

The Scientists Have Betrayed Us! The Effects of Anti-Science Communication on Negative Perceptions Toward the Scientific Community

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In today's digitized media ecologies, anti-science beliefs and deliberate attacks on the legitimacy of experts and empirical evidence are getting more widespread. Blaming scientific elites may be an important populist communication tactic used to fuel disenchantment and cynicism toward scientists regarded as part of the "corrupt" elite. To investigate the effects of different blame attributions to scientific elites, we rely on experimental data collected among a representative sample of Dutch citizens ($N = 475$). We randomly exposed people to populist versus nonpopulist blame attributions to scientific elites, or conspiracies in which different elite actors were accused of secretly collaborating to manipulate and mislead the people. Our findings show that, under some conditions, anti-science communication negatively affects evaluations of scientists. By demonstrating the impact of anti-science populism, we show how the public's opposition to expert knowledge and the rejection of truthful information may be fueled by blaming scientists.

Keywords: anti-science populism, blame attribution, climate change, conspiracy theories, disinformation, populism, post-truth politics

In a context of increasing distrust toward scientific facts and expert knowledge among disenchanted segments of the population, populist rhetoric frequently targets journalists (Egelhofer & Lecheler, 2019) or scientific elites (Mede & Schäfer, 2020). In this setting, scholars have emphasized the need to comprehensively study the connection between "populism and the production and communication of knowledge" (Ylä-Anttila, 2018, p. 357). As delegitimizing anti-science discourses are becoming more widespread in an epistemology characterized by factual relativism (Van Aelst et al., 2017), it is important to explore its impact on public perceptions of the scientific community. Against this backdrop, this article explores how anti-science discourse expressed in populist communication impacts people's negative evaluations of and feelings toward scientists: To what extent do populist versus nonpopulist attacks on scientific elites delegitimize support for the scientific community?

We regard anti-science communication as an umbrella term that captures science-related populism, conspiracy theories, and nonpopulist critiques of scientists. It may thus capture different ways of

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communicating critique or hostility toward scientists. We specifically focus on the affinity between populist discourse and the attribution of blame. We understand populism as a social identity frame that expresses an antagonistic divide between alleged ordinary people and corrupt elites, while stressing that the monolithic will of the people should be central in politics (e.g., Canovan, 1999; Mudde, 2004). The populist emphasis on distrust toward scientific facts and empirical evidence has introduced an important common enemy for the people: the scientific elites who allegedly do not represent the virtuous people and their common truths (e.g., Saurette & Gunster, 2011). Especially for people who have lost trust in how knowledge is created and disseminated by various institutions, science-related populism may offer a persuasive narrative (Mede & Schäfer, 2020) because it responds to disenchanting citizens' distrust in established practices of truth-telling and expert knowledge.

In a digital information setting where different counterfactual and established narratives compete for legitimacy alongside attacks targeted at the scientific and media elites, citizens may no longer know whom to trust, or select the version of reality that reassures their existing beliefs. Hence, as different groups of the population distrust the scientific community and experts (Merkley, 2020; Motta, 2018) while populist parties incorporate anti-science beliefs into their communication strategy (Krämer & Klingler, 2020; Pauwels, 2010), there may be an important opportunity structure for anti-science communication to delegitimize the scientific community among the public. Just like political populism has a polarizing impact (Müller et al., 2018) by reinforcing sentiments of deprivation and distrust among citizens, we suggest that science-related populism is most effective for a group of vulnerable citizens who are disenchanting and already distrust the scientific elites. Based on experimental research that has looked at the persuasiveness of populist cues in communication (e.g., Blassnig & Wirz, 2019; Hameleers & Schmuck, 2017), we expect that the emphasis on a divide between ordinary people and allegedly corrupt elites activates negative perceptions toward the scapegoated out-group.

Because climate change communication in particular may target different scapegoats (Sarithchandra & Haltinner, 2020) in various ways and intensities, this article aims to understand how anti-science rhetoric in the context of climate change developments can demobilize support for the scientific community. Using an experiment in the Netherlands, we specifically test the effects of Mede and Schäfer's (2020) understanding of science-related populism and contrast this to a nonpopulist critique on scientists and a more encompassing conspiracy theory. As an important contribution, this article aims to understand how different populist, nonpopulist, and conspiracist anti-science constructions affect people's opposition to the scientific community—potentially impeding support for interventions against climate change.

Science-Related Populism as a Post-Truth Social Identity Frame

Essentially, populism cultivates the idea that society is ultimately divided into two antagonistic camps: the ordinary people versus the corrupt elite (e.g., Mudde, 2004). Populist ideas emphasize that the elites fail to represent the ordinary people and that the people's collective will should be central in politics. Populist messages communicate a specific social identity frame by stressing that the ordinary people form an internally consistent in-group with a general will (i.e., the power should be given back to the people) and that out-group members are far removed from the people (Bos et al., 2020). Populism's expression of an antagonistic divide between the "good" people and the "corrupt" elites implies that differences between "us" and "them" are

irreconcilable and that the norms, values, desires, and will of the people are collectively shared by the in-group and substantially different from the motivations and norms of the culpable out-group.

In populist communication, the attribution of blame to the out-group is central (see, e.g., Busby, Gubler, & Hawkins, 2019; Hameleers, Bos, & de Vreese, 2017; Vasilopoulou, Halikiopoulou, & Exadaktylos, 2013). More specifically, populist communication not only stresses the moral and antagonist divide between the in-group of the ordinary people and the out-group of corrupt elites (e.g., Jagers & Walgrave, 2007; Mudde, 2004) but also contains a causal opposition: The corrupt elites are blamed for not representing the ordinary people's common interests, and are also accused of only serving their own political agendas (Hameleers et al., 2017). In line with the centrality of this causal opposition, we regard the attribution of blame to the elites as a central component of populist communication strategies that stress the divide between blameless people and culpable elites.

In this article, we extend the conceptualization of populist blame attributions typically understood in relation to the political establishment to scientific elites. We hereby follow the conceptualization of science-related populism introduced by Mede and Schäfer (2020). Science-related populism can be defined as the emphasis on an antagonism between the good and honest ordinary people and the culpable scientific elite. This antagonism also includes the attribution of blame: Scientists are blamed for not representing the people's reality, for lying to the people, and for failing to independently cover reality as it happened. In that sense, it reflects the delegitimizing discourses and "fake news" accusations associated with antimedia populism in populist communication (see, e.g., Egelhofer & Lecheler, 2019; Waisbord, 2018): Alternative people-centric realities are legitimized as truthful, whereas the truth claims expressed by the allegedly unvirtuous scientific elites are delegitimized or deemed deceptive.

