

Public trust and mistrust of climate science: A meta-narrative review

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Abstract

This systematic meta-narrative literature review aims to explore the narratives of trust evident in literature on public (mis)trust relating to climate science published up until May 2021, and to present the main findings from these papers. We identified six narratives of trust: attitudinal trust, cognitive trust, affective trust, contingencies of trust, contextual trust and communicated trust. The papers' main findings spanned theoretical conclusions on the importance of positionality to trust and morality to trustworthiness, to qualitative findings that the scientific community was mainly trusted, to quantitative findings that explored how trust functioned as an independent, dependent or mediating variable. This literature review sheds important light on the interrelationship between climate science and publics, highlights areas for further research, and in its characterisation of trust narratives provides a language for conceptualising trust that can further interdisciplinary engagement.

Keywords

climate change, interaction experts/ publics, public mistrust, public trust, systematic literature review

The scientific community has been concerned about public mistrust for more than a century and a half (Oreskes, 2019). Trust is a resource that mediates the relationship between publics and scientists, and it is known to be precarious; once trust is lost, it is difficult to regain (Slovic, 1999). While surveys show that most publics around the world hold science and scientists in high esteem, many are ambivalent about specific developments and the lack of impact of science on politics (Eurobarometer, 2021; Funk et al., 2020). There have been concerns that trust in climate science has been negatively impacted over the years by the Climategate affair (Leiserowitz et al., 2013), populist denials of climate change (Forchtner, 2019), media misrepresentation (Coen et al., 2021), and 'sticky' misinformation (Van der Linden et al., 2017: 2), tendencies that have also been evident in recent communication about the pandemic (Fuchs, 2021; Loomba et al., 2021).

Climate science provides a critical case with which to investigate public trust in science. Public trust in climate science is deemed necessary for ensuring that the public and governments that get

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their mandates from the public adopt climate-friendly behaviours and policies to avert the devastation predicted to result from further global warming (Perkins et al., 2021).

This meta-narrative review on public (mis)trust relating to climate science adopts an interdisciplinary approach because climate change is a ‘wicked problem’ (Stang and Ujvari, 2015) that can be best addressed through interdisciplinary collaboration (cf. Bruine de Bruin and Morgan, 2019). However, interdisciplinarity is challenged by the fact that different disciplines may understand topics like ‘trust’ and ‘mistrust’ in different ways (Hudson, 2004). This means that researchers from different disciplines attempting to collaborate on investigating public (mis)trust relating to climate science may end up speaking at cross-purposes, in line with theories of perspectivism (Alrøe and Noe, 2011; Fage-Butler, 2013).

As various conceptualisations of trust and mistrust may be associated with disciplinary fields, we chose to investigate academic research on (mis)trust relating to climate science using Greenhalgh and colleagues’ (Greenhalgh et al., 2005; Wong et al., 2013) systematic meta-narrative review methodology, specifically because it supports the exploration of narratives in various disciplines. Our systematic meta-narrative review has two main purposes: (1) to map out how various disciplines have conceptualised public (mis)trust relating to climate science, and (2) to identify the main findings on public (mis)trust relating to climate science.

I. Methodology

Overview

To investigate academic research on (mis)trust relating to climate science, we used the systematic meta-narrative review methodology (Greenhalgh et al., 2005; Wong et al., 2013), because this methodology makes it possible to investigate how the ‘same’ problem’ (Greenhalgh et al., 2005: 417) has been investigated in heterogeneous research traditions. This form of review also makes it possible to explore both empirical and theoretical studies, and quantitative as well as qualitative research. The methodology understands narratives as conceptualisations of the object of inquiry (here, trust in climate science); narratives are ‘topics that have been differently conceptualised and studied by different groups of researchers’ (Wong et al., 2013: 2). We based our approach on Greenhalgh et al. (2005: 420) who described six phases: planning in a multidisciplinary team, searching for relevant literature, mapping key elements for each research tradition, evaluating the quality of the studies, synthesising the findings, and summarising recommendations. Also, following Greenhalgh et al. (2005), we use the word ‘paper’ in this review to reflect that various academic genres – for example, articles, conference papers, literature reviews and chapters – can be included in a systematic meta-narrative review.

