Public trust in science

Overview findings on trust and scientific trustworthiness

RAND Europe

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Background

This report is one of three outputs from a programme of research on public trust in science conducted by RAND Europe and commissioned by Wellcome. The study examines trust and trustworthiness in science and scientists, with a particular focus on what helps establish and demonstrate the trustworthiness of science.

Acknowledgements

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Executive summary

This document presents an overview and synthesis of findings from RAND Europe's research for Wellcome on public trust in science and scientific trustworthiness.

The first phase of this work involved a literature review of conceptual and empirical research on public trust in science, with a specific focus on Europe, the USA and Canada. The second phase involved an exploratory analysis of how scientific trustworthiness is demonstrated, recognised and contested in social media.

Key findings

Trust in science is generally moderate to high, with little evidence of a widespread collapse in confidence. Levels of trust differ between countries and at the individual level. However, those who actively distrust may have a disproportionate impact on public conversations around science.

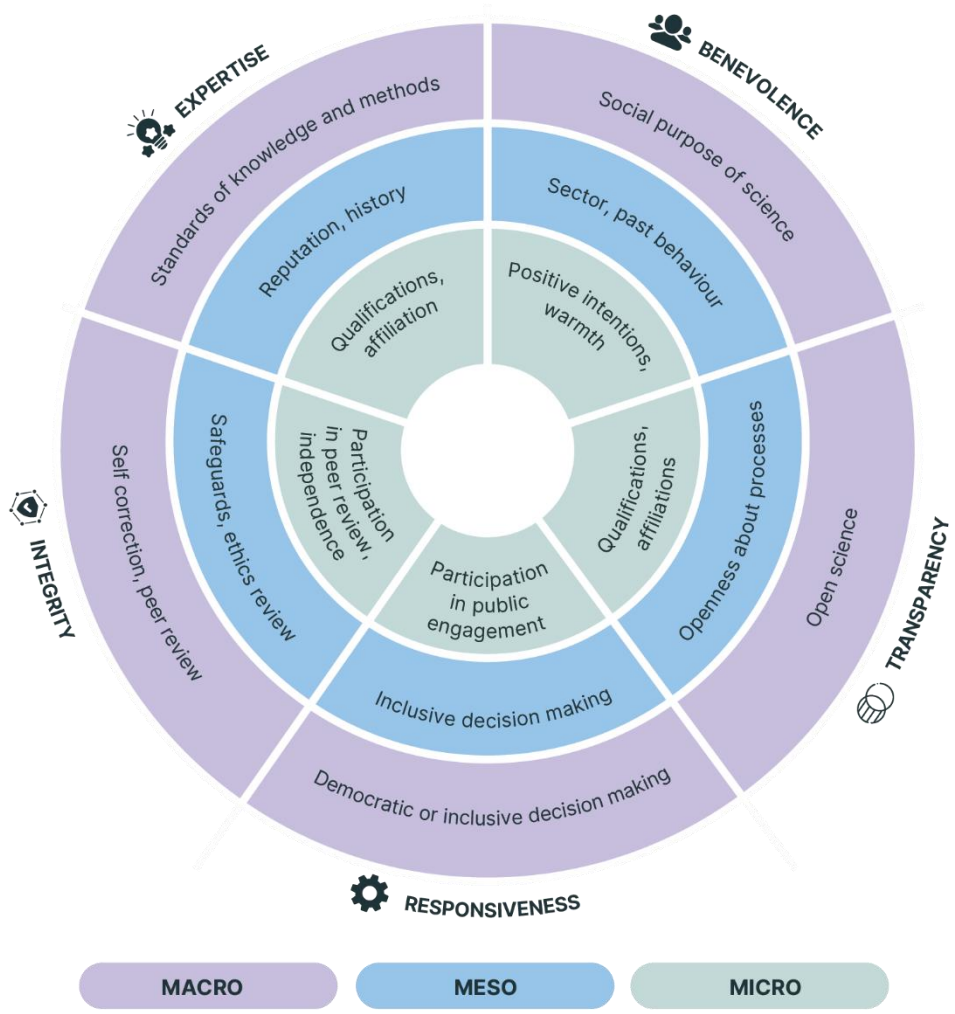
A lack of trust should be distinguished from distrust. A lack of trust may be neutral, passive and reflect a lack of engagement or interest. Distrust, in contrast, involves a belief that scientific actors may mislead, act in bad faith or fail to uphold expected standards. This belief may be warranted at times, particularly by personal or historical experience.

Maintaining public trust in science requires attention to scientific trustworthiness. Trustworthiness can be defined as the qualities that make individuals, institutions and scientific systems deserving of trust, regardless of whether trust is conferred. It relates to five qualities: expertise, integrity, benevolence, transparency and responsiveness.

Building well-placed public trust in science requires **trustworthiness to be demonstrated** in ways that allow members of the public to place their trust confidently. This occurs at the individual (micro), institutional (meso) and system (macro) levels (see figure 1 below).

Figure 1

The three levels and five dimensions of scientific trustworthiness, with indicative activities at the micro (individual), meso (institutional) and macro (system) levels (Source: RAND Europe analysis).



