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How should scientists act? Assessing public perceptions of scientists and scientific practices and their implications for science communication

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Abstract

Is how science is conducted legitimate? Are scientists trustworthy? Whether the public answers "yes" to these questions is critical for science communicators. We explore how social factors affect public perceptions of the practice of science, and then test how those beliefs relate to views about how scientists engage with the public and policy making. Our results show that political ideology and religiosity affect these views. However, more importantly, respondents' concerns about the integrity of the scientific process are the strongest predictor of views about scientists' behavior, providing a focus area for future communication efforts in support of science-based decision making.

Keywords

Popularization of science and technology; Public perception of science and technology; Science and policy-making

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1 ▪ Science, scientists, and the public

From appearances on news programs to testimony at government hearings, scientists are in the public's eye. Science and scientific information have become interwoven in the discourse around myriad health, economic, and environmental concerns [Brewer & Ley, 2013; Motta, 2018, 2019; Safford et al., 2021a, 2021b; Weingart, 2023; Yuan et al., 2019]. Scientists' efforts to communicate may fundamentally be about sharing relevant data and analysis, but it increasingly involves guiding policy and raising awareness regarding the broader implications of their findings for individuals and society [Alvarez et al., 2023; Batelaan, 2022; Bucchi & Trench, 2021; Chinn & Sol Hart, 2022; Gauchat, 2015; Safford et al., 2021a, 2021b; Weingart, 2023].

Scientific findings play a key role in expanding understanding of some of the most pressing global issues including climate change, the COVID-19 pandemic, and the advance of artificial intelligence [Beets et al., 2023; Hamilton et al., 2015; Khojasteh et al., 2022; Pechar et al., 2018; Safford et al., 2021a]. Nonetheless, these topics have increasingly become divisive social issues and seemingly neutral science communication is filtered through the complex social discourse that surrounds these types of concerns. As the societal implications of scientific findings become more and more prominent, it is logical that the public asks questions about how scientists conduct their research and who is funding it and consider what role scientists should play in guiding decision-making. In short, the integrity of both scientists and the scientific enterprise are under increased scrutiny [Batelaan, 2022; Chinn & Sol Hart, 2022; Gauchat, 2015; Nisbet et al., 2015; Safford et al., 2021a, 2021b]. This is where sociological research is critical and can support science communicators by highlighting factors that shape public perceptions of science-related concerns.

We advance this type of inquiry by exploring survey data from the state of Maine in the United States that provides insights into public perceptions of scientific practices and scientists' engagement with the public and policy makers. Maine, located in the northeastern United States, is an ideal locale for examining the social bases of science-related views as key elements of the state's identity and economy — natural resources and the environment — are often understood through the lens of scientific information. Debates about harvesting fish and timber or assessing climate change implications for coastal and forest conservation are prevalent in the state and scientific information is key in the framing of these issues [Breigenzer et al., 2024; Correia, 2010; Fernandez et al., 2020; Pershing et al., 2015; Safford & Hamilton, 2012; Whitmore et al., 2025]. In addition, policy makers across levels of government have engaged with scientists in decision-making processes associated with these types of science-related concerns [Bieluch et al., 2017; Cossarini et al., 2014; Jansujwicz, 2017; Overton, 2024; Sullivan et al., 2017], making Maine an appropriate location for investigating how beliefs about the practice of science affect views about scientists' communication efforts as well as their engagement in policy and decision making.

2 ▪ Science communication and public perceptions of the practice of science

Social scientists and communication scholars have long studied the social foundations of trust in science, science skepticism, and challenges to scientific authority [Brewer & Ley, 2013; Gauchat, 2012, 2015; Hamilton et al., 2015; Nadelson et al., 2014; Safford et al., 2021b,

2020]. Recent social science research across many countries shows that individuals generally trust science and scientific experts, but this can vary by demographic characteristics such as gender and education, with women and those with lower educational attainment often expressing lower levels of trust [Krause et al., 2019; Obreja et al., 2023; Ophir et al., 2023; Funk et al., 2020; Rutjens et al., 2018]. Moreover, events that are linked to science can also influence and shift science views, with the COVID-19 pandemic being the most notable recent example [Algan et al., 2021; Kreps & Kriner, 2020; Safford et al., 2021b].

Science and scientific topics have also become more contentious, and patterns of ideological sorting along political lines more and more shape how the public thinks about scientific concerns [Chinn et al., 2024; Gauchat, 2012; Hamilton & Safford, 2021; Mason, 2018; Motta et al., 2021; Nisbet et al., 2015; Obreja et al., 2023; Safford et al., 2021a, 2020]. As scientists mobilize to engage with science-based issues and contribute to policymaking, this can create the sense that science is ideological and subsequently erode confidence in the neutrality of scientists [Chryssochoidis et al., 2009; Cofnas et al., 2018; Gauchat, 2012].

