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ARTICLE

Using consensus messaging and social identity to influence perceptions about nuclear power

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Abstract

In recent years, nuclear energy has regained public interest as a method of maintaining reliable power supply during the transition away from fossil fuels and other non-renewable energy sources towards renewable energy. However, lack of public support for maintaining or expanding nuclear power, particularly from Democrats, stands in the way of widespread adoption in the U.S. We use an experimental design ($N = 1{,}624$) to investigate consensus messaging, social identity cues, and topic frames as potential message features that alter public support for nuclear power. Results offer practical implications about improving how nuclear power is described to different audiences in public communication about science.

Keywords

Environmental communication; Public perception of science and technology; Risk communication

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In the United States and across the world, nuclear power represents a polarizing topic in conversations about energy production. Proponents of nuclear power argue that nuclear energy is less financially and environmentally costly than ongoing use of non-renewable sources, while opponents generally focus on perceived risks of nuclear waste and accidents. In recent years, nuclear energy has regained public interest as a method of maintaining reliable power supply during the transition away from fossil fuels and other non-renewable energy sources towards renewable energy [Daly, 2022]. Lack of public support for maintaining or expanding nuclear power stands in the way of widespread adoption [American Nuclear Society, 2023].

In the United States, Americans are divided about nuclear power, with 51% of the population in favour and 47% opposed, and support has been declining over time. Levels of support and opposition are also split along party lines, with 60% of Republicans and 53% of Independents favouring the use of nuclear energy as a source of electricity in the United States, compared to only 39% of Democrats [Saad, 2022]. Democrats' generally low levels of support for nuclear power represents an interesting paradox, as nuclear power can take the place of fossil fuels and help reach environmental goals, and yet Democrats are less likely to say that the federal government should encourage the production of nuclear power [Leppert et al., 2025].

Taken together, there appears to be a gap between scientists' perceptions of nuclear power and the public's perceptions. In situations like these, where there is a gap between scientists and the public, science communication strategies can be an effective way to close those gaps. One messaging technique that has been explored extensively in prior research is consensus messaging, an approach that communicates to lay audiences the degree of consensus, or agreement, among scientists about a particular topic [van Stekelenburg et al., 2022]. Previous research has found that informing the public about scientific or expert consensus about certain topics can change attitudes [e.g., Bartoš et al., 2022; Bode et al., 2021], as learning that trusted individuals or experts espouse a particular belief increases uptake of that belief among lay audiences. However, although there is a clear majority of scientists who support nuclear power expansion in the United States, consensus messaging has been studied less frequently in this context. With 65% of scientists favouring the expansion of nuclear power plants [Rainie & Funk, 2015], communicating this majority perspective to the public may be effective at shifting attitudes towards this energy source.

In addition to describing scientific consensus as a way to change attitudes, an alternative approach that may also be persuasive is by cueing individuals' social identity, particularly their political affiliation. Evidence suggests that science topics are becoming increasingly politicized [Gauchat, 2012], and individuals may turn to their political party for signals about what attitudes to hold about science. At the same time, trust and perceived credibility of scientists varies based on political affiliation, such that stronger conservatism is associated with less trust and perceived credibility in scientific expertise [Merkley, 2020]. As a result, political cues are a potentially relevant and persuasive message design feature about science messages.

Finally, the way that science topics are described, or framed, may influence perceptions of them. For example, evidence has found that perceptions vary based on the use of the term "climate change" versus "global warming" [e.g. Schuldt et al., 2011]. Relevant to nuclear power, it is possible that modifying the message frame that is used to describe this energy technology may change public perceptions in a more positive way. This study will also consider the effectiveness of using a different message frame ("nuclear" vs. "atomic" energy) to change lay audience attitudes.

Taken together, the purpose of this study is to examine several message design features — consensus messaging, social identity cues, and topic framing — as approaches to change attitudes among partisans about nuclear power. Using an experimental method ($N = 1{,}624$), we offer several insights into how public communication strategies can be designed to enhance support for nuclear energy, particularly in the U.S. context where opinions are deeply divided along partisan lines.

1 ▪ Consensus messaging

With contested science topics like climate change, vaccination, and genetically modified foods, there is often a gap between what scientists believe and what the public believes. This gap is not solely attributable to differences in knowledge between these groups [i.e., the deficit model; Miller, 1983] but can also be attributable to differences in values and worldviews. Regardless of the origin of the source of the gap, informing the public about the degree of consensus that scientists hold about contested topics can close gaps in opinion between scientists and lay audiences. Consensus messaging refers to the communication strategy that emphasizes the overwhelming agreement among experts, particularly scientists, on a specific issue. The goal of consensus messaging is to reduce public uncertainty and increase the acceptance of scientifically-backed information by highlighting that a vast majority of experts share the same viewpoint [van Stekelenburg et al., 2022]. Consensus messaging is often used in climate communication, aiming to bridge the gap between scientific understanding and public opinion about human-caused climate change [Bayes et al., 2023].

