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Good news about good news? The limited impacts of informing Americans about recent success in climate change mitigation

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Abstract

Slowing the process of global warming will require sustained reductions in greenhouse gas (GHG) emissions over decades, which in turn depends on public support for decarbonization. We are beginning to see evidence of success in cutting emissions. Will wider recognition of this "good news" strengthen or soften support for further action? In contrast to previous research showing a demotivating effect of good news about climate mitigation, our pre-registered survey experiment finds no average impact of factual reports of climate progress on Americans' worries about climate change, perception of efficacy in fighting climate change, willingness to pay additional taxes, support for green industrial policy, or willingness to donate to a climate NGO, and no evidence of heterogeneous effects across relevant subgroups. Given the importance of sustained public support for decarbonization, these null results can be seen as good news for mitigation policy, but more research is needed to assess the impact of the perceived tractability of climate mitigation on support for mitigation efforts.

Keywords

Climate change, optimism, technology, public opinion, information

Introduction

Although the global average temperature continues to rise and severe weather events have become more common in recent years due to global warming,[1] there are also encouraging recent signs that GHG emissions can be contained and reduced. Notably, the cost of generating renewable energy from solar and wind power has steadily declined, such that utility-scale solar plants recently became the cheapest-ever way of generating energy,[2] and the production of renewable energy is rising quickly in many countries. Emissions have been declining in the US and the European Union for 15 years, and some analysts expect global emissions to start steadily declining by 2025.[3]

In this paper, we seek to better understand how the public reacts to these encouraging but not-yet-widely known pieces of good news about climate change. As Hornsey and Fielding (2016) note, learning about progress in addressing climate change could make people more supportive of further action, because the problem seems more tractable; it could also make people *less* supportive of further action, because the problem seems less severe. Hornsey and Fielding (2016) conclude on

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the basis of a US survey experiment that the latter mechanism is more pervasive: an optimistic message about the trajectory of global emissions makes people less motivated to take action. This could be bad news for the mitigation of climate change, given that constraining further warming will require sustained public support for aggressive action even as emissions drop much further (Azevedo et al., 2020; Drews and Van Den Bergh, 2016).[4] Other studies find limited effects of more or less optimistic climate messages (e.g., Bernauer and McGrath, 2016; Ettinger et al., 2021). Given the mixed evidence, and the likely increasing importance of understanding how the public responds to news of progress against climate change, the topic deserves further attention.

We re-examine the effect of climate "good news" on public attitudes using an information provision experiment embedded in a pre-registered online survey of Americans (n = 2001). Instead of simply exposing respondents to different messages and measuring their responses (a design that can exaggerate information effects and bias results toward researcher expectations), we use an "ask-tell" design (Braley et al., 2023): after asking all respondents a series of factual questions about climate change mitigation, we randomly give some respondents the correct responses to select questions relating to the trajectory of US emissions, the cost of solar energy production, and the relative size of the renewable energy and coal sectors. Because most respondents underestimate progress in these areas, our information treatment conveys facts that most respondents would see as "good news." Finally, we survey respondents' views on climate change, their ability to address it, their support for policy responses, and their willingness to donate to a climate NGO.

We find no effect of providing encouraging news about climate mitigation on any of our outcome measures, either on average or within subsets defined by pre-treatment pessimism on these topics, political ideology, party ID, and other characteristics. This suggests, contrary to some previous research, that broader appreciation of progress in climate mitigation will not erode support for further mitigation efforts, at least in the US. Because our information treatments appear not to have substantially changed respondents' perceptions of the tractability of climate mitigation, we view it as a still-open question how these perceptions affect citizens' support for further mitigation efforts. We can conclude, however, that while governments and NGOs should not expect to increase average support for climate action by advertising mitigation success stories, they should also not hesitate to do so out of concern that such messages will discourage action.

Theory

How might good (or bad) news about climate mitigation affect individuals' willingness to contribute to further mitigation efforts?

A simple decision theoretic model helps to highlight some possibilities. Suppose an individual is deciding whether to make a costly contribution to a collective project (e.g., mitigation of GHG emissions) that may or may not succeed in the future. The individual receives a fixed utility benefit B if the project succeeds and contributing to the project costs c (which could include financial costs as well as costs due to social pressure or cognitive dissonance). Whether this individual contributes then depends on B and c as well as the degree to which the individual's contribution increases the probability of the project's success (call this δ). Specifically, she should contribute if $\delta B > c$.