These patterns, in part, relate to the cultural authority of science. Culture forms core values and beliefs and these have an important role in mediating views of scientists and scientific information. For example, the secularized nature of science might be seen as undermining the cultural authority of religious institutions and thus scientists may be considered as anti-religion and not trustworthy [Nadelson & Hardy, 2015; Perry et al., 2021; Simpson & Rios, 2019; Whitehead & Perry, 2020]. Scholars studying trust in science have also illustrated how cultural preferences linked to things such as the role of government, corporate responsibility, among others intertwine with political ideology to influence trust in science [Fairbrother, 2017; Pechar et al., 2018; Lee et al., 2016; van der Linden, 2016]. While consideration of the cultural authority and relative confidence in science provides indications as to why the public trusts or does not trust "science" generally, investigating public perceptions of specific scientific practices, and the related behaviors of scientists, offer a window into the filters through which science communication reaches the public.

Recent scholarship suggests that more pointed analysis of different components of scientific inquiry, and scientists' roles as social actors, is needed to fully understand how science-related concerns are perceived by the public [Cologna, Kotcher et al., 2024; Fage-Butler et al., 2022; Safford et al., 2021b]. Besley et al. [2021] show that trust in scientists is based largely on the public's assessment of their competence, integrity, openness, and benevolence. As sociologists and science communicators investigate these features of science, analysts and scholars need to ask respondents questions that focus on gauging perceptions of scientists' competency (in ability and integrity) and whether they trust scientists to make independent unbiased decisions [Besley & Tiffany, 2023]. Expanding inquiry beyond measuring degrees of trust in science to investigating public confidence in scientists as social actors is critical [Batelaan, 2022; Cofnas et al., 2018; Mann & Schleifer, 2020].

Assessments of the credibility and competence of scientists is also connected to institutional trust and consideration of the interests of organizations supporting research [Kossowska et al., 2021; Safford & Polette, 2021]. These entities actively promote certain types of scientific studies; thus, it is not surprising that public support for funding scientific research, and what institutions and organizations engage in scientific research, play a role in how the public perceives the scientific enterprise [Gauchat, 2015; Lupia et al., 2024; Motta,

2019]. Scientists are visible representatives of universities, corporations, and government agencies and research shows that confidence in science relates to views about these entities as well as scientists themselves [Achterberg et al., 2017; Alvarez et al., 2023; Chinn & Sol Hart, 2022; Gauchat & Andrews, 2018; Pechar et al., 2018; van der Linden, 2016]. As the public sees scientists and scientific institutions aligned with particular interests or policies, they may be viewed as biased and their credibility questioned [Chinn & Sol Hart, 2022; Hartman et al., 2017].

Scientists' elevated status due to their expertise can also create social distance between them and the broader public. They are increasingly viewed by some as elitest and detached, and this can also undermine their credibility as communicators [Mede & Schäfer, 2020; Merkley, 2020; Motta, 2018]. Similarly, the notion that decision-making linked to science-related issues should simply be deferred to scientists due to their expert knowledge only amplifies the distancing of scientists from society and undermines confidence [Brossard & Nisbet, 2007; Dudo & Besley, 2016; Howell et al., 2020]. Related behaviors also play a role in shaping public perceptions of the scientific process. One of the most common motivations for scientists to engage with the public is to correct misinformation. They often point out misguided claims or challenge errors of inference; however, these communication approaches may be perceived as condescending and can further erode trust in scientists and the scientific process [Chinn et al., 2024; Yuan et al., 2019].

Public confidence in science is clearly connected to the character and credibility of scientists [Hartman et al., 2017]. They occupy a unique social status due to their special expertise and are often presented as doing work that is crucial for economic and social well-being, however, merely occupying such a special status does not always instill trust [Fujiwara et al., 2022; Hendriks et al., 2016; Weingart, 2023]. Differences in people's evaluation of the credibility of scientists and the scientific enterprise can influence their attitudes about science-related issues; thus, studying the social factors shaping these evaluations is an important area for further sociological inquiry [Dudo & Besley, 2016; Hartman et al., 2017; Hendriks et al., 2016; Safford et al., 2021b, 2020]. We advance this type of understanding by first investigating what factors predict confidence in scientific practices and then examine how confidence in scientific practices relates to the public's assessment of scientists' efforts as communicators and their engagement in policy and decision making.