Anti-science claims can come in different shapes and forms, and the antagonism central to science-related populism may be distinguished from other forms of attacks on the scientific community. To comprehensively understand the impact of science-related populism relative to other attacks on scientists, we explicitly compare science-related populism to more general blame attributions and a more extreme, related expression of a populist conspiracy theory (Harambam, 2017). We understand general blame attributions or nonpopulist critique on scientists as any form of skepticism or negativity targeted at scientists that does not include a hostile attack on scientists as an out-group and lacks references to the ordinary people as a deprived in-group. It is thus a nonantagonist manner of emphasizing negative sentiments toward scientists. It may, for example, consist of critique on scientists for failing to clearly stress the importance of climate change. By including this variety of anti-science communication, our article makes an important contribution by exploring how the addition of an explicit populist argument that stresses a moral and causal antagonism between the virtuous people and unvirtuous scientists strengthens the persuasive power of blame attributions.

Populist conspiracy theories add a specific delegitimization discourse to anti-science communication in the sense that the scientific elites are blamed for *deliberately hiding reality from the people* and for spreading lies to cover up power dynamics—central elements of conspiracy theories in a populist context (e.g., Silva, Vegetti, & Littvay, 2017). Such a populist conspiracy combines populism's good-versus-evil antagonism with the idea that the authorities—including the political and scientific elites—are deceiving the

public to hide power discrepancies (Oliver & Wood, 2014). Here, it is important to stress the overlap between science-related populism and conspiracy narratives. Just like conspiracy narratives, science-related populism pictures the scientific establishment as a conspiring and corrupt entity that ignores the will and common interests of the ordinary people (Mede & Schäfer, 2020). In that sense, science-related populism can also refer to a collaboration with political elites—pointing to a shared responsibility of political and scientific elites. Yet, the populist conspiracy theories conceptualized in this article can be distinguished from science-related populism by the following aspects: (1) They neglect participatory demands of ordinary people to be involved in scientific analyses; (2) they specifically point to the goal-directed deception of elites who mislead the people to hide power discrepancies, and (3) they do not refer to scientists as the central scapegoats, but rather regard them as part of a universal corrupt elite. Considering the overlap between science-related populism and conspiracist narratives, we can regard a conspiracist narrative as an aspect of science-related populism. Together, we thus compare three different modes of anti-science communication in which blame attributions are present in different ways (see Table 1). As overarching aim, we explore to what extent, and for which segments of the population, these attributions of blame are effective in fueling the public's opposition to scientists.

Table 1. Conceptual Overview of Science-Related Populism Compared to Other Delegitimizing Attacks in Anti-Science Communication.

	Anti-science blame	Science-related populism	Populist conspiracy theories
Presence blame	Directed at scientists in general	Directed at corrupt/failing scientists	Directed at corrupt/failing scientists who are part of a conspiracy
Populist antagonism	Not present	Virtuous and honest people versus deceptive scientific elites	Virtuous and honest people versus all elites who plot a scheme to hide reality
Specificity and intensity of attack	Scientists in general, low intensity	Corrupt scientists (moral and causal attack), higher intensity	Corrupt scientists (moral and causal attack), highest intensity

The Effects of Blaming the Scientific Elites

Numerous studies have indicated that populist communication can be persuasive (e.g., Bos et al., 2020; Busby et al., 2019; Müller et al., 2018). Applied to anti-science communication, Merkley (2020) found that exposure to populist cues activated distrust toward intellectuals and experts—which shows that exposure to anti-elitism cues with a populist narrative can reinforce people's opposition toward scientists. Populism may be regarded as an effective communication tactic because it simplifies complex political issues into a matter of "us" versus "them," which reassures a positive image of the self (see, e.g., Bos et al., 2020). The people are seen as virtuous and "good," whereas the elites are reduced to an "evil" outsider responsible for the people's collective deprivation. Populist blame attributions hereby introduce a credible

scapegoat for the people's problems while reassuring a positive image of the in-group as a blameless, honest entity (e.g., Bos et al., 2020).

The social identity model of collective action (SIMCA; Van Zomeren, Postmes, & Spears, 2008) can help to explain the effectiveness of anti-science communication and blame attribution, and populist communication more specifically (see, e.g., Bos et al., 2020). The SIMCA postulates that the emphasis on a politicized social identity, in-group injustice, and a credible scapegoat motivates people to act on behalf of their in-group (Van Zomeren et al., 2008). In line with this, by priming a positive image of the in-group (i.e., the people are honest) and out-group hostility (i.e., scientists are to blame for the people's deprivation), populist identity frames may mobilize members of the in-group to act on behalf of their deprived entity (Bos et al., 2020). The psychological mechanisms by which people are persuaded by such social identity frames can be understood as the priming or activation of positive in-group schemata and negative out-group schemata (Krämer, 2014; Müller et al., 2018). Schema theory posits that contextual elements, such as media coverage, can activate cognitive clusters or schemata (Brewer & Nakamura, 1984). In other words, exposure to anti-science messages that hold scientists accountable for the in-group's problems may activate congruent mental maps among receivers. Repeated exposure to negative images of scientific elites, then, may result in a higher accessibility of negative evaluations when people are asked to evaluate scientists.

Exposure to anti-science messages may thus activate or prime positive stereotypes of the in-group (the people are virtuous, pure, and innocent) and negative out-group stereotypes (the elites are evil, dishonest, corrupt, and self-interested). Next to these negative evaluations of scientists, populist messages may trigger negative emotional responses toward the scientific elites—which is in line with experimental research showing that populism may fuel negative emotions toward the scapegoated out-group (Wirz, 2018).

