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“Don’t Tell Me What to Do”: Resistance to Climate Change Messages Suggesting Behavior Changes

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35 **Introduction**

36 Climate change arguably presents the most challenging collective action problem the
37 world has ever faced. Rising global temperatures due to the increasing accumulation of
38 greenhouse gases in the atmosphere will fundamentally reshape societies, threatening economies,
39 health care systems, and geopolitical relations. It is projected that state-of-the-art behavioral
40 interventions, such as providing targeted information to consumers about high-impact individual
41 and household energy choices, could significantly reduce greenhouse gas emissions in the U.S.
42 over time (Dietz et al. 2009; Capstick, Lorenzoni, Corner, and Whitmarsh 2014; Stern 2020);
43 however, such reductions may be difficult to achieve in practice due to a lack of public (political)
44 support for specific pro-environmental policies (Druckman 2015; Nielsen, van der Linden, and
45 Stern 2020; van der Linden 2016). In this context, it is crucial to understand how best to promote
46 high-impact individual and collective actions to mitigate the effects that will occur as a result of
47 climate change. How effective are direct messages that recommend changes in personal behavior
48 or the enactment of new laws to reduce emissions? Does the impact of such a message depend on
49 the presence of an expert source linked to the recommendations?

50 A large body of research has accumulated which shows that exposure to strategic frames
51 and persuasive messages can influence perceptions and willingness to support various actions to
52 address climate change (Bolsen and Shapiro 2017; Druckman and McGrath 2019; Hart and
53 Feldman 2016; van der Linden 2017); however, few studies have investigated the impact of
54 exposure to messages that recommend specific changes in individual behaviors such as reducing
55 beef consumption or cutting back on air travel as ways to reduce global carbon emissions
56 (Nielsen, Clayton et al. 2020), as well as collective policies such as increasing taxes on carbon
57 emissions and increasing vehicle fuel efficiency requirements. Do people become more willing to

58 change their behaviors or support specific pro-climate candidates and policies following exposure
59 to framed messages emphasizing the need for such actions? When climate scientists engage in
60 what may be viewed as “political advocacy” by recommending specific “solutions”, does this
61 have an impact on the degree to which the public trusts them to provide impartial and unbiased
62 information about climate change? Do the effects of exposure to such messages depend on
63 individual characteristics such as a person’s party identification?

64 The present study examines the response to framed messages that advocate both changes
65 in individual behavior including, for example, taking fewer plane flights and using less hot water,
66 as well as collective actions such as retrofitting buildings or halting deforestation to address the
67 impacts of climate change. Responses reported include willingness to engage in personal actions
68 to reduce greenhouse gas emissions, stated preference to vote for a candidate who would enact
69 pro-climate legislation, belief that human activity is the cause of accelerated global warming, and
70 trust in climate scientists. To illuminate these relationships, we implemented a survey-experiment
71 (N=1,915) online through Amazon’s Mechanical Turk (MTurk) platform that manipulated: (1) the
72 presence of recommendations for changes in public policy *or* individual behavior in order to
73 reduce emissions of greenhouse gases; and, (2) the presence of a subtle source cue attributing
74 these recommendations to climate scientists. The experiment thus dealt with two aspects of
75 climate communication: the differences in the response to a message recommending collective
76 policies or personal sacrifices as a way to mitigate climate change; and, (2) the introduction of a
77 source manipulation that attributed the recommendation to a generic climate scientist. We find
78 that presenting individuals with framed messages that advocate personal behavioral changes to
79 combat climate change, with or without an expert source cue, *reduces* their expressed willingness
80 to take action, *decreases* support for pro-climate candidates, *decreases* belief in the scientific

81 consensus, and *lowers* trust in climate scientists. We address some of the implications of these
82 findings for debates regarding how best to mobilize collective action to combat climate change as
83 well as the role of climate scientists in policy advocacy.

84 **Solution Framing and Climate Action**

85 The concept of “climate action” refers both to individual behavioral changes to
86 voluntarily reduce emissions or support for government actions to accomplish this goal (Lubell
87 et al. 2007; Zahran et al. 2006). It has been estimated, for instance, that greenhouse gas
88 emissions would be reduced considerably if consumers could be persuaded (collectively) to
89 substitute meat and dairy with plant-based foods in their diet (Green et al. 2015; Poore and
90 Nemecek 2018). Yet people often hold misperceptions about the personal actions that would be
91 most effective at reducing climate pollution (Bord 1998; Bostrom et al. 1994; Kempton 1991;
92 Sterman and Sweeny 2007; Whitmarsh 2009).