Scientists and institutions often foreground expertise as the basis for public trust. However, public evaluations of trustworthiness also emphasise motives, independence, openness and a willingness to listen to or engage with public concerns. Responses to scientists on social media often focus on independence, funding, governance and links to political or commercial interests.

Transparency works differently for different audiences. Openness about uncertainty and scientific limitations can strengthen trustworthiness for some people by signalling honesty. However, the same transparency can reinforce doubt for others, especially those already sceptical.

Responsiveness or scientific openness to dialogue and conversation is conceptually important but less visible in practice than other qualities. Active listening, public engagement and genuine dialogue appear less often in current science communication practice, especially on social media.

Public assessments of trustworthiness and the placing of trust also depend on the social and political context of a scientific domain, as well as an individual's willingness to trust.

Implications and recommendations

The findings underline the need for approaches that support scientists and institutions in robustly demonstrating their trustworthiness.

Key recommendations are as follows:

1. Scientific institutions, funders and scientists should work to build and maintain public trust in science by ensuring that the public can place their trust in **genuinely trustworthy science.**
2. Efforts to demonstrate trustworthiness should not rely solely on showing expertise. Scientists and scientific institutions should make **visible commitments to integrity, benevolence, transparency and responsiveness**.
3. Scientists' and institutions' commitments to **integrity** should acknowledge concerns about motivations as well as the robustness of scientific practice. Scientists and institutions should be clear and open about their commitments, values and funding.
4. Claims about **benevolence** and the wider social benefits of science should **acknowledge the limits of individual scientists' or institutional action** and situate them within broader social, economic and political systems and constraints.
5. It is important that **findings are communicated transparently**, particularly about uncertainty. Communication should be open and clear. It requires careful attention to audience, context, and content.
6. **Scientists and institutions** should respond to public views, hopes, and concerns and involve the public in their work. Where public engagement and dialogue have informed research, this should be communicated widely to

demonstrate how science responds to people and communities.

7. Scientists should consider how to engage actively and responsibly with audiences, rather than relying on one-way communication. Institutions can enable this by ensuring engagement is supported by institutional policy.
8. Scientists and institutions should consider how different online and offline settings can demonstrate differing forms of interaction with the public and dimensions of trustworthiness. This might, for example, mean using YouTube for one-way dissemination, discussing research on Reddit, and engaging members of the public in in-person conversation or formal dialogue.
9. Scientists and institutions should account for the changing nature and role of social media in shaping how scientific trustworthiness is demonstrated and interpreted. Changes in how social media platforms are governed and how users interact with them mean that their use in science communication and their role in shaping the demonstration and interpretation of scientific trustworthiness should be continually under review.

The report identifies specific areas for further research to support these recommendations, as outlined below:

- Understanding the dynamics of public trust in science and the relationship between public trust and perceived scientific trustworthiness requires not only large-scale cross-sectional surveys, but also robust longitudinal approaches and observational research to understand behaviours associated with public trust in science.
- Quantitative work should be supported by consistent measures of trust and distrust that distinguish between trust in scientists, institutions and systems, and between trust, a lack of trust and distrust.
- Observational work should examine behaviours and attitudes indicative of trust and distrust in science.
- Qualitative and quantitative work with individuals and groups who actively distrust scientists, institutions and science in general is needed to understand the basis for distrust as a discrete phenomenon.
- Further work is needed to understand when and how communicating uncertainty signals transparency. This is particularly important to avoid undermining perceived competence among those who distrust science. This work can serve as a basis for clear, consistent guidance for researchers on the importance of transparency and how to mitigate these risks.

- Experimental, intervention-based research focused on the individual and combined dimensions of trustworthiness should be conducted to provide a clearer understanding of how they affect public trust in science across different public groups and scientific areas.
- Systematic qualitative and quantitative research with scientists, public engagement practitioners, and members of the public is needed to understand whether and how both a commitment to, and involvement in, public engagement contributes to public trust in science and impacts on scientific practice.
- Research using data science approaches should examine the potential to observe, in real time, the dynamics of public and scientific trust in science and the impact of Artificial Intelligence (AI) on science communication. Online and social media data collected for this work should be made as widely available as possible to facilitate replication and extension.

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Introduction

Trust in science, scientists and scientific institutions plays a central role in how scientific knowledge is received, interpreted and acted upon in contemporary societies. It enables people to understand the world and make informed decisions in the face of uncertainty and in circumstances in which they cannot independently verify specialised knowledge. Growing concerns about declining trust in science, polarisation and misinformation have sharpened attention on the relationship between science and wider society.

A growing body of research examines how much trust the public has in science, identifying groups that are more or less trusting. However, trust is also shaped by the qualities and actions of scientists and scientific institutions. We cannot separate questions of public trust from questions of scientific trustworthiness and its interpretation: what it means for science to be worthy of trust, how this is demonstrated in practice and how diverse audiences interpret those demonstrations.

This overview document states the overarching project findings. It presents and synthesises the headline findings of work discussed in more detail in two further reports (Coringrato et al. 2026; Cardoz et al. 2026). The first report reviews the literature to summarise the landscape of conceptual and empirical evidence on public trust in science and the qualities associated with trustworthy scientific practice. It highlights overall trends and clarifies key conceptual and empirical distinctions: between trust and distrust, between trust and trustworthiness and between different dimensions and levels of trustworthiness. Further detail can be found in the literature mapping report (Coringrato et al. 2026).