Search strategy and selection criteria

The search undertaken on 3 May 2021 identified peer-reviewed papers on (mis)trust relating to climate science up until that date in the databases Scopus, Web of Science, EBSCO, ProQuest and Ovid MEDLINE to ensure broad inclusion of literature from the life sciences, social sciences, physical sciences, health sciences, business, applied science and technology, and arts and humanities. The following search terms were used: TITLE-ABS-KEY(((mistrust* OR distrust* OR trust*) W/5 (science OR scientific OR scientist*)) AND climat*) – which meant that we looked for ‘mistrust*’, ‘distrust*’ and ‘trust*’ in the title, abstract or keywords, within five word proximity to ‘science’ or ‘scientific’ or ‘scientist*’ and in combination with ‘climat*’ to ensure relevance.

Our database search identified 404 papers. The data were imported into Covidence software which supports the online management of systematic reviews. After Covidence automatically

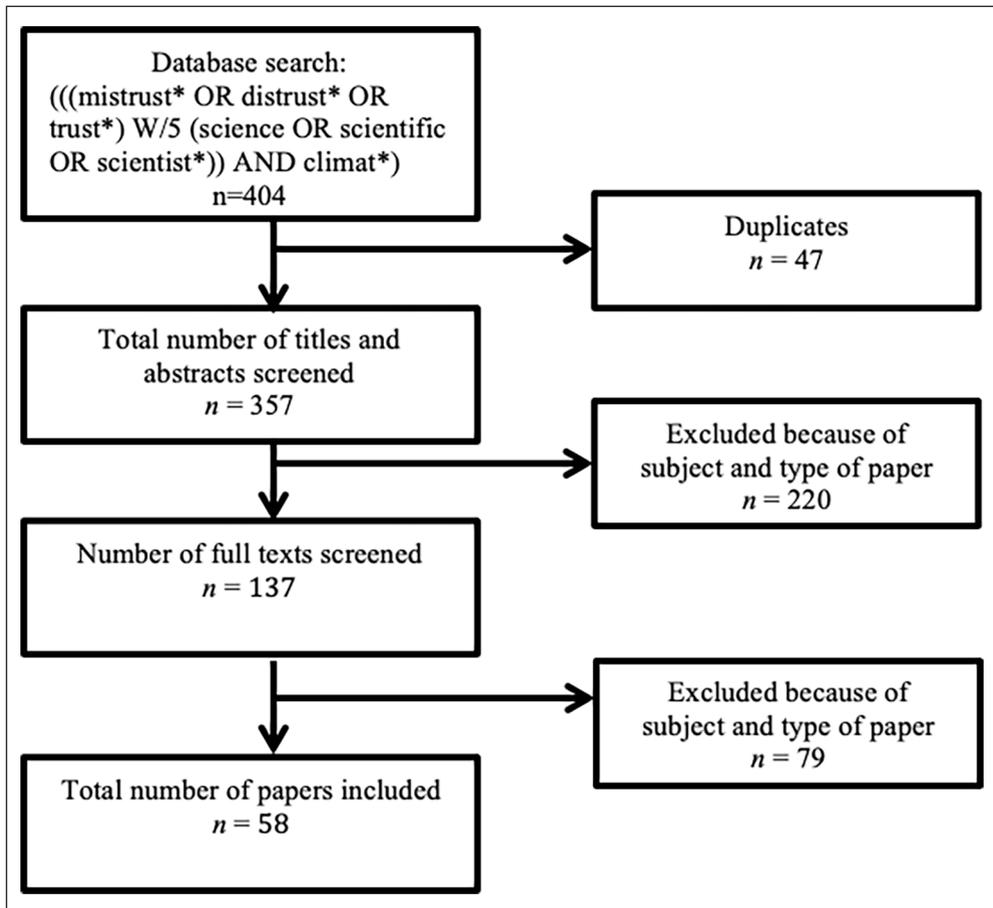


Figure 1. Flow diagram of the literature search process.