3 ▪ Research design and methodology

To examine the inter-relationship between views about the practice of science and assessments of scientists' behavior, this study utilizes data from the June 2023 Pine Tree Poll (PTP). The PTP is a regular omnibus survey administered by the University of New Hampshire (UNH) Survey Center employing probability-based web panels of residents of the U.S. state of Maine. Panel participants are chosen randomly from a pool of potential respondents that were recruited by randomly selecting landline and cell phone numbers across Maine. Subsequently, panel members received and responded to the survey between June 15–19, 2023, with 769 individuals participating.

In collaboration with the UNH Survey Center, we developed a series of questions focused on science-related views building off the extant literature and the structure of questions used previously on the PTP and other panel surveys. Table 1 outlines poll questions that form

Table 1. Variable definitions with codes, weighted summary statistics, and number of respondents.

Independent variables
Gender: Male (coded 1, 52%), Female (coded 2, 48%) ($n = 728$)
Age: 18–34 (coded 1, 19%), 35–49 (coded 2, 19%), 50–64 (coded 3, 31%), 65+ (coded 4, 31%) ($n = 764$)
Education: HS or less (coded 1, 25%), Some College (coded 2, 34%), College (coded 3, 25%), Postgrad (coded 4, 16%) ($n = 768$)
Income: < $45,000 (coded 1, 25%), $45,000–$75,000 (coded 2, 25%), $75,000–$100,000 (coded 3, 16%), $100,000–$150,000 (coded 4, 20%), $150,000+ (coded 5, 15%) ($n = 658$)
Ideology: Liberal (coded 1, 39%), Moderate (coded 2, 26%), Conservative (coded 3, 35%) ($n = 727$)
Religious Attendance: Never (coded 1, 66%), Few times per year (coded 2, 21%), Few times per month (coded 3, 3%), Weekly or more (coded 4, 9%) ($n = 758$)
Dependent variables
Scientific Method: "The scientific method generally produces accurate conclusions." ($n = 769$)
Strongly Disagree (coded 1, 3%)
Somewhat Disagree (coded 2, 7%)
Neutral (coded 3, 18%)
Somewhat Agree (coded 4, 32%)
Strongly Agree (coded 5, 39%)
Science Sponsors: "When I hear about scientific studies, I worry that the findings of those studies are influenced by the companies or organizations sponsoring them." ($n = 769$)
Strongly Disagree (coded 1, 2%)
Somewhat Disagree (coded 2, 5%)
Neutral (coded 3, 12%)
Somewhat Agree (coded 4, 39%)
Strongly Agree (coded 5, 42%)
Scientists Adjust: "Scientists adjust their findings to get the answers they want." ($n = 769$)
Strongly Disagree (coded 1, 17%)
Somewhat Disagree (coded 2, 20%)
Neutral (coded 3, 20%)
Somewhat Agree (coded 4, 28%)
Strongly Agree (coded 5, 15%)
Scientists Effort: "Scientists do not put enough effort into informing the public about new developments in science and technology." ($n = 769$)
Strongly Disagree (coded 1, 6%)
Somewhat Disagree (coded 2, 13%)
Neutral (coded 3, 36%)
Somewhat Agree (coded 4, 35%)
Strongly Agree (coded 4, 11%)
Scientists Results: "Scientists should only report scientific results and leave others to make environmental and natural resource management decisions." ($n = 769$)
Strongly Disagree (coded 1, 13%)
Somewhat Disagree (coded 2, 24%)
Neutral (coded 3, 23%)
Somewhat Agree (coded 4, 22%)
Strongly Agree (coded 5, 18%)

variables utilized in this study as well as descriptive statistics and coding for statistical analyses used later. Probability weights, which are applied in all figures and models, help ensure the panel sample is reflective of the adult population of Maine in terms of gender, age, education, region of the state, and political party registration.

We utilize six individual characteristics as independent variables in our analyses (see Table 1). Selection of these variables is based on those shown in the extant literature to affect views of science and scientific concerns [Gauchat, 2012; Hamilton & Safford, 2021; Mason, 2018; Motta et al., 2021; Obreja et al., 2023; Safford et al., 2021a]. *Gender* is dichotomized male/female and coded 0, 1. Panel respondents were offered a non-binary gender alternative, however only a small number chose this option (9 individuals), and they were not sufficient in number for use in our statistical analyses. *Age* is measured in years and *Education* is subdivided into four categories (high school or less, some college, college graduate, and post graduate studies), and coded 1 to 4. *Income* has five groupings (less than $45,000, $45,000–75,000, $75,000–100,000, $100,000–150,000, and over $150,000 (coded 1 to 5) and *Ideology* is broken into three categorizations of political beliefs (liberal, moderate, and conservative) and is coded 1 to 3. The final background category, *Religious Attendance*, reflects how often respondents indicated they attend religious services (never, few times a year, few times a month, and weekly or more) and is coded 1 to 4.