People often turn to expert opinions to form their own attitudes, and informing the public about what scientists believe can be particularly important for contested science topics like climate change, where certain groups have deliberately introduced uncertainty to public discourse to undermine support [Merkley, 2020]. Indeed, studies have shown that when individuals are informed of the scientific consensus on climate change, they are more likely to align their beliefs with the scientific view. For example, Deryugina and Shurchkov [2016] found that providing clear, direct information about the scientific consensus can shift public perceptions toward a broader acknowledgment of climate change as a reality.

However, the persuasive power of consensus messaging is not uniform. Some studies have found that consensus messages can backfire by causing psychological reactance, particularly among individuals who feel that their freedom to form opinions is being constrained [Chinn & Hart, 2023]. And, as will be discussed, the influence of partisan identities and the politicization of many science and health topics are significant moderating variables that can diminish the impact of consensus messaging. Bolsen and Druckman [2018] note that in highly politicized environments, consensus messaging may reinforce existing beliefs rather than change them, especially among those with strong partisan identities. As a result, consensus messaging may be most effective for topics that are less politicized or for which people do not have strong existing opinions [McCright et al., 2013].

We explore this idea by testing the efficacy of scientific consensus messages for nuclear power. Theoretically, nuclear power is a meaningful context because it is less politicized and may be less salient than more polarizing science topics, like climate change or, more recently, vaccines. In the United States, people tend to be relatively ill-informed or lack familiarity about nuclear power, often erroneously forming attitudes about nuclear power based on their attitudes towards nuclear weapons [Baron & Herzog, 2020]. Practically, consensus messaging is under-studied with nuclear power. Nuclear power may represent a promising bridge between current, non-renewable approaches to energy productions and a more sustainable, renewable energy future. However, in the United States, expansion of nuclear power has faced challenges due, in part, to lack of public support [American Nuclear Society, 2023]. At the same time, the majority of scientists support nuclear power's expansion [Rainie & Funk, 2015], making this topic a strong fit for a consensus messaging intervention.

Researchers have explored why consensus messages might lead to changes in public opinion. Indeed, from a classical perspective, work dating to Festinger's [1957] theory of cognitive dissonance suggests that when individuals become aware of a discrepancy between their prior beliefs and new information, they experience psychological discomfort that motivates a re-evaluation of their beliefs. More recent research suggests that becoming aware of scientific consensus about climate change can increase individuals' own acceptance of even polarized science topics [Lewandowsky et al., 2013]. Building on these findings, the "gateway belief model" suggests that if people are aware of scientific consensus, they will update their own beliefs about consensus, and this will lead to downstream persuasive effects [van der Linden, 2021]. For example, understanding that 97% of scientists believe that climate change is caused by humans leads people to worry more about the issue and be more likely to support social action [Cook et al., 2013].

To replicate this mechanistic understanding, in this study, participants were initially asked what percentage of scientists they believe support the expansion of nuclear power in the United States. Then, participants were shown the actual percentage [65%; Rainie & Funk, 2015] and asked again about their estimate of scientific consensus. In alignment with previous research on consensus messaging, we predict that exposure to the scientific consensus message would increase perceptions of scientific agreement (H1).

Following consensus message exposure and questions, participants were asked outcome measures related to their perceived scientific knowledge, interest, and trust, as well as their perceptions of nuclear power's cleanliness, innovativeness, safety, and cost, among others. We argue that the process of updating one's understanding of consensus and arriving at greater consensus estimates will be positively associated with these outcome measures (H2). Finally, we hypothesize that the process of updating one's belief about scientific consensus in nuclear power will mediate the relationship between consensus message exposure and outcomes (H3).

H1: Exposure to a consensus message with scientists as the reference group will result in a higher estimate of agreement of scientific consensus about nuclear power.

H2: Higher agreement estimates will be positively associated with perceived scientific knowledge, interest, and trust, as well as more positive attitudes towards nuclear energy.

H3: Effects of consensus messages with scientists as the reference group on perceived scientific knowledge, interest, and trust, and more positive attitudes towards nuclear energy will be mediated by updated agreement estimates.

