

# Public attention to science and political news and support for climate change mitigation

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**We examine how attention to science and political news may influence public knowledge, perceived harm, and support for climate mitigation policies. Previous research examining these relationships<sup>1,2</sup> has not fully accounted for how political ideology shapes the mental processes through which the public interprets media discourses about climate change. We incorporate political ideology and the concept of motivated cognition into our analysis to compare and contrast two prominent models of opinion formation, the scientific literacy model<sup>3-5</sup>, which posits that disseminating scientific information will move public opinion towards the scientific consensus, and the motivated reasoning model<sup>6,7</sup>, which posits that individuals will interpret information in a biased manner. Our analysis finds support for both models of opinion formation with key differences across ideological groups. Attention to science news was associated with greater perceptions of harm and knowledge for conservatives, but only additional knowledge for liberals. Supporting the literacy model, greater knowledge was associated with more support for climate mitigation for liberals. In contrast, consistent with motivated reasoning, more knowledgeable conservatives were less supportive of mitigation policy. In addition, attention to political news had a negative association with perceived harm for conservatives but not for liberals.**

The scientific community now recognizes that global climate change is primarily caused by human activities and is already having significant negative impacts<sup>8</sup>. Despite this link, less than half of Americans believe anthropogenic climate change is occurring and it continually ranks at the bottom of national priorities<sup>9</sup>. In light of this discrepancy, scholars have examined, in part, how attention to these news stories may influence relevant attitudes and beliefs<sup>1</sup>. However, individuals often selectively view and interpret information in ways that reinforce previously held beliefs<sup>10,11</sup>. Thus, more information about climate change in the public sphere has the potential to amplify, rather than attenuate, public polarization and to fail to motivate public action on the issue<sup>12</sup>.

The selective interpretation of factual information has raised challenges to a model of science communication often termed the scientific literacy model. Within the literacy model, increasing scientific literacy by disseminating of factually accurate scientific information through formal (for example, schools) and informal (for example, mass media) channels will move public opinion towards consensus scientific perspectives, and help promote public support in line with scientific views of societal issues such as global climate change<sup>3-5</sup>.

In contrast, the motivated reasoning model posits that individuals 'work backwards' and process information in a biased

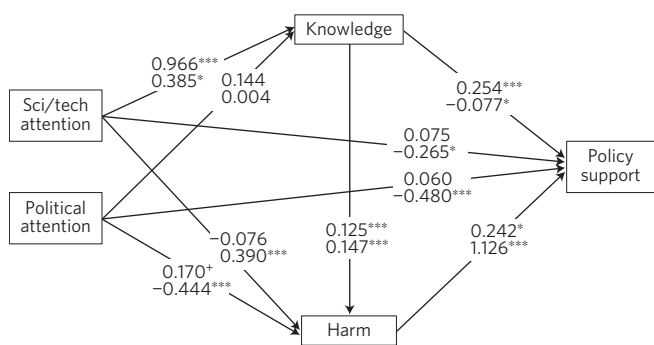
manner to reach conclusions consistent with previously held beliefs<sup>6</sup>. People do not approach evidence and arguments about controversial issues in a purely rational, even-handed manner<sup>7</sup>. Instead, an individual's beliefs and political ideology strongly biases how they respond to information through selective attention, comprehension and/or recall<sup>6,7,13</sup>. For example, those with greater issue involvement or with strongly held opinions are less likely to modify their beliefs when confronted with new information and so will frequently ignore, misinterpret, counter-argue or derogate ideologically incongruent evidence<sup>14-16</sup>.

Recent work has found that attention to environmental news can increase knowledge about climate change, which can, in turn, influence both perceptions of harm and policy support<sup>1</sup>. This research, however, has typically conceptualized ideology only as a control variable and does not account for how political ideology may act as a moderator that amplifies or dampens the influence of media discourse<sup>1,2</sup>. In addition, research has often focused on the contrasting validity of the literacy model against the motivated reasoning model<sup>17,18</sup>, but rarely has examined how these two models may operate simultaneously. This is critical, as the partisan divide for politically polarizing issues such as climate change has been shown to fundamentally alter how individuals interpret issue-relevant information<sup>19</sup>, creating a belief gap in which ideology may influence differential knowledge gains<sup>20,21</sup>. Knowledge gains may still influence perceived harm and policy support, although the nature of this relationship may also be dependent on political ideology.