In this article, we specifically look at different in-group and out-group cues in anti-science communication (see Table 1) that could activate the perceived antagonism between the in-group and the targeted out-group. Because the explicit antagonism between the ordinary people and corrupt scientific elites is more central in science-related populism compared to general blame attributions, we expect a stronger priming effect on people's evaluations of the scientific community. Hence, explicit populist cues emphasize a stronger sense of in-group injustice and out-group negativity by (1) explicitly referring to the deprived community of ordinary citizens and (2) referring to the elites as corrupt and failing to represent the people, which should result in stronger activation effects than mere blame attributions on their own (also see Bos et al., 2020). Hence, we expect that populist blame attributions that cultivate a moral and causal opposition between the in-group and out-group have a stronger priming effect on negative evaluations than regular blame attributions do. We forward the following hypotheses:

- H1: Exposure to messages that blame the scientific elites activates more negative evaluations of scientists (a) and negative feelings toward scientists (b) than exposure to a message in which blame attribution is absent.*
- H2: These effects are stronger for populist than nonpopulist attributions of blame to the scientific elites.*

Populist Conspiracies: The Political Elites and Scientists Plot a Scheme Against Us

Applied to the central issue studied in the article—anti-science narratives applied to climate change—the affinity between populist worldviews and conspiracies implies that scientists are framed as being aligned with political elites or certain ideological agendas: They, for example, are accused of collaborating with political movements to maintain the power discrepancy between the ruling elites and the ordinary people, which means that they have to cover up the truth and spread alternative facts to keep the people at bay (Silva et al., 2017). Populist conspiracies may thus entail a combination of (a) cultivating distrust in established facts and expert knowledge, (b) blaming scientific elites, and (c) pointing to a conspiracy of the ruling elites who work together to hide reality from the people.

We expect that messages that frame the antagonism between the scientific elites and the ordinary people as a conspiracy have the strongest effects on negative evaluations of scientists. Because in-group injustice and deprivation is more central (i.e., the scientists have betrayed the people and cover up reality), and considering that the out-group threat is more severe, the effect of such populist cues should be stronger than the presence of regular anti-science blame attributions or science-related populism that does not stress this antagonism (see Table 1). In addition, the more encompassing the threat from the elites is (i.e., more encompassing than just blaming the scientific elites), the more relevant and urgent it is to act on behalf of the deprived in-group (Bos et al., 2020). Thus, because the out-group threat is stronger in such populist conspiracies (no one can be trusted, all elites are allegedly evil) and because there is more at stake for the ordinary people as an in-group (who are deprived of the actual reality that is deliberately kept from them), we expect the effects of populist cues to be stronger under the condition that the scientific elites are allegedly working together with other elites (politicians, large corporations) to hide reality from the people. We hypothesize:

H3: Exposure to populist conspiracy messages results in a stronger activation of (a) negative evaluations of scientists, (b) negative feelings toward scientists, and (c) engagement with the message as compared with messages in which such conspiracies are absent.

The Moderating Role of Deprivation and Distrust

Conspirational theories are arguably most effective in a context where they can feed on skepticism of audience segments that feel excluded by the elites (Fenster, 2008). When people support an antagonistic conspirational worldview, they may also support the idea that political and scientific elites are deceptive and involved in a scheme to maintain the power discrepancy between the culpable elites and the ordinary people. This inherently cynical view on politics and scientific elites has also been regarded as a crucial factor in the support for populist parties and their rhetoric (Bos, van der Brug, & de Vreese, 2013; Doyle, 2011): The more people distrust the established order, the more likely they are to be persuaded by populist communication that cultivates their distrust and disenchantment. A similar mechanism is found for relative deprivation: People who perceive they are more disadvantaged than other groups in society are affected most by populist messages that activate an antagonism between the ordinary people and culpable others (Bos et al., 2020).

Against this backdrop, we postulate that perceived relative deprivation and preexisting negative evaluations of scientists (distrust in their capabilities and honesty) moderate the effects of populist blame attributions. We can explain this based on social identity framing theory. Specifically, when a social group experiences disadvantage related to the allocation of resources to their in-group compared with out-groups, a stronger sense of intergroup conflict is cultivated (Tajfel & Turner, 1986). The sense of deprivation and in-group injustice will augment the perceptual gap between the in-group and the culpable out-group (Bos et al., 2020). Hence, the more people perceive they are relatively deprived, the stronger the experience of in-group injustice. Likewise, the more the out-group experiences preexisting distrust and cynicism, the more credible the idea becomes that the elites are accountable for the people's deprivation.

Relative deprivation and cynical or distrusting views toward the out-group can thus both be connected to opportunity structures that make blame frames more credible and personally relevant. The underlying psychological mechanism can be regarded as an in-group confirmation bias (Knobloch-Westerwick, Mothes, & Polavin, 2020) driven by defensive motivated reasoning (Festinger, 1957; Kunda, 1990). Arguably, people process incoming information in a motivated way and tend to avoid cognitive dissonance when confronted with new information (Festinger, 1957). As a result, people are more likely to uncritically support messages that confirm their prior attitudes and identities, and counterargue statements that run counter to their existing views (Knobloch-Westerwick et al., 2020).

Attributions of blame to the "corrupt" elites confirm the beliefs of citizens who are distrusting and cynical toward scientists in general. For those segments of the population, the out-group cue is more relevant and mentally accessible, which should lead to stronger framing effects (Chong & Druckman, 2007). In a similar vein, for people who perceive being relatively deprived, the sense of in-group injustice should be more accessible and credible: The populist frame resonates more strongly with the perceived threat on the status of the in-group of relatively deprived citizens (Elchardus & Spruyt, 2016). Among people with more pronounced feelings of relative deprivation and distrust toward the scientific elites, populist schemata that cultivate the antagonistic divide between the ordinary people and elites should be more easily available and thus easier to trigger by exposure to blame attributions. Both factors correspond to a confirmation bias related to the specific identity framing of populist blame attributions that emphasize (1) in-group injustice and (2) out-group blame. We hypothesize:

H4: The effects of populist attributions of blame to scientific elites on (a) negative evaluations of scientists and (b) negative feelings toward scientists are stronger for people with more pronounced prior levels of relative deprivation.

H5: The effects of populist attributions of blame to scientific elites/populist conspiracies on (a) negative evaluations of scientists and (b) negative feelings toward scientists are stronger for people with cynical or distrusting perceptions about scientists.