Now suppose the individual receives "good news" about the project—that is, information causing her to believe that others are contributing more than she thought, or that those contributions will be more effective than she thought. This information could affect her decision by changing δ. Before receiving the good news, the individual may believe that the project is certain to fail with or without her contribution, so that $\delta B = 0 < c$; then the good news could make her think that her contribution could make a difference, so that $\delta B > c$ and she chooses to contribute. On the other hand, if the individual already was inclined to contribute, then good news could convince her that success is assured even without her contribution, reducing δ to zero and making it rational to not contribute.[5]

Non-instrumental motives are likely important in decisions about contributing to a collective project like climate change mitigation. Suppose the individual's contribution has a negligible impact on the project's success ($\delta \approx 0$), so that a purely instrumental individual would never contribute. If the individual is a conformist who perceives the cost of contributing to be negative when enough others are contributing, or a team player who gets more benefit from success of the project when she herself has contributed, then information suggesting that many others are contributing and the project is likely to succeed could convince her to contribute. If she is a nonconformist or contrarian, it might have the opposite effect.

Of course, good news about climate mitigation or another collective project could also have no impact on an individual's willingness to contribute. Beliefs about the likely success of the project or the effectiveness of individual action may be hard to change. The perceived costs of contributing c could be high compared to the benefit of success B, so that small changes in δ don't matter. Moving further from the model, an individual could view climate mitigation as an ethical question or hold a fixed political position derived from political elites, such that her decision about contributing does not depend on her perception of the effectiveness of individual efforts. Whether individuals find "good news" about climate mitigation to be motivating, demotivating, or neither (on average or in subsets of a population) is therefore an empirical question to which we hope to contribute in this paper.

Related literature

The most relevant previous paper is Hornsey and Fielding (2016), who study the effect of different messages about the trajectory of global CO_2 emissions on US respondents' emotions and motivation to take action against climate change. In their experiment, they present survey respondents with different framings of recent carbon emissions data: for example, the optimistic framing emphasizes that year-on-year global emissions were flat in 2014 for the first time in 40 years, while the pessimistic framing states that in 2014 "there was again no reduction in emission levels" (*p*. 30). Hornsey and Fielding (2016)'s findings suggest that good news about emissions may on average make people feel better but do less: respondents who see the optimistic message report more hope and less distress, but they also report less motivation to do something about climate change.

Two recent studies show more modest impacts of emphasizing good or bad news about climate change mitigation efforts. Clayton and Karazsia (2020) ask US respondents to read an "empowering" message (e.g., "Wind and solar power are cheaper than ever and responsible for an increasing portion of energy use") or a "powerless" message (e.g., "Greenhouse gases contributing to global warming have long been on the rise and are now accelerating at their fastest pace in 7 years"); most of their results are null, but they note that the empowering message reduced one of their climate anxiety measures (cognitive/emotional impairment). Ettinger et al. (2021) compare Americans' reactions to a "hope video" (which among other things emphasizes the declining cost of renewable energy) and a "doom and gloom video" (which among other things emphasizes that renewables would need to be expanded massively to meet climate targets); they find no effect on perceptions of climate risk, likelihood of behavior change, or likelihood of climate activism.

Our analysis also relates to research examining how support for climate action depends on framing—primarily, whether one emphasizes the risks of climate change or the economic and other benefits of successful mitigation.[6] Again, results are mixed. Lockwood (2011) shows larger support for renewable energy among UK voters when it is framed as a path to energy independence rather than an economic opportunity or a way to tackle climate change; similarly, Bain et al. (2012) find that "framing climate change action as increasing consideration for others, or improving economic/technological development" was more motivating to Australian climate change skeptics than emphasizing the risks of climate change, and Dasandi et al. (2022) detect a preference for emphasizing opportunities rather than threats in the US, UK, and China (see also Dechezleprêtre et al., 2022, who compare videos about climate change impacts to videos about policy responses.) By contrast, Bernauer and McGrath (2016) find no evidence that framing mitigation in terms of technological/economic benefits or community spirit increases support among American survey respondents (including skeptics) compared to a conventional frame of avoiding harms of climate change.

Advantages of our design

Our study contributes to this literature by using a preregistered design to measure the impact of factual messages about the success of climate mitigation efforts on a large sample of Americans. Our design differs from previous approaches in important respects.

In typical experiments measuring the effect of information treatments or framing, respondents are asked to read a text (e.g., Clayton and Karazsia, 2020; Hornsey and Fielding, 2016) or watch a video (e.g., Dechezleprêtre et al., 2022; Ettinger et al., 2021) before answering questions on the subject of the text/video. Given the lack of pretext for presenting this information, survey respondents can easily infer that the purpose of the survey is to test reactions to the information. If asked how they feel about climate change afterward, they may report feelings that align with the expected effect partly because they guess the researcher's objective and seek to align their responses with it (though see Mummolo and Peterson, 2019). This demand effect may be exacerbated when, as in Hornsey and Fielding (2016), the researcher does not simply ask the respondent's attitude but instead asks the respondent how the stimulus affected their attitude.[7] As a result, these studies may find that stimuli substantially affect attitudes even when the true effect is small or non-existent.