removed duplicates, we screened the remaining 357 papers by title and abstract. We did this by reading in teams of two the titles and abstracts and deciding on whether to include/exclude the publications. Papers were included if they were peer-reviewed, were on the topic of the climate, and where public (mis)trust relating to scientific expertise and scientific experts/communicators was a specific focus. Papers were excluded in the case of book reviews or news articles, if a very narrow subset of the public was included, if they were not written in English, if they did not deal in any meaningful way with public trust or the climate, or if we found further duplicates beyond those that were automatically detected by Covidence. We manually removed 220 papers leaving 137 for full-text readings. After the title and abstract review stage, we reviewed in pairs the full texts of the included publications. Decisions on inclusions and exclusions of the papers were agreed by the whole team. Based on full-text reading, 79 papers were excluded, resulting in a final sample of 58 papers (see Figure 1).

Data extraction

The following categories were used to extract relevant information from our final data set of 58 papers: author(s), location of empirical studies, academic discipline, research aim, method,

conceptualisation of trust, type of trust and main findings. Our choice of categories was informed by Wong et al. (2013: 2) who state that:

A meta-narrative review asks some or all of the following questions: (1) Which research (or epistemic) traditions have considered this broad topic area?; (2) How has each tradition conceptualised the topic?; (3) What theoretical approaches and methods did they use?; (4) What are the main empirical findings?; and (5) What insights can be drawn by combining and comparing findings from different traditions?

Table 1 (Supplemental File) provides an overview of the extracted information.

2. Findings from the data extraction

When presenting our findings, we refer to the papers by their number; review papers are included alphabetically in the Reference List at the end of this paper prefixed by their number.

Locations

Just over half of the papers included in our sample (31 papers) referred to studies conducted exclusively (24 papers) or partly (7 papers) in the United States. Studies from European countries were reported in 19 papers. There were five papers based on research conducted in Australia, two in Pacific Islands nations, and one in each of the following countries: China, Brazil, and Canada. Although 12 papers reported studies conducted in more than one country, just one (58) was truly international in scope with a total of 32 countries involved; another noteworthy study included 10 European countries (6). For 13 papers, we did not assign location as they were theoretical papers or literature reviews.

Disciplines

Academic discipline was rarely unambiguous, as co-authors could have different disciplinary affiliations, or their disciplinary affiliation could differ from that of the journal in which the paper was published. Whenever there was doubt about which academic discipline to ascribe to a given paper, all three authors of the review participated in the discussion until one discipline could be specified. We could have allowed for more than one discipline for each paper, but that would not have lessened the challenge. We identified the following 10 disciplines in our sample: Environmental Studies (12 papers), Communication (9 papers), Climate Studies (8 papers), Sociology and Psychology (7 papers each), Science Studies (6 papers), Philosophy (3 papers), and Political Science, Education, and Risk Studies (all 2 papers each). Strikingly, papers focusing on trust and mistrust relating to climate science came exclusively from the social sciences and humanities (SSH), broadly construed. The journals belonged to the SSH domain or were interdisciplinary in scope. In other words, no papers were framed in terms of the natural or technical sciences, despite our broad database search.

Methods and data

Methods-wise, we categorised the papers into four distinct types: quantitative (38 papers) theoretical or literature review (13 papers), qualitative (5 papers) and mixed methods (2 papers). All but one of the quantitative papers relied on surveys. The number of respondents ranged from 48 (Amazon M-Turk) to 45,119 (International Social Science Survey Programme). The one exception used content analysis of social media content produced by the US National Oceanic and Atmospheric Administration (33).

All qualitative papers and the two papers based on a mixed-methods approach reported results from focus group interviews (from 10 to 270 participants), individual interviews, stakeholder engagement activities, and/or participatory workshops. The theoretical papers and the two literature reviews discussed (mis)trust in relation to climate change without reporting new empirical results. None of the theoretical papers or the two literature reviews could be assigned to one or more specific location, as mentioned earlier. For evidence or warrant, they relied on other academic sources, most of which reported on studies performed in the United States and/or Europe, as we also found in our quantitative sample.