Previous knowledge and political ideology are also likely to interact with systematic differences<sup>12</sup> in how climate change is presented in different types of news story. Reporting in political news stories is more likely to engage in 'false balance', in which climate skeptics are provided equal time with individuals offering the scientific consensus on climate change, which results in an over-representation of contrasting 'inaccurate' information<sup>22-24</sup>. Reporting in science and environmental stories, however, tends to offer more accurate information in describing climate change and less likely to engage in the false balance<sup>23</sup>. On the basis of these differences, attention to political news is more likely to generate belief gaps based on political ideology; as the diversity of views on political news, which include more skeptical and scientifically inaccurate information, is likely to amplify polarization as individuals latch on to information that reinforces previously held beliefs.

The present study seeks to investigate the role of the motivated reasoning and literacy models in explaining the relationships between attention to science/technology news and political news, knowledge, perceived harm of climate change, and support for climate mitigation policies. Specifically, we propose that attention to scientific and political news will differentially influence

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**Figure 1 | Model used for analysis.** +*p* < 0.10, \**p* < 0.05, \*\*\**p* < 0.001. For all links, the top number is the unstandardized coefficient for the direct effect for strong liberals and the bottom number is the unstandardized coefficient for the direct effect for strong conservatives.

policy support through the mediators of knowledge and harm, with moderation by political ideology such that attention to political news will have an overall negative association with policy support for conservatives but not for liberals, and attention to scientific news will have an overall positive association for liberals but not for conservatives. We also investigate how knowledge may directly impact policy support and indirectly impact policy support through harm, as moderated by political ideology (see Fig. 1 for conceptual map).

The literacy model would suggest that scientific news, which generally presents the claims of science in a manner consistent with scientific agreement, would be positively related to scientific knowledge and perceptions of harm, across participants of all political ideologies. Results show support for the literacy model, as the total effect of scientific news on both knowledge and harm was positive and significant across virtually all levels of political ideology (see Table 1 for coefficients); the only exception was that for those who were extremely liberal, scientific news was not related to harm, probably owing to a ceiling effect. In addition, knowledge had a similar positive association with perceived harm across all levels of political ideology (Table 2), as expected by the science literacy model.

However, we also see evidence in line with the motivated reasoning model, which would predict that political ideology would

influence the strength of the relationship between news (both scientific and political), knowledge, harm, and policy support. Results show that political ideology moderated the relationships of scientific news to knowledge, harm, and policy support; these interactions were such that scientific news had a stronger positive impact on knowledge for strong liberals than strong conservatives, a weaker positive impact on harm for strong liberals than strong conservatives, and a stronger negative impact on policy support for strong conservatives than strong liberals (Table 1).

Political ideology also moderated the paths between political news to harm and to policy support. These interactions were such that attention to political news had a negative association with perceived harm for strong conservatives but a marginal positive association with perceived harm for strong liberals, and that attention to political news had a stronger negative association with policy support for conservatives than for strong liberals (Table 1).

Finally, ideology moderated the paths from knowledge and harm to policy support. Knowledge had a positive association with policy support for strong liberals but a negative association for strong conservatives. In contrast, harm had a stronger positive association with policy support for strong conservatives than strong liberals. Political ideology did not moderate the positive association between knowledge and harm (Table 2).

We note that the nature of two interactions, those between political ideology and the pathways between attention to science news to harm and harm to policy support, provide evidence of a main-streaming effect such that greater attention to science news brought conservative perceptions of harm closer to liberal views and greater perceptions of harm brought conservative levels of policy support closer to liberal levels of policy support (Fig. 2). This highlights the potential of scientific news to increase perceptions of harm, and then policy support, among conservatives. All other interactions with political ideology demonstrate a polarizing effect: more attention to scientific news was associated with greater political polarization of knowledge, more attention to political news was associated with greater political polarization of perceived harm, more attention to science and political news was associated with greater political polarization about policy support, and higher levels of knowledge were associated with greater political polarization about policy support. Figures for all significant interactions demonstrating a polarizing effect are provided in the Supplementary Information.

**Table 1 | The direct and total effects of scientific news and political news on knowledge, harm, and policy support, at various levels of political ideology.**