Evidence generally supports that emphasizing the extent of scientific consensus increases people's perception of agreement, but evidence is less concrete for how this updating translates to outcomes [van Stekelenburg et al., 2022]. One factor that has been proffered as an explanation for the varying influence of consensus messaging is that they may be less effective among specific groups, like more politically conservative individuals. Indeed, Bolsen and Druckman [2018] highlight that partisanship and political identity play crucial roles in moderating the impact of consensus messages. In their study, individuals with strong partisan ties, particularly those aligned with climate-sceptic groups, were less likely to be influenced by consensus messaging, suggesting that political identity can act as a barrier to persuasion. Here, we investigate whether this finding extends to the nuclear power context, hypothesizing that:

H4: The relationship between exposure to a consensus message with scientists as the reference group and accuracy of scientific consensus will be moderated by political conservatism.

2 ▪ Science and social identity

Next, we investigate the mechanisms for why conservatism may reduce the efficacy of consensus messaging and explore whether lessons from this area may inform other message design strategies that may be more persuasive.

Conservative individuals may be less likely to be influenced by consensus messages for several reasons. First, in the United States, politically conservative individuals are more likely to espouse beliefs consistent with anti-intellectualism, a worldview that distrusts experts and intellectual elites. According to one study, individuals with strong anti-intellectual attitudes are less likely to be persuaded by consensus messages, particularly when these messages are perceived as coming from distrusted sources [Motta, 2018]. Second, scientists may be seen as representatives of a broader anti-conservative agenda, which leads to resistance of and rejection towards consensus messages [Hoffarth & Hodson, 2016]. Lastly, Chinn and colleagues [2024] recently found that conservatives may be more likely to see scientists as part of a socially threatening elite, which could lead to a rejection of the very consensus that the messaging aims to communicate. Each of these factors leads to the conclusion that political conservatives may be less likely to be influenced by consensus messaging, and each of these factors point to particular *social* features of conservatism.

Together, there is reason to believe that scientific consensus messaging will be more effective for some types of people over others; specifically, 79% of Democrats are confident in science as an institution, whereas only 45% of Republicans are confident in science [Jones, 2021]. More conservative individuals tend to be more sceptical of scientific expertise but are nearly twice as supportive as Democrats of nuclear power expansion [Leppert et al., 2025]. Considering all of these factors, another, less explored message design strategy to shift public perceptions of nuclear power could be by signalling participants' social identity.

At a basic level, social identity theory (SIT) predicts that group members evaluate their in-group positively, relative to their out-group, and are likely to act consistently with their in-group as a way of distinguishing themselves from the out-group [Tajfel & Turner, 1979]. More specifically, members of an in-group who hold positive perceptions about their in-group are likely to aspire to homogeneity, or similarity, with other members of their in-group, and strive to maximize differences from their outgroup. As a result, in-group members try to hold similar attitudes or behaviours as other members. These findings have been replicated across a variety of political contexts [e.g. Hart & Nisbet, 2012].

These findings have also been extended to science contexts. For example, [Kobayashi, 2018] argues that social consensus can be just as powerful as scientific consensus in shaping beliefs. For instance, if individuals perceive that a majority of their peers or social group members believe in climate change, they are more likely to adopt similar beliefs, even in the absence of strong scientific messaging.

To test this notion in the context of attitudes towards nuclear power, participants were *also* randomly assigned to a consensus message featuring the degree of public consensus about nuclear power from the perspective of their political in-group or outgroup. Exposure to a consensus message from one's political in-group should increase acceptance of that consensus, as identity-congruent information is often valued more heavily in judgment and decision making [Druckman et al., 2013]. When faced with a consensus message attributed to their political in-group, individuals may be more receptive to that information (perhaps above and beyond their acceptance of scientific consensus) because it aligns with their group identity. Research on partisan motivated reasoning shows that individuals frequently defer to elite cues from political leaders and organizations [Taber & Lodge, 2006; Bolsen et al., 2014]. Thus, in the context of a polarized issue like nuclear power, in-group partisan messages may carry more weight than messages grounded in scientific consensus.

Thus, H5 predicts that exposure to an in-group consensus message will lead to a higher subsequent consensus estimate (H5). This study also predicts that, like scientific consensus, consensus updating about one's understanding of social or partisan consensus could mediate the relationship between exposure to a consensus message and more positive outcomes related to perceived scientific knowledge, interest, and trust, as well as attitudes towards nuclear power expansion (H6).

H5: Exposure to a consensus message with members of one's political in-group as the reference group will result in a higher estimate of agreement of partisan consensus about nuclear power.

