

Science skepticism in times of COVID-19

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Abstract

In the current paper, we argue that to get a better understanding of the psychological antecedents of COVID-related science skepticism, it is pivotal to review what is known about the (social) psychology of science skepticism. Recent research highlighting the role of ideologies and worldviews in shaping science skepticism can inform research questions as well as pandemic responses to COVID-19. It is likely that the antecedents of general COVID-19-related skepticism substantially overlap with the antecedents of climate change skepticism. Additionally, skepticism about a potential vaccine in particular will likely be fueled by similar worries and misperceptions to those shaping more general antivaccination attitudes, of which conspiracy thinking is particularly worth highlighting. We conclude by reflecting on how the COVID-19 crisis may shape future social-psychological research aimed at understanding trust in science and science skepticism.

Keywords

climate change, conspiracy thinking, COVID-19, science skepticism, vaccination

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Introduction

It's going to disappear. One day, it's like a miracle, it will disappear (Wolfe & Dale, 2020).

The systematic and unwarranted rejection of science—both in terms of empirical evidence and the methods used to produce that evidence—can have catastrophic effects on public health, the economy, and the environment (van Bavel et al., 2020; World Health Organization [WHO], 2019). Although trust in science is still comparatively high in many countries, it has been argued that

science skepticism is on the rise (e.g., Pittinsky, 2015; Rutjens, Heine, et al., 2018) and that “anti-science forces are on the march” (Nature Editorial, 2017). This increase, however, seems

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domain-contingent and does not apply to science generally. Some of these contentious domains are climate change, vaccination, and genetic modification (Rutjens, Sutton, & van der Lee, 2018). To illustrate, consider that two of the top 10 public health threats as listed by the World Health Organization in 2019 are climate change and vaccine hesitancy (WHO, 2019). The potentially irreversible (Steffen et al., 2018) effects of human emissions on global warming stem from, at best, an underestimation of the problem or, at worst, from the blatant denial of the reality of climate change (Dunlap, 2013; Lewandowsky & Oberauer, 2016). The recent resurgence of measles outbreaks in various countries across the globe can arguably be traced back to public skepticism about vaccination (Wenner Moyer, 2018). The ongoing COVID-19 pandemic can now be added to the list of contentious topics that the public is sharply divided on (Dryhurst et al., 2020). Heated discussions about the severity of COVID-19 symptoms, the necessity and (economic) consequences of the various lockdowns across the world, and the usefulness of face masks and social distancing measures rage across the internet (Kerr et al., 2020). To get a better understanding of the psychological antecedents of COVID-19-related science skepticism, it is therefore pivotal to review what we know about the (social) psychology of science skepticism.

Pre-COVID: How Can Research on Science Skepticism Inform Social Psychological Perspectives on the COVID-19 Crisis?

As mentioned before, two of the domains that have been the subject of both heated public debate and psychological research on the causes and consequences of the skepticism they are evoking are climate change and vaccination (Hornsey et al., 2018a, 2018b; Lewandowsky, Gignac, & Oberauer, 2013; Rutjens, Sutton, & van der Lee, 2018; van der Linden, Panagopoulos, et al., 2020). However, does skepticism about climate change and vaccination share the same antecedents? Evidence suggests that this is not the case. In fact, science skepticism is

heterogeneous (Rutjens, Sutton, & van der Lee, 2018; Rutjens & van der Lee, 2020). This heterogeneity refers to the domains of skepticism as well as to its predictors. Levels of skepticism vary across domains (Rutjens, Sutton, & van der Lee, 2018; Rutjens & van der Lee, 2020), but more importantly perhaps, heterogeneity also pertains to the predictors of skepticism. That is, levels of skepticism about diverse domains vary across ideological groups. Whereas it has long been thought that political conservatism is the main contributor to differences in science skepticism, this view now seems more nuanced, with climate change skepticism as a notable exception (Hornsey et al., 2018a; Rutjens, Sutton, & van der Lee, 2018; Rutjens et al., 2021). Self-identifying as a religious and particularly as a spiritual believer has been found to be a more potent contributor to skepticism in various other domains, such as vaccination and evolution (Rutjens & van der Lee, 2020; Rutjens et al., 2021). In what follows, we outline how existing research on science skepticism and worldviews—including political and religious identities and group processes—can inform research and pandemic responses to COVID-19 (see Packer et al., 2021, for discussion of conforming and deviant responses to COVID-19).