Drawing on exploratory empirical research, we then describe empirical findings related to how scientific trustworthiness is understood and operationalised in social media settings. We provide an initial insight into how trustworthiness cues are produced, recognised and challenged in everyday online interactions around science. Further details can be found in the social media analysis report (Cardoz et al. 2026).

Together, these reports emphasise that understanding public trust in science requires attention to scientific trustworthiness and to how demonstrating trustworthiness may contribute to the formation of well-placed trust in science. The findings can enable scientists and scientific institutions to more effectively consider the qualities that

make them trustworthy and understand the limits and risks of different approaches to demonstrating these qualities. In closing, we identify and evaluate how dominant approaches to science communication demonstrate trustworthiness and provide recommendations to support scientists and funding institutions in upholding and demonstrating the trustworthiness of science.

From trust in science to trustworthy science

What is trust?

Trust is a relationship between an individual or group who is trusting (the trustor) and the individual or group who is being trusted (the trustee). This relationship is formed within a specific activity or field. Trust in science can be understood as trust in scientists' capacity to provide accurate and reliable information, or epistemic trust (Wilholt 2013).

Trust in science is multidimensional and culturally embedded, shaped by cognitive assessments, emotional responses and social contexts. It can be considered in terms of trust placed in individual scientists (the micro-level), scientific institutions (meso-level) or at the macro-level, in science as a collective enterprise or activity (Kwantes et al. 2026; Slater & Scholfield 2022; Younger-Khan 2026).

Trust – or the lack of trust – should be distinguished from distrust (Kwantes et al. 2026; National Academies 2015). Distrust in science is not simply the absence of trust but a belief that scientific actors may act with malevolent intentions, produce misleading information or fail to uphold expected standards (National Academies 2015). Distrust is not always a negative and is not always irrational, but can be warranted when it rests on rational, evidence-based arguments (Geislar & Holman 2025).

In the following sections, we introduce headline findings from the literature review of public trust in science and scientific trustworthiness. Full details are presented in our second report (Coringrato et al. 2026). We start with an overview of findings related to public trust in science, before introducing qualities

associated with scientific trustworthiness and considering how scientists and institutions can demonstrate these qualities.

The state of trust

There is little evidence of a general collapse in public trust in science. Across countries and surveys, trust in science is generally moderate to high and has remained so consistently. Trust in science and scientists is generally higher than trust in other domains, such as government and politicians, or criminal justice and judges (Edelman Trust Institute 2026; Herrick et al. 2026).

Overall patterns mask substantial variation. Trust levels differ between countries, with higher trust commonly reported in Northern Europe and Anglophone countries and lower trust in parts of Eastern Europe (Cologna et al. 2025). Moreover, a small but significant number of people across countries do not have trust in science (Cologna et al. 2025). This active distrust can have a disproportionate impact on policy and the spread of misinformation. At the individual level, values, identity and prior beliefs are often stronger predictors of trust than demographics alone (Cologna et al. 2025). Higher trust is more common among older, more educated and higher income groups (Alvarez et al. 2023; Bromme et al. 2022). Lower trust is consistently associated with conservative ideology in the USA and Europe, as well as with populist attitudes and conspiratorial worldviews (Cologna et al. 2025). Trust also varies by scientific domain. For example, medical and physical sciences tend to attract greater trust than climate science, economics or social science (Gligorić et al. 2024).

Scientific trustworthiness

Public trust in science represents only one part of a picture. Trust relationships are not simply characterised by the amount of trust placed, but by how well it is placed. Misplaced trust in untrustworthy individuals or institutions can be harmful (O'Neill 2018).

Enabling well-placed public trust in science requires understanding what underpins the trustworthiness of science at the individual, institutional and system levels. An idealised perception of science is that of a system concerned with the generation of knowledge through objective methodology and analysis (John 2018). However, trust in science relates not only to trust in scientists as providers of information, but to expectations that scientists' behaviour will align with norms of scientific practice, and that they act with goodwill and integrity (Avitabile & Demichelis 2024; Besley & Tiffany 2023; Morin-Martel 2025). The trustworthiness of scientists is thus associated not only with epistemic competence but also with moral reliability (Goldenberg 2023).

The qualities associated with the trustworthiness of scientists and science can be characterised across five dimensions of trustworthiness (ALLEA 2018; British Academy 2024; Reif et al. 2024):

- Expertise or competence refers to being knowledgeable, possessing problem-solving skills and other competencies and qualifications.
- Benevolence refers to the intentions and goodwill of researchers toward research participants or society more broadly.
- Integrity refers to both reliability and adherence to scientific norms, including participation in peer-review processes and independence from political or financial influence.
- Transparency refers to the extent to which scientists communicate about the details of the scientific process to non-experts.
- Responsiveness captures the extent to which scientists are perceived to engage with and respond to the public.