The five dependent variables listed in Table 1 allow closer consideration of PTP participants' views about the process of science and the behaviors of scientists as they engage with society and decision makers. The first three questions, *Scientific Method*, *Science Sponsors*, and *Scientists Adjust* focus on the practice of science. *Scientific Method* asks whether respondents agree or disagree that the scientific method generally produces accurate conclusions, while *Science Sponsors* assesses whether they worry that the findings of scientific studies are influenced by the companies or organizations sponsoring them. Finally, *Scientists Adjust* asks respondents whether they agree that scientists adjust their findings to get the answers they want.

The remaining two questions home in on the behavior of scientists and their efforts communicating with the public about scientific discoveries and engagement with decision makers. *Scientists Effort* asks respondents to assess the effort scientists put into informing the public about new developments in science and technology and *Scientists Results* queries respondents whether they believe scientists should only report scientific findings and leave others to make environmental and natural resource management decisions. As noted earlier, environmental concerns are some of the most prominent science-based issues in Maine, and the scientific community there has engaged with both the public and policy makers, making it an appropriate thematic focus for assessing predictors of views about scientists' involvement with decision making. While not exhaustive, these questions provide a window into public perceptions of scientific practices and scientists' engagement. They also establish a basis for investigating whether different demographic and social background characteristics relate to these views, as well as the extent to which beliefs about the practice of science predict views about scientists' engagement with society and decision makers.

4 ▪ Beliefs about the practice of science and scientists engagement

Results from the June 2023 PTP show that most Mainers have confidence in the scientific method, with 71% of respondents either somewhat or strongly agreeing that it produces accurate results (see Figure 1). Nonetheless, 19% of respondents chose neutral when assessing the scientific method and 10% were more skeptical and either somewhat or strongly disagreed with this statement. The relatively large number of respondents that were

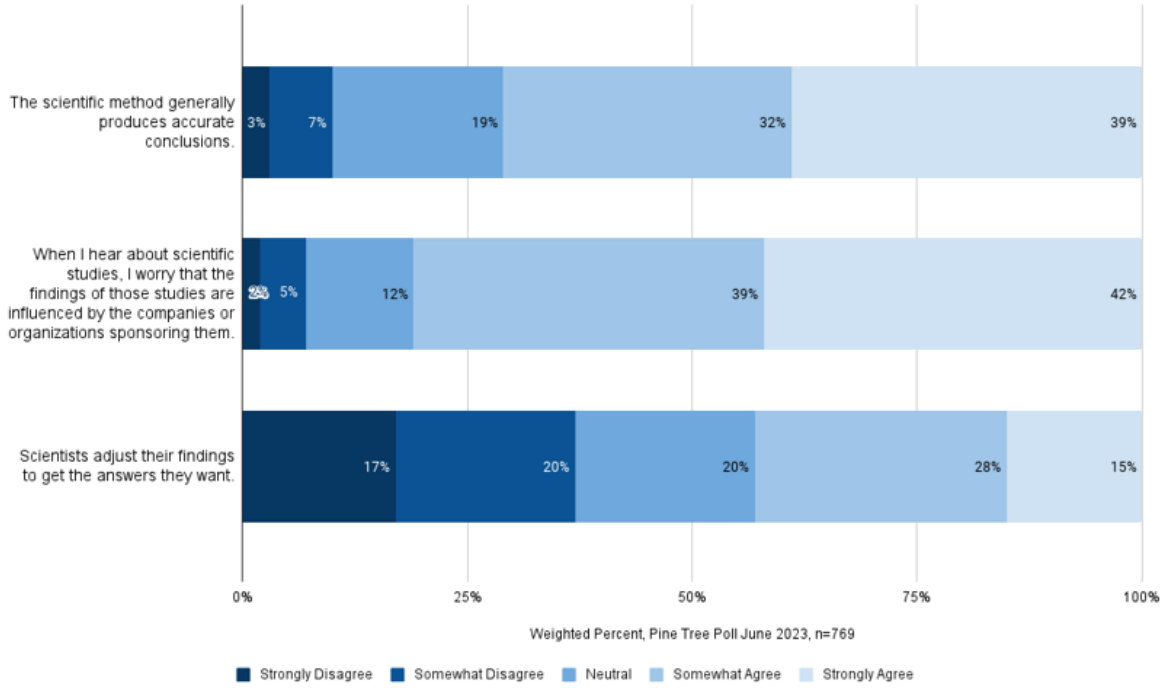

Figure 1. Participant responses to questions about the practice and process of science.

either neutral or had doubts about the accuracy of the scientific method suggests the scientific method is not universally understood, trusted, or considered reliable and this points to the importance of understanding what aspects of the practice of science may give respondents pause.