We instead employ an "ask-tell" design (Ahler, 2014; Braley et al., 2023), in which we selectively provide information in the context of a series of factual questions. This method of information provision has three main advantages compared to previous research in this area. First, because the preceding knowledge quiz asks respondents about the information we provide, we have a clear measure of what the respondent should learn from our information treatment, which is useful for interpreting treatment effects and can be used in subgroup analysis (Haaland et al., 2023). Second, by offering a pretext for providing the information (i.e., that we wanted to provide answers to some of the questions on the quiz), we may reduce experimenter demand effects. Third, participants may update factual beliefs more strongly when told that their existing knowledge is incorrect than when simply shown new information.

Our design also advances on previous work by including a real-stakes outcome (a choice to donate money to a climate NGO or keep it). Such outcomes allow for a tougher test of information effects than typical attitudinal responses (Dechezleprêtre et al., 2022).

Research design

Sample characteristics

A sample of 2001 Prolific participants completed our survey on May 7, 2023. Some characteristics of the sample appear in Table 1. The sample was balanced by design on gender only (49.6% female). Our sample is otherwise fairly representative of the US population in terms of race (77% white vs 75.5% in the US Census's 2022 population estimates,[8] 9.3% Black or African American vs 13.6%, 7.3% Asian vs 6.3%, 8.7% Hispanic vs 19.1%) and age (median age of 38 vs 38.8 in the census, though about 50 in the electorate[9]). As is often the case in online surveys, our sample is more educated than the population (only 14.6% did not attend college vs 36% in the census) and includes fewer households earning above $100k (22.1% vs 36%); our sample is also strongly disproportionately left-leaning (50.4% identify as Democrats, 16.7% as Republicans, 29.3% as Independents vs 29%, 30%, and 38% in a contemporaneous Gallup poll[10]). Compared to the US electorate, our sample thus over-represents the kind of young, left-leaning voter who tends to be concerned about climate change and favors climate action (Bumann, 2021), and our results are especially informative about how such voters may react to news of progress in climate mitigation.

We included an attention check asking respondents to select two specific responses from a five-point agree/disagree Likert scale (exact wording appears in the appendix). Only 14 respondents (0.7%) selected just one response, indicating that they ignored the instructions entirely; another 92 respondents (4.6%) selected the wrong pair of responses, indicating some inattentiveness. Below we retain these respondents to simplify interpretation. In the Appendix, we reproduce Figure 1 and the average effects regression table without these 106 respondents, producing very similar conclusions.

Structure of the survey

After collecting background characteristics, we ask respondents to answer 10 factual questions about climate change as part of a "knowledge quiz" (all questions and answers appear in Appendix Table 5). We ask respondents not to look up the answers and inform them that we will give them the correct answers later in the survey. The final three questions ask about facts that later form the basis of our "good news" information treatments. These three questions are listed (along with the correct answers) in Table 2. We designed these questions so that informing respondents of the answer might make them more optimistic about climate change mitigation (particularly in the US); indeed, 73% gave a response that was more pessimistic than the correct one about changes in US emissions, 92% underestimated the drop in the cost of solar power, and 96% underestimated the size of the solar and wind sector relative to coal.[11]

Following the knowledge quiz, we randomly provide answers to these three "good news" questions. Specifically, after the respondent has answered all questions on the knowledge quiz, we randomly determine whether the respondent is to be shown the correct answer to each of these questions before proceeding to the rest of the survey. These randomizations are independent, so that respondents are assigned to see anywhere between 0 and 3 correct answers. Those who are not assigned to receive any information treatments proceed directly to the next section. Those who are assigned to receive at least one correct answer are told that before moving to the next section of the survey "we want to share with you a few facts from our knowledge quiz that many participants find surprising," after which we provide the information treatments for which the respondent was randomly selected. In each of these information treatments, we remind the respondent about the question that was asked, we remind them of the answer they provided, and we tell them if they were correct or incorrect. If they were incorrect, we tell them the correct answer. We also provide a source for the correct answer and a short

Table 1. Characteristics of the sample.

Characteristic	Proportion	Characteristic	Proportion
Female	0.50	4-Year college degree or more	0.53
White	0.78	Household income < $50k	0.39
Black or African American	0.09	Household income > $100k	0.24
Asian	0.07	Democrat	0.52
Hispanic	0.09	Independent	0.30
Age <= 30	0.28	Republican	0.17
Age 31–50	0.46	Very concerned about climate change (pre-treatment)	0.30
Age 70+	0.02	Extremely concerned about climate change (pre-treatment)	0.28
No more than HS education	0.15	Strongly agree w. "I believe I can do something to address climate change" (pre-treatment)	0.14

Table 2. Questions on our knowledge survey that form the basis of our "good news" information treatments.