Demonstrating trustworthiness

To form trust relationships, those looking to place trust must come together with those receiving trust. To establish public trust in science, members of the public must be able to effectively distinguish those scientists and scientific institutions who are genuinely trustworthy. Distinguishing who or what is genuinely trustworthy remains a persistent social challenge. Cues, demonstrations or signals associated with dimensions of trustworthiness can inform judgements about scientific actors and claims:

- Signals of expertise or competence may include disclosure related to education level, intelligence, professionalism, experience, qualification and skills. These cues can signal professionalism, methodological rigour and intellectual capability (Besley & Tiffany 2023; Reif et al. 2024).
- Integrity cues may include behaviours that highlight honesty, accountability and adherence to ethical and professional standards. Scientific norms and procedures act to demonstrate integrity, including transparent self-reporting, study replication, peer reviewing and critiquing reports, article badging, identity verification and transparency protocols (Jamieson et al. 2019; Rosman et al. 2022; Schneider et al. 2022).
- Benevolence signals may include framing messages in terms of prosocial motivation, transparency and empathy or addressing ethical implications (Benson-Greenwald et al. 2023; Janssen & Jucks 2023).

- Transparency cues may include acknowledging or engaging with uncertainty or demonstrating open science practices. These communicate openness about processes, values and limitations and complement expertise and integrity (Schneider et al. 2022; Schröder et al. 2025).
- Finally, responsiveness may be signalled by openness to feedback and willingness to listen (Reif et al. 2024), and direct engagement in citizen science or those with lived experience (Aspen Institute 2024; British Academy 2024).

Such cues differ between individuals (the micro-level), institutions (the meso-level) or science as a system (the macro-level). Moreover, each level is dependent on the behaviour and qualities of the other. Thus, demonstrations of a scientist's expertise may be based on their position at a specific institution. In contrast, the trustworthiness of an individual or an institution may be established by demonstrating adherence to epistemic norms, such as independent peer review. Potential cues are summarised in Table 1 and Figure 2 below.

Figure 2

The three levels and five dimensions of scientific trustworthiness, with indicative activities at the micro (individual), meso (institutional) and macro (system) levels (Source: RAND Europe analysis)

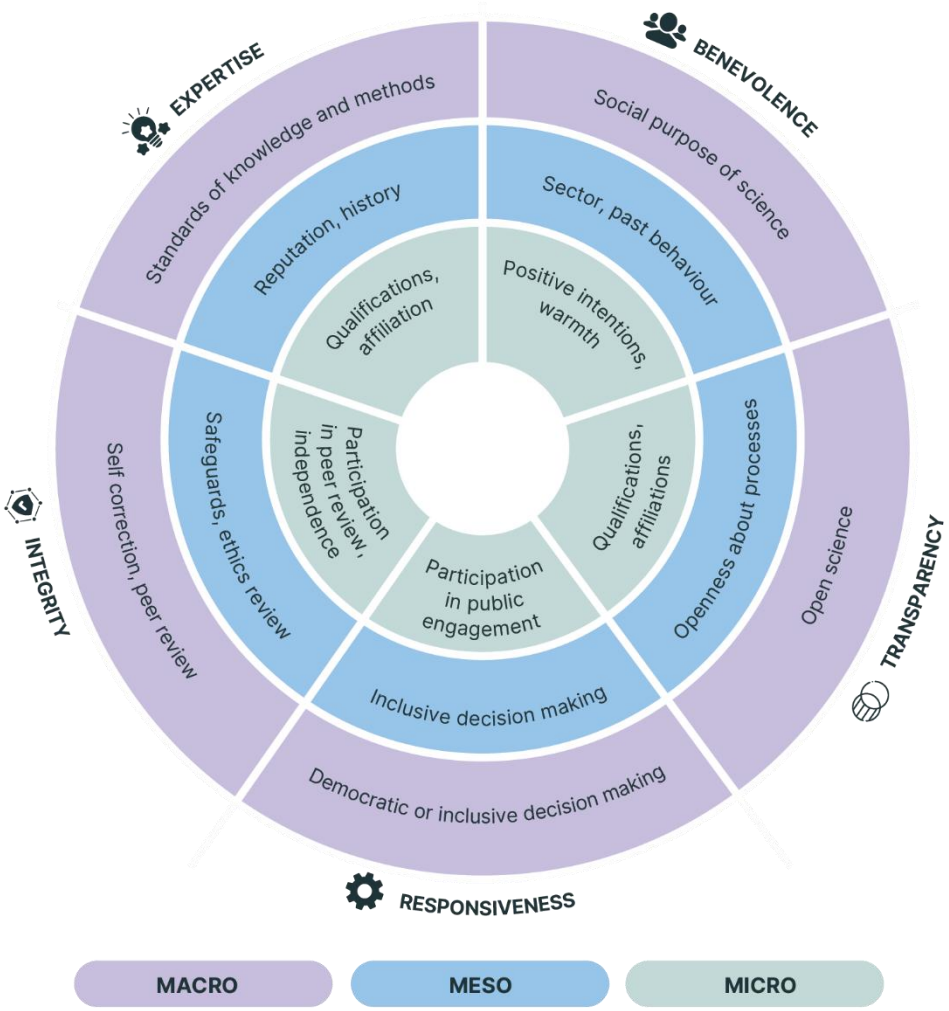

Table 1

A consolidated framework for the analysis of trust in science, with examples of relevant qualities and activities associated with dimensions across levels