All survey-based papers operationalised trust as a measurable variable that could be scored on a rating scale. Many different scales were used, most typically 3-, 4- or 5-point scales, but 6-, 7-, 10-, or 11-point scales were also included. All surveys relied on respondents' self-reports. Most of the survey-based papers – about three quarters – developed their own question(s) to measure trust. The remaining quarter of survey-based papers used measures of trust adapted from previous studies. In our sample of survey-based papers, only two papers with different authors relied on the same inventory of trust questions adapted from previous studies by other authors not included in our sample (namely, 12 and 47, both based on Nisbet et al., 2015). We also found four papers based on the same inventory of questions developed by the authors themselves (22, 23, 49, 50).

The surveys differed in how many survey items (questions) were used to score levels of trust. Seventeen papers used just 1 item; 6 papers used 2-3 items; and 15 papers used more than 3 items. One study, aiming to develop and validate a new survey inventory, introduced 18 items to capture distrust of climate science (49, 50). A total of 14 items showed high internal reliability and were used to calculate 'the average score for each respondent's overall distrust level' (49: 7). The distrust in climate science scale, based on an inventory of these 14 items, was used in 2 other papers by the same authors (22, 23).

Papers taking a qualitative approach displayed no methodological convergence, and there was scant information about questions, interview guides, transcriptions, or coding. We found no indication of standardised or structured interview formats for probing interviewees' trust in climate science or climate scientists or attempts at developing such formats. The same goes for workshop formats and other engagement activities.

Research aims

All papers were based on the premise that trust is important in relation to climate science but differed in their approach to studying the significance of trust issues. All quantitative survey papers sought to determine the role of trust as a variable in relation to other variables. About half of the quantitative survey papers in our sample investigated trust as a dependent variable, affected by other variables such as gender, political ideology, worldview, environmental values, media consumption, religiosity, attitudes towards government and industry, and more. One quarter investigated trust as an independent variable or as a mediating variable. These papers sought to determine whether trust as a variable affected or had an intermediary role between different kinds of variables such as the ones already mentioned. The remaining quarter of quantitative papers reported cumulative frequencies and not correlations of trust variables.

The theoretical papers in our sample had widely differing aims. They included everything from understanding manifestations of post-truth (43), to helping climate scientists create and maintain trust with their audiences (18), and arguing that trust in experts is based on rational assessment of organised scepticism within science (4). We did find some coherence around two related topics: communication of climate science to different audiences, and laypersons' trust in experts. Papers focusing on communicative aspects of trust in climate science explored issues

such as cognitive biases involved in receiving messages about climate science, climate scientists' communication of their science, and media coverage of climate science results (18, 20, 21, 27, 32). Papers focusing on laypeople's trust examined emotional dimensions of young people's trust in climate science, public scepticism of climate science following ClimateGate, the responsibility of the climate science community for overcoming public distrust, and epistemic trust in climate science in an era of post-truth or social inequality (2, 42, 43). The two literature review papers focused on the effects of trust in science on climate-friendly behaviours (10) and the challenge of communicating about climate change in light of research on trust in social, psychological, and neuroscientific disciplines (36).

Theoretical and qualitative papers differed widely in the scope of their investigation of the notion of trust. Most papers in these categories addressed specific issues such as two rural Australian communities' perceptions of climate change, the role of trust in climate science in relation to meat consumption habits, and barriers to Swedish forestry stakeholders' engagement with climate science (3, 26, 56). Others approached trust from a more generalised point of view, exploring issues such as moral dimensions of public trust in climate science and rational deference to experts based on institutionally organised scepticism about experts' knowledge claims (4, 43, 50).

Narratives of trust

Most papers did not explicitly define trust. However, based on the papers' context and operationalisation of trust, we were able to identify core narratives or conceptualisations of trust (see Table 1 – Supplemental File). We synthesise our findings by proposing the following dimensions to make sense of the range of narratives or conceptualisations at work in the papers. These were not mutually exclusive, as more than one conceptualisation was often found in individual papers (see the Supplemental File).