H6: Effects of consensus messages with one's political in-group as the reference group on perceived scientific knowledge, interest, and trust, and more positive attitudes towards nuclear energy will be mediated by updated agreement estimates.

3 ▪ Message framing

The last area of investigation for this study has practical implications and considers whether the way that nuclear power is described could shift public willingness to accept it. For example, the term "nuclear" may evoke negative connotations, such as warfare or pollution. On the other hand, a term like "atomic" may be less familiar as a descriptor but may not be associated with these negative connotations. Theoretically, the idea that different presentations of the same information can influence judgments comes from framing research, which argues that information can be presented in a variety of ways and these variations can produce alternative perceptions of the same content [Entman, 1993].

A framing effect occurs when attention is drawn towards certain aspects of information while simultaneously directed away from other aspects, and this change in attention, directed by the framed message features, influences outcomes.

Framing has been used to increase acceptance of contested science topics, like climate change, among sceptical audiences [e.g., Luong et al., 2019; Sapiains et al., 2016]. Because people lack familiarity or have less certain attitudes about nuclear power in the United States [Baron & Herzog, 2020], it is possible that re-framing nuclear energy as atomic energy may produce a framing effect, such that atomic energy is a more persuasive way to describe this contested science topic. We explore this idea through the following research question:

RQ: Does the framing of nuclear power as atomic power impact perceptions of nuclear energy production?

4 ▪ Method

4.1 ▪ *Participants*

Participants (N = 1,634) were recruited using Amazon's Mechanical Turk (MTurk), an online crowdsourcing platform that is widely used in social science research [Buhrmester et al., 2011]. Because MTurk has been critiqued for providing low-quality responses [Chmielewski & Kucker, 2020], we took several steps to ensure data integrity. Guided by recommendations from Chmielewski and Kucker [2020], we ensured that all participants were located in the United States and required CAPTCHA authentication.

Participants were recruited based on their political ideology in an attempt to obtain a roughly equal percentage of Democrats (55.1%; n = 901) and Republicans (44.9%; n = 733). Participants were asked to identify the political party they belonged to; if they selected Independent, they were then prompted to answer what party they voted with most often. There were slightly more female respondents (57.6%) than male respondents (40.9%). Participants were 82.2% White, 9.7% Black, 4.8% Asian, and 0.7% American Indian, Alaska Native, or Native Hawaiian. Most participants were aged 25–53, with a modal group aged 35–44 (29.8%), the second highest group aged 25–34 (25.9%), and the third highest group aged 45–53 (18.4%). Most participants had a four-year college degree (42.2%), some college (17.1%), or a two-year degree (11.7%).

Compared to the 2020 U.S. Census (the most recent complete data at the time of writing), our sample was more White (82.2% vs. 57.8%) and female (57.6% vs. 50.5%) than the national population. The prevalence of college-level education in our sample (42.2% with a four-year degree) also slightly exceeded national averages ($\sim$ 38%), suggesting moderate educational skew. Remaining demographics (political affiliation and age) were roughly equivalent to Census numbers [U.S. Census Bureau, 2021].

4.2 ▪ *Procedure*

Participants were randomly assigned in a 2 (political affiliation: Democrat or Republican) × 3 (reference group for the consensus message: scientists; political in-group; political outgroup) × 2 (message wording: nuclear energy or atomic energy) experimental design. After providing consent, their political affiliation, and their degree of conservatism, participants were asked to give an estimation of the degree of consensus among the reference group they were assigned to ('What percentage of [scientists/Democrat/Republicans] support expanding [nuclear/atomic] energy to generate electricity in the United States?"). Then, they were shown a message about the actual percentage of support among the assigned reference group. The message was held on-screen for five seconds to encourage participants to read it carefully. Following exposure, participants were asked to re-estimate the degree of consensus among the same reference group. Then, they were asked questions related to outcome variables. The survey took about five minutes to complete ($M = 4.97$; $SD = 4.64$).

4.3 ▪ *Materials*

All participants were shown a consensus message about nuclear energy. To mirror the structure of previously described and cited surveys about support for nuclear energy from Pew and Gallup, the messages were phrased as follows: "[x]% of [reference group] support expanding [nuclear/atomic] energy to generate electricity in the United States".

Reference group. To test whether the message source affects participants' perceptions of nuclear energy, they were randomly shown the degree of consensus among scientists (n = 687; 58%), their political in-group (n = 547; 33.5%) or their political out-group (n = 400; 24.5%).