Context of the Study

We tested these hypotheses in the national setting of the Netherlands: a country with a multiparty system in which (right-wing) populist movements have been influential from the early 2000s onward

(Aalberg, Esser, Reinemann, Strömbäck, & de Vreese, 2017). In this country, the debate around climate change and human interference is relatively polarized. At the same time, accusations of “fake news” to the media and scientific elites are salient among politically discontented citizens, alternative media platforms, and populist politicians. In other words, the Netherlands should offer a credible opportunity structure to explore the effect of post-truth populist discourse on negative evaluations of scientists across different segments of society. In this setting, we exposed people to anti-science communication in which scientists are blamed for not doing enough to combat climate change—an interpretation that more closely reflects a left-wing than a right-wing populist interpretation of the issue.

Method

We rely on an experimental survey design among a representative sample of Dutch citizens. In our experiment, people were randomly assigned to an online news story about climate change. We adjusted existing news stories on climate change (from different sources) to make them reflect either (1) a neutral story without blame attribution, (2) blame attribution to scientific elites without explicit populist cues, (3) blame attribution to scientific elites with populist cues, (4) blame attribution to all elites without explicit populist cues, and (5) a populist conspiracy in which all elites are blamed in a populist way. Our experimental design can be described as a between-subjects factorial design in which participants were randomly allocated to one of the five versions of the news story (equal group sizes).

Sample

The data collection was outsourced to a large international research agency (Kantar Lightspeed). The agency was instructed to collect a varied sample of Dutch participants that matched national representativeness on age, gender, and education. Kantar uses a large database of potential participants (voluntary opt-in). Recruitment was done online: Email invitations were sent to eligible participants (over 18 years old, not having participated in more than three projects a month). In total, 475 completes were generated. These completes reflected census data in the Netherlands. The sample was 46.5% female. In our sample, 24.4% were lower educated, 30.5% were higher educated, and 45.1% had a moderate level of education, which closely matches the national distribution. The mean age was 48.64 years ($SD = 12.65$). Relevant for the key questions of this experiment, the sample shows a nonskewed distribution of ideological self-placement. Specifically, 37.1% identified as left-wing and 45.7% as right-wing (which closely matched the electoral outcomes of recent elections, with an overrepresentation of right-wing parties in the multiparty government). Ideology was normally distributed, with similar percentages of extreme left- and right-wing citizens at the fringes.

Pretreatment power analyses (based on previous experiments with populist communication) indicated that the power to detect significant differences ($\alpha = .05$, two-tailed) for main effects was .80, with about 65 participants per cell. For the interaction effects, where we expected larger effect sizes, the power was .74. Because this may be regarded as suboptimal (interaction effects are said to require between 4 and 16 times the amount of completes to achieve sufficient power to detect differences depending on effect sizes), we aimed to achieve 100 completes per treatment condition. Yet, given that the power for interaction effects was suboptimal, we have to interpret these effects with some caution.

Independent Variables: Science-Related Populism and Blame Attribution

Based on existing climate change news, we constructed a short online news article in which recent developments about carbon dioxide (CO₂) emission were problematized. The article stated that “policies to fight climate change should be more effective.” In the control condition, a general storyline on the need for stricter emission rules was included. In the anti-science “regular” blame attribution condition (negativity bias without populist cues), scientists were held responsible for not coming up with concrete solutions and blamed for focusing too much on unintelligible climate change models. The explicit populist blame attribution condition added an “us versus them” frame and an intentional accusation of misleading the ordinary people: Climate scientists were accused of spreading confusion and misleading the public by being dishonest about developments related to climate change. The populist framing conditions also cultivated the divide between the ordinary people and the corrupt scientific elites by explicitly stressing that the ordinary people were misled and not represented by the scientific elites, who were only serving their own interests. This way, we distinguished general anti-science communication from an explicit science-related populist condition in which the antagonism between the virtuous people and the unvirtuous scientific elites was emphasized (we based ourselves on the differences in emphasis in anti-science blame attribution as conceptualized in Table 1).

In the nonexplicit-populist condition, political and corporate elites were, next to the scientific elites, framed as being responsible for causing problems related to climate change developments. Just like the nonpopulist anti-science condition, there was blame attributed to the out-group without specifying the moral antagonism between the ordinary people and the culpable elites. The populist conspiracy condition, however, added a populist interpretation to this collective blame attribution and emphasized that the elites were plotting a scheme against the ordinary people to hide the real situation on climate change. In other words, responding to the conceptualization included in Table 1, this condition reflected the most extreme anti-science message because it blamed different elites together while stressing a populist antagonism and a conspiracist narrative (they together plot a scheme against the people and deliberately hide power discrepancies). In Appendix, all stimuli are included (translated from Dutch into English).

Dependent Variables

Negative Evaluations of Scientists

We measured participants’ perceptions toward the scientific community using four items that asked participants to rate scientists on different stereotypical traits. Specifically, the question wording was as follows: “There are many different beliefs about different groups in society. Some will describe your experiences with groups better than others. Could you now rate scientists on the extent to which you feel they can be described by the following labels?” The answer categories were bipolar statements: dishonest–honest, unreliable–reliable, lazy–hard-working, and unfriendly–friendly. The four items formed a reliable scale that was reverse-coded into a scale tapping negative evaluations toward scientists ($M = 3.16$, $SD = 1.15$, Cronbach’s $\alpha = .902$). These items were based on existing research measuring stereotypical perceptions of elite actors in response to populist communication (e.g., Aalberg et al., 2017) and adjusted for the out-group of scientific elites. The items aim to tap a mixture of both competency and likability

dimensions (Halkias & Diamantopoulos, 2020) to capture a comprehensive set of evaluations based on stereotypical traits.

Feelings Toward Scientists

We asked participants to rate, on a scale from 1 (*very negative feelings*) to 7 (*very positive feelings*), their feelings toward scientists, climate experts, and some "filler" groups. We computed a scale based on the items measuring feelings toward scientists and climate experts ($M = 4.35$, $SD = 1.26$, Cronbach's $\alpha = .862$). These items were based on existing measures of feelings used in experimental research, but adjusted to tap general emotional responses to scientists as an out-group.