	Dependent variables					
	Knowledge		Harm		Policy support	
<b>Effect of scientific news</b>						
Interaction of scientific news * ideology	-0.096*		0.075***			-0.056+
	Direct (total)	Direct	Total	Direct	Total	
Strongly liberal	0.966***	-0.078	0.044	0.075	0.331**	
Liberal (-1 s.d.)	0.783*	0.064	0.167*	-0.031	0.173+	
Moderate (mean)	0.647***	0.169*	0.257***	-0.110	0.124	
Conservative (+1 s.d.)	0.511***	0.274***	0.346***	-0.189*	0.131	
Strongly conservative	0.385*	0.390***	0.447***	-0.265*	0.208	
<b>Effect of political news</b>						
Interaction of political news * ideology	-0.023		-0.106***			-0.089***
	Direct (total)	Direct	Total	Direct	Total	
Strongly liberal	0.144	0.170+	0.188+	0.060	0.142	
Liberal (-1 s.d.)	0.101	-0.032	-0.019	-0.110	-0.105	
Moderate (mean)	0.069	-0.183*	-0.174*	-0.237*	-0.359***	
Conservative (+1 s.d.)	0.036	-0.334***	-0.329***	-0.364***	-0.672***	
Strongly conservative	0.004	-0.445***	-0.444***	-0.480***	-0.981***	

+*p* < 0.10, \**p* < 0.05, \*\*\**p* < 0.001.

**Table 2 | The direct and total effects of knowledge and harm on harm and policy support, at various levels of political ideology.**

	Dependent variables		
	Harm	Policy support	
Effect of knowledge			
Interaction of knowledge * ideology	0.004	-0.055***	
	Direct (total)	Direct	Total
Strongly liberal	0.125 <sup>+</sup>	0.254***	0.284***
Liberal (-1 s.d.)	0.132***	0.150***	0.218***
Moderate (mean)	0.137***	0.072***	0.171***
Conservative (+1 s.d.)	0.142***	-0.006	0.127***
Strongly conservative	0.147***	-0.077*	0.089 <sup>+</sup>
Effect of harm			
Interaction of harm * ideology		0.147***	
		Direct (total)	
Strongly liberal		0.242*	
Liberal (-1 s.d.)		0.520***	
Moderate (mean)		0.728***	
Conservative (+1 s.d.)		0.935***	
Strongly conservative		1.126	

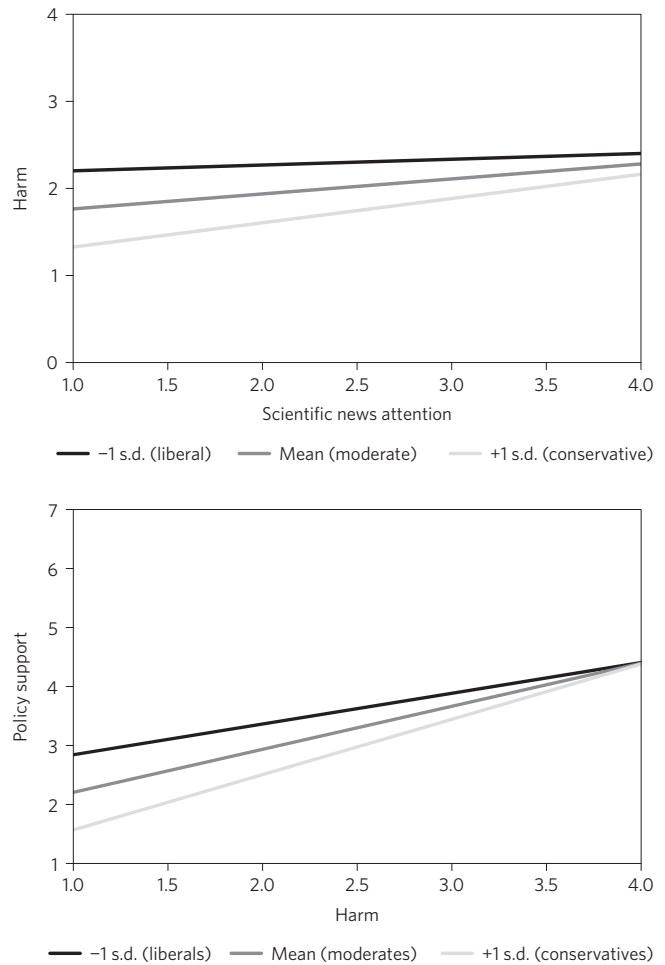
<sup>+</sup>p < 0.10, \*p < 0.05, \*\*\*p < 0.001.

Looking to the indirect effects, for conservatives attention to science news had a significant association with policy through the pathways of harm and knowledge to harm in support of the predictions of the literacy model. Through the pathway of knowledge, excluding harm, however, there was no significant indirect effect for conservatives. Attention to political news led to different indirect effects; the indirect effect on policy through harm was negative, in support of the motivated reasoning model, but the pathways of knowledge and knowledge to harm were not significant (Table 3).