The subsequent two questions focus on key elements of scientists' engagement with society — communicating with public about science-related topics and interacting with decision makers — that the literature suggests relate to declining confidence in science [Besley et al., 2021; Hartman et al., 2017; Kossowska et al., 2021; Motta, 2019; Safford et al., 2021b]. Potential manipulation of scientific studies by sponsors appears to worry many PTP respondents, with 42% strongly agreeing they were concerned the results of scientific research may be influenced by funders. As an additional 39% somewhat agreed with this statement, these results demonstrate that more than 80% of respondents worry about funding entities influencing the findings from scientific studies. While the tenets of scientific practice suggest that assessments of findings should focus on methodological rigor, the public in Maine has concerns that the findings from scientific studies may be influenced by the organizations sponsoring them.

The final question displayed in Figure 1 concentrates on the character of scientists themselves and how they formulate their findings. PTP respondents appear uncertain about the integrity of scientists. 43% of panel members either somewhat or strongly agreed that scientists adjust their findings to get the answers they want, 20% indicated they were neutral, and the final 37% either somewhat or strongly disagreed with this statement. If we combine those who agreed and those choosing neutral, our results show that nearly two-thirds of respondents are uncertain about scientists' uprightness and believe they may manipulate their research to get the outcomes they want.

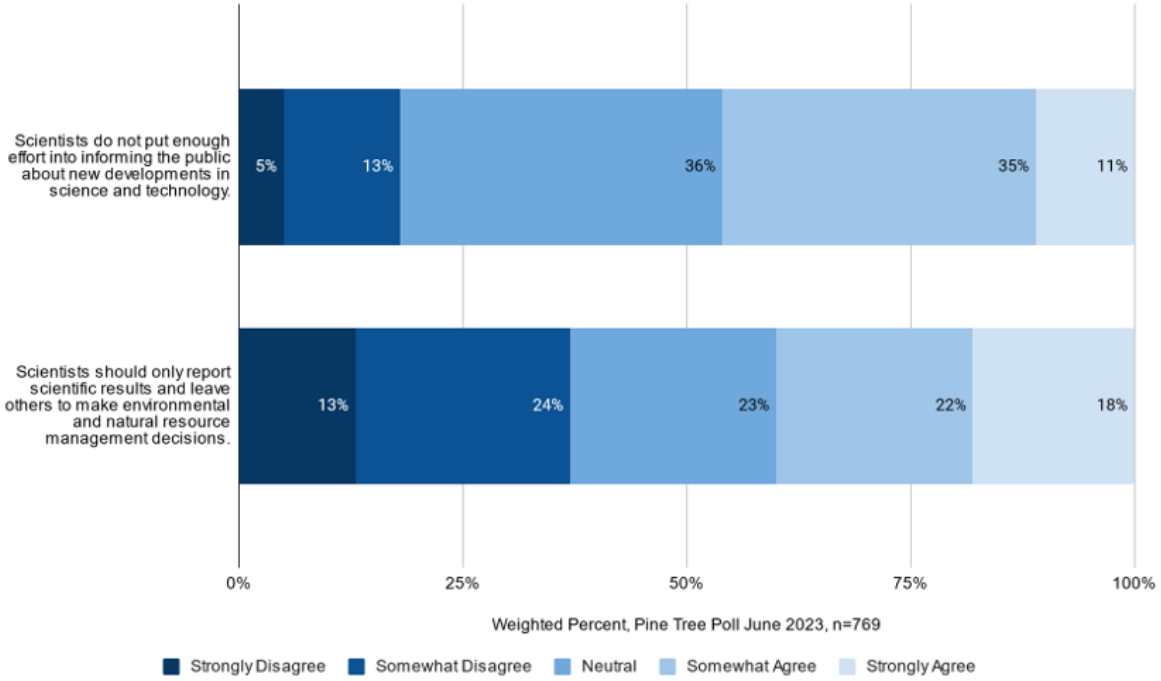

Figure 2. Participant responses to questions about scientists' behavior.