Topic framing. To test whether the way nuclear energy is described affects participants' perceptions, they were randomly shown a message mentioning *nuclear* energy (n = 709; 43.4%) or *atomic* energy (n = 925; 56.6%)

4.4 ▪ *Measures*

Political conservatism. Political conservatism was measured with a single item asking participants where they would place themselves on a scale from (1) very liberal to (7) very conservative ($M = 3.89$; $SD = 2.02$).

Consensus updating. Consensus updating was measured by taking the difference between participants' second response to the question "What percentage of [reference group] support expanding [nuclear/atomic] energy to generate electricity in the United States?", which they saw after seeing the consensus message, and their response to this same question before seeing the consensus message. Participants responded to these questions using a slider from 0–100%. Participants' average change between the first and second question was 6.72 points ($SD = 22.74$).

Perceived scientific knowledge. Perceived scientific knowledge was measured with scale developed for this project. Unfortunately, the items were not reliable and were dropped for internal consistency. A single item, formulated as follows: "I feel like I know a lot about science" ($M = 4.11$; $SD = 1.56$), was kept due to its face validity at addressing the concept of interest, how much people perceive that they know about science.

Scientific interest. Scientific interest was measured with a five-item scale adapted for this specific topic from previous work by [Shulman et al., 2020]. This scale included measures like "I like reading about science" and "I am interested in science" ($M = 4.59$; $SD = 1.28$; $\alpha = .90$)

Scientific trust. Scientific trust was measured with a four-item scale adapted from Pew Research [2019], including questions such as "I trust scientists in this country" and "I feel confident that scientists act in the best interest of the public" ($M = 5.26$; $SD = 1.22$; $\alpha = .91$)

Attitudes towards nuclear energy. Attitudes were measured with six-item semantic differential scale developed for this project, where participants were asked to rate nuclear energy as unsafe to safe, very bad to very good for the environment, very expensive to very inexpensive, very antiquated to very innovative, very unreliable to very reliable, and very dirty to very clean ($M = 4.46$; $SD = 1.20$; $\alpha = .80$).

5 ▪ Results

Hypotheses, results of hypothesis tests, and implications are summarized in Table 1.

Table 1. Summary of hypotheses, results, and implications.

Hypothesis	*Prediction*	*Result*	*Implication*
H1	Exposure to a scientific consensus message will increase perceived scientific agreement about nuclear power.	Supported	Scientific consensus messaging can effectively increase perceptions of expert agreement, extending prior findings to the context of nuclear energy.
H2	Higher agreement estimates will correlate with greater perceived scientific knowledge, interest, trust, and positive attitudes.	Supported	Updating perceptions of consensus is positively associated with key outcomes, suggesting it functions as a "gateway belief".
H3	Changes in consensus estimates will mediate the relationship between consensus message exposure and downstream attitudes and beliefs.	Not supported	Unexpected negative mediation effects suggest consensus updating may backfire, possibly due to metacognitive awareness of knowledge gaps.
H4	Political conservatism will moderate the effect of consensus message exposure on perceived consensus.	Supported	Conservative individuals are less responsive to scientific consensus messages, reinforcing evidence of ideological resistance.
H5	Exposure to a partisan in-group consensus message will increase perceived agreement among in-group members.	Not supported	In-group consensus messages reduced perceived agreement, suggesting expectancy violation or skepticism may counteract intended effects.
H6	Updated in-group consensus estimates will mediate the effect of in-group consensus message exposure on outcomes.	Not supported	In-group consensus messaging produced negative indirect effects on knowledge, interest, trust, and attitudes, pointing to possible reactance or distrust.
RQ	Does framing nuclear energy as "atomic" (vs. "nuclear") affect perceptions?	Partially supported	No significant framing effects on most outcomes; only reduced scientific trust in the "atomic" condition, suggesting framing may be perceived as manipulative.

The first hypothesis predicted that exposure to a consensus message with scientists as the reference group would lead to a higher estimate of scientific consensus about expansion of nuclear power. This hypothesis was tested using a simple linear regression analysis, where assignment to the scientific consensus message condition predicted a positive difference in pre-exposure and post-exposure consensus estimates. Results supported this hypothesis, as exposure to scientific consensus significantly and positively predicted higher consensus estimates ($B = 9.09$, $SE = 1.13$, $t(1,1632) = 8.89$, $p < .001$).