For indirect effects for liberals, attention to science news did not have significant indirect effects on policy through the pathways of harm or knowledge to harm but did significantly impact policy support through the pathway of knowledge, in support of the literacy model. Attention to political news did not have any significant indirect effects on policy support for liberals (Table 3).

Strengths of this study include a nationally representative sample and a nuanced approach to analysis that allows for political ideology to moderate proposed theoretical linkages between variables. As with all studies, some caution should be taken in the interpretation of results. The use of cross-sectional data makes it impossible to make unequivocal causal claims, although the order of variables is consistent with predictions of previous literature and other models that have examined the issue<sup>1</sup>. In addition, the present study measures policy attitudes but does not directly observe voting behaviour based on those attitudes.

Our study helps clarify the respective roles of the science literacy model and the motivated reasoning model in understanding how attention to science and political news may respectively influence perceptions of knowledge, harm, and policy support. The positive impact of attention to science news on policy through knowledge for strong liberals, and through knowledge to harm for strong conservatives, lends support to the predictions aligned with the science literacy model. The motivated reasoning model, however, also finds support as political ideology moderated the linkages of science news to knowledge, political news to harm, and the linkages of knowledge and harm to policy support. The continued support of the motivated reasoning model raises caution that rather than controlling for political ideology when examining politically



**Figure 2 | Converging effects of scientific news attention on harm and perceptions of harm on policy support at varying levels of political ideology.**

polarizing issues such as global climate change<sup>1,2</sup>, it is critical to analyse the moderating effect of political ideology on how the public processes information.

From a practical perspective, the present study also suggests that communicators need to be aware of the inherent structural factors within different types of news platform as they constrain communicators' ability to effectively influence the accuracy of audience beliefs about climate change. For example, political news outlets often feature 'debates' between scientists and non-scientists that may contribute to greater political polarization and 'boomerang'<sup>3</sup> to depress support for climate mitigation for moderate and conservative audiences. In contrast, news platforms that specialize in science or environmental news may be more likely to accurately present climate information and avoid false-equivalencies, but typically have smaller audiences as compared with political news outlets.

Although finding the perfect information channel for science communication and accounting for how ideology influences audience processing of information may be difficult, our results suggest some promising pathways for science communicators. Namely, for conservative audiences, employing science/environmental news platforms to highlight the potential harm and risks of climate change, rather than focusing on factual knowledge, may increase policy support among this segment. Furthermore, improving the accuracy of climate change coverage in political news outlets and reducing false-balance, especially

**Table 3 | Indirect effects of scientific news, political news, and knowledge on harm and policy support, at various levels of political ideology.**

Level of political ideology	Dependent variables			
	Harm	Through knowledge		Policy support
	Through knowledge	Through knowledge	Through knowledge to harm	Through harm
<b>Indirect effect of science news</b>				
Strongly liberal	0.128**	0.246***	0.029 <sup>+</sup>	-0.018
Liberal (-1 s.d.)	0.103***	0.117***	0.054***	0.033
Moderate (Mean)	0.088***	0.046**	0.064***	0.123*
Conservative (+1 s.d.)	0.072***	-0.003	0.068***	0.256***
Strongly conservative	0.057*	-0.030 <sup>+</sup>	0.064*	0.439***
<b>Indirect effect of political news</b>				
Strongly liberal	0.018	0.037	0.004	0.041
Liberal (-1 s.d.)	0.013	0.015	0.007	-0.017
Moderate (Mean)	0.009	0.005	0.007	-0.133*
Conservative (+1 s.d.)	0.005	0.000	0.005	-0.313***
Strongly conservative	0.001	0.000	0.001	-0.501***
<b>Indirect effect of knowledge</b>				
Strongly liberal				0.030*
Liberal (-1 s.d.)				0.068***
Moderate (Mean)				0.099***
Conservative (+1 s.d.)				0.133***
Strongly conservative				0.166***

<sup>+</sup> $p < 0.10$ , \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

in those outlets that lean conservative, may diminish the direct negative influence of political news on perceived harm and policy support exhibited in our analysis. Our study's results also suggest that harnessing science/environmental news to further increase in knowledge among liberals directly and indirectly (through harm) may lead to even greater support for climate mitigation policies.

Taken together, the results from this study suggest that increasing knowledge alone is unlikely to overcome the political divide around climate change, whereas increasing risk perceptions may dampen political polarization and lead to greater policy support across the political spectrum. Future research may build from the present study to further refine our understanding of how the science literacy model and motivated reasoning model may co-occur and influence interpretation of and responses to information about controversial science issues such as global climate change.

## Methods

Data from this study are drawn from a nationally representative sample collected by GfK Knowledge Panel in August 2009 ( $N = 1,673$ , completion rate = 73.5%, cumulative response rate = 9.1%; ref. 25).