For the most part, Mainers recognize the general rigor of the scientific method, but uncertainty about the influence of funders and the integrity of scientists as they generate results appears to shape their assessments of scientific findings. Figure 2 expands on these insights and displays results from the two PTP questions that focused on scientists' communication efforts and engagement with decision makers. Interestingly, 46% of panel participants agreed that scientists need to put more effort into informing the public about new scientific developments. This finding, along with the fact that 36% of respondents were neutral on this question, shows that most panel members felt scientists' communication efforts were insufficient, even for the purely informative elements where they share information with the public about new scientific discoveries.

Finally, respondents were nearly evenly divided on what is the appropriate role for scientists in environmental and natural resource decision making. 40% agreed scientists should only report scientific results and leave others to make environmental and natural resource management decisions, while conversely 37% disagreed with this statement. The fact that panel members were split on this question, and that 23% were also neutral, indicates division and uncertainty regarding the appropriate role for scientists in science-related decision-making processes.

5 · Perceptions of the process of science and scientists' behavior

The descriptive statistics visualized in Figures 1 and 2 highlight notable patterns in the way the public in Maine view scientists and the practice of science. However, additional statistical tests enable more pointed analysis of how individual characteristics may shape

Table 2. Predictors of perceptions related to the practices and process of science.

Predictor	*Dependent variables*		
	Scientific Method	*Science Sponsors*	*Scientists Adjust*
Gender (female)	−0.976***	−0.218	0.366
Age	−0.235	−0.132	−0.116
Education	0.364**	−0.112	−0.217
Income	0.151	−0.002	−0.063
Ideology (conservative)	−1.397***	0.377*	1.466***
Religious Attendance	−0.442***	0.157	0.113

$p < .001$***, $p < .01$**, $p < .05$*, weighted coefficients from ordered logistic regression ($n = 607$).

patterns in those views, as well as illustrate ways beliefs about how science is practiced affect consideration of appropriate behaviors for scientists. Table 2 explores possible predictors of PTP panelists' beliefs about the scientific method, the influence of science funders, and the integrity of scientists. Weighted ordered logit regression was employed with the ordered dependent variables reflecting the *Scientific Method*, *Science Sponsors*, and *Scientists Adjust* questions.

Figure 1 showed that 71% PTP respondents either somewhat or strongly agree that the scientific method produces accurate conclusions, however our regression model in Table 2 illustrates that several demographic characteristics shape the likelihood that individuals agree with this statement. Results show that women are significantly less likely to agree that the scientific method produces accurate results, while those with higher educational achievement are more likely to agree it does. These gender effects parallel other studies that have shown women are less trusting of science than men [Finucane et al., 2000; Gauchat, 2012; Rutjens et al., 2018]. The finding that education is a significant predictor is also logical, as those with higher educational achievement are likely to have had exposure to science training and thus would be more confident in the scientific method. These findings are also consistent with the extant literature that shows similar patterns in the effects of education on science-related views [Obreja et al., 2023; Gauchat, 2012; Hamilton et al., 2015; Safford et al., 2021b].

We also found that both *Ideology* and *Religious Attendance* variables predict beliefs about the scientific method. Individuals who self-identify as conservative as well as those who regularly attend religious services are significantly less likely to agree that the scientific method produces accurate conclusions. The strength of these effects ($p < .001$) illustrates how foundational views about the practice of science are, for some, being filtered through the lens of cultural belief systems. These findings associated with views about the scientific method offer initial clues into the way individuals' identities and belief systems influence how they assess the practice of science.

The second model in Table 2 explores how the same independent variables predict views about the influence of science-sponsors on the findings from scientific studies. Our results show that factors such as gender and education, that related to beliefs about the scientific method, are not significant for *Science Sponsors*. The only variable that has a significant effect is *Ideology*, with political conservatives being more likely to be concerned about the influence of sponsors on scientific studies. This pattern of limited effects is also apparent in

the third model for *Scientists Adjust* that gauged to what extent our independent variables predict views about scientists manipulating their findings to get the answers they want. Ideological conservatives are again significantly more likely to be concerned about scientists' integrity as they formulate their results, more often agreeing that they adjust their findings to get the answers they want.

Clearly, a wider range of variables predict general views about the scientific method than those related to concern that funders and scientists are influencing scientific results. Nonetheless, the fact that ideological conservatives had less confidence in the scientific method and have concerns about the influence of sponsors and scientists' integrity highlights the politicization of scientific concerns in the U.S. In addition, while the second and third regression models in Table 2 show few background characteristics predict views about scientific practices, descriptive statistics in Figures 1 and 2 still indicate that large percentages of PTP respondents are concerned about the influence of funders as well as scientists' integrity. Thus, it is important to assess to what extent having concerns about the practice and process of science may shape opinions about the scientists' efforts as communicators and their engagement in policy and decision making.