The second hypothesis predicted that higher consensus estimates would be positively associated with perceptions of perceived scientific knowledge, interest, and trust, as well as more positive attitudes towards nuclear energy. This hypothesis was tested with a one-way ANOVA, where the difference in consensus estimates predicted perceived scientific knowledge, interest, trust, and attitudes. Results also supported this hypothesis, as the difference in consensus estimates was positively associated with perceived scientific knowledge ($F(1,116) = 1.27$, $p = .03$), interest ($F(1,116) = 1.30$, $p = .02$), trust ($F(1,116) = 1.37$, $p = .007$), and attitudes towards nuclear power ($F(1,116) = 2.02$, $p < .001$).

The third hypothesis predicted that effects of consensus messages with scientists as the reference group on perceived scientific knowledge, interest, and trust, and more positive attitudes towards nuclear energy, would be mediated by updated consensus estimates (Figure 1). This analysis, as well as some of the additional hypothesis tests reported below, was conducted using the PROCESS macro for SPSS. The PROCESS macro is a widely used regression-based tool that enables estimation of mediation and moderation effects [Hayes, 2018]. To test H3, Model 4 of the PROCESS macro was used, such that the relationship between consensus message exposure and updated estimates represents Path A and the relationship between updated agreement estimates and outcomes represents Path B. Results for this hypothesis are shown in Table 2. As predicted, exposure to the consensus message produced higher consensus estimates, but this change actually led to lower perceived knowledge, interest, trust, and less positive perceptions of nuclear power. H3 was not supported.

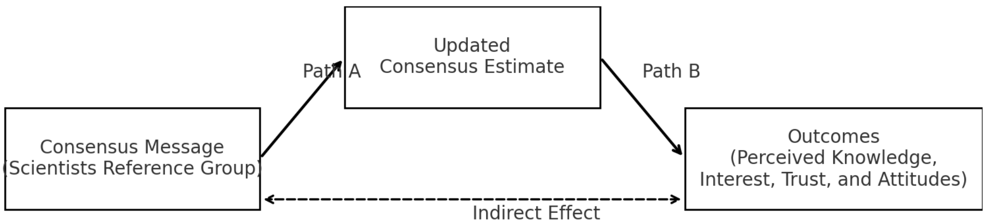

Figure 1. Path diagram depicting relationships tested in H3.

The fourth hypothesis predicted that the relationship between exposure to a consensus message with scientists as the reference group and consensus updating would be moderated by political conservatism (Figure 2). This hypothesis was tested using Model 1 of the PROCESS macro. Results of the interaction analysis suggest that the more politically conservative individuals were, the less likely they were to increase their perceptions of scientific consensus ($B = -1.16$, $SE = .55$, $t(1,1633) = -2.09$, $p = .04$). Thus, H4 was supported.

The fifth hypothesis predicted that exposure to a consensus message with members of one's political in-group as the reference group would result in a higher estimate of agreement of

Table 2. Results from the Mediation Analyses for Hypothesis Three.

Outcomes	*Path 1* *B* (*SE*)	*Path 2* *B* (*SE*)	R^2	*Indirect Effect* *B* (*SE*)	95% CI LL, UL
Knowledge	9.86 (1.11)***	-.01 (.001)***	.02	-.10 (.02)	-.14, -.06
Interest	9.76 (1.12)***	-.008 (.001)***	.02	-.06 (.01)	-.09, -.04
Trust	9.90 (1.12)***	-.06 (.001)***	.02	-.05 (.02)	-.09, -.02
Attitudes	9.93 (1.11)***	-.01 (.001)***	.04	-.11 (.01)	-.16, -.06

Note: Path 1 denotes the path coefficient between the scientific consensus condition (0: partisan consensus condition, 1: scientific consensus condition) and updated consensus estimates. Path 2 denotes the relationship between updated consensus estimates and outcomes. All models were run using Model 3 [Hayes, 2018, 95% bias-corrected bootstrap CIs based on 5,000 resamples]. Non-zero indirect effects indicate support for the mediation model hypothesized.
* $p < .05$, ** $p < .01$, *** $p < .001$

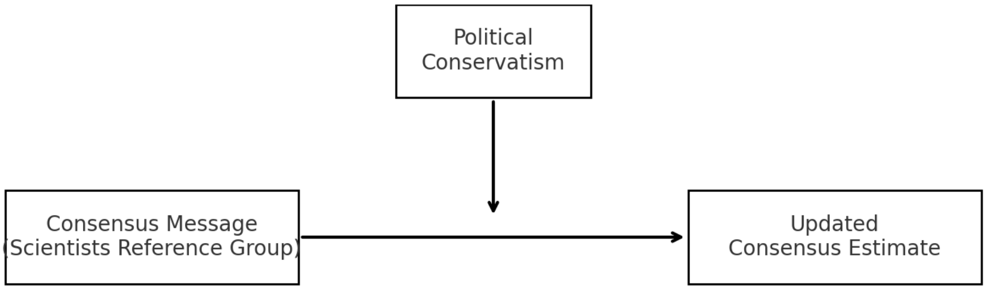

Figure 2. Path diagram depicting relationships tested in H4.