93 When individuals are exposed to communications that emphasize specific considerations
94 about climate change, such as recommendations to engage in climate-friendly behaviors or
95 support pro-climate policies, they may prioritize the highlighted consideration when forming
96 their opinion, often shifting their opinion in the direction of the message; this is referred to as an
97 *emphasis framing effect* (Druckman 2011). Prior research has found that exposure to messages
98 that highlight descriptive social norms (Bolsen, 2013; Bolsen, Leeper, and Shapiro 2014;
99 Goldberg et al. 2019; Mildemberger and Tingley 2019; van der Linden 2015), the benefits or
100 costs of climate policies (Levine and Kline 2017; 2019), the benefits or costs of personal actions
101 (Bolsen, Druckman, and Cook 2014), or the details of specific climate policy proposals
102 (Buntaine and Prather 2018) can influence people’s willingness to engage in or support
103 collective actions aimed at reducing climate change.

104 Despite robust empirical findings showing the direct impact of messages on changing both
105 attitudes and behavior in the direction of the message (Chong and Druckman 2007), there are also
106 several reasons why specific types of messages *might not be effective*. First, most people value
107 freedom of choice, particularly in decisions they make in their everyday lives (Permuter et al
108 1980; Fujiwara et al. 2013). Several empirical studies have found that a behavior change as
109 personal as a change in diet is met with particular resistance, even among those who ardently
110 favor action to mitigate global climate change (Attari et al. 2011; DeBoer et al 2013). Several
111 factors may come into this resistance but among them is the concept of psychological “reactance”
112 which may be triggered when people perceive their freedom of choice is impinged upon by
113 directives from others (Brehm 1966; Gifford et al. 2011; Gifford 2011; Ma et al. 2019; Nisbet,
114 Cooper, and Garrett 2015).

115 Second, rather than take personal responsibility for an issue as large as climate change,
116 many people would prefer an “upstream” solution that would not impinge on their personal
117 behavior; even many of those who believe that climate mitigation is urgent would prefer that the
118 producers rather than the consumers of carbon be regulated or taxed (Campbell and Sedikides
119 1999; Hardisty et al. 2019). The results of these empirical studies suggest that at least some
120 respondents are more likely to favor more distant policy solutions that do not have a direct impact
121 on their personal behavior.

122 Third, addressing large scale collective action problems may require generating support
123 for policies that have been politicized on ideological grounds because they involve the regulation
124 of free markets or potential restrictions on personal freedoms. Surveys have shown that
125 Americans are divided over support for public policy to mitigate climate change, with liberal
126 Democrats as opposed to conservative Republicans more likely to support tougher fuel efficiency

127 standards and various tax incentives even if this means greater costs to themselves or their
128 families (Nisbet et al, 2015; Pew Research Center 2018). Campbell and Kay (2014) have
129 suggested that in order to protect their values and cultural worldviews, conservatives might not
130 only oppose specific climate change mitigation strategies but also deny that climate change itself
131 is a problem: in other words, when confronted with solutions to climate change that would pose
132 regulations, supporters of free-market solutions will respond by denying that climate change
133 exists, not due to their perception of the “inherent seriousness” of the threat but because they
134 oppose on ideological grounds the solutions that are generally proposed to address it.

135 Fourth, there are questions about the efficacy of voluntary adoption of individual-level
136 behavior changes when the earth is confronted with a problem as overwhelming as global climate
137 change. Even when people believe that climate change presents a dire threat and they
138 acknowledge that behavior change by a large part of the world’s population would help, they may
139 believe changing their personal behavior is futile (McGrath N.d.:16): that “individual voluntary
140 behaviors in and of themselves to have no bearing on the macro political problem of climate
141 change, which requires global coordination, not personal commitments” (see also, Bubeck et al.
142 2012; Hornsey et al. 2016; Kellstedt, Zahran, and Vedlitz 2008).

143 Based on this literature, we pose the following research question: *Do messages that*
144 *recommend personal behavior change or collective policies to combat climate change affect*
145 *individuals’: (i) willingness to take personal steps or support collective actions to address climate*
146 *change; (ii) support for political candidates with a pro-climate agenda; and, (iii) belief in human-*
147 *caused climate change? (Research Question #1)*

148 **Message Source Effects**

149 A long and robust history of empirical research on communication and environmental
150 risk perceptions makes clear that the messages are more impactful when they emanate from
151 credible and trustworthy sources (Brewer and Ley 2013; Druckman 2001; Liu and Priest 2009;
152 Lupia 2013; Benegal and Scruggs 2018; Bolsen et al. 2019; Van Boven et al. 2018). The
153 question this research poses is whether attribution to an unnamed climate scientist makes the
154 message more or less credible and trustworthy, or, alternatively, if such attribution doesn't affect
155 the impact of the message.