Moderators

Prior Perceptions Toward Scientists

Before being exposed to the stimuli, participants were asked to indicate their general perceptions toward scientists. These measures were different from the posttreatment evaluations (stereotypical traits) and tapped more general perceptions that related to distrust in scientists' honesty and role in society. We used the following items (measured on 7-point disagree–agree scales): "Scientists mostly spread false information" and "Scientists are ignorant to the real problems facing our society" ($M = 3.57$, $SD = 1.39$, Cronbach's $\alpha = .843$). These items were based on measures of distrust typically used to tap perceptions toward the news media and the operationalization of populist attitudes as individual-level perceptions (Akkerman, Mudde, & Zaslove, 2014; Schulz et al., 2018).

Perceived Relative Deprivation

Using a battery of five items from established scales (Elchardus & Spruyt, 2016), we assessed people's perceptions of being worse off than other groups in society. We used items such as, "Some groups in society get more than ordinary Dutch citizens" and "If people like me need something, we always have to wait longer than other groups in society" ($M = 4.89$, $SD = 1.29$, Cronbach's $\alpha = .911$).

Manipulation Checks

The manipulation of blame attribution to the scientific elites was successful: Participants were significantly and substantially more likely to associate the message with blame attribution to scientists in the blame condition ($M = 4.79$, $SD = 1.51$) compared with the control condition ($M = 3.73$, $SD = 1.60$), $F(1,473) = 52.60$, $p < .001$. The manipulation of populism was also successful: Participants in the populist conditions were more likely to recognize the framing of a divide between the ordinary people and the culpable elites ($M = 4.86$, $SD = 1.53$) compared with the control condition ($M = 4.09$, $SD = 1.46$), $F(1,473) = 31.31$, $p < .001$. A randomization check confirmed that there were no substantial or significant differences in the groups' composition in terms of ideology, age, gender, and educational attainment. We also assessed whether the manipulations were credible and if participants perceived them as similar to daily news coverage

on the issue. On a 7-point scale, they were quite likely to perceive the treatments as credible and similar to news coverage they encounter normally ($M = 4.19, SD = 1.74$).

Results

The Effects of Blaming Scientific Elites

The ordinary least squares regression models are summarized in Tables 2 and 3. The first hypothesis postulated that exposure to a message that blames the scientific elites activates negative evaluations of (H1a) and negative feelings (H1b) toward scientists. When focusing on the conditions that blame scientific elites (see Table 2, Model I), it can be observed that negative evaluations of scientists are more pronounced among those respondents who saw a message that blamed scientific elites, in a populist or nonpopulist way, compared with those who were in the control condition. We can confirm this when we look at pairwise corrected mean score comparisons yielded by analyses of variance. Here, we see a significant effect of the treatment on negative evaluations toward scientists, $F(4, 470) = 2.34, p < .05$. Specifically, participants evaluated scientists more negatively in the anti-science blame condition ($M = 4.59, SD = 1.15$) and the populist science blame condition ($M = 4.63, SD = 1.16, p < .05$) compared with the control condition ($M = 5.08, SD = 1.12, p < .05$). These findings support H1a. Second, a comparable picture arises when we look at the effect of blame attributions on negative feelings toward scientists (Table 3, Model I). However, the impact of anti-science communication was only significant for nonpopulist blame attributions and marginally significant for populist blame attributions. These findings partially confirm H1b. Pairwise mean score comparisons confirm this: Participants reported more negative feelings toward scientists in the blame attribution ($M = 4.16, SD = 1.35$) than the control condition ($M = 4.66, SD = 1.16, p < .05$), but the difference was not significant for the populist blame attribution condition ($M = 4.15, SD = 1.34$).

The second hypothesis assumed that populist blame attributions have a stronger impact on negative evaluations and feelings toward scientists than regular blame attributions. Our findings do not support this hypothesis. Hence, inspecting pairwise corrected mean score differences, we see that the populist and nonpopulist blame attribution conditions do not differ significantly regarding negative stereotypical evaluations toward scientists ($\Delta M = -.04, SE = .17, p = 1.00$) or negative feelings toward scientists ($\Delta M = -.05, SE = .18, p = 1.00$). Importantly, these findings illustrate that populist blame attributions are not more persuasive than regular blame attributions in anti-science communication.

Table 2. Effects of Blame Attributions on Negative Evaluations of Scientists.

	Model I (<i>n</i> = 475)			Model II (<i>n</i> = 475)			Model III (<i>n</i> = 475)		
	B	SE	β	B	SE	β	B	SE	β
(Constant)	5.04	.12		6.51	.22		6.26	.27	
Regular blame scientists	.35	.17	.12*	.23	.15	.08	.26	.15	.09 [†]
Populist blame scientists	.32	.16	.11*	.31	.15	.11*	-.38	.49	-.14
All elites blamed	.01	.17	.01	.02	.15	.01	.02	.15	.01
Populist conspiracy	.33	.17	.11*	.28	.15	.10 [†]	.01	.54	.00
Prior cynicism scientists				.32	.04	.39***	.25	.05	.30***
Relative deprivation				.07	.04	.08 [†]	.07	.05	.08
Populist communication × prior cynicism							.17	.08	.29*
Populist communication × deprivation							-.02	.08	-.04
Adjusted <i>R</i> ²		.011			.188			.192	
<i>F</i>		2.34 [†]			19.31***			15.30***	
<i>F</i> for change in <i>R</i> ²					52.23***			2.83	

Note. Two-tailed tests. Unstandardized (B) and standardized (β) regression weights. The treatment variable (conditions) was dummy coded with the control (no populism and no blame attribution) as the reference category.

[†] $p < .10$. * $p < .05$. *** $p < .001$.

Table 3. Effects of Blame Attributions on Negative Feelings Toward Scientists.

	Model I (<i>n</i> = 475)			Model II (<i>n</i> = 475)			Model III (<i>n</i> = 475)		
	B	SE	β	B	SE	β	B	SE	β
(Constant)	4.56	.13		6.37	.24		6.38	.30	
Regular blame scientists	-.38	.18	-.12*	-.26	.17	-.08	-.28	.16	-.09 [†]
Populist blame scientists	-.34	.18	-.11 [†]	-.34	.16	-.11*	.01	.53	.03
All elites blamed	-.07	.18	-.02	-.07	.17	-.02	-.07	.17	-.03
Populist conspiracy	-.25	.18	-.08	-.19	.17	-.06	-.87	.59	-.27
Prior cynicism scientists				-.32	.04	-.35***	-.27	.05	-.29**
Relative deprivation				-.14	.04	-.15**	-.19	.06	-.19**
Populist communication × prior cynicism							-.15	.08	-.23 [†]
Populist communication × deprivation							.12	.09	.25
Adjusted <i>R</i> ²		.006			.186			.190	
<i>F</i>		1.67			19.04***			14.78***	
<i>F</i> for change in <i>R</i> ²					53.04***			1.82	

Note. Two-tailed tests. Unstandardized (B) and standardized (β) regression weights. The treatment variable (conditions) was dummy coded with the control (no populism and no blame attribution) as the reference category.