	Dimensions				
	Expertise	Benevolence	Integrity	Transparency	Responsiveness
Micro (individual scientists)	Qualifications, affiliation	Positive intentions, warmth	Participation in peer review, independence	Acknowledge uncertainty, limits	Participation in public engagement
Meso (organisations, institutions, and governance)	Reputation, history	Sector (public/private), past behaviour	Safeguards, ethics review	Openness about processes	Inclusive decision-making
Macro (science as a system)	Standards of knowledge and methods	Social purpose of science	Self-correction, peer review	Open science	Democratic and inclusive decision-making

Examining trustworthiness in practice

Social media represents a prominent forum for communicating science, and a site where trust in science may be under threat (ALLEA 2019). In the second phase of this research, we undertook an exploratory mixed-method analysis of trust and trustworthiness cues in social media content across YouTube, Reddit, X and BlueSky. This work builds on the conceptual and empirical insights described above and in our literature review report (Coringrato et al. 2026), as well as on research on science communication on social media (Amarasekara & Grant 2019; Gierth & Bromme 2020; Reif et al. 2020).

The research combines quantitative classification of posts with qualitative examination of discussion threads. It focuses on scientific domains selected as particularly relevant to Wellcome's research strategy: mRNA research, gene editing, climate and health, and digital mental health.

Social media users are not representative of the whole population. While we used a mix of methods and strategically sampled posts to cover a range of domains and platforms, the research was necessarily exploratory. Thus, the findings should be interpreted as reflecting particular social media audiences, providing insight into how trustworthiness is negotiated in practice rather than definitive measures of public attitudes.

Findings

Trust and distrust in online interactions

Audience trust and distrust in science can be observed in online interactions but are expressed in different ways and at different levels. Expressions of trust are commonly diffuse and implicit, comprising general endorsement, acceptance of scientific findings, confidence, hope or support for science. These statements often lack explicit justification and are articulated in broad terms, directed

towards science as a whole, specific fields or technologies, or individual scientists and institutions.

In contrast, distrust is more likely to be explicit and articulated. It is commonly directed at meso-level concerns related to how science is funded, regulated, communicated or governed, rather than at scientific findings in isolation. Critiques frequently focus on issues such as independence, accountability and the influence of political or commercial interests.

Overall, expressions of trust or distrust reflect ongoing and evolving audience judgements about scientific claims, actors and institutions, shaped by prior beliefs and values. Rather than being opposites on a single continuum, trust and distrust are distinct but related positions that often co-occur within the same discussions.

Dimensions of trustworthiness

Quantitative analysis suggests a mismatch between what scientists signal and what audiences attend to. Scientists' and scientific institutions' posts on X and BlueSky most commonly highlight credentials, institutional affiliations and research outputs, reinforcing expertise or competence as the dominant mode of scientific self-presentation.

In contrast, content associated in our analysis with integrity, benevolence and transparency tends to attract relatively higher levels of audience interaction, including replies, reposts and other forms of engagement. While engagement does not represent trust, it does provide the opportunity for trust relationships to form, and this pattern indicates that audiences are particularly attentive to questions of motivation, openness and social purpose.

Qualitative analysis allowed us to trace the cues through which scientists and institutions demonstrate the five dimensions of trustworthiness (expertise, integrity, benevolence, transparency and responsiveness) and to examine how audiences interpret these cues – whether endorsing, challenging or redirecting them toward wider concerns about motives, governance and power.

Expertise

Expertise is important and necessary, but it is not sufficient to establish trustworthiness. While it can establish authority, it does not resolve concerns about values, motives or institutional interests. Credentials, institutional affiliations and references to scientific consensus can reinforce credibility but may also prompt scepticism – particularly where institutions are viewed as politically, economically or culturally contested. Expertise, therefore, functions as a necessary but context-dependent and potentially fragile

foundation for trustworthiness. Clear and accessible communication can further reinforce perceptions of competence.

"This is from NASA: the current warming trend is of particular significance because most of it is extremely likely, greater than 95 per cent probability, to be the result of human activity since the mid-20th century and proceeding at a rate unprecedented over decades to millennia. Countless other sources from other nations and agencies also agree."

(Scientist, Climate and Health, YouTube)

The importance of expertise cues in our study mirrors the findings of prior research (Schröder et al. 2025). In addition, the importance of communicative skills to how commentators in our analysis respond to scientific posts on YouTube reinforces recommendations in previous work by the Aspen Institute on the role of clear and accessible explanations in demonstrating trustworthiness (Aspen Institute 2024).

Integrity

Integrity concerns centre on motives and independence. Scientists and institutions tend to demonstrate methodological integrity through references to evidence, procedures and scientific norms. However, audiences tend to ask for clearer evidence of motivational integrity, including independence from financial or political influence. This pattern is consistent with the distinction introduced above between trust in information and the normative expectations that the public holds about how scientists ought to behave. There is a particular emphasis on financial independence and institutional accountability to establish trustworthiness.