Political Ideology and (Climate) Science Skepticism

Hornsey and Fielding (2017) highlight that whilst antisience attitudes are generally what people observe, it is the “root” of the attitude that scholars need to understand. Attitude roots are the factors that drive and sustain surface skepticism about science, and include deeply held worldviews, identities, and ideologies. To this extent, the denial of science is often uniquely attributed to the political Right (Mooney, 2012). For example, in an editorial, *Nature* (“Science Scorned,” 2010) describes an “anti-science strain pervading the right-wing in the United States” (p. 133). Indeed, trust in science has declined particularly amongst U.S. conservatives (Gauchat, 2012). As mentioned in the previous section, however, this trend is especially clear in some domains—such as climate change—where denial

of the issue has been prevalent on the Right (Dunlap, 2013; Hornsey et al., 2018a; van der Linden, Panagopoulos, et al., 2020). One reason that has been offered for this is that the free-market ideology espoused by many conservatives does not sit well with environmental policies (e.g., Lewandowsky, Gignac, & Oberauer, 2013). Although there is evidence that similar patterns are observed in European countries (Kränge et al., 2019; Rutjens et al., 2020), other large-scale comparisons have found that such elevated and politicized skepticism amongst conservatives is often confined to the “paranoid style” of U.S. politics (e.g., see Hornsey et al., 2018a; van der Linden, Panagopoulos, et al., 2020).

However, the role of conservative or right-wing political ideology seems largely confined to skepticism about climate change specifically. Religiosity is a stronger correlate of evolution and vaccination skepticism than political ideology is (Ecklund et al., 2017; Rutjens, Heine, et al., 2018). Other scholars have also noted that science skepticism is “bipartisan” in the sense that both liberals and conservatives can engage in motivated denial when the science is uncongenial to their worldview or their political or social identity (Ditto et al., 2019; Nisbet et al., 2015; Washburn & Skitka, 2018; see Abrams et al., 2021, for discussion of social identity processes during COVID-19). Indeed, while correlations between political orientation and skepticism about, for example, vaccination or genetic modification tend to be weak to nonexistent, it is feasible that—in contrast to the aforementioned relation between right-wing ideology and climate change skepticism—more pronounced antiscience sentiments pertaining to these topics can be found among certain segments of the political Left. Therefore, one insight we can draw from the existing literature is that the role of worldviews and group-based ideologies is context-dependent with regard to science skepticism.

Importantly, the specific context of COVID-19 lends itself to a clear expectation of greater science skepticism among the political Right. For example, with mandatory self-isolation and restrictions on traveling, shopping, and social interactions, governments have significantly

curtailed people’s economic and personal freedoms. These measures directly antagonize key aspects of the conservative worldview, such as a strong preference for justifying the status quo over social change, the prioritization of individual freedom, and a desire for minimal government intervention (Jost, 2017; Jost et al., 2003; Stenner, 2009). Similarly, the antireflexivity hypothesis suggests that compared to liberals, conservatives trust and support science less in situations when science emphasizes negative public health impacts of economic production (McCright et al., 2013). Perhaps unsurprisingly then, cross-cultural research in 10 countries has found that those who hold individualistic as opposed to egalitarian worldviews consistently view COVID-19 as a lower risk (Dryhurst et al., 2020). Recent research has also found that compared to liberals, conservatives are much less likely to trust COVID experts and the World Health Organization, and to engage in important public health behaviors such as wearing a face mask (Kerr et al., 2021), and significantly more likely to endorse misinformation about COVID-19 (Roozenbeek et al., 2020). This may be in part because the intergroup discourse among political elites has been polarizing (Green et al., 2020), and extreme right-wing outlets have spread more misinformation about COVID-19 compared to traditional media at the start of the pandemic (Motta et al., 2020). Thus, political ideology and partisanship seem particularly relevant for understanding and studying responses to the current COVID-19 pandemic.