[†] = $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

The Effects of Conspiracy Theories Blaming All Elites

H3 assumed that populist conspiracy messages that frame an out-group threat comprising all elites affected negative evaluations (H3a) and feelings toward scientific elites (H3b). Table 2 shows that the blame-all-elites condition significantly increases respondents' negative evaluations of scientists compared with the control condition (Model I) only when populist language is used. We can confirm this with an analysis of variance where we compare mean score differences: Although the populist conspiracy condition in which blame attribution is combined with a populist antagonist narrative results in more negative evaluations toward scientists ($M = 4.63$, $SD = 1.15$) compared with the control condition ($M = 5.08$, $SD = 1.12$, $p < .05$), participants in the control condition are not significantly more negative toward scientists than participants in the anti-science condition that blames all elites without explicitly pointing to a populist conspiracy ($M = 5.03$, $SD = 1.03$). Next, our analyses showed no significant effects of the conditions that blamed all elites, both the nonpopulist and populist message, on negative feelings toward elites (Table 3, Model I). Therefore, H3b is not supported.

The Role of Prior Levels of Deprivation and Evaluations of Scientists

H4 and H5 assumed the moderating effects of prior levels of deprivation (H4) and (negative) evaluations of scientists (H5) on the effect of the populist conditions on (a) negative evaluations of scientists

and (b) negative feelings toward scientists. Tables 2 and 3 provide the regression analyses that include the interaction terms in Model III. Our findings show that there are no significant interaction effects between exposure to populist communication and pretreatment perceptions of relative deprivation on negative evaluations (Table 2, Model III) or feelings (Table 3, Model III) toward scientists—which does not support H4. When we look at pretreatment cynicism, we find support for a significant interaction effect that is in line with H5: the stronger participants' existing distrust of and cynicism toward scientists, the stronger the impact of populist anti-science communication on negative evaluations toward scientists (Table 2, Model III). We additionally find a marginally significant interaction effect between exposure to populist communication and pretreatment cynical and distrusting perceptions toward scientists on negative feelings (Table 3, Model III). This finding indicates that, although the interaction effect fails to reach conventional levels of significance, participants distrusting scientists report slightly *less* negative feelings when exposed to a populist compared with nonpopulist message. This finding offers no support for H5.

Discussion

Populist communication not only may attribute blame to political elites but can also highlight an antagonism between “virtuous” ordinary people and “corrupt” or “unvirtuous” scientific elites—a phenomenon that has been labeled *science-related populism* (Mede & Schäfer, 2020). In times of increasing relativism toward expert knowledge and empirical facts (Van Aelst et al., 2017; Waisbord, 2018), attributing blame to scientists for misleading or misinforming the public may be a persuasive communication tactic that resonates with the “fake news” and antiexpert labels used by populist politicians (Egelhofer & Lecheler, 2019). In this setting, we conducted an experiment to assess how science-related populism compared with general blame attributions and more extreme populist conspiracy theories impacts public evaluations of the scientific community.

Our main findings show that attributing blame to scientific elites for failing climate change policies—in either a populist or nonpopulist way—activates negative evaluations of scientists. Negative emotions toward scientists were only activated when blame attributions to scientists were emphasized without a conspiracy or populist cue. Comparing the three different forms of anti-science communication studied in this article, our findings do not point to a clear persuasive advantage of science-related populism (Mede & Schäfer, 2020) over regular blame attributions. Simply attributing blame to scientists for failing to come up with concrete solutions was just as persuasive as emphasizing a central antagonism between the ordinary people and the culpable elites. This is not in line with experimental evidence that points to the persuasive advantage of explicit populist cues (e.g., Blassnig & Wirz, 2019; Hameleers & Schmuck, 2017). Yet, when all elites *together* were held accountable for climate-related problems, the explicit populist conspiracist narrative enhanced the impact of blame attributions.

We can explain this based on the credibility of the blame attributions offered in the different anti-science narratives. In line with social identity framing and populist communication's impact, populist cues are found to have the strongest impact when they highlight a sense of in-group injustice and a credible scapegoat (Bos et al., 2020). For the general public, the antagonism between “corrupt” scientists and “honest” ordinary people may not be a credible interpretation frame for the forwarded position that scientists are not doing enough to fight climate change. Although anti-science populism may be a credible narrative

when climate change is denied or human interference is rejected, the pro-climate change interpretation used in this article may offer a less plausible narrative to frame in terms of a populist antagonism—at least in the Dutch context, where populist anti-science positions are associated with climate change denial and cynicism. Although populism is a flexible and thin ideology that may be attached to all sorts of left- and right-wing positions, anti-science communication regarding climate change is more likely to be an issue owned by the radical right wing in the Dutch setting. Future research should therefore experiment with different (ideological) positions assigned to the issue of climate change.

Here, we should note that anti-science communication did not have consistent effects on negative emotions toward scientists. Although stereotypical traits were activated by pointing to the failures of scientists under some conditions, people's emotions are a more stable trait that are not simply altered or primed by blaming scientists or pointing to a populist antagonism. Although this does not support literature that found that populist cues may affect emotional states in the political realm (Wirz, 2018), we can explain this based on the rather subtle nature of our manipulations and the less emotional nature of scientific evaluations. Hence, the treatment did not offer a strong oppositional narrative of climate change, and the blame attribution narrative did not include a strong appeal at emotional responses.