Shorthand	Question	Correct answer	Other answer options	Contextual statement (provided only to treated respondents)
Renewables jobs	About 120,000 Americans currently work in the coal industry. How many Americans work in the solar and wind power industries?	Around 480,000, or four times as many	Around 30,000, or one-fourth as many; around 60,000, or half as many; around 120,000, or the same number; around 240,000, or twice as many	Building a solar plant has become the cheapest-ever way to generate electricity. Further investment in transmission and storage is necessary to make the best use of cheap and clean power from solar and other renewable sources
US emissions	In 2007, the US emitted about 6 billion tons of carbon dioxide from fossil fuels. How has that number changed since then?	It went down by about 15%, to 5 billion tons	It went down by about 30%, to 4 billion tons; it stayed about the same (6 billion tons); it went up by about 15%, to 7 billion tons; it went up by about 30%, to 8 billion tons	Increasing use of renewable energy is expected to cause further job growth in this sector. Analysts believe that political support from the fast-growing clean energy sector could lead to more proactive climate policy in the future
Solar cost	In the US and elsewhere, large solar power plants are built to convert sunlight into electricity for the grid. How has the cost of building such projects changed over the last 10 years?	The cost has gone down by around 80%	The cost has gone down by about 40%; the cost has stayed about the same; the cost has gone up by about 40%; the cost has gone up by about 80%	This drop has occurred mainly because we are using less coal, more natural gas, and more renewables. A similar drop has taken place in Europe. Experts say that we can cut a lot more by generating more electricity from low-carbon sources and plugging more of our machinery (cars, industrial boilers, etc.,) into the electrical grid

contextual statement (appearing in the last column of Table 2) that links the fact to the US's efforts to reduce GHG emissions. Because the three information treatments are administered according to a factorial design, we can measure the effect of each of these pieces of information separately (averaging over the other treatment statuses) and also measure the effect of providing more versus less information; we do both below.

Next, we ask all respondents a set of questions about respondents' attitudes toward climate change.

- **Beliefs and emotions**: We ask a question about the respondent's confidence that global CO_2 emissions will be cut in half by 2050, four questions about the respondent's concern about climate change from Lawson et al. (2019) (the answers to which we sum to create a concern index), and two questions about the respondent's sense of efficacy adapted from Clayton and Karazsia (2020) (the answers to which we sum to create an efficacy index). These questions are designed to capture beliefs and emotions that could inform willingness to contribute to climate mitigation.
- **Willingness to contribute to climate mitigation**: We measure the respondent's willingness to pay taxes to support climate change policy, their view on whether the Inflation Reduction Act (IRA) goes too far or should go further, and (after explaining that they have been entered into a lottery for a $100 prize) their willingness to donate some or all of their winnings to Evergreen Action, a policy advocacy group that contributed to the development of the IRA and is working on IRA implementation.

Details on the wording and response options, as well as the mean and standard deviation of each outcome variable, are provided in Table 3. In all analyses below, we use standardized versions of each outcome (i.e., the raw measure divided by its standard deviation).

Table 3. Outcome variables in the survey.

Outcome variable	Question wording	Response options	Mean	Std. dev
Optimism about future emissions	"The Intergovernmental Panel on Climate Change has stated that to limit global warming to 2 degrees Celsius above pre-industrial levels, global CO2 emissions will need to drop by more than half by 2050. How likely do you think it is that we will cut emissions by at least that amount?"	From "Definitely not" (1) to "Definitely" (6)	2.81	1.04
Concern about climate change	(1) "How worried are you about climate change?" and "How much do you think climate change will," (2) "affect you personally?", (3) "negatively affect people in the United States?", and (4) "negatively affect future generations of people?"	Sum of responses on four questions, from "Not at all" (1) to "A great deal" (5)	13.89	4.45
Efficacy index	"I believe I can do something to help address the problem of climate change." "I believe that by working together we can reduce greenhouse gas emissions and address climate change."	Sum of responses on two questions, from "Strongly disagree" (1) to "Strongly agree" (5)	7.44	2.09
Willingness to pay higher taxes	"Would you be willing to pay higher taxes to support a more aggressive national effort to fight climate change?"	From "Totally unwilling" (1) to "Extremely willing" (5)	2.71	1.29
Support for aggressive policy	[Following description of IRA:] "Do you think the IRA goes too far or not far enough in addressing climate change?"	From "Goes much too far" (1) to "Should go much further" (5)	3.41	1.17
Donation	"By taking this survey, you are automatically entered into a lottery to win $100. [Description of Evergreen Action] Please use the slider below to indicate how much of your lottery winnings (between $0 and $100) you would like us to donate to Evergreen Action, should you win."	Integer values from 0 to 100	21.94	25.81

At the very end of the survey, all respondents are shown correct responses to all questions on the knowledge quiz. We randomly chose one respondent as the lottery winner, and (following that respondent's instructions) we awarded $50 to that respondent and $50 to Evergreen Action.