Vaccination Skepticism

Because COVID-19 is closely linked to the topic of vaccination, it is useful to pay special attention to vaccination skepticism, a complex issue that is predicted by multiple variables. A recent analysis of 100 million individuals on Facebook found that whereas antivaccination groups are currently still in the minority, they are projected to dominate mainstream discourse on Facebook within the next decade without intervention (Johnson et al., 2020). Only 50% of Americans currently plan to get a COVID-19 vaccine when one becomes

available (Cornwall, 2020). Examining the underlying attitude roots (cf. Hornsey & Fielding, 2017) of vaccination skepticism is therefore complex. Unlike climate science, the role of free-market ideology is less clearly pronounced when it comes to vaccination attitudes (Lewandowsky, Gignac, & Vaughan, 2013). For example, recent cross-cultural work highlights the role of spirituality, faith in science, science literacy, and conspiracy thinking (Hornsey et al., 2018b; Rutjens & van der Lee, 2020). It seems reasonable to consider these variables when researching attitudes and behavioral intentions regarding a future COVID-19 vaccine. Consistent with the aforementioned findings around COVID-19, Hornsey et al. (2018a) showed that, across 24 countries, individuals with strong individualistic worldviews were more likely to hold antivaccination views—though conspiratorial thinking was the most influential contributor. We turn to conspiracy thinking in the following section.

Conspiracy Theories

A key factor that has been found to consistently contribute to science skepticism in several domains is conspiracy thinking. Mertonian norms notwithstanding (Merton, 1973; Rutjens, Heine, et al., 2018), science is partially a social enterprise—serving various social functions in addition to knowledge production—conducted by scientists that are not free of ideology (Rutjens & Brandt, 2018; Stevens et al., 2018). Awareness of this notion can lead people to question the motives of scientists, and this might be more pronounced for, say, climate scientists than for theoretical physicists. This may provide fertile ground for conspiracy theories about the motivations and agendas of scientists to flourish. Conspiracy theories about science abound, for example, in the domain of climate change and vaccination (Lewandowsky, Gignac, & Oberauer, 2013; van der Linden, Panagopoulos, et al.), and these are certainly not restricted to the fringes of society. About 50% of Americans now endorse at least one conspiracy (Oliver & Wood, 2014). Moreover, Bessi et al. (2015) report findings showing that antiscience conspiracy content is

shared on social media about 3 times more often than science content. One reason why conspiracy theories may contribute to science skepticism is that they tend to focus on the alleged wrongdoings of institutions, elites, and authorities, which include science and scientists (Rutjens et al., 2018). This may be particularly the case when scientific data threaten the person's worldviews or ideologies. Indeed, it is not always science itself but rather what science implies for public policy that is the root cause of science denial and skepticism (Campbell & Kay, 2014; Rutjens & Brandt, 2018).

Accordingly, dangerous conspiracy theories about COVID-19 have flourished (van der Linden, Roozenbeek, & Compton, 2020), including the infamous “Plandemic” video, which, among other conspiracies, claimed that the virus was bioengineered in China and that wearing a mask can “activate” the virus (see Douglas, 2021, for discussion of conspiracy theories during the COVID-19 pandemic). Uscinski et al. (2020) find that belief in conspiracy theories about the coronavirus is linked to rejecting information from expert authorities. A cross-cultural comparison of belief in conspiracies about the coronavirus by Roozenbeek et al. (2020) finds that although most people find misinformation about the virus relatively unreliable, up to a third of the population in each surveyed country endorse the conspiracy that the virus was bioengineered in a lab in Wuhan, at least to some degree. Rhetoric such as “Chinese virus” can fuel out-group hostility (Croucher et al., 2020), and belief in coronavirus conspiracies is a consistent predictor of personal vaccine hesitancy (which affirms the parallels with general vaccine skepticism as outlined in the previous section), lower willingness to recommend the vaccine to vulnerable others, and reduced general compliance with public health measures.