Attitudinal trust. All papers based on surveys understood trust as an attitude that can be measured or probed. Attitudinal trust is dispositional in the sense that respondents have it (or not), yet it remains a disposition until participants realise their trust or distrust by answering attitudinal survey questions. It therefore makes sense to see attitudinal trust as a construct that is articulated or even defined by the survey questions. The surveys indicated two kinds of attitudinal trust: generalised trust and relational trust. Generalised trust relates to being a trusting individual based on the general belief that others are honest and sincere and do not intend to harm. Just one paper, using data from the International Social Survey Programme (ISSP) conducted in 2010, reported on generalised trust (58). Relational trust, on the other hand, is more specific; it is articulated with respect to particular institutions or certain actors as sources of information or as those taking some form of action on climate change. Some surveys, for example, probe trust in science, scientific institutions, environmental organisations, corporations, federal agencies, or (branches of) government. Here, relational trust is understood as a two-part (but not necessarily mutual) relationship between the truster and the trusted. Other surveys probe trust in scientists, or more specifically climate scientists, politicians, public administrators, or science communicators etc., relying on a three-part understanding of relational trust in that the truster trusts the actor(s) in question to do something, for example, to provide reliable information or take appropriate action. Although two-way and three-way relational trust were evident in the articles we reviewed, we suggest that surveys asking questions about trust in science or scientists are functionally equivalent to surveys asking questions about trust in science or scientists to provide reliable information, as science and scientists are culturally expected to provide reliable and evidence-based information. The ellipsis implied by 'A trusts B' (which implies 'to do X' or 'in relation to Y') is common, as highlighted by Hardin (2002: 9).

Cognitive trust. Attitudinal trust develops partly through reflection, cf. slow thinking (Kahneman, 2011), and involves assessment of the trusted and – in cases of three-part relational trust – the action involved. As noted above, the survey-based papers invited such reflections as they asked respondents to assess the degree of their trust in institutions, their representatives, or in some of the roles performed by institutions and their representatives. None of these papers themselves reflected upon the cognitive dimensions of the respondents' assessment of their own trust in science, scientists, or other actors; how the respondents come to their responses is clearly beyond the scope of the quantitative papers of our review. We found two theoretical papers that offer some guidance in this matter. One argues that it is reasonable for people to trust scientific experts and their expertise, not because they are more trustworthy individuals with special access to objective truths, but rather because there are controls and norms in place that afford scientists – or rather scientific knowledge – a high degree of integrity (4). This paper, drawing on Robert Merton's (1977) idea of science as a partly self-regulating normative system, positions trust in science as a reasoned expectation that the controls and norms of science operate independently of and thus counteract any potential personal biases or conflicts of interests. The other theoretical paper that provides some explanation of trust as an outcome of cognitive processes argues that it is reasonable for citizens in technological and democratic societies to accept their epistemic dependence on experts, that is, their dependence on expert knowledge for many crucial decisions in their everyday lives (Pala, 2019). According to this paper, citizens should refrain from absolute trust in experts. As regards 'fully justified and almost undisputed beliefs', citizens would find that their decisions and actions were 'more successful' if they relied on trust in experts (43: 125). The paper argues that it is reasonable for citizens to understand and accept the epistemic division of labour, or rather the 'network of multiple epistemic dependencies' (43: 127), thus arriving at a reasoned assessment of their trust in science.

Affective trust. Three of the papers in our sample recognised emotional aspects of trust as distinct from cognitive aspects (1, 17, 42). We classified Papers 1 and 42 as theoretical; Paper 17 is quantitative. Paper 1 is from the discipline of Philosophy and defines trust as dispositional and involving positive affect. Paper 17 is from the discipline of Communication and emphasises the (affective) warmth of science communicators as important for public attitudes to their trustworthiness. Paper 42 is from the discipline of Psychology and refers to findings from previous studies, two of which were conducted by the author of the paper. The paper does not define trust as an emotional state, but rather as a way in which to cope with emotions produced by scientific information about climate change. It is argued that trust in climate science is related to positive emotions such as hope for the future, whereas distrust in climate science is associated with concern for the future. Positive emotions are 'created by this trust', because it allows young people to face their concerns about future problems; thus, trust gives them 'strength to be active although the problem cannot be solved directly' (42: 4). Others cope with the anxieties produced by pending climate change by 'being distrustful of climate change science, for instance, arguing that the scientists are exaggerating the seriousness of climate change' (42: 4).

