Chapter 6
A General Public's Perspective: Factors that Constrain Individual Trust in Science

Christiana Varda, Kalypso Iordanou, and Josephina Antoniou

Abstract This chapter explores factors that may constrain individual trust in science examined across a general, non-expert, public from a set of European contexts. The work is grounded in a rich qualitative dataset comprised of eight focus groups and one individual interview, conducted in Austria, Cyprus, Greece, Ireland and France in the context of the VERITY project. The data were analyzed inductively using thematic analysis, and themes were identified and compared in iterative cycles. The chapter focuses on three themes that were identified in the data: (1) *individual factors*, including affect, competencies, as well as motivational and cognitive attributes; (2) *socio-cultural factors*, including social norms, social influence and the role that conflicts across different contexts play in hindering individual trust; (3) *environmental factors*, including the country-level educational system and online information environments. The findings suggest how different mechanisms can shape individual trust in scientists and science, as an institution.

Keywords Trust in science · Individual trust · General public · Epistemic trustworthiness · Barriers to trust · Public trust in science

6.1 Introduction

Trust in science is increasingly being tested by growing skepticism, misinformation, and polarized debates, as evidenced by controversial socioscientific issues such as climate change (Lewandowsky 2021; Cook 2019), vaccinations (Burki 2019), and other heath-related issues (Suarez-Lledo and Alvarez-Galvez 2021). Trust is further eroded when the same evidence can lead to different policy decisions, as illustrated in the varied global responses to the COVID-19 AstraZeneca vaccine (Amoretti and Lalumera 2023) indicating the role that political decision-makers can

C. Varda (✉) · K. Iordanou · J. Antoniou
University of Central Lancashire, Larnaca, Cyprus
e-mail: cvarda1@uclan.ac.uk

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play—intentionally or unintentionally—in fostering science skepticism, or, at worst, distrust. This turbulent context is in spite of an awareness of the societal impact of science, as indicated by a Special Eurobarometer survey which found that nine in ten European citizens considered science and technology to have a beneficial influence on society (European Commission 2021). This could suggest that while there is an appreciation of the value that science adds to society, the trust that the general public places on science is nuanced. This is on account of the networked nature of trust in science. Multiple actors, including scientists, the media, policy-makers, public and private funders, as well as academic institutions, influence whether, and how science is trusted (Varda et al. 2024). Still, the nature of trust in science is complex, as evidenced by Cologna et al. (2025) who found that across varied global settings, while trust in science is high, personal attributes can affect whether individuals trust science. This could suggest that trust in science might vary in the context of science-related issues depending on who is trusted (i.e., individuals or institutions) (Contessa 2022).

This chapter seeks to extend this line of research by seeking to delve deeper into the factors that laypersons identify as significant for constraining individuals' trust in science. We report on qualitative data across different European countries (Cyprus, Greece, Austria, France and Ireland) and focus on a general, non-expert, public, who is routinely called to discern between trustworthy and untrustworthy sources to make informed decisions about scientific issues that concern them.

6.2 Background

6.2.1 Epistemic Trust in Science

The general public has a bounded understanding of science in comparison to scientists, lacking the ability to understand the causal complexities required to explain a scientific concept, and the ability to discern relationships between topics (Bromme and Goldman 2014). When confronted with conflicting information about a scientific issue people can either rely on first-hand evaluation, by directly evaluating whether the information is valid, or if they lack relevant prior knowledge to make that assessment, they rely on second-hand evaluation, by evaluating whether the source of information is trustworthy (Stadtler and Bromme 2014). This creates a dependency between trustors and trustees, as the inability to assess information trustworthiness forces reliance on others. (Govier 1997; Hardwig 1991). When people decide to trust scientific information, they enter into a trust relationship as trustors placing trust in a trustee, who creates the context for trust to occur. People trust others as information sources when they deem their judgment reliable, and, in the context of science, this trust is epistemic, since it concerns the acquisition of knowledge. In the context of science-based sources people determine whether to trust based on expertise, integrity and benevolence (Hendriks et al. 2016).

However, trust relationships can take multiple forms depending on the occupants of the trustee-trustor positions, which could be individuals or groups. Contessa (2022) posits that trust in science might be individual-oriented, group-oriented, or institutions-oriented depending on who occupies the position of the trustee in the relevant relationship. This underpins the social nature of science but also presents the complexity of understanding trust in science because different trust relationships might result in different perceptions when moving from individual trust to individuals / groups / institutions. Ultimately, the goal is to have individual trust at the institutional level, setting the foundation for a trust relationship between society and scientific institutions.