**Analysis.** Models were fitted using structural equation modelling in Mplus, version 7.

**Measurement.** Variables in the model included attention to political news, attention to science news, knowledge, harm, and policy support. Indicators for harm included three items that measured: How much do you think global warming will harm: (1) plants and animals, (2) people in the United States, (3) you and your family. Responses ranged from 1 (not at all) to 4 (a great deal). There were eight indicators for policy support, including assessing support for a 'carbon tax', developing a new international treaty on global climate change, and several other climate policies (see Supplementary Methods for all items). Responses ranged from 1 (strongly oppose) to 7 (strongly support). Also included as observed variables were attention to political news—measured with an item that asked 'Generally speaking, how much attention do you pay to news and information about the following topics?: News about National Politics'—and attention to science news that asked about 'News about Environmental Issues', and 'News about Science and Technology' (averaged). Responses ranged from 1 (none at all) to 4 (a great deal). Knowledge was measured with seven items that assessed knowledge about global warming, for example 'The hole in the ozone layer is the primary cause of global warming' (see Supplementary Methods for all

items). Correct responses were summed to form an eight-point scale (0–7). Political ideology was measured on a seven-point scale from 0 (Extremely liberal) to 6 (Extremely conservative).

Controls included media use, environmentalist, evangelical, age, education, sex, income, and race (white). Indicators for media use included four items that measured: 'During a typical week, how often do you use each of the following sources to get news and information?: (1) Newspapers (either print or online), (2) Internet news sites like Google or Yahoo, (3) Blogs or other individuals' web sites, (4) TV News (local, national, cable, and so on)'. Responses ranged from never to 7 days a week. Environmentalist was measured with an item that asked: 'Would you describe yourself as an environmentalist?' with responses (1) Yes, definitely, (2) Yes, somewhat, and (3) No. Evangelical was measured with an item that asked: 'Would you describe yourself as a born-again or evangelical Christian?' (1) Yes, (2) No. Age, Education (from 1, no formal education to 14, professional or doctorate degree), sex, income, and racially white were also included as controls in the structural model.

Missing data were handled using hotdeck imputation<sup>26</sup> where respondents missing data on a given item were imputed a value randomly selected from among respondents who matched their age and sex. This method allows all cases ( $N = 1,673$ ) to be retained and is known to be superior to listwise deletion<sup>27</sup>.

First a measurement model was fitted, with all latent and observed model variables. Model fit was slightly subpar (root mean square error of approximation (RMSEA) = 0.072 {0.069, 0.076}; comparative fit index (CFI) = 0.914), and modification indices suggested that correlating the errors for media use on Internet news sites such as Google or Yahoo and on blogs or other individuals' web sites; for harm to people in the United States and to you and your family; and for two of the policy support indicators ('Do nothing to directly address global warming but rather limit government regulation, spending, and taxation to encourage economic growth' and 'Let the free market, economic competition, and technology attempt to address global warming without government action') would substantially improve model fit. Once these correlations were included, model fit was adequate (RMSEA = 0.054 {0.050, 0.057}, CFI = 0.954).

Next, a structural model was fitted (Fig. 2), with all structural paths moderated by political ideology (accomplished by including multiplicative terms in the model, for example, attention to science news \* ideology). As the interaction between harm and ideology was a latent interaction (using the XWITH command in Mplus), model fit for the structural model was not able to be determined (Mplus cannot determine model fit with latent interactions). However, given that the primary interest for this analysis is to assess relationships between variables, rather than model comparison, and that model fit for the measurement model was adequate, the inability to determine model fit was not a substantial barrier. Path coefficients at the specified levels of political ideology were determined by centring ideology at the specified level and re-estimating the model.



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## Author contributions

The contribution of the respective authors is as follows: P.S.H. contributed to designing the study, writing the manuscript, and guided data analysis. P.S.H. is responsible for preserving the original data on which the paper is based, verifying that the figures and conclusions accurately reflect the data collected and that manipulations to images are in accordance with Nature journal guidelines, and minimization of obstacles to sharing materials, data and algorithms; E.C.N. contributed to designing the study and writing the manuscript; T.A.M. performed data analysis with MPlus and contributed to writing the manuscript.

## Additional information

Supplementary information is available in the online version of the paper. Reprints and permissions information is available online at [www.nature.com/reprints](http://www.nature.com/reprints). Correspondence and requests for materials should be addressed to P.S.H.

## Competing financial interests

The authors declare no competing financial interests.