Theoretically, our findings on more encompassing conspiracist blame attributions offer support for a discursive affinity between populism, conspiracy theories, and post-truth politics. In today's fragmented digitized media environment, messages that challenge elite knowledge and established facts become more prominent and influential: Actors at the fringes of the political spectrum are afforded access to alternative media spaces in which conspiracies, anti-elitist, and disinformation beliefs can be expressed. Such ideas can have a real-life impact on support for the scientific community: Actors that deliberately spread disinformation to delegitimize expert knowledge on climate change and frame scientists as self-interested and corrupt can succeed in the goal of demobilizing support for climate change interventions. As extant literature has identified that attacking the established order to increase cynicism and derail societies by increasing polarization is an important goal of disinformation agents (e.g., Bennett & Livingston, 2018; Marwick & Lewis, 2017), our findings support the idea that this can be an influential tactic when combined with a populist conspiracy reasoning.

In line with the hypothesized mechanism of trait activation (Krämer, 2014; Müller et al., 2018), we found that populist attributions of blame are most effective among citizens who have negative prior perceptions of scientists. Among these segments of the audience, negative schemata of "evil" scientists are arguably more easily accessible, and more likely to be triggered after exposure to populist messages. This is in line with the ideational approach to populism (Hawkins, Carlin, Littvay, & Rovira Kaltwasser, 2018). Populist perceptions can be activated by contextual factors that make interpretations of an antagonistic divide between the people and the elites more credible and personally relevant. This also demonstrates that populist messages that blame scientists may be most effective when they target people with congruent prior attitudes.

We did not find moderating effects of attitudinal congruence for populist conspiracies, nor did we find support for hypothesized interaction effects with relative deprivation. This contradicts research that found indirect effects of populist communication among relatively deprived citizens (Bos et al., 2020)—at least when looking at the mobilization of the in-group as a dependent variable. The only significant

interaction effect between relative deprivation and populist conspiracies was on positive feelings toward scientists—which runs counter to the expected direction of effects. One potential explanation of these unexpected findings can be found in the way we framed populism and blame attribution in political communication. Our manipulation deviates from many operationalizations of right-wing populism in terms of the framing of an unowned issue (climate change) and the direction of the blame attributions (climate scientists do not do enough, instead of more prominent populist blame attributions that emphasize that they do too much). Feelings of relative deprivation may offer a more relevant contextual opportunity for right-wing populist messages that emphasize the cleavage between ordinary people and profiting out-groups. Yet, in line with arguments of a populist zeitgeist (Mudde, 2004), we believe it is important to study the impact of populist identity framing outside of right-wing settings, also taking into account that anti-science sentiments can be a focal point of left-wing populists in different regions too. Left-wing populism is an important political force across the globe, and the strategic use of populist framing even exceeds the sphere of populist politics: Any communicator can “flirt” with populism when attempting to influence the electorate, and we show how this can be applied to fuel negative perceptions toward scientists.

Our findings have implications for practice and policy in the field of science communication. We show that, under some conditions and for some people, emphasizing negativity toward the scientific community can amplify negative perceptions toward scientists. Although critique and skepticism toward elite actors is a fundamental part of democracy and the media’s role as a watchdog, it is important that such critique remain civil and founded on rational arguments. In addition, it may be important for science communication to relativize the public’s distrust and to acknowledge uncertainty and cynicism experienced toward scientists. One way of achieving this is to acknowledge the origins of changes and updates in analyses and to report on “honest” mistakes. This way, trust may be restored through accountability and transparency and by involving people’s concerns and distrust in communication about science.

This study has some noteworthy limitations. First, the scope of the experiment was limited to a single national setting and assessed the effects of blame attribution on one highly salient topic: climate change. Although this is an issue that transcends national borders, and even though anti-science beliefs and post-truth politics are global phenomena, future research needs to more specifically assess the transferability of our findings to other settings. Second, we zoomed in on a populist interpretation that is less directly associated with left- or right-wing host ideologies. We framed scientists as responsible for not offering concrete solutions to fight climate change—which may contradict a more conservative populist issue position suggesting that we should not invest more in the fight against climate change. Although we believe that this issue position can credibly be framed in a populist way, we suggest future research to compare the effects of opposed politicized interpretations: framing climate change as a hoax versus the most important issue to address. We should also note that the differences among the three levels of anti-science communication were relatively small, especially when comparing the populist versus nonpopulist blame conditions that both criticized science. Although it was one of our main aims to assess the impact of related, but differently framed, anti-science beliefs, the lack of effects may be due to the nuanced differences between conditions. Future research may explore whether more explicit populist cues and less clear blame attributions yield comparable results. Here, it is also crucial that manipulations only differ on the level of explicit populist references: It may be argued that the accusations of deliberately misleading the people

used in this experiment are closer to “fake news” labels than populist rhetoric, which may need to be part of separate (isolated) manipulations in future research.

Despite these limitations, we believe that our study has important implications. We demonstrate how attacks on expert knowledge may increase cynicism and negativity toward scientists—which may increase the public’s opposition toward climate change policies. Practically, it is important to consolidate trust in the scientific community and show that scientists have no intentions to manipulate public opinion and deliberately mislead citizens.

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Appendix: Stimuli

Note. All stimuli are translated from Dutch (original language) to English. Differences in length, consistency, spelling, and formulation are likely to be due to translation issues.

Policy to combat climate change could be more effective

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Global warming is an urgent problem. Yet, the measures taken to date have failed to combat this problem. The longer we wait, the greater the damage to the planet and the economy will be. It is therefore important to start thinking about measures that need to be taken to turn the tide. Timely action can make a difference to ensure the well-being of future generations.

A better future is surely possible. The price of carbon-dioxide emission needs to be increased to encourage both citizens and businesses to reduce their energy consumption and switch to clean energy sources. Carbon taxes are considered the most powerful and efficient tools, but only if they are implemented in a fair and growth-friendly manner.

Regulations regarding carbon-dioxide emission would help to provide a healthier life for more than 700,000 people worldwide who are now severely affected by local air pollution, the International Monetary Fund (IMF) has calculated. It would help control future global warming, as agreed by the international community. About 50 countries worldwide have implemented some form of regulation to restrict CO₂-emission, which is currently far below what the planet needs. Countries seem to be mainly concerned with the impact of higher energy costs on the competitive advantages in their industries. Sweden has already set a good example. Emissions have decreased by 25 percent since the measurements were introduced in 1995, while the economy has increased by 75 percent since then. The challenge is to ensure that more countries adopt CO₂-emission regulations and thereby help to combat global warming. The transition to clean energy still has a long way to go, and more action is needed to change the current course of climate change.