6.2.2 What Might Constrain Individual Trust in Science?

Individual trust in science, however, might be constrained by a range of factors. In a review of the literature, Cologna et al. (2024) indicate that in the context of climate science, political beliefs and religious views can influence scientific skepticism, though these factors applied more to a US rather than a European context. Angelucci and Vittori (2024) also show that, in the context of COVID-19, technocratic and populist attitudes influenced the extent to which science was trusted by individuals; these attitudes strongly related to trust in science, with technocratic attitudes resulting in greater trust, while populist attitudes having the opposite effect. Perceptions about the trustworthiness of science can also be shaped by pre-existing attitudes towards the research topic (Wintterlin et al. 2022) especially if it concerns a controversial issue (Altenmüller et al. 2021). Perceptions about scientists' motivations and practices (Cologna et al. 2025), as well as other individual factors, such as prior knowledge (Larrain et al. 2024), and cognitive biases (Altenmüller and Poppe 2024) can also influence whether science is trusted. Additionally, when individuals' moral values are perceived to be under threat, it can shape how scientific information is evaluated (Bender et al. 2016; Ryan et al. 2024). Individuals may also hold multiple, different, understandings of what counts as science, shaping different cultural meanings of science that could influence how people understand and interpret scientific information (Gauchat 2011).

Furthermore, how science is communicated to a lay, non-expert, public, might also constrain individuals' perceptions of scientific trustworthiness. For instance, when scientific jargon is used to communicate science, it can signal expertise, but it can also negatively influence perceptions on source trustworthiness (Thon and Jucks 2017). The presence of jargon can constrain comprehension and can also affect the fluency of scientific information processing, leading to motivated reasoning which can impact endorsement for scientific developments (Bullock et al. 2019). The challenge of communicating science in an accessible and understandable way might also lead to oversimplification of science, which may result in greater agreement with knowledge claims, and greater confidence in one's own judgments over deference to an expert source (Scharrer et al. 2017). Furthermore, individuals may also

misjudge what scientific information they should rely on to make evidence-based decisions, depending on who is communicating, and what and how uncertainty is conveyed (van der Bles et al. 2019). Uncertainty relating to consensus in science is more likely to lower scientific trust, while the uncertainty inherent in reporting statistics can have the opposite effect (Gustafson and Rice 2020).

Building on this body of research, we report on a qualitative study conducted within a European context that seeks to explore the factors constraining individual trust in science to better understand how trust in science could be supported.

6.3 Methods

The study took place in the context of the VERITY project, which endeavors to systematically examine how to support an ecosystem of trust, whereby multiple stewards of trust function in complementary ways to enhance trust in science (Varda et al. 2024). The study adopted a qualitative approach in order to examine individuals' perspectives of trust in science, sourced from a general, non-expert, public. A total of eight focus groups and one interview were conducted (n = 66; male: n = 26, female: n = 34; six participants did not provide demographic information). The individual interview included the perspective of a disabled participant.

6.3.1 Sample

Participants were recruited by VERITY partners in Cyprus, Greece, France, Ireland and Austria. Calls for participation were shared through institutional communication channels and participants were recruited using a convenience sample. The final sample comprised of participants in urban and rural settings, and with varied educational backgrounds. In terms of maximum level of education attained, the sample comprised participants with primary education (n = 15), secondary education (n = 5), undergraduate degree (n = 21), postgraduate degree (n = 11), doctoral degree (n = 8).

The sample comprised participants aged 18–30 (n = 16), 31–40 (n = 9), 41–50 (n = 8), 51–60 (n = 5), 61–70 (n = 9), 71–80 (n = 9), and 81+ years old (n = 4).

Two groups resided in a rural village and comprised participants who had entered retirement age, and whose higher level of education was primary school.

6.3.2 Data Collection

Focus groups were primarily conducted in person and were audio recorded; two focus groups were conducted online via Microsoft Teams and were video recorded. The minimum number of participants was six and the maximum nine persons, per focus group. A protocol for the focus groups was provided for each data collection

site, which was accompanied by training on group facilitation prior to the data collection. Participants were asked their views on (a) science, (b) the reasons for potential fluctuation in trust, (c) trusted sources of information, (d) challenges and suggestions for science communication, (e) actors responsible for enhancing trust. All participants were first informed about the project and provided informed consent on the outset of the study. The study was approved by the Cyprus National Bioethics Committee (approved: 23 February 2023; Reference code: BEBK EIT 2023.01.69).

6.3.3 Data Analysis

All personal data were pseudonymised at the onset of the analysis and were transcribed verbatim. Data collected in a language other than English were translated using automated artificial intelligence software and were then checked against the original language transcript by researchers in the relevant data collection team. The data were coded by the first author in NVivo 14, and were analysed inductively, using thematic analysis to extract themes across the entirety of each transcript (Clarke and Braun 2016). This analytical method was adopted to enable the identification of themes in the data in an iterative and systematic manner; all themes were discussed amongst all authors. In this chapter, we focus on insights in relation to the factors that constrain individual trust in science.