partisan consensus about nuclear power. This hypothesis was tested using linear regression analysis, where assignment to the political in-group consensus message condition predicted a positive difference in pre-exposure and post-exposure consensus estimates. Results suggested that partisan consensus messages significantly and *negatively* predicted later consensus estimates ($B = -6.78$, $SE = 1.14$, $t(1,946) = -4.85$, $p < .001$). Thus, H5 was not supported.

The sixth hypothesis predicted that effects of consensus messages with one's political in-group as the reference group on perceived scientific knowledge, interest, trust, and attitudes towards nuclear energy, would be mediated by updated consensus estimates. This hypothesis was tested using separate runs of Model 4 of the PROCESS macro from Hayes [2018], such that the relationship between in-group partisan consensus message exposure and updated estimates represents Path A and the relationship between updated agreement estimates and outcomes represents Path B (Figure 3). Results for this hypothesis are shown in Table 3. Exposure to the in-group partisan consensus message produced *lower* consensus estimates, and this change was related to *lower* perceived knowledge, interest, trust, and less positive perceptions of nuclear power. H6 was not supported.

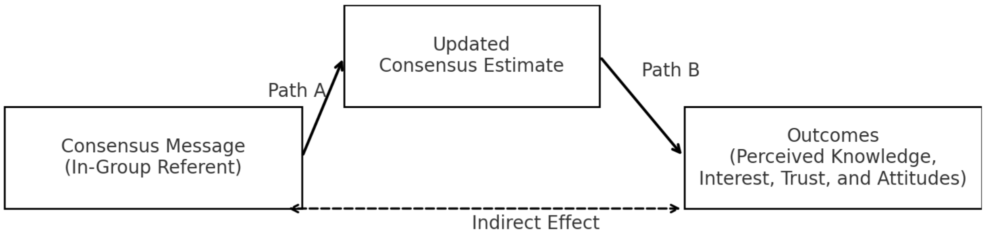

Figure 3. Path diagram depicting relationships tested in H6. Note: each outcome was run with a separate instantiation of PROCESS Model 4.

Table 3. Results from the Mediation Analyses for Hypothesis Six.

Outcomes	*Path 1* *B* (*SE*)	*Path 2* *B* (*SE*)	R^2	*Indirect Effect* *B* (*SE*)	95% CI LL, UL
Knowledge	-6.82 (1.40)***	-.008 (.002)***	.01	.06 (.02)	.02, .10
Interest	-6.93 (1.40)***	-.007 (.002)***	.01	.05 (.02)	.01, .09
Trust	-6.72 (1.40)***	-.006 (.002)***	.01	.04 (.02)	.01, .07
Attitudes	-6.82 (1.40)***	-.005 (.002)***	.007	.03 (.02)	.005, .06

Note: Path 1 denotes the path coefficient between the scientific consensus condition (0: partisan consensus mismatch, 1: partisan consensus match) and updated consensus estimates. Path 2 denotes the relationship between updated consensus estimates and outcomes. All models were run using Model 3 [Hayes, 2018, 95% bias-corrected bootstrap CIs based on 5,000 resamples]. Non-zero indirect effects indicate support for the mediation model hypothesized.
* $p < .05$, ** $p < .01$, *** $p < .001$

The research question asked whether the framing of nuclear power as atomic power would impact perceptions of nuclear energy production. This research question was examined with a one-way ANOVA. Results were non-significant for all outcomes with the exception of trust in science. Participants in the atomic power condition ($M = 5.12$; $SD = 1.29$) reported significantly less trust than those in the nuclear power condition ($M = 5.43$; $SD = 1.11$).

6 ▪ Discussion

This study investigated the influence of consensus messaging, social identity cues, and topic framing on public support for nuclear power. We review findings related to each of these message design strategies below.

6.1 ▪ *Consensus messaging*

The results confirm the efficacy of consensus messaging in increasing perceptions of scientific agreement on nuclear power. As hypothesized (H1), participants exposed to a consensus message about scientists' support for nuclear power adjusted their estimates of scientific consensus upwards. This finding aligns with previous research on consensus messaging in other contested science areas, such as climate change and vaccinations [e.g., Dixon, 2016; van der Linden et al., 2015], demonstrating that highlighting scientific agreement can effectively reduce public uncertainty and sway opinions. However, this study extends these findings to the context of nuclear power, a topic less frequently addressed in consensus messaging research.