156 Linking recommendations for individual and collective action on climate change to
157 expert scientists might influence positive response because of the high level of overall trust that
158 Americans report for the scientific community compared with other institutions (Krause et al.
159 2019; Mullin 2017). In this scenario, trust in the scientific community should translate to trust
160 in climate scientists when they discuss issues in their area of expertise including climate change.

161 Alternatively, however, empirical studies have shown that this general trust in science or
162 in scientists is not universal within the United States. Instead, numerous surveys have found an
163 association between conservative political ideology and a loss of trust both in science itself as
164 well as in scientists (Hamilton, Hartter and Saito 2015; Krause et al. 2019; Leiserowitz et al.
165 2012; McCright et al. 2013; Safford et al. 2019). This distrust is exacerbated when scientists
166 themselves engage in public policy debates (Brulle 2018; Milkoreit et al. 2015; Motta 2018).
167 The tendency of political polarization around scientifically-based warnings has been documented
168 most recently with respect to the Covid-19 pandemic (Ballew et al. 2020; Ellis 2020; Krause et
169 al. 2019; Pennycook et al. 2020; Van Bavel et al. 2020).

170 In a recent study, we compared the impact of climate scientists with party leaders and
171 military leaders, and found that climate scientists had relatively little positive impact on the

172 perceived threat of climate change when the message was linked with a mild suggestion to
173 “promote energy efficiency and renewable energy technologies” (Bolsen et al. 2019). We found
174 that when information about the national security or environmental effects of climate change was
175 attributed to climate scientists, this linkage often *weakened* the impact of the message for
176 Republicans and Independents. In the current study, we focused on the combination of specific
177 packages of recommendations attributed either to a climate scientist or with no attribution to
178 elucidate the influence of message type and message source.

179 Based on this literature, we pose the following research question: *When a message that*
180 *recommends specific individual or collective actions to combat climate change is attributed to an*
181 *unnamed “climate scientist”, does this attribution have an effect on the message’s impact or on*
182 *the degree to which there is general trust in climate scientists to provide unbiased and impartial*
183 *information?* (RQ #2)

184 **Methods**

185 We administered a survey over the period of September 23 – October 1, 2019 using
186 Amazon’s Mechanical Turk to recruit 1,915 unique respondents.¹ Following a brief introduction,

¹ MTurk is a widely used online crowdsourcing platform, producing a convenience sample that differs from the general population, but not in ways that impede making generalizable causal inferences (Levay, Freese, and Druckman 2016; Clifford, Jewell, and Waggoner 2015). Further, the results have been found to be comparable to identical studies fielded on general population samples (Mullinix, Leeper, Druckman, and Freese 2015). Sample demographics are included in Appendix table A-1. We restricted the survey to individuals who had completed a minimum of 200 previous tasks on MTurk with a minimum approval rate of 95%.

187 respondents opting to participate were randomly assigned to one of six experimental conditions
188 (see Table 1). These included: (1) a simple sentence stating that “climate change is a threat to
189 both the environment and the national security of the United States” (*No Source Baseline*); (2)
190 the same sentence attributed to “climate scientists” (*Climate Scientists Source*); (3) the no-source
191 baseline sentence with an added statement that “it is recommended that we as individuals take
192 fewer plane flights, drive less, eat less beef, use less hot water and adjust the thermostat” (*No*
193 *Source + Individual Actions*); (4) the baseline sentence with individual behavioral
194 recommendations attributed to “climate scientists” (*Climate Scientists + Individual Actions*); (5)
195 the no-source baseline sentence with the statement that “it is recommended that we as a nation
196 adopt new laws that: limit the amount of carbon pollution in the air, stop deforestation, require
197 business and industry to switch from coal to sustainable energy, increase vehicle fuel efficiency,
198 and retrofit all public buildings to make them maximally energy efficient” (*No Source + Policy*
199 *Actions*), and (6) the baseline sentence along with the same policy recommendations attributed to
200 a “climate scientist” (*Climate Scientists + Policy Actions*). The experimental design was
201 constructed to vary two dimensions: the extent to which the statement was accompanied by
202 recommendations concerning personal behavior or policy changes, and whether or not the
203 statement was attributed to a climate scientist or no source.