6.4 Findings

This study explored factors that might constrain individual trust in science. In our data, while participants expressed trust in individual scientists for informed opinions, their discussions on why one's trust in science might waver focused on factors in relation to three themes. First, participants mentioned *individual factors* such as affect, competencies, motivational and cognitive attributes, which can influence a person's capacity to use science-related information; this theme was discussed the most across all focus groups. Second, participants referred to *socio-cultural factors,* such as social norms, and practices within a community, as well as potential conflicts that may emerge within this context. Third, participants referred to *environmental factors*, referring to external conditions or influences that affect individuals' lives and opportunities; these factors were typically beyond an individual's immediate control. We elaborate on each of these themes with qualitative excerpts from the data.

6.4.1 Individual Factors

To start, the motivational dimensions of trust in science were underlined by references relating to personal interest in the topic, which was closely connected to personal incentives for wanting to seek out additional information from reliable sources. These motivational aspects may affect how and from where science-related information is sourced, and how much time is spent engaging with it.

Participants mentioned individuals' digital literacy skills—the ability to use digital technology aptly—as potentially hindering individual trust in science, emphasizing the digital literacy gap between younger and older generations. They acknowledged that while most people have access to technology via their smartphone, being able to use it as a tool that can facilitate engagement with reliable scientific sources is not a given, and may even result in superficial engagement with science-related information, as indicated in the following excerpt:

> It's much easier to reject something than to sit down every day and examine what you read. Looking to see if the source you're reading is correct, looking for who's behind what you're reading. So I think for the majority, it's easier to reject something than it is to go through that search process every day. (Focus group 1, GR)

A range of factors relating to *cognition* were also mentioned as potentially constraining individuals' trust in science, including beliefs, cognitive processes, perceptions, and prior knowledge and understanding of science. Participants discussed two types of beliefs that can affect how individuals respond to science-related issues: *moral and ideological beliefs* and *epistemic beliefs*. Religiosity was the main focus of the conversation, especially among Austrian and Greek focus groups. Participants in the Irish focus group, also mentioned populist beliefs as a potentially constraining factor. Epistemic beliefs, which are related to the nature of knowledge and knowing (Hofer and Pintrich 1997), were implicitly referenced in the focus group discussions by focusing on (a) the varied ways in which people believe that knowledge is generated (i.e., trusting one's own judgment, versus trusting scientific consensus), and (b) the belief that knowledge is either tentative or stable, which can affect how science is perceived. The changing nature of knowledge could spark uncertainty about what to believe and whom, which can trigger emotional responses such as fear or confusion; this can also influence individuals' trust in science:

> I mean you get confused: one says 'this', the other says 'that'. And eventually, you must figure things out by yourself. (Focus group 3, CYP)

The excerpt indicates how affective responses to science-related information can play a role in how people choose to cognitively engage with science-related information, and, by extension, this might also affect trust in science. In our data participants discussed how *cognitive biases* can hinder individual trust in science. Participants referred to confirmation bias, which can result in the searching or interpreting information in a way that reinforces one's prior beliefs or values (Nickerson 1998). They also implicitly referred to the Dunning-Kruger effect (Dunning 2011), mentioning how laypersons might overestimate their abilities to judge the accuracy

of science-related information, despite their limited competence. The inadvertent reliance on cognitive biases during the evaluation of science-related information was also regarded as a catalyst for conspiracy ideation, which might not only constrain trust in science, but has the potential to block it (Lewandowsky et al. 2013). Participants also referred to the epistemic practices that individuals might rely on to evaluate information, mainly focusing on criteria relating to source trustworthiness and benevolence (c.f. Hendriks et al. 2016) and claim corroboration as a process of assessing trustworthiness.

Furthermore, in our data, participants also pointed out the value of relevant *prior knowledge* and having an understanding of how science works; in the absence of both, individual trust in science might be constrained. *Perceptions of science* were also mentioned as potentially obstructing individuals' trust in science. Participants pointed to instances where science might contradict personal experience, especially in the context of medical science. Connected to this, the *personal repercussions of science*, can also influence science trustworthiness. When discussing the latter, participants mainly focused on technological advancements (specifically, artificial intelligence) and the perceived threat to people's livelihoods.

6.4.2 Socio-Cultural Factors

When participants referred to socio-cultural factors, they focused on the role that *social norms* and *social influence* can play when deciding on whether to trust science, but also pointed to a range of conflicts that can constrain trust in science. For instance, participants highlighted that some topics may be taboo topics for certain societal contexts (e.g., abortion). Additionally, the social nature of trust was illustrated through the value that individuals placed in their peer networks. For instance, they mentioned trusting peers within their social circle to act as "familiar experts" who provide a second-hand evaluation of science, as indicated in the excerpt below:

> My neighbor is studying medicine right now or he's a civil engineer right now and he's doing his studies in construction and engineering. [...] He's from the field, he's just learning this first hand and he's listening to these resources. Then I can say okay, this is my expert, I can rely on him because he has the right access. [...] But you should probably build up a small expert network and when every citizen in society does that then we are all experts in our own way. (Focus group 1, AUS)

The excerpt highlights the networked aspect of trust but also suggests the potential pitfalls of self-selecting expertise networks since the process of curation might provide false confidence in one's ability to judge whether to trust science.