While consensus messaging increased perceptions of scientific consensus, the effects on other outcome variables, such as perceived scientific knowledge, interest, trust, and attitudes towards nuclear power, were more complex. Although higher agreement estimates were positively associated with these outcomes (H2), changes in consensus estimates actually reduced perceived scientific knowledge, interest, and trust, as well as exerted a negative influence on perceptions of nuclear power (H3). This suggests that, while change in consensus perceptions is a gateway belief to other attitude change, it may produce backfiring effects, at least for the present topic. It is possible that becoming aware of the gap between one's own perceptions and what scientists believe actually makes a person feel bad about this gap. The theoretical explanation for this relationship comes from metacognition [Schwarz, 2015], which would argue that becoming aware of gaps in one's knowledge may lead to negative affect.

These findings suggest potential boundary conditions for the influence of consensus, indicating that under certain issue contexts, consensus may fail to override prior beliefs or attitudes. This idea should be explored in future research, as should consideration of other mechanisms, beyond consensus updating, that may explain the effectiveness of consensus messaging.

6.2 ▪ *Political identity*

The second set of hypotheses concerned how partisanship could interact with and influence consensus perceptions and outcomes. H4 predicted that the relationship between consensus message exposure and consensus updating would be moderated by political conservatism. This relationship was supported by previous research and aligns with the notion that more conservative individuals also tend to be more sceptical of scientists as a source of expertise. Consistent with expectations, the more conservative individuals were, the less they were willing to update their consensus perceptions.

Given that political ideology influences beliefs about science topics, this study also examined whether information about consensus from one's political in-group could be an effective persuasion strategy. Contrary to expectations, exposure to consensus messaging from one's political in-group *reduced* consensus updating (H5) and this reduction in consensus produced negative outcomes related to knowledge, trust, interest, and attitudes (H6). This pattern is consistent with what some scholars have termed a "backfire effect", in which a corrective message causes a shift in the opposite direction of the intended effect. Although early studies documented this phenomenon [e.g., Nyhan & Reifler, 2010], more recent large-scale experimental work has found that such backfire effects are relatively rare and often context-dependent [Wood & Porter, 2019]. In this study, the in-group referent condition resulted in lower perceived consensus and less favourable views toward nuclear power. This effect directionally resembles a backfire effect and may be caused by one of a few theoretically-grounded reasons.

First, it is possible that connecting one's partisan identity to information about nuclear power made people more sceptical of this information, and this scrutiny led to the negative outcomes. Second, it is also possible that individuals experienced expectancy violation, such that the consensus from their in-group went against their preconceived notions, and this expectancy violation produced the negative outcomes. Future research should consider expectancy violations or motivated resistance to persuasion as potential mechanisms of these unexpected relationships and explore whether the backfire effect observed subsequently replicates.

6.3 ▪ *Framing*

Lastly, on a practical note, this study explored whether changing terminology to describe nuclear energy as atomic would influence perceptions. Findings revealed that there were no significant differences in the use of these two terms, except on scientific trust. Perhaps participants felt that shifting the terminology was an attempt to mislead them. Future research should consider the mechanisms of this finding, and in the interim, public communicators should continue describing nuclear power or energy in the ways that lay audiences are familiar with.

6.4 ▪ *Implications and future research*

These findings are tempered by limitations. Without a longitudinal approach, it is difficult to determine how lasting the observed effects will be. Methodologically, future work should employ more reliable measurement to ensure greater confidence in observed effects. Further, the participants recruited to this study were generally highly educated; the vast majority had at least some college education. This level of education may mean that participants had more general science knowledge, or specific knowledge about nuclear power, than the general population. Lastly, and as noted, additional measurement into competing mechanisms like expectancy violation or motivated resistance to persuasion could shed light on other variables underlying the efficacy of consensus messages. These offer promising directions for future work.

In conclusion, the findings of this study underscore the importance of considering both the content and the context of messages when communicating about contentious science topics. Practitioners should recognize that invoking political identity, even through in-group cues, may not always yield persuasive benefits. In contexts involving complex or low-salience technologies, emphasizing broad scientific consensus may still be a more reliable route to shaping attitudes and trust. With appropriate message design, communicators may more effectively bridge the gap between scientific consensus and public opinion, ultimately contributing to more informed and balanced public discourse on nuclear energy and other critical issues.

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