"Oh yes, could you be a little
more objective regarding mRNA based vaccines and less of a cheerleader, because they're in their infancy
in human's [sic], and you have no idea how many bad reactions may occur until they've refined the process or technology. Thanks again.:-)"

(Comment, mRNA, YouTube)

Integrity cues were less prominent in our qualitative findings than in prior research (Schröder et al. 2025). However, integrity considerations do seem to be an important driver of attention. They involve active critique and evaluation of scientific claims, rather than passive dismissal, and their content and tone of comments echo the findings in the wider literature on the importance of independence to the trustworthiness of science (Gundersen et al. 2022).

Benevolence

Expressions of benevolence can generate positive responses. This is particularly true in biomedical and mental health domains, where audiences express hope and excitement and refer to personal experiences of illness, exclusion or unmet need. However, these signals are often evaluated against broader concerns about inequality, access and power. While individual scientists may be perceived as well-intentioned, this does not necessarily resolve scepticism about whether scientific systems benefit society equitably.

"we believe in a world where no one is held back by mental illness [...]"

(Scientist, Digital mental health, YouTube)

The prominence of benevolence in our analysis reflects prior analyses of trustworthiness cues (Schröder et al. 2025). Existing research links benevolence cues to greater trust (Benson-Greenwald et al. 2023; Hautea et al. 2024). However, in the responses from social media audiences in our research, personal or institutional expressions of benevolence are interpreted in light of assessments of the social, economic and political motivations of researchers and structural and systemic constraints on the realisation of scientific hopes.

Transparency

Transparency, particularly in communicating uncertainty, plays a complex, double-edged role. For some audiences, openness about limitations and uncertainty signals honesty and strengthens trustworthiness. For others, the same cues can reinforce doubts about the reliability of scientific knowledge or suggest that conclusions are premature. This variety highlights the need to consider how transparency is communicated, to whom and in what context.

"Whatever method you use, this takes years of work. For example, to make the measles vaccine, scientists had to grow the virus for almost ten years. They needed to weaken the virus enough that it would trigger an immune response without making you sick."

(Scientist, mRNA vaccine development, YouTube)

Our findings add to existing work around the ambivalence of transparency cues, particularly in policy-relevant contexts. They highlight the potential of methodological openness and acknowledgement of uncertainty to enhance perceived trustworthiness (National Academies 2019), but also to complicate communication in contexts of contested evidence or prior distrust (Kreps & Kriner 2020).

Responsiveness

Responsiveness is one of the least visible dimensions of trustworthiness across platforms but remains conceptually important. At a micro-level, it is demonstrated through direct engagement with audiences, such as responding to comments or participating in discussions. Such interaction is relatively rare, but

where it occurs, it can signal openness and willingness to listen. At the meso- or macro-level of dialogue and participation in decision-making, this dimension is often expressed as an aspiration accompanying other dimensions of trustworthiness rather than as a visible feature of practice.

"... progress in the field of science and technology is inevitable. As a society, our goal should be to foster open dialogue, robust ethical frameworks, and transparent regulations that ensure the responsible use of these technologies."

(Comment, CRISPR, Reddit)

The existing literature emphasises the importance of responsiveness and dialogue in the form of humility, active listening and engagement with public hopes and concerns (Reif et al. 2024; Rios et al. 2025). Dialogic approaches can reinforce the perception that experts are listening to partners, rather than distant authorities (Aspen Institute 2024). The infrequency with which responsiveness is highlighted or demonstrated in our sample means that it remains unclear how these efforts contribute to the perceived trustworthiness of science in practice.

Discussion

Across the two phases of this project, we aimed to understand the nature and level of public trust and distrust in science, to understand scientific trustworthiness and to identify what scientists and institutions can do to demonstrate that they are worthy of trust. In doing so, we propose a framework for understanding scientific trustworthiness among social media audiences that emphasises five dimensions (expertise, integrity, benevolence, transparency and responsiveness) across three levels (micro, meso and macro). This model is summarised in Figure 1 above.

Across the literature review and social media analysis, we have examined the cues or signals that demonstrate these dimensions of trustworthiness to others. While the trustworthiness of science is demonstrated by expertise, other qualities may be those most valued by wider audiences. Our findings suggest that some qualities of trustworthy science, including responsiveness, transparency, and motivational integrity, are conceptually important but currently receive less attention in public discussions of science.

Findings from both phases also highlight the importance of context and interpretation. While the literature review emphasises that trust and trustworthiness are relational and audience-dependent, the social media analysis shows how, in practice, the same cues can be interpreted differently by different publics. Together, these findings underline that demonstrating trustworthiness is not only a matter of signalling appropriate qualities, but also of understanding how those signals are received, contested and reshaped across different contexts.

Table 2 considers the implications of these findings through a series of illustrative approaches to how scientists demonstrate trustworthiness online. These aim to highlight the strengths and limitations of different approaches to communication that demonstrate the trustworthiness of science. For instance, a scientist may explain the evidence clearly but still need to provide greater transparency about funding or conflicts of interest. Similarly, when presenting new technologies as solutions to human needs, scientists and institutions may need to demonstrate how public benefit will be achieved and distributed fairly.

These approaches are not linked to the activity of any specific individual or institution but are high-level representations suggested by the literature and our social media analysis. They can be used to reflect on individual or institutional approaches to communication, or for training.