Results

Following our pre-analysis plan (PAP),[12] we estimated the effect of providing good news on each standardized outcome using linear regression with robust standard errors. For each outcome, we regress the variable on the number of correct answers we provided the respondent (0–3)[13] plus the (recentered) covariates we found to be most predictive of that outcome in the pilot[14]; in the figures, we report the coefficient and 95% confidence interval for the estimated effect of an additional piece of good news. To study treatment effect heterogeneity, we add an interaction between subgroup membership indicators (e.g., levels of pre-treatment concern about climate change) and the number of pieces of good news provided; we derive the estimated effect for each subgroup from this regression and report these effects with 95% confidence intervals in the figures. Our PAP stated that we would study heterogeneity by pre-treatment factual pessimism,[15] but we show exploratory results for other interactions. The appendix contains the regression tables underlying all estimates.

Figure 1 shows the estimated effect of an additional piece of good news on average (black dots at the top of each panel) and for subgroups defined by pre-treatment covariates for each of the six outcomes in Table 3. We find no discernible effect of providing more pieces of "good news" on any outcome on average; the lowest p-value is 0.321. Estimated effects for subgroups defined by age, political ideology, party ID, pre-treatment pessimism, pre-treatment concern about climate change, and pre-treatment self-efficacy are generally small and confidence intervals include zero in all but one case. The general impression is that providing good news about climate mitigation does not affect beliefs, attitudes, or policy preferences.

The only exception to the generally null results in Figure 1 is the finding that an additional piece of good news reduces donation amounts for the most pessimistic respondents. The estimated effect for these respondents is −0.133 standard deviations (about $3.42), and the interaction term (comparing the effect for this group to the effect for the low-pessimism group) has a p-value of 0.009. Given that we are testing multiple interaction terms on multiple outcomes, adjustment for multiple testing is appropriate. Specifically, following our PAP we seek a family-