204
205 [Insert Table 1 here]

206 *Dependent Variables*

207 We measured how exposure to the experimental treatments affected respondent beliefs on
208 four key outcome measures. After respondents had read the headline or short paragraph, they
209 were asked: “how willing are you to take steps in your own life that would reduce greenhouse gas
210 emissions as a way to fight climate change?” on a 7-point response scale (1=*strongly unwilling*;

211 7=*strongly willing*). The second question was, “how willing are you to vote for candidates who
212 favor greater regulation of carbon emissions by business and industry, and higher taxes on carbon
213 emitters?” on a 7-point response scale (1=*strongly disagree*; 7= *strongly agree*). Third,
214 respondents were asked the extent to which they agreed or disagreed with the statement, “climate
215 change is occurring faster now because of human activity:” on a 7-point response scale (1=
216 *strongly disagree*; 7= *strongly agree*). Finally, they were asked “how much would you say that
217 you trust climate scientists to provide accurate and impartial information?” (1=strongly distrust;
218 7=strongly trust). Since so much of the previous survey research has found robust effects of
219 political party identification with their response to climate information, we also analyzed the
220 impacts of political partisanship.

221 **Results**

222 To test our research questions, we estimated a series of OLS regression models. In each
223 model we omit the *No Source Baseline* condition as our reference group and regress the
224 dependent variable on the condition indicators. For each dependent variable, we first report the
225 full main effects model using all respondents in the sample. Following this, we present a series of
226 subset models restricting the analysis to 1) Republicans, 2) Independents, and 3) Democrats in
227 the sample. In all models, cell entries contain OLS coefficients representing the difference in
228 means between the treatment condition and the *No Source Baseline* condition. Standard errors
229 are presented in parentheses below, and two-tailed *p*-values are reported alongside the coefficient
230 estimates.²

231 *Personal action*

² Additional analyses, including the results of a balance test and sample demographics are available in the Appendix. A comprehensive test of source effects is presented in the Appendix.

232 The first effect that we analyzed was willingness to take personal action as indicated by
233 response to the question: “How willing are you to take steps in your own life that would reduce
234 greenhouse gas emissions as a way to fight climate change? Changes might include driving
235 conventional cars alone less, conserving energy in your home, or changing your diet.” As shown
236 in Table 2, when “no source” was linked with suggestions for making behavioral changes (*NS*
237 *Individual Action*), the effect was to *reduce* willingness to take action ($b = -0.31, p=0.01$); in
238 other words, the difference in the mean score of those exposed to this treatment as compared
239 with the baseline group was one-third of a point on the seven-point scale. None of the other
240 conditions elicited a statistically significant effect at conventional levels in the full model.
241 Further, in our analyses of partisan groups, no estimates reach statistical significance at $p<0.05$.

242

243 [Insert Table 2 here]

244 *Preference for political candidates that support climate mitigation*

245 We next analyzed the responses to the question: “How willing are you to vote for
246 candidates who favor greater regulation of carbon emissions by business and industry, and higher
247 taxes on carbon emitters?” Note that this question does not ask for changes in personal behavior
248 and is a classic “upstream” delegation of responsibility. Shown in Table 3, when the treatment
249 was linked with individual behavioral change and came either from no source (*NS Individual*
250 *Action*) or an unnamed climate scientist (*CS Individual Action*), the response was negative: the
251 respondents were significantly less likely (*NS Individual Action*, $b = -0.42, p = 0.003$; *CS*
252 *Individual Action*, $b = -0.51, p = 0.00$) than the *No Source Baseline* group to respond that they
253 would vote for a candidate that supports climate mitigation. There were similar negative effects

254 for both the general climate scientists source ($b = -0.26, p = 0.06$) and the no source policy
255 action conditions (*NS Policy Action* ($b = -0.26, p = 0.07$.)

256 Across the party groups, only the Independents showed treatment effects across a broader
257 range of conditions: when individual action or policy changes were suggested either by no source
258 or by a climate scientist, Independents stated that they were significantly *less* likely to vote for
259 candidates supporting climate legislation than their co-partisans in the baseline. For
260 Independents, the only condition that did not elicit a statistically significant response was the
261 addition of a climate scientist source (*CS Source*) to the baseline statement.

262 [Insert Table 3 here]

263 *Accelerated anthropogenic climate change*

264 The treatments did not specifically address the issue of the accelerating pace of climate
265 change due to human activity but the responses to this question did vary in different message
266 formats (Table 4). Overall, when asked “To what extent do you disagree or agree that ‘climate
267 change is occurring faster now because of human activity’ ”, respondents were less likely to
268 attest that the climate is changing faster because of human activity when this message was linked
269 with changes in personal behavior either attributed to no source (*NS Individual Action*, $b = -0.34$,
270 $p = 0.01$) or to a climate scientist (*CS Individual Action*, $b = -0.38, p = 0.00$). When linked with
271 policy recommendations (*NS Policy Action* and *CS Policy Action*) or no recommendations at all
272 (*CS Source*), there was no impact on the response.