With scientists increasingly communicating directly with the public, and the growing emphasis on engaging scientists in decision making related to policy and management, we set out to test to what extent social background factors as well as views about the practice of science shape how the public assesses scientists' engagement-related behavior.

Table 3 shows results from two models that employed ordered logit regression to test how our independent variables from Table 1, as well as *Scientific Method*, *Science Sponsors* and *Scientists Adjust*, predict responses to our two behavior-focused dependent variables *Scientists Effort* and *Scientists Results*. The first model shows that there are no significant differences in respondents' views about the effort scientists put into communicating about new discoveries based on their individual background characteristics. However, we do find significant effects based on PTP respondents' views about the practice of science. Individuals who worry about the influence of funders, as well as those who question scientists' integrity as they formulate their results, are significantly more likely to believe scientists should put more effort into communicating about scientific discoveries. Results in

Table 3. Predictors of perceptions about how scientists should engage.

Predictor	*Dependent variables*	
	Scientists Effort	*Scientists Results*
Gender (female)	0.162	−0.273
Age	0.213	0.042
Education	−0.195	−0.149
Income	−0.156	−0.061
Ideology (conservative)	0.002	0.517**
Religious Attendance	0.107	0.431**
Scientific Method	0.128	−0.087
Science Sponsors	0.363**	0.307*
Scientists Adjust	0.401**	0.620***

$p < .001^{***}$, $p < .01^{**}$, $p < .05^{*}$, weighted coefficients from ordered logistic regression ($n = 607$).

the second model illustrate that respondents holding those views are also more likely to agree that scientists should only report results and leave environmental and natural resource decision making to others. Perhaps most importantly, we find no significant effects from *Scientific Method*. Rather than general trust in the scientific method, it is beliefs about the integrity and practice of science that appear to shape views about appropriate behaviors for scientists as communicators and policy-informers.

Finally, PTP respondents who self-identify as political conservatives and those who attend religious services more regularly are significantly more likely to agree that scientists should only report results and not engage directly in natural resource and environmental decision making. It is interesting that these two variables linked to cultural beliefs affect the likelihood that individuals believe scientists should engage with decision making, but they have no effect on general views about the effort scientists put into informative communication about scientific developments. These findings confirm nuances in the connections between cultural characteristics and beliefs about appropriate behaviors for scientists, offering broader insights for science communicators and social scientists alike.

6 ▪ Discussion

Results from our analysis of data from Pine Tree Poll in Maine show distinct patterns in the way the public perceives the practice of science and the role of scientists. The importance of differentiating between general views about science and those related to specific practices and behaviors is one of the clearest findings from our research. Most individuals believe, generally, in the accuracy of the scientific method. However, this does naturally equate with confidence in the process of scientific inquiry nor assuage concerns about social forces inappropriately influencing the practice of science. More than three-quarters of PTP respondents worry about undue influence from science-sponsors and nearly half are concerned scientists are adjusting their results to get the answers they want. Clearly, a significant portion of the public is wary about self-interests affecting the key actors in the scientific process — scientists and science funders. This should be a call to action for science communicators, who need to not only convey scientific data and analysis, but also focus on instilling confidence in scientists and science-related institutions who are at the foundation of the scientific enterprise.

Just as we discovered variation between general beliefs about the scientific method and the integrity of science actors, similar patterns appear in our two questions focused on the behaviors of scientists. Members of the public do not appear to believe scientists put sufficient effort into conveying information about new scientific developments, and the fact that many individuals responded “neutral” to this question suggests that scientists need to be more engaged and highlight the efforts they are putting into communication as a part of their practice. This finding is consistent with the extant literature, which shows the public does not feel fully informed about complex science-related issues [Bromme & Goldman, 2014; Sinatra et al., 2014] and believes scientists should put additional effort into outreach [Claessens, 2012; Cologna, Mede et al., 2024; Wong, 2024]. As with our findings related to scientists and the practice of science, science communicators need to call attention to scientific innovations and connect scientific researchers to these efforts to demonstrate to the public how scientists are involved, as well as the effort they are exerting to connect their work with society.

Nonetheless, the public is more divided about how they feel scientists should contribute to applied decision making, and this is a cautionary finding for scientists who may feel motivated or even compelled by their research to engage directly in science-based policy making and management. Our results show a sizable segment of the public in Maine does not believe direct engagement by scientists in environmental or natural resource management decision-making is appropriate. This runs counter to trends in the state and beyond where scientists are more and more involved in these types of policy and decision-making processes [Cvitanovic et al., 2015; Overton, 2024].