Contingencies of trust. We take contingencies of trust to refer to one of three complementary ways of conceptualising the temporal and incidental dimensions of trust: trust that depends on the occurrence of other events or phenomena, trust that produces other events or phenomena, or trust that is co-produced alongside other events or phenomena. In the case of affective trust, somewhat crudely put, there is trust caused by emotions, and/or emotions caused by trust, and/or an interactive relationship between trust and emotions. Paper 42 that conceptualised trust in terms of emotions is inclined towards the view that trust creates emotions. Many other papers examined the contingencies of trust in many other ways, namely the 31 quantitative papers that took trust to be dependent

on other variables, or to be independent, yet predictive of other variables, or to mediate the effect of two or more variables, not to mention the many qualitative and theoretical papers that also framed trust in extended networks of complex contingencies. All these papers would agree that trust needs to be conceptualised in terms of specific contingency factors and processes involved in the configuration of trust, but may not agree on which factors and processes affect trust.

Contextual trust. Whereas contingencies of trust point to the development of trust effects over time, the contextual nature of trust refers to synchronous interactions. Context is notoriously difficult to define, and no paper makes an explicit attempt to do so. All survey-based quantitative papers and two theoretical papers explicitly placed trust in synchronous interactions with one or more contextual factors. The quantitative papers did so by means of survey questions. Context here means all factors that have an immediate impact on trust and vice versa. We found papers that situate trust and trust relationships in relation to personal, topical, demographic, socioeconomic, geographical, and/or ideological factors. The two theoretical papers proposed that trust reflects social position and values and that socioeconomic factors, gender, personality, cultural norms, and so on, could play a role in shaping people's trust in climate science (19, 42, respectively).

Communicated trust. Another conceptualisation of trust is that it affects, is affected by and is conveyed through communication. In this conceptualisation, trust is conceived as situated in the discourse between scientists and the public, as often transmitted through various media, and where scientific communication to the public can be enhanced through trust-building in discourse. Many of the papers that included the communication narrative came, naturally enough, from the field of Communication, but others came from other fields, such as Climate Studies (29), Psychology (11, 21, 47) and Environmental Studies (57). They often emphasised the trustworthiness of communicators or information as an underlying factor for trust in science.

Types of trust

Beyond narratives, we also explored types of trust. For the 'type of trust' category (see the Supplemental File), we drew on two of the 'types of trust' categories in Larson et al.'s (2018) systematic review of trust in vaccination – 'trust in factor' and 'information' – and added one more. 'Trust in factor' relates to *whom* one trusts based on their expertise or credibility. In our meta-narrative review, 'trust in factor' referred to all kinds of social actors involved in defining and deliberating on climate science issues such as knowledge producers, knowledge brokers or providers, policymakers, public administration, and local communities of neighbours, friends and family. Thus, 'trust in factor' relates to a generalised understanding of whom one trusts as a knowledgeable source about climate science. Larson et al.'s (2018) 'information' category was another useful 'type of trust' subcategory for our meta-narrative review. 'Information' refers to the *trustworthiness of the information* provided by the 'trust in factor'. Both subcategories were, not surprisingly, present in most of the papers. As we were open to new categories when we extracted information from the papers, we added a new category under 'types of trust' called 'trust in action' which refers to public trust in social actors' ability to *take action* on climate science, as this was clearly a different form of trust to providing trustworthy knowledge is at stake. This form of trust had to do with delivering climate-friendly actions and often related to the moral imperative to 'do what is right'. Seven papers included this trust type (12, 14, 30, 38, 41, 45, 46). We can link these three types of trust to Hardin's (2002) categorisation of trust being a three-part relation – A trusts B to do/be C, where 'B' is the 'trust in factor', and 'C' is captured by both 'information' and 'trust in action'. 'A', of course, represents the public – which all of the papers had in common due to the selection criteria for inclusion, mentioned earlier.