273 Across partisan groups, none of the treatments had a significant impact on responses for
274 Democrats or Republicans. However, among Independents, the treatment condition did affect
275 response: when the message was linked with climate scientists and either mentioned individual (b

276 = $-0.71, p < 0.01$) or policy changes ($b = -0.64, p < 0.01$), Independents were significantly less
277 likely to respond that climate change is accelerating as a result of human action.

278 *[Insert Table 4 here]*

279 *Trust Climate Scientists to provide accurate information*

280 Our final set of analyses examine the effects of the treatments on answers to “how much
281 would you say that you trust climate scientists to provide accurate and impartial information?”
282 Overall, this message linked with suggestions for changes in individual behavior reduced trust in
283 climate scientists both when no source ($b = -0.34, p = 0.01$) was mentioned or when a climate
284 scientist ($b = -0.37, p < 0.01$) was mentioned. The policy recommendations had no effect
285 overall on response. Among partisans, Republicans were less likely to state that they trust
286 climate scientists when the message was linked with suggestions for change in personal behavior
287 ($b = -0.58, p = 0.04$), and both Republicans ($b = -0.62, p = 0.02$) and Independents ($b = -0.59, p$
288 $= 0.02$) were less likely to trust climate scientists when climate scientists recommended changes
289 in personal behavior. Among Democrats, those exposed to policy recommendations
290 accompanied by a climate scientist source had higher scores for trust in climate scientist ($b =$
291 $0.23, p = 0.04$), while there was no impact from the remaining conditions.

292

293 *[Insert Table 5 here]*

294 **Discussion**

295 This study evaluates the impact of messages suggesting the need for changes in
296 individual behavior or public policy attributed to no source or to an unnamed climate scientist.
297 We found that when messages advocate “solutions” to combat climate change that would require
298 major changes in individual behavior, the general response was less willingness to support pro-

309 mitigation candidates, a reduced belief in human-induced climate change, and in the case of this
300 message delivered by “no source”, less willingness to take personal actions to reduce emissions.
301 In addition, messages recommending individual behavior changes as a way to address climate
302 change, with or without the subtle source attribution linking the recommendation to a climate
303 scientist, reduced trust in climate scientists to provide accurate and impartial information.
304 Messages that imply the need for individual sacrifices in living style that will be required to
305 reduce emissions are thus translated into a negative response to the entire message, including an
306 increased skepticism about climate science and trust in climate scientists. Messages about
307 policies that would affect others, such as taxes on industry and business or on carbon emitters,
308 are more palatable and do not result in such a negative response.

309 Response to the messages was strongly influenced by the political identification of the
310 respondents. In general, support for various actions and pro-climate beliefs was stronger among
311 Democrats than among Republicans in the no-source baseline condition. Further, Republicans
312 and Independents tended to respond more negatively in certain conditions if the message was
313 attributed to a climate scientist. This finding links back to the increasingly large set of findings
314 that have demonstrated conservative skepticism about a variety of scientific messages, but the
315 fact that the Independents reacted so negatively to these messages in our study warrants further
316 study. Our small sample size only permits conjecture about the ways in which Independents are
317 responding, but the finding warrants study with a larger and more representative sample.

318 Given the nature of our sample, we are cautious about the generalizability of our findings,
319 and we encourage future work on representative samples to probe additional factors that may
320 condition the impact of a wider range of individual behaviors and policy recommendations
321 targeting climate mitigation efforts. Future research should identify the specific actions or

322 policies that will be palatable to particular groups of listeners so that the entire process does not
323 backfire. We acknowledge that respondents may have been reacting negatively to portions of
324 the message seeking individual action (e.g., changes in diet): future research should unpack the
325 reactions to specific behavioral suggestions in order to tailor effective messages for diverse
326 populations (Nielsen et al., 2020). Respondents might also not connect recommended
327 behavioral changes to actual reductions in global concentrations of carbon dioxide, and the
328 framing of this connection needs to be explored (van der Linden 2016). In addition, future work
329 needs to extend our understanding of source effects, particularly those with ascribed scientific
330 expertise.