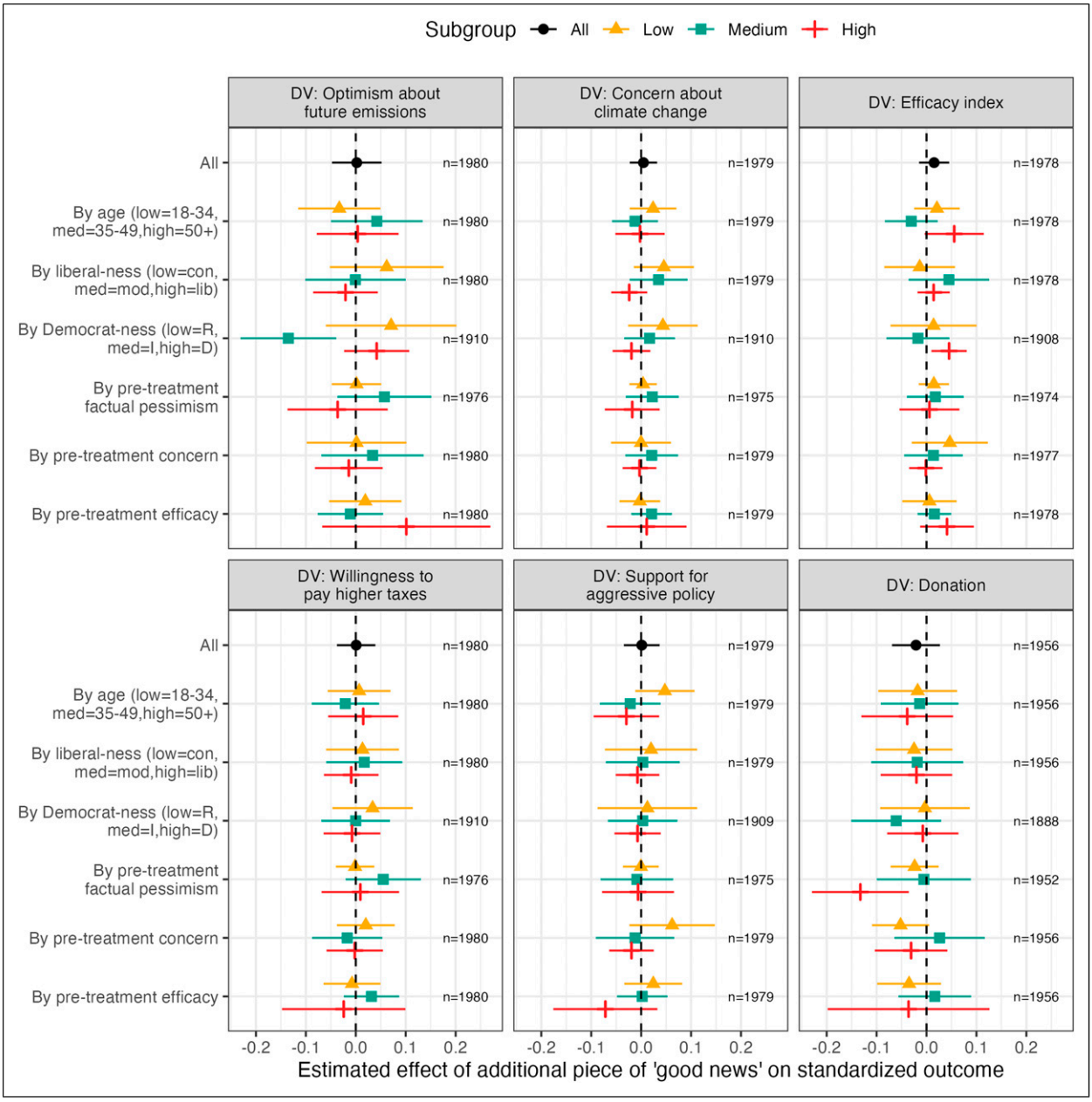

Figure 1. Effect of "good news" on six outcomes, on average and across subgroups.

wise error rate (FWER) no higher than .05 in assessing the null hypothesis that all interactions[16] between the number of good news items and terciles of pre-treatment pessimism are zero, separately for the first three outcomes (relating to attitudes and beliefs) and the second three outcomes (relating to policy preferences). We use randomization inference to determine a p-value cutoff that would lead to a false-positive rate no higher than 0.05 across these interactions and outcomes.[17] The resulting p-value cutoff for the policy preference outcomes is 0.007, which is lower than the raw p-value for this interaction. We therefore fail to reject the null hypothesis that all interactions are zero, and the effect of additional good news does not vary across levels of pre-treatment pessimism.[18]

Figure 2 reports the effect of each information treatment separately on each outcome, both on average and by respondent factual pessimism.[19] Considering each test individually, we find that providing the "Renewables jobs" treatment reduces willingness to pay higher taxes by about 0.07 standard deviations across the whole sample (p-value: 0.033); all other estimates of average effects are not significant at the 0.05 level. Following the simulation

