with a group, more so than merely belonging to a group, activates social identity processes that lead to pro-environmental action (Fritsche et al., 2018). Thus, future research could assess respondents' sense of identification with different age groups, instead of their age, as a moderator of the "Greta Thunberg Effect."

Fourth, future research could test why political identity moderates the effect of familiarity on collective efficacy. Potential explanations could be that political identities strengthen collective efficacy or that liberals and conservatives receive different information about Greta Thunberg (Swim et al., 2019). Fifth, future research can explore other mechanisms of collective action, such as political engagement and the role of affect. Lastly, future studies could replicate these results with teenagers and children in different countries (e.g., Sweden).

4.2 | Conclusion

Arguably the most popular climate activist of our time, Greta Thunberg is simultaneously heralded as Time Magazine's Person of

the Year by some, and asked to "work on her anger management issues" by others (Alter et al., 2019; McCarthy, 2019). The present study, to date, is one of the first to present empirical evidence supporting the "Greta Thunberg Effect," and to offer a potential explanation of why a young leader could be a powerful influence on collective action. We find that familiarity with Greta Thunberg is related to greater intentions to take collective action and that collective efficacy beliefs account for this effect. Not restricted to younger adults, familiarity with Greta Thunberg predicts collective action intentions across all ages. Moreover, though stronger among liberals, the indirect effect via collective efficacy is also present among conservatives and is robust even when controlling for individuals' overall support for climate activism. These findings suggest that Greta Thunberg's calls to action could motivate public action across the political spectrum.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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