331 **Appendix**

332

333 *(Insert Appendix Table A-1 through Table A-3 here)*

334

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Table 1: Experimental Design and Treatments

Condition	Treatment
No Source Frame (<i>Baseline</i>) (<i>N</i> = 319)	Climate change is a threat to both the environment and the national security of the United States.
No Source + Individual Action (<i>N</i> = 319)	Climate change is a threat to both the environment and the national security of the United States. It is recommended that we as individuals: <ul style="list-style-type: none"> • take fewer plane flights • drive less • eat less beef • use less hot water • adjust the thermostat
No Source + Policy Action (<i>N</i> = 317)	Climate change is a threat to both the environment and the national security of the United States. It is recommended that we as a nation adopt new laws that: <ul style="list-style-type: none"> • limit the amount of carbon pollution in the air • stop deforestation • require business and industry shift from coal to sustainable energy • increase vehicle fuel efficiency • retrofit all public buildings to make them maximally energy efficient
Climate Scientist (<i>N</i> = 319)	Climate scientists say that climate change is a threat to both the environment and the national security of the United States.
Climate Scientist + Individual Action (<i>N</i> = 319)	Climate scientists say that climate change is a threat to both the environment and the national security of the United States. They recommend that we as individuals: <ul style="list-style-type: none"> • take fewer plane flights • drive less • eat less beef • use less hot water • adjust the thermostat
Climate Scientist + Policy Action (<i>N</i> = 319)	Climate scientists say that climate change is a threat to both the environment and the national security of the United States. They recommend that we as a nation adopt new laws that: <ul style="list-style-type: none"> • limit the amount of carbon pollution in the air • stop deforestation • require business and industry shift from coal to sustainable energy • increase vehicle fuel efficiency • retrofit all public buildings to make them maximally energy efficient

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Table 2: Personal Action - Main Effects

	(1) All		(2) Rep		(3) Ind		(4) Dem	
	<i>Coef.</i>	<i>p-val</i>	<i>Coef.</i>	<i>p-val</i>	<i>Coef.</i>	<i>p-val</i>	<i>Coef.</i>	<i>p-val</i>
NS Individual Action	-0.31*	0.013	-0.51	0.059	-0.41	0.078	0.05	0.684
	(0.12)		(0.27)		(0.23)		(0.13)	
NS Policy Action	-0.11	0.362	-0.11	0.685	-0.16	0.505	-0.09	0.491
	(0.12)		(0.28)		(0.24)		(0.13)	
CS Source	-0.14	0.254	-0.40	0.148	0.03	0.902	-0.08	0.548
	(0.12)		(0.28)		(0.23)		(0.13)	
CS Individual Action	-0.23	0.066	-0.40	0.137	-0.23	0.331	-0.04	0.739
	(0.12)		(0.27)		(0.24)		(0.13)	
CS Policy Action	-0.13	0.299	-0.12	0.681	-0.46	0.053	0.07	0.597
	(0.12)		(0.28)		(0.24)		(0.13)	
Constant (No Source)	5.58**	0.000	4.96**	0.000	5.47**	0.000	5.99**	0.000
	(0.09)		(0.20)		(0.17)		(0.09)	
N	1906		505		551		850	
<i>AIC</i>	7071.0		2020.0		2074.4		2583.7	
<i>BIC</i>	7104.4		2045.3		2100.3		2612.2	

514 Note: Cell entries are OLS coefficients with standard errors in parentheses below. Two-tailed p-values are presented
515 in the adjacent column. Coefficients represent the estimated difference in means between the treatment condition
516 and the No Source Baseline condition.

517 * $p < 0.05$, ** $p < 0.01$

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Table 3: Vote for Candidates - Main Effects

	(1) All		(2) Rep		(3) Ind		(4) Dem	
	<i>Coef.</i>	<i>p-val</i>	<i>Coef.</i>	<i>p-val</i>	<i>Coef.</i>	<i>p-val</i>	<i>Coef.</i>	<i>p-val</i>
NS Individual Action	-0.42** (0.14)	0.003	-0.51* (0.29)	0.077	-0.53* (0.26)	0.041	-0.05 (0.14)	0.695
NS Policy Action	-0.26 (0.14)	0.070	0.02 (0.29)	0.944	-0.65* (0.27)	0.015	-0.20 (0.13)	0.142
CS Source	-0.26 (0.14)	0.067	-0.27 (0.29)	0.360	-0.42 (0.26)	0.108	-0.11 (0.13)	0.396
CS Individual Action	-0.51** (0.14)	0.000	-0.47 (0.28)	0.099	-0.94** (0.27)	0.001	-0.13 (0.14)	0.324
CS Policy Action	-0.18 (0.14)	0.222	-0.20 (0.30)	0.493	-0.76** (0.27)	0.004	0.19 (0.13)	0.150
Constant (No Source)	5.54** (0.10)	0.000	4.33** (0.21)	0.000	5.39** (0.19)	0.000	6.29*** (0.09)	0.000
N	1911		507		552		852	
AIC	7705.7		2081.2		2215.4		2656.7	
BIC	7739.0		2106.6		2241.3		2685.2	

522 Note: Cell entries are OLS coefficients with standard errors in parentheses below. Two-tailed p-values are presented
523 in the adjacent column. Coefficients represent the estimated difference in means between the treatment condition
524 and the No Source Baseline condition.