Main findings on public trust in climate science

To answer the second research question, we considered the findings of the papers on public (mis) trust of climate change science with respect to the methods used in the papers and aim in the following to indicate the general thrust of the findings, including areas of intervention; the Supplemental File provides a more granular overview.

Overall, theoretical papers spanned a wide variety of conclusions. For example, the importance of experts being trustworthy and embracing their moral duties was emphasised (1). Public trust was highlighted as being dependent on institutions' transparency and accountability (2) and could be enhanced by scientists admitting when they got things wrong (18). Another strategy for promoting trust involved creating dialogue and inviting public engagement (20). Paper 19 challenged the concept of a monolithic 'public', as individuals' positionality (gender etc.) impacts on their trust in science. Trust and distrust were understood as forms of engaging in science (42), with epistemic mistrust of justified scientific claims being considered bad for democratic societies (43). The public's negative attitudes to environmental policies was largely attributed to their distrust of science, government, institutions and people associated with them (15). The literature reviews, on the other hand, found that greater awareness of trust determinants and of the relative levels of trust held by non-experts could improve climate change experts' ability to engage the public leading to positive climate-friendly behaviours (10), and that those communicating about climate science should pay more attention to engaging diverse publics in the context of larger trust networks relating to socio-technical systems and everyday practices (36).

The qualitative papers found that publics often accepted the reality of climate change, but that perceptions of causes and solutions differed (7, 56). Public scepticism of scientists was found to be an effect of public perceptions that scientists had hidden motives, lacked competence and had been wrong in the past (50). The papers also reported that user engagement and coproduction of knowledge fostered public trust (31), that publics tended to trust science and scientists (26) and that even sceptics had high levels of deference to scientific authority (50).

Some of the quantitative papers showed varying levels of mistrust of climate information among the studied populations (22, 37, 40, 55). Several showed that mistrust in science was correlated with ideology, worldviews, and values. Specifically, male gender, conservative ideology, beliefs about scientific integrity, and religiosity were associated with higher levels of distrust regarding climate change (8, 11, 16, 24, 25, 34, 38, 48, 49, 52), while trust was related to democratic ideology, education and previous interest in or knowledge of science (13, 24, 37, 39, 44, 52). Previous epistemic beliefs predicted evaluation of the trustworthiness of texts (53). Other findings included that publics wished scientists to be concerned for humanity and the environment in their communication (17) and advocate for climate change, working closely with policymakers (9). Trust in scientists was found to regulate the acceptance of messages about climate change (29), to mediate the effect of climate-related information on publics (35), to influence the public's climate change risk perception (54), and to promote climate-friendly behaviours (8, 22). The media outlet for the communication of scientific messages and the identity of the communicator were also found to impact public trust (5, 28, 41, 46, 51, 57).

3. Discussion and conclusion

This systematic meta-narrative review was undertaken in order to shed light on the narratives of trust in climate science and to present the main findings of papers that were concerned with public (mis)trust relating to climate science. The review resulted in the identification of six main conceptualisations of trust (attitudinal trust, cognitive trust, affective trust, contingencies of trust,

contextual trust, and communicated trust). Public trust was often characterised as residing in experts or expert institutions, and as being associated with trustworthy information. We also identified ‘trust in action’ in some of the papers; the presence of this type of trust may reflect public concerns about climate inaction.

We found significant parallels between the findings of our review and the findings of the review conducted by Larson et al. (2018) on vaccine acceptance. First, trust was often referred to implicitly, rather than explicitly examined in the context of a formal definition. Lack of definitional stringency is problematic, given the abundance of meanings of trust and mistrust. Second, most of the studies in our review reflected a narrow focus on high-income countries. This is again problematic, particularly as climate change is experienced differently by people around the world, and some communities are more at risk of climate change. Finally, the rather basic approach to measuring trust using a single item was also evident in 17 of the papers in our dataset, indicating the need for a more comprehensive understanding of trust in relation to climate science. We thus concur with Larson et al. (2018) that ‘trust can often be an ill-defined and loosely measured concept’ (p. 1607).