Figure A1. Control condition.

Science in the way of effective climate policy

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Global warming is an urgent problem. Yet, measures taken to date have hardly been effective because scientists are more focused on building complex climate models than providing concrete solutions. The longer we wait, the greater the damage to the planet and the economy will be. Until now, policies based on scientific insights are constantly lagging behind new developments. In addition, science is unable to come up with recommendations that are actually feasible.

A better future is surely possible. However, the proposal to raise the price of carbon-dioxide emission to stimulate the transition to clean energy has been thwarted by the fact that science only provides information that is too complex.

Regulations regarding carbon-dioxide emission would help to provide a healthier life for more than 700,000 people worldwide who are now severely affected by local air pollution, the International Monetary Fund (IMF) has calculated. It would help control future global warming, as agreed by the international community. About 50 countries worldwide have implemented some form of regulation to restrict CO₂-emission, which is currently far below what the planet needs. However, many countries are late with the implementation of such policies, partly due to a lack of scientific clarity. Sweden has already set a good example. Emissions have decreased by 25 percent since the measurements were introduced in 1995, while the economy has increased by 75 percent since then. The challenge is to ensure that more countries adopt CO₂-emission regulations and thereby help to combat global warming. However, in many countries this process is delayed by scientists. The transition to clean energy seems unfeasible as long as scientists dominate the debate with their complex explanations and no workable solutions.

Figure A2. Scientist blame condition.

Failing scientists manipulate climate policy, victimizing ordinary citizens

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Global warming is an urgent problem for us. Yet, measures taken to date have hardly been effective because scientists are more focused on building complex climate models than on providing concrete solutions that serve the interest of ordinary people. The longer we wait with climate-change policies, the greater the damage to our planet and the economy will be. Influential climate scientists, however, are only concerned with their scientific careers and consciously create confusion by spreading complex information.

A better future is possible. However, the proposal to raise the price of carbon-dioxide emission to stimulate the transition clean energy has been thwarted by scientists who serve other interests. Elitist climate scientists put their personal agenda first, even at the expenses of the quality of life and interests of ordinary citizens.

Regulations regarding carbon-dioxide emission would help to provide a healthier life for more than 700,000 people worldwide who are now severely affected by local air pollution, the International Monetary Fund (IMF) has calculated. It would also help control future global warming so that we can keep our feet dry in the Netherlands. About 50 countries worldwide have implemented some form of regulation to restrict CO₂-emission, which is currently far below what the planet needs. However, many countries continue to postpone its implementation, partly due to scientists that deliberately mislead the ordinary people.

Sweden has already set a good example. Emissions have decreased by 25 percent since the measurements were introduced in 1995, while the economy has increased by 75 percent since then. The challenge is to ensure that more countries adopt CO₂-emission regulations and thereby help to combat global warming. In most countries, including the Netherlands, elite scientists do not cooperate in this solution. In doing so, they ignore the fact that ordinary citizens are now the victims of climate change. The transition to clean energy seems unfeasible as long as climate scientists come up solely with complex and inimitable analyzes that are not in the interest of ordinary citizens.

Figure A3. Populist scientist blame condition.

Politics, businesses and science collectively fall short in shaping climate policy

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Global warming is an urgent problem. Actions so far have barely been effective because politicians, scientists and the industry are not working efficiently enough to tackle the global climate-change problem. The longer we wait with climate-change policies, the greater the damage to the planet and the economy will be. Those responsible for tackling the problem - politics, science and businesses – do not work together and therewith don't follow up with implementable actions.

A better future is possible. Raising the price of carbon-dioxide emission will stimulate companies to reduce energy consumption and switch to clean energy. However, the aforementioned parties are too concerned with their own interesting and do not cooperate well enough to achieve efficient and targeted solutions.

Regulations regarding carbon-dioxide emission would help to provide a healthier life for more than 700,000 people worldwide who are now severely affected by local air pollution, the International Monetary Fund (IMF) has calculated. It would help control future global warming, as agreed by the international community. About 50 countries worldwide have implemented some form of regulation to restrict CO₂-emission, which is currently far below what the planet needs. However, many countries are late with the implementation of such policies. The challenge is to ensure that more countries adopt CO₂-emission regulations and thereby help to combat global warming. A lack of decisiveness and cooperation among climate science, politics, and business is the reason why these measures are still not in place. The actors are mainly focused on their individual agendas and therewith lose sight of the common goal. The transition to clean energy seems unfeasible as long as these influential actors do not collectively collaborate to turn the tide on climate-change issues. This is yet another situation that shows that cross national problems can only be tackled if all influential actors work together efficiently.

Figure A4. All elites blamed condition.

Elites sabotage climate policy, victimizing ordinary citizens

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Global warming is an urgent problem for us. Yet, measures taken to date have hardly been effective since they are based on the false conclusions and failing policies by the elites in charge, namely the politicians, multinationals, and climate scientists. The longer we wait with climate-change policies, the greater the damage to our planet and the economy will be. However, the corrupt elites only care about their own interest and conspire to hide real solutions from ordinary citizens.

A better future is possible. However, the proposal to raise the price of carbon-dioxide emission to stimulate the transition clean energy has been thwarted by self-enriching elites in science, politics, and business. They put their personal agenda first, even at the expenses of the quality of life and interests of ordinary citizens.

Regulations regarding carbon-dioxide emission would help to provide a healthier life for more than 700,000 people worldwide who are now severely affected by local air pollution, the International Monetary Fund (IMF) has calculated. It would also help control future global warming so that we can keep our feet dry in the Netherlands. About 50 countries worldwide have implemented some form of regulation to restrict CO₂-emission, which is currently far below what the planet needs. In many countries, including the Netherlands, the measure has been successfully lobbied against by politicians, business, and climate scientists, who are mainly concerned about their own agenda rather than the interests of the common people. In doing so, they ignore that ordinary citizens are now the victims of climate change. The transition to clean energy seems unfeasible as long as the elites, in their pursuit of power, ignore the problems and let the ordinary, hardworking citizens pay for it. This is yet another situation which shows that those in control are fighting only for their own interests and are not concerned with the well-being of ordinary people.

Figure A5. Populist conspiracy condition.