525 * $p < 0.05$, ** $p < 0.01$

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Table 4: Climate Change is Occurring Faster - Main Effects

	(1) All		(2) Rep		(3) Ind		(4) Dem	
	<i>Coef.</i>	<i>p-val</i>	<i>Coef.</i>	<i>p-val</i>	<i>Coef.</i>	<i>p-val</i>	<i>Coef.</i>	<i>p-val</i>
NS Individual Action	-0.34*	0.011	-0.53	0.072	-0.35	0.146	-0.01	0.915
	(0.13)		(0.29)		(0.24)		(0.12)	
NS Policy Action	-0.12	0.355	0.13	0.670	-0.41	0.099	-0.11	0.338
	(0.13)		(0.30)		(0.25)		(0.11)	
CS Source	-0.19	0.155	-0.39	0.193	-0.03	0.889	-0.15	0.190
	(0.13)		(0.30)		(0.24)		(0.12)	
CS Individual Action	-0.38**	0.005	-0.40	0.170	-0.71**	0.005	-0.03	0.768
	(0.13)		(0.29)		(0.25)		(0.12)	
CS Policy Action	-0.19	0.162	-0.27	0.378	-0.64**	0.009	0.13	0.277
	(0.13)		(0.30)		(0.25)		(0.12)	
Constant (No Source)	5.76**	0.000	4.65***	0.000	5.71**	0.000	6.40**	0.000
	(0.09)		(0.21)		(0.18)		(0.08)	
N	1912		507		552		853	
<i>AIC</i>	7452.7		2104.9		2131.2		2407.0	
<i>BIC</i>	7486.0		2130.2		2157.1		2435.4	

Note: Cell entries are OLS coefficients with standard errors in parentheses below. Two-tailed p-values are presented in the adjacent column. Coefficients represent the estimated difference in means between the treatment condition and the No Source Baseline condition.

* $p < 0.05$, ** $p < 0.01$

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Table 5: Trust Climate Scientists - Main Effects

	(1) All		(2) Rep		(3) Ind		(4) Dem	
	<i>Coef.</i>	<i>p-val</i>	<i>Coef.</i>	<i>p-val</i>	<i>Coef.</i>	<i>p-val</i>	<i>Coef.</i>	<i>p-val</i>
NS Individual Action	-0.34*	0.011	-0.58*	0.043	-0.36	0.143	0.03	0.771
	(0.14)		(0.29)		(0.25)		(0.12)	
NS Policy Action	-0.15	0.276	-0.10	0.737	-0.47	0.066	-0.00	0.990
	(0.14)		(0.30)		(0.26)		(0.11)	
CS Source	-0.07	0.586	-0.17	0.561	-0.06	0.806	0.02	0.880
	(0.14)		(0.29)		(0.25)		(0.12)	
CS Individual Action	-0.37**	0.006	-0.62**	0.029	-0.59*	0.022	0.05	0.681
	(0.14)		(0.28)		(0.26)		(0.12)	
CS Policy Action	-0.03	0.826	-0.07	0.818	-0.43	0.088	0.23*	0.042
	(0.14)		(0.30)		(0.25)		(0.11)	
Constant (No Source)	5.53**	0.000	4.54***	0.000	5.31**	0.000	6.21**	0.000
	(0.10)		(0.21)		(0.18)		(0.08)	
N	1909		506		551		852	
AIC	7476.3		2080.4		2160.5		2395.4	
BIC	7509.6		2105.8		2186.4		2423.9	

Note: Cell entries are OLS coefficients with standard errors in parentheses below. Two-tailed p-values are presented in the adjacent column. Coefficients represent the estimated difference in means between the treatment condition and the No Source Baseline condition.