Post-COVID: How Will the COVID-19 Crisis Shape Future Research on Science Skepticism?

One urgent question for research on COVID-19 is looking at ways to counter antiscience conspiracy beliefs, and research so far has yielded some

potentially useful results. For example, education and scientific literacy training have been shown to be useful in domains such as genetically modified organisms (GMOs; McPhetres et al., 2019). Another promising line of research is psychological inoculation where people are forewarned and preemptively exposed to weakened doses of attitudinal challenges in an attempt to confer resistance to future attacks (McGuire, 1964). Inoculation against misinformation has been successfully applied in the context of climate change (van der Linden et al., 2017) and antivaccination (Jolley & Douglas, 2017). When inoculation is not possible, real-time rebuttal of science denial has also shown promise on topics such as vaccination and climate change (Schmid & Betsch, 2019). Although these findings are promising, they have been obtained in other contexts. Thus, more research is needed on the determinants of science skepticism about COVID-19 specifically and how to effectively counter it across the population.

Another pressing question for future research is how knowledge about the determinants of COVID-19 science skepticism could help inform the design of interventions. For example, key predictors of endorsement of COVID-19 conspiracy theories include political conservatism, self-perceived minority status, information sources (e.g., social media vs. WHO), as well as trust in science and analytical thinking—two factors which consistently predicted reduced belief in COVID-19 misinformation in different countries (Roozenbeek et al., 2020). One avenue for future research could therefore aim to improve trust in science. Although invoking uncertainty is often quoted as a facilitator of science denial, recent work has found that transparently communicating scientific uncertainty about contested facts does not necessarily undermine public trust in science (Gustafson & Rice, 2020; van der Bles et al., 2020). According to the gateway belief model of attitude change (van der Linden et al., 2015; van der Linden et al., 2019), communicating expert consensus where available has also shown to decrease polarization and align public attitudes with the scientific consensus across

domains, including climate change (Lewandowsky, Gignac, & Vaughan, 2013; van der Linden et al., 2018), GMOs (Kerr & Wilson, 2018), and vaccination (van der Linden et al., 2015).

A final question is how the COVID-19 crisis will impact science skepticism in the long run. Whereas most science deniers will perceive science as threatening to their beliefs, worldviews, and values (e.g., evolution, climate change), and sometimes to their health (e.g., GMOs, vaccination), these attitudes rarely come to fruition in the context of an immediate and real global crisis. With COVID-19, acting in accordance with one's skeptical attitudes might come at an immediate personal cost (i.e., getting infected), whereas following scientific advice prevents that cost. Perceiving the importance of science in managing the COVID-19 crisis might therefore have unexpected positive effects on trust in science over and beyond the pandemic.

Conclusion


Unfortunately, COVID-19 is unlikely to “disappear” (miraculously) any time soon, if ever at all. As reviewed in this article, COVID-19 skepticism shares commonalities with other known forms of science denial, of which the parallels with climate change skepticism and vaccine skepticism are of particular interest. Work on climate change skepticism is relevant because the context of COVID-19 lends itself to an expectation of greater science skepticism among the political Right due to similar perceived restrictions to personal freedoms, desire to maintain the status quo, and preference for minimal government interference. Work on vaccine skepticism is of obvious relevance because it can help formulate predictions about which groups will likely protest against a COVID-19 vaccine. Thus, COVID-19 skepticism incorporates aspects of both climate change denial and vaccine hesitancy, and their group-based ideological predictors. In addition, work on the relation between conspiracy thinking and science skepticism is relevant to understanding the abundance of conspiracy theories in the context of COVID-19. Taken together, the

burgeoning research field on social-psychological perspectives on science denial is an indispensable resource when the aim is to understand and predict COVID-19 skepticism.

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