Table 2

Approaches to demonstrating the trustworthiness of scientists and institutions

Approach	Signals	Strength	Limitation
Transparent explanation	Shares background information, explains processes and mechanisms, provides sources and communicates the broader context.	**Transparency**: Makes scientific reasoning more visible and supports informed engagement.	For some audiences, uncertainty makes scientists seem honest and careful. For others, especially those who distrust, uncertainty can become a reason to doubt the science.
Methodologically rigorous but motivationally opaque	Demonstrates careful methods and scientific procedures.	**Integrity:** Builds procedural credibility by showing that claims are grounded in good scientific practice.	Does not answer concerns about motives, funding, political influence or commercial interests.
Caring and relatable problem-solving	Foregrounds the societal value of research, often by expressing concern for human well-being, lived experience, or unmet need.	**Benevolence:** Humanises science and can elicit positive emotional responses, particularly in biomedical and mental health contexts.	Demonstrating prosocial motives does not resolve concerns about structural inequality, access, or whether scientific systems benefit all groups fairly.
Authoritative but distant expertise	Relies heavily on credentials, consensus, and corrective explanation to establish authority.	**Expertise:** Can reassure audiences who value scientific authority and decisive claims.	May alienate people if it appears dismissive, elitist or unresponsive to public concerns.

Recommendations

The findings of the literature review and social media analysis can provide the basis for strategic science communication that signals when science is genuinely trustworthy, with the goal of building well-placed trust.

While establishing firmer, causal links between cues of scientific trustworthiness and public trust requires further research, we here set out recommendations for consideration by individuals and institutions communicating about their science. These recommendations concentrate on how scientists and institutions can work to establish and demonstrate the features of their work that make them trustworthy.

Recommendation 1: Scientific institutions, funders and scientists should work to build and maintain public trust in science by ensuring that the public can place their trust in **genuinely trustworthy science.**

The foundation for building and maintaining public trust in science is ensuring that scientists and scientific institutions are worthy of trust. This endeavour involves taking time to reflect on why they are trustworthy and why there may be distrust, ensuring that scientists and institutions have expertise and integrity, work with benevolence and transparency, and are responsive and open to wider society.

Recommendation 2: Efforts to demonstrate trustworthiness should not rely solely on showing expertise. Scientists and scientific institutions should make **visible commitments to integrity, benevolence, transparency and responsiveness**.

Expertise is a necessary but insufficient component of scientific trustworthiness. Signals of expertise, such as credentials, institutional affiliation and methodological rigour, establish authority but do not consistently translate into public trust, particularly in contested domains. Benevolence, integrity, and transparency are central to trust in science but are less well represented in discussions of science. Establishing the trustworthiness of science involves building and demonstrating these broader dimensions of trustworthiness. As the relative importance of these dimensions in differing contexts is unclear, future work should also consider how to balance and operationalise these elements effectively.

Recommendation 3: Scientists' and institutions' commitments to **integrity** should acknowledge concerns about motivations as well as the robustness of scientific practice. Scientists and institutions should be clear and open about their commitments, values and funding.

Public concerns around the integrity of science concentrate on motivations, independence, and potential conflicts of interest. Failure (or perceived failure) to uphold good scientific practice and perceived political or financial influence can erode trust (Garza et al. 2019; Kwantes et al. 2026; Mihelj et al. 2022) and undermine the sense that scientists are acting in the public's interest (Garza et al. 2019; Gundersen et al. 2022). Scientists and institutions should be clear and open about their commitments, values and funding.

Recommendation 4: Claims about **benevolence** and the wider social benefits of science should **acknowledge the limits of individual scientists' or institutional action** and situate them within broader social, economic and political systems and constraints.

Benevolence appears important for better establishing the trustworthiness of individual researchers (Besley & Dudo 2022; Benson Greenwald et al. 2023), but this does not translate to research domains or wider science. Macro-level social structures and inequalities undermine the perceived societal potential of science and cannot be tackled through micro-level demonstrations of trustworthiness. While communications of benevolent intent are positive, for credibility, they should be complemented with clearer evidence of whether and how action is being taken to address structural challenges.

Recommendation 5: It is important that **findings are communicated transparently, particularly about uncertainty**.

The literature emphasises both the ethical and potential practical benefits of transparency about uncertainty but also risks in some contexts and if not well-defined (Howe et al. 2019; Janssen & Jucks 2023; Kreps & Kriner 2020; Schneider et al. 2022; Steijaert et al. 2021; van der Bles et al. 2020). Communicating technical uncertainty may make the scientific process seem more credible and increase perceived integrity, but it may also diminish support for scientific recommendations in policy, particularly in contentious fields. Communication should be open and clear. It requires careful attention to audience, context, and content.

Recommendation 6: Scientists and institutions should **respond to public views, hopes, and concerns** and involve the public in their work. Where public engagement and dialogue have informed research, this should be communicated widely to demonstrate how science responds to people and communities.

Action to increase scientific involvement in, and awareness of, public engagement and dialogue related to their work would help amplify it in their discussions of their work. Sponsors of public engagement and dialogue should work to increase awareness of these activities among researchers. Researchers and institutions should be encouraged to actively engage with public views on science and to highlight how research responds to public concerns and needs or is informed by public engagement and dialogue. This may help demonstrate that science is **responsive** to public concerns.