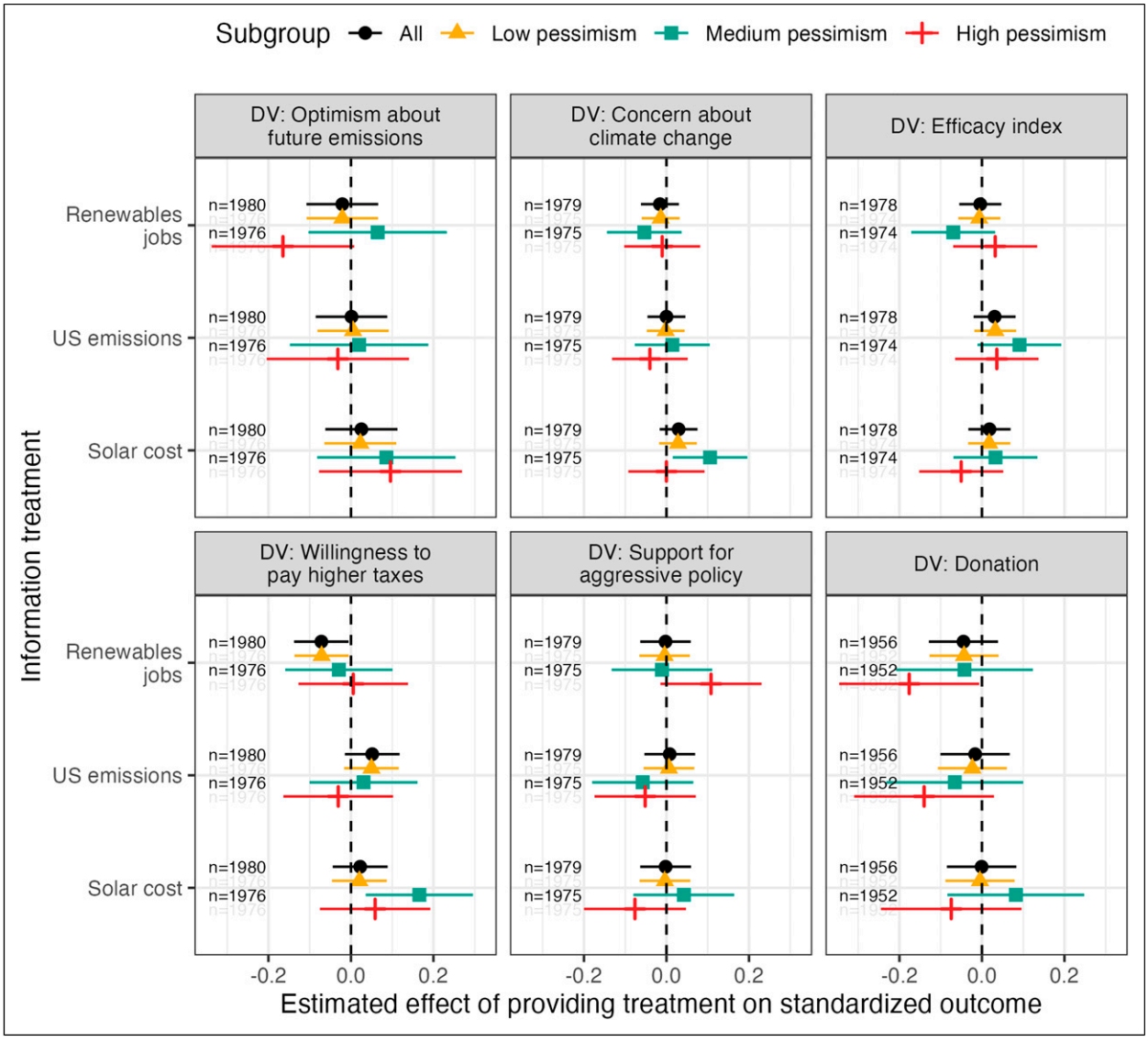

Figure 2. Effect of each information treatment, on average and by respondent pre-treatment factual pessimism.

procedure stated in our PAP, we determine that to obtain an FWER of 0.05 for all three information treatments across the policy preference outcomes (willingness to pay taxes, support for aggressive policy, and donation), we should apply a p-value threshold of 0.005. We therefore fail to reject the null hypothesis that there is no effect of any information treatment on any of our policy preference outcomes. Turning to treatment effect heterogeneity, and again judging by raw p-values, we find two significant interactions: the "Renewables jobs" treatment increases support for aggressive policy more among the high pessimism group than the low pessimism group (p-value: 0.036) and the "Solar cost" treatment increases willingness to pay higher taxes more among the middle pessimism group than the low pessimism group (p-value: 0.014). But our simulation procedure indicates a p-value threshold of 0.002 to maintain an FWER of 0.05 across interactions and treatments for the three policy preference outcomes, so again we fail to reject the null hypothesis that there is no differential effect of any information treatment on any of our policy preference outcomes.

A power analysis explained and presented in the Appendix indicates that our design is likely to detect substantively meaningful effects of good news. If each piece of good news increased all six outcomes by as little as 0.05 standard deviations, then we would reject the null hypothesis of no effect with probability between .5 and .95 depending on the outcome; taking into account multiple comparisons, we would reject the null hypothesis of no effect on any outcome with probability .95 for the first three

outcomes and probability .8 for the second three outcomes. Likewise, if the effect of each piece of good news differed by 0.1 standard deviations between high- and low-pessimism respondents, we would reject the null of no treatment effect heterogeneity with probability around .5 across outcomes, and with substantially higher probability when we consider families of outcomes and take into account multiple comparisons.

An important explanation for our null findings is that our information treatments appear not to have affected respondents' confidence in the success of future mitigation efforts, as shown by the null effects of these treatments on the "Optimism about future emissions" measure both on average and in subgroups. Our information treatments were designed to increase respondents' optimism about the possibility of limiting the effects of climate change, but they apparently did not do so.[20] In the absence of such an effect, it is not surprising that we also find no effects of these information treatments on other attitudes and preferences. In this sense, one key conclusion of our study is that Americans' perceptions of the tractability of climate mitigation are resistant to change by factual information treatments.

Discussion

Using an "ask-tell" design to provide American survey respondents factual updates on climate change mitigation, we find no effect of "good news" on either attitudes or policy preferences among US respondents. These findings contrast with those of studies that show that emphasizing progress in addressing climate change can demotivate survey respondents (Hornsey and Fielding, 2016) as well as studies that show that optimistic reframings of climate change can reassure and motivate survey respondents (e.g., Bain et al., 2012; Dasandi et al., 2022). Our findings are more consistent with Bernauer and McGrath (2016) and Ettinger et al. (2021), who find limited impacts of such reframings.