Participants also extensively discussed how different types of *conflicts* that emerge in the context of science can constrain individual trust. First, when science contradicts religious beliefs, it might reduce trust because it can affect how individuals understand certain phenomena. Second, conflicts within science can also reduce trust; when scientists disagree publicly (as in the case of COVID-19 vaccination, or masking, which were given as examples), individuals might be uncertain as

to who should be trusted, and this can influence decision-making. Third, science and politics were regarded as being in conflict, since they are informed by different agendas. Participants recognized that science and politics need to work in complementary ways, so that science informs policy, but distrust in politics might also affect individuals' trust in science, when these are entangled:

> Between what science does and what the public thinks about it. The example we all have in mind is when we talk about vaccines. In general, when we judge science, it's in relation to what politics does with it. We say to ourselves, well, vaccines, what should we do with them? And so, I don't know whether we're judging science or politics and what's being decided. (Focus group 1, FR)

The lobbying power of politics, or other commercial actors, was also connected to the fourth conflict that participants discussed in our data, which related to scientists' conflicts of interest, especially as concerns commercial incentives (e.g. pharmaceutical companies in the case of vaccines), which can be perceived as biasing scientific results.

6.4.3 Environmental Factors

In discussing environmental factors, participants referred to circumstantial contexts that might constrain whether people trust science or not. Participants in Cyprus and Greece focused on the countries' *educational system* and the extent to which it accommodates and engages students in STEM subjects. More attention, across all focus groups was given to issues of *access*, however. This included access to science and scientists: whether people are afforded the opportunity to engage and participate in science, or whether individuals have access to scientists, who were viewed as trustworthy in providing expert opinions. Participants highlighted barriers to access that they routinely navigate. For instance, while there is access to information online, access to scientific journals might be restricted to the public, or in the case of searching for information, algorithms mediate information prominence.

Additionally, participants extensively discussed the *online information context* and how that can affect trust in science. They expressed feeling overwhelmed by—in the words of one participant — "the information tsunami" online, and expressed concerns over individuals' ability to differentiate between trustworthy and untrustworthy information online. This was connected with concerns of the presence of online misinformation, especially for scientific issues, which can be disseminated via social media platforms.

> But with the social media, it has probably already influenced in a direction that mistrust is growing. This social media development is probably already contributing to the fact that mistrust will tend to increase a bit, because it has become more difficult to know what the trustworthy sources are. (Focus group 1, AUS)

6.5 Conclusions

This work sought to examine the factors that might constrain individual trust in science. Participants across a range of European contexts discussed individual, socio-cultural and environmental factors that could constrain whether one trusts science to make information decisions.

Our findings suggest that trust in science might be affected by a range of individual factors, in relation to *motivation* and *cognition*, affect and competencies; *socio-cultural factors*, such as social norms, social influence and conflicts within science or other groups or institutions; and *environmental factors*, such as a country's educational system, online information environments and access to science and scientists. Individual trust might waver when accounting for individual-to-group trust relationships, whereby scientists as a group may be trusted, but politicians are not. The trust relationship between individual-scientists, seems to affect not only the individual-to-group trust relationship, but the individual-to-institution (i.e. science) as well. On the other hand, ideological (e.g. political affiliation) or moral (e.g. religion) beliefs can prompt individuals to assess the trustworthiness of science as members of a group, suggesting that in such cases the relationship is social, rather than individual, and might merit different mechanisms for enhancing trust. Agata and colleagues (Chap. 10) indicate that a systemic view can provide a better understanding of the interactions between a general public and scientific actors (individuals, groups or institutions), accounting for its relational and transient nature. Such approach could elucidate the trust mechanisms at play by encompassing the personal and social aspects affecting trust in science.

Our findings align with other studies employing a multi-stakeholder focus group methodology, in suggesting a complex interplay between individual and collective trust dynamics. This particularly applies for trust relationships in technological development, which suggests the need for inclusive dialogue and diverse stakeholder engagement and consideration of stakeholder perspectives, values and concerns in developing ethical frameworks for scientific advancements (Christodoulou and Iordanou 2021; Iordanou and Antoniou 2023; Ryan et al. 2024).

The study is not without its limitations; the sample was small and non-probabilistic. However, we sought to gain perspectives from a range of populations across geographical and age contexts, and the study offers some initial insights as to factors that could merit further exploration.

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