Recommendation 7: Scientists should consider how to **engage actively and responsibly** with audiences, rather than relying on one-way communication.

Responsiveness through public participation and dialogue can contribute to trustworthiness (Aspen Institute 2024; Bedessem et al. 2021; Besley & Dudo 2022; British Academy 2024; Momme et al. 2025). However, our analysis of online spaces suggests that there is little active interaction among scientists, institutions and public audiences. This limits researchers' ability to **demonstrate open-mindedness and responsiveness** and may contribute to a return to one-way approaches to science communication. Developing **responsive, active listening** in online and offline settings requires institutional support, including recognition of the time needed to do this as part of science engagement, training in how to do it well, and potential changes in institutional social media policies to support and protect researchers as they engage online.

Recommendation 8: Scientists and institutions should consider how different online and offline settings demonstrate differing forms of interaction with the public and dimensions of trustworthiness.

Different online and offline settings afford different forms of interaction between scientists and members of the public. Individuals and institutions should **consider the possibilities and limits associated with each setting** for building trust relationships. For example, social media analysis suggests that YouTube communication can demonstrate expertise through a scientist's reputation and communication style. In contrast, Reddit's conversational orientation enables more responsive two-way interactions. Engagement in these forums can complement – and be complemented by - offline public engagement activities.

Recommendation 9: Scientists and institutions should **account for the changing nature and role of social media** in shaping how scientific trustworthiness is demonstrated and interpreted.

Changing media environments shape how trustworthy behaviour is interpreted (Boyd 2020; Gierth & Bromme 2019; Reif et al. 2020;

Schröder et al. 2025). Our analysis suggests that **social media's role in science communication is shifting in line with wider platform changes and changing user behaviour.** This change is reflected in scientific discussion moving to less widely used spaces, such as BlueSky, and in declining opportunities for interaction, e.g. where YouTube comments are disabled. For scientists and institutions, the shifting nature of the social media environment may mean creating new communities and spaces for engagement, rather than relying on the capabilities of existing platforms.

In combination, these recommendations provide a coherent set of guidance and approaches. They align with and extend the recent survey and report produced for Wellcome and More in Common (Herrick et al. 2026). Specifically:

- **Recommendation 1** aligns with Herrick et al.'s recommendations related to recognising when **authority is not enough**, and demonstrating integrity by **making independence visible**
- **Recommendations 2 and 4** align with the recommendation to show **impact beyond the laboratory** – both by demonstrating the responsiveness of science to public concern and acknowledging the structures that limit the impact of science on everyday life.
- **Recommendation 3** aligns with recommendations on **communicating uncertainty with respect** and on supporting people **to think, not just comply**.

The recommendations can provide a basis for future work to determine whether and how a focus on scientific trustworthiness can enable well-placed public trust and, in turn, reinforce the future development of trustworthy science. Our review suggests several areas requiring further research to support this, and to build a better understanding of public trust in science and scientific trustworthiness:

- Understanding the dynamics of public trust in science and the relationship between public trust and perceived scientific trustworthiness requires not only large-scale cross-sectional surveys, but also robust longitudinal approaches and observational research to understand behaviours associated with public trust in science.
- Quantitative work should be supported by consistent measures of trust and distrust that distinguish between trust in scientists, institutions and systems, and between trust, a lack of trust and distrust.
- Observational work should examine behaviours and attitudes indicative of trust and distrust in science.

- Qualitative and quantitative work with individuals and groups who actively distrust scientists, institutions and science in general is needed to understand the basis for distrust as a discrete phenomenon.
- Further work is needed to understand when and how communicating uncertainty signals transparency. This is particularly important to avoid undermining perceived competence among those who distrust science. This work can serve as a basis for clear, consistent guidance for researchers on the importance of transparency and how to mitigate these risks.
- Experimental, intervention-based research focused on the individual and combined dimensions of trustworthiness should be conducted to provide a clearer understanding of how they affect public trust in science across different public groups and scientific areas.
- Systematic qualitative and quantitative research with scientists, public engagement practitioners, and members of the public is needed to understand whether and how both a commitment to, and involvement in, public engagement contributes to public trust in science and impacts on scientific practice.
- Research using data science approaches should examine, in real time, the dynamics of public trust and scientific trustworthiness and the impact of Artificial Intelligence (AI) on science communication. Online and social media data collected for this work should be made as widely available as possible to facilitate replication and extension.

Conclusion

Public trust in science remains generally strong but is conditional on how science is communicated and perceived. Audiences do not judge trustworthiness on expertise alone: they look for clear evidence of integrity, independence, openness, and a willingness to listen. Our findings highlight that trust is shaped through interaction - by context, platform, and the concerns people bring to science - not simply by the strength of evidence.

This means that building trust in science is less about asserting authority and more about demonstrating how science works, why it matters, and whose interests it serves. Effective approaches will combine strong evidence with visible commitments to transparency, fairness, and public engagement, tailored to different audiences and settings. Strengthening trust in science depends on supporting researchers and institutions to communicate in ways that make their trustworthiness clear, credible, and relevant in practice.

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