Scientists have important roles to play in informing policy and management, but simply increasing engagement without addressing underlying apprehension about scientists' integrity may only further erode public support for science-based decision-making. This is where communication could be key, with such outreach focusing not just on the policy relevance of scientific findings, but also instilling confidence that scientists are trustworthy and thus should collaborate in decision-making. This communication likely needs to be targeted carefully given the level of unease among the public about scientists' engagement with decision-making, and our regression analyses provide clues as to where and how to focus.

Data from the PTP show concern about the integrity of scientists, and that scientific processes have cultural and ideological bases. Previous studies demonstrate that some individuals view science as a threat to the cultural authority of religion [Nadelson & Hardy, 2015; Perry et al., 2021; Simpson & Rios, 2019; Whitehead & Perry, 2020]. Thus, it is not surprising that PTP respondents who more regularly attend religious services are significantly less likely to believe in the accuracy of the scientific method, as core scientific claims such as the validity of evolution would likely be considered inaccurate and controversial by those believing in creation. Relatedly, more religious respondents are also more likely to think scientists should only share their results and not engage in decision making, which is also a logical result as the policy and management arenas are an area where the cultural authority of religion is important in the U.S. and could be challenged by increased scientific involvement [Perry et al., 2021; Simpson & Rios, 2019].

The politicization of all aspects of science and scientific practices is also apparent in our findings. Ideology predicts views regarding all but one of our questions, underscoring that conservatives are skeptical or uncertain about scientists and the practice of science. Where we do not see political effects is on views about scientists' efforts to inform the public about new scientific discoveries. This outlier may offer an opening for science communicators to engage with conservative skeptics. By increasing transparency regarding science funding, as well as focusing on helping the public get to know scientists as individuals, and their role in novel scientific developments, science communicators may potentially assuage some of conservatives' concerns about undue influence from science funders and the belief that scientists may be manipulating their results. Such communication activities will likely be challenging given the ideological polarization of politics in the U.S. and other countries, but without addressing doubts conservatives have about scientists and science sponsors, this segment of the public will likely remain skeptical of science-based decision-making, and this may limit the application of critical scientific knowledge to address myriad societal concerns.

The aforementioned findings offer important sociological insights regarding the social bases of beliefs about the practice of science. However, where our statistical analyses are most

informative relate to our central question that asks to what extent do views about the practice of science shape beliefs about appropriate behaviors and engagement by scientists. Individuals who are concerned about undue influence by science-funders and those who believe scientists adjust their findings to get the answers they want are significantly more likely to think scientists are both not putting sufficient effort into communication and should only report their results and leave others to make policy-related natural resource and environmental decisions. If individuals believe science is somehow biased, then it makes sense that they would not want scientists directly involved in policy-related decision-making. As with the previous findings related to religion, these results suggest outreach emphasizing transparency about the motives of science funders and the interests of scientists themselves could be a first step towards assuaging concerns about the integrity of the scientific process and unease about scientists' efforts to engage with society and policy making.

Finally, our results clearly show that while most PTP respondents trust in the accuracy of the scientific method, those beliefs about the scientific method have no significant effects on views about communication efforts and policy engagement by scientists. Rather it is concern about how science is carried out that matters the most. It appears that it is a lack of confidence in scientists and the practice of science, rather than merely an erosion of trust in science that is occurring. Thus, simply discussing the rigor of science or consensus among the scientific community to garner the public's confidence will likely have minimal effects on support among individuals concerned about the integrity of the practice of science. Their skepticism is about scientists and scientific inquiry, and this is where re-oriented science communication, built on social scientific analyses of public perceptions, is needed.

7 ▪ Conclusion

Across the globe, science and scientific concerns are increasingly contested. Paradoxically, it is also a time when science is even more urgently needed to understand the complex economic, health, and environmental concerns that are emerging. These needs for expanded research are not only in the biological and physical sciences, but also in social science. This study illustrates how sociological inquiry can broaden understanding of the social foundations of attitudes and beliefs about scientists and the scientific process. More importantly it highlights how this type of research generates data that can be applied to inform communication and outreach strategies that seek to address the erosion of confidence in scientists and the practice of science. Our investigation is not exhaustive, and we are circumspect about the generalizations we can make from a poll limited to one U.S. state and with five questions that are not comprehensive in their assessment of public perceptions of scientists and scientific inquiry. However, our research and analysis build on the extant literature that suggests traditional measures of trust in science are insufficient, and that beliefs about science generally can vary significantly from views regarding scientists themselves and how science is practiced. Further collaboration between social scientists and science communicators is need to both to facilitate the development of more strategic communication tools, but also to inform future social science inquiry that can help better gauge and understand the social factors that influence how the public views myriad dimensions of science.

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