* $p < 0.05$, ** $p < 0.01$

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Variable	Value	N	(%)
Age	18 - 24	199	(10.4%)
	25 - 34	697	(36.5%)
	35 - 44	488	(25.5%)
	45 - 54	284	(14.9%)
	55 - 64	171	(8.9%)
	65 - 74	68	(3.6%)
	75 or older	5	(0.2%)
Female	Male	681	(35.9%)
	Female	1,217	(64.1%)
Race	White	1,409	(73.7%)
	African American	195	(10.2%)
	Asian American	136	(7.1%)
	Hispanic	103	(5.4%)
	Mixed race or Other	69	(3.6%)
Education	Less than high school	14	(0.7%)
	High school graduate	179	(9.4%)
	Some college	428	(22.4%)
	2-year degree	240	(12.6%)
	4-year degree	741	(38.8%)
	Professional degree	275	(14.4%)
	Doctorate	35	(1.8%)
Income	Less than \$15,000	142	(7.4%)
	\$15,000 - \$24,999	190	(9.9%)
	\$25,000 - \$34,999	219	(11.5%)
	\$35,000 - \$49,999	301	(15.7%)
	\$50,000 - \$74,999	420	(22.0%)
	\$75,000 - \$99,999	292	(15.3%)
	\$100,000 - \$149,999	259	(13.5%)
	\$150,000 - \$199,999	51	(2.7%)
	More than \$200,000	38	(2.0%)
Political party	Republican	507	(26.5%)
	Independent	552	(28.9%)
	Democrat	853	(44.6%)
Ideology	Conservative	557	(29.1%)
	Moderate	503	(26.3%)
	Liberal	852	(44.6%)

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550 **Appendix Table A-1: Descriptive Statistics**

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	(1) No Source	(2) NS Individual Action	(3) NS Policy Action	(4) CS Source	(5) CS Individual Action	(6) CS Policy Action
Female	0.08 (0.13)	-0.07 (0.13)	-0.15 (0.13)	-0.09 (0.13)	0.16 (0.13)	0.08 (0.13)
Minority	-0.13 (0.15)	0.07 (0.14)	0.06 (0.14)	0.13 (0.14)	-0.10 (0.15)	-0.05 (0.14)
Republican	-0.01 (0.17)	-0.01 (0.16)	0.05 (0.17)	-0.10 (0.17)	0.14 (0.17)	-0.07 (0.17)
Democrat	0.10 (0.15)	-0.21 (0.15)	0.11 (0.15)	-0.07 (0.15)	0.06 (0.15)	0.01 (0.15)
Age	-0.02 (0.05)	0.04 (0.05)	-0.07 (0.05)	0.04 (0.05)	0.04 (0.05)	-0.03 (0.05)
Education	-0.04 (0.05)	-0.02 (0.05)	0.05 (0.05)	0.03 (0.05)	-0.04 (0.05)	0.02 (0.05)
Income	0.01 (0.03)	-0.02 (0.03)	-0.03 (0.03)	0.04 (0.03)	0.04 (0.03)	-0.04 (0.03)
Constant	-1.50** (0.31)	-1.47** (0.30)	-1.38** (0.31)	-1.96** (0.31)	-1.93** (0.31)	-1.44** (0.31)
N	1898	1898	1898	1898	1898	1898

559 Note: Cell entries are logit coefficients with standard errors in parentheses below.
560 * $p < 0.05$, ** $p < 0.01$

561 **Appendix Table A-2: – Balance Test**

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583 **Appendix – Test of Climate Scientists Source Effects**
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	NS vs CS Source		NS Ind vs CS Ind		NS Pol vs CS Pol	
	<i>Diff.</i>	<i>p-value</i>	<i>Diff.</i>	<i>p-value</i>	<i>Diff.</i>	<i>p-value</i>
Trust Climate Scientists	0.07 (0.125)	0.557	0.03 (0.144)	0.858	-0.12 (0.137)	0.39
Vote for Candidates	0.26 (0.136)	0.053	0.08 (0.15)	0.572	-0.09 (0.145)	0.558
Personal Action	0.14 (0.117)	0.233	-0.08 (0.129)	0.535	0.02 (0.122)	0.9
Climate Change Occurring Faster	0.19 (0.128)	0.137	0.03 (0.139)	0.804	0.06 (0.136)	0.64

585 *Note:* Cell entries are coefficient estimates with standard errors in parentheses below.

586 **Appendix Table A3: Climate Scientist Source Effect**

587 An additional set of analyses examine whether, and to what degree, there is evidence of source
 588 effects, that is, the difference between a message attributed to a climate scientist as opposed to no
 589 identified source. We perform a series of t-tests between the “No Source” and “Climate Scientist
 590 Source” while holding constant the message content. If the climate scientist as a source of
 591 information were having a separate and meaningful effect, we would expect systematic
 592 significant differences in the means across the dependent variables. The results indicate that in
 593 all but one test there is no statistically significant difference between the “No Source” and
 594 “Climate Scientist.” This finding corroborates and extends the conclusions from our prior work
 595 (Bolsen, Palm, and Kingsland 2019), in that there is no impact of climate scientists as a message
 596 source independent of the message’s content, but also extends this finding to show no impact of
 597 climate scientists as an information source across a variety of potential mitigation measures.
 598