Although our null results do not support the idea that broader recognition of progress in climate mitigation will inspire greater action, they also do not support the idea that broader recognition will reduce support for decarbonization. In that sense, our results suggest that public support for mitigation is more durable than previous studies suggest.

Our results are of course specific to the US in 2023, a setting in which opinion on climate change and climate policy is seen as stable and highly politicized (Egan and Mullin, 2017). More research is necessary to determine how factual messages emphasizing climate progress affect public opinion in other settings.

Moreover, while this study provides evidence that factual information about progress in climate mitigation has limited effects on respondent attitudes, we consider as unresolved the question of how the perceived tractability of climate change mitigation affects individuals' willingness to take action. We had hoped to experimentally vary these perceptions by exposing participants to surprising but factual "good news" about recent progress in decarbonization, but perceptions of tractability were resistant to change. Future studies that investigate these questions should therefore focus on locating information treatments that have a stronger impact on these perceptions of tractability or subgroups whose perceptions are more easily manipulated.

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Supplemental Material

Supplemental material for this article is available online.

Notes

1. IPCC, "AR6 Synthesis Report: Climate Change 2023" (link).
2. International Renewable Energy Agency, "Renewable Power Generation Costs in 2020" (link to summary).
3. Ole Rolser, Bram Smeets, and Rune van der Meijden, "Charting the global energy landscape to 2050: Emissions" (link).
4. IPCC, "AR6 Synthesis Report: Climate Change 2023" (link).
5. Similarly, Hornsey and Fielding (2016) note that good news about climate mitigation could motivate by making people feel more capable (their "motivational model") or demotivate by making people feel less concerned (their "complacency model").
6. See Badullovich et al. (2020) for a review of research on framing of climate change. Drews and Van Den Bergh (2016) and Hornsey and Fielding (2020) review the broader research on public support for action on climate change.
7. Dasandi et al. (2022) similarly show respondents two messages and ask respondents which message would affect their behavior more. Graham and Coppock (2021) suggest that survey respondents are not reliable judges of how a treatment affects them.

8. US Census Bureau, "QuickFacts" (link), visited Aug 23, 2023.
9. Pew Research Center, "What the 2020 electorate looks like by party, race and ethnicity, age, education and religion" (link), visited Aug 23, 2023.
10. Gallup, "Party Affiliation" (link), visited Aug 23, 2023.
11. Our information treatments are not "good news" in any more general sense. For example, the relative size of the renewables sector versus coal could be bad news for someone with a personal stake in the fossil fuel industry.
12. Our PAP did not state that we would standardize outcomes. This and three other deviations are stated in the paper and explained further in the appendix.
13. Two anonymous reviewers suggested that we take into account respondents' answers on the knowledge quiz in defining the treatment. In additional analysis reported in Appendix Figure 9, we use as the treatment the number of times we gave the respondent the correct answer to a question to which the respondent had given an overly pessimistic answer. The results are almost identical to those using the number of correct answers we provide.
14. These were political ideology for all outcomes; pre-treatment efficacy for the "Efficacy" outcome and pre-treatment climate concern for the other five outcomes; and household income for "Willingness to pay higher taxes" and "Donation."
15. We coded respondents' answers to each of the three "good news" questions on the knowledge survey on a numerical scale of pessimism (0 points for saying that the cost of solar had dropped by 80%, one point for saying it had dropped by 40%, etc.). We sum these scores across the three questions to get a pessimism score and divide respondents into terciles.
16. Our PAP said we would only include interactions with "top pessimism tercile," but because interactions with "middle pessimism tercile" are relevant we include all interactions.
17. We use the simulation approach outlined in Alexander Coppock, "10 Things To Know About Multiple Comparisons" (link).
18. Consistent with this, we find no evidence that good news has a larger effect on pessimistic respondents' optimism about future emissions (top left panel of Figure 1), and we find no evidence that good news differentially reduces pessimistic respondents' willingness to pay taxes or support aggressive policy.
19. Survey respondents were exposed to two information treatments not highlighted in Figure 1 but discussed in our PAP: half of respondents were given the answer to the gas tax comparison question on the knowledge quiz, and half were told about the IRA before the other outcome variables. To simplify presentation (allowing us to focus on the effect of providing "good news"), we omit these treatments from the paper, but we discuss and present the results (all null after corrections for multiple testing) in the Appendix (Figure 8).
20. It is possible that the US-focused facts we provided made respondents more optimistic about US mitigation efforts without changing their view of the prospects for mitigation globally. Future research could examine whether news of domestic versus global progress has different effects.

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