A methodological strength of our review is that the three reviewers who undertook the review represent three different faculties at the university: Arts, Natural Sciences, and Health. The member who represented Arts (AFB) had previously worked at the Business and Social Sciences faculty of the university. However, all of the disciplines represented in the meta-narrative literature review fell broadly under Social Sciences and Humanities. This was slightly surprising, but it may have something to do with our search terms: ‘trust’, ‘mistrust’ and ‘distrust’ were chosen, but others may be more common in other disciplinary areas. Also, just as trust is not always defined in the papers we reviewed, and clearly means many things (it is polysemantic and complex), it needs to be borne in mind that ‘climate change’ is also likely to mean different things to the fields concerned. It could therefore be very instructive to explore the conceptualisations (narratives) of ‘climate change’ in another study.

We noted little methodological coherence across the papers in our review. Although some quantitative papers used previously validated survey items, we found no convergence on specific items or a specific number of items to measure respondents’ trust. No surveys used well-established, validated psychometric measures of trust such as the Trust in Science and Scientist Inventory (Nadelson et al., 2014) or the Credibility of Science Scale (Hartman et al., 2017), nor did they refer to guidelines for measuring trust (OECD, 2017). However, nearly all of the surveys did report on methods such as actual questions being posed. In contrast, the qualitative papers reported very little, if any, information about methods, and we were unable to discern any methodological convergence or coherence in our sample of qualitative papers. Even though all quantitative and qualitative studies assume that trust can somehow be probed, the lack of commonly accepted inventories, questions, or engagement formats made it difficult to generalise or compare the findings of individual papers.

Contrary to our expectations, the conceptualisations of trust relating to climate science that we identified in the papers were weakly associated with disciplinary fields, if at all. The narrative ‘communicated trust’ was mainly associated with the field of Communication, as noted earlier, but other clusterings around conceptualisations of trust can be considered to have methodological rather than disciplinary associations. For example, surveys which were used in many disciplinary fields (though most typically in Psychology) always relied on an attitudinal conceptualisation of trust. In other cases, the conceptualisation of cognitive trust was found both in papers based on the survey methodology and theoretical papers. Also, the affective conceptualisation of trust, the conceptualisation of trust as contingent, and the contextual conceptualisation of trust similarly cut across fields and methodologies in the papers and did not fit neat disciplinary divisions, despite the

assumption in the meta-narrative review methodology that there was likely to be greater coherence between narratives and disciplines. The slipperiness of the concept may reflect our object of inquiry. Trust and mistrust are supple; they permeate relationships, are both cognitive and affective, can be measured, are communicated, and have both disciplinary and vernacular meanings.

There were also notable absences in our findings: although there is increasing focus in public engagement with climate science (Mees et al., 2019), there was little focus on mutual or reciprocal trust in the literature we reviewed. All reviewed papers implied that trust relating to climate change has to do with public trust of science, but none also studied scientists' trust in members of the public, scientists' trust in public deliberation to deal with complex issues such as climate change, or scientists' confidence in democratic government institutions taking action on climate change. Similarly, although many papers built on a relational and contextual idea of trust, no papers explored in any depth alliances or partnerships between scientists and members of the public as a way of understanding or even facilitating trust. Of course, this tendency may be due to our inclusion criteria, but we suggest that greater focus could be placed on more symmetric forms of judiciously placed trust, particularly as trust facilitates cooperation (Hardin, 2002), and cooperation is essential for climate change outcomes.

Our meta-narrative review confirms the point made earlier by Castelfranchi and Falcone (2010) that 'trust is a layered notion, used to refer to several different (although interrelated) meanings' (p. 10). However, although the literature on trust and climate change offers many layers of understanding, there are notable deficiencies, as noted above. The lack of common conceptual and methodological ground is a serious problem as we seek to qualify – and quantify – trust issues that arise from climate science and climate change. If there is little fundamental agreement on what trust is and how trust works, the findings will become blurred, even meaningless. This could be one (but only one) reason why mitigating concerns about trust in climate science and science in general has proven difficult.

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Supplemental material

Supplemental material for this article is available online.

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