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Why and How to Tailor Science Communication to Science Sceptics

Introduction

Data from representative and long-lasting longitudinal studies, such as the General Social Survey, clearly show that we are witnessing the polarisation of trust in science, which means that the differences between individuals and certain subgroups of the population are becoming more prominent than ever before (Gauchat, 2012; Hamilton & Safford, 2021; Lee, 2021). While the idea that these inter-individual differences may be meaningful in explaining decisions made in different contexts is not new, it gained significant traction during the recent COVID-19 pandemic during which low trust in science and scientists was often mentioned as one of the key reasons for the lack of compliance with preventive measures. As a consequence, many world leaders and media outlets now consider building trust in science essential in the battle against COVID-19 and potential future crises. Not surprisingly, the construct of "trust in science" has also attracted the attention of the scientific community. For example, in the last three years (from the beginning of 2020 to the end of 2022), the number of scientific works referring to "trust in science or scientists" is larger than the sum of all such works published before 2020 (418 versus 299 documents indexed in the Scopus database). It is thus clear that researchers are investigating the predictors and outcomes of trust in science as well as the possible solutions that may help to effectively communicate evidence to science sceptics and, over time, build trust in science and scientists.

In this chapter, we will first explain *why* people's trust in science is something that needs to be considered in the context of promoting health and other scientifically supported behaviours. To do so, we synthesise the existing research on trust in science, its determinants, and, especially, potential consequences, with a particular emphasis on health-related outcomes. Second, we will attempt to elaborate *why* distrust in science is linked to low compliance with evidence-based recommendations. In particular, we will draw on the Health Belief Model (Rosenstock, 1974) and the Intertwined Model of Reactance (Dillard & Shen, 2005) to explain the potential mechanisms underlying these associations and clarify why scientific communication should be tailored to science sceptics or individuals who have a distrust of science. Third, we will shift the focus from the question of *why* to the question of

how, and specifically to *how* messages containing scientific information could be articulated to reduce unintended consequences among science sceptics.

Trust in science: definition, factors, and potential consequences

Trust – across the various disciplines that deal with trust, such as philosophy, economy, and psychology – is generally defined as the intention to accept potential vulnerability based on positive expectations about the intentions of another person or institution (Dirks & Ferrin, 2002; Rousseau et al., 1998). While some authors consider trust to be part of an individual's general disposition, which is, for example, necessary for developing relationships and functioning in the social world (Evans & Krueger, 2009), an alternative or rather complementary view takes into account that trust can vary depending on the person or institution that occupies the role of the trustee. This nuanced approach distinguishes between interpersonal trust (i.e. beliefs regarding the reliability, honesty, and skills of other individuals, which have important implications in close relationships; Larzelere & Huston, 1980; Twenge et al., 2014) and institutional trust (i.e. beliefs regarding the trustworthiness of "generalized others"; Paxton, 1999). The two are not entirely independent. For example, higher institutional trust may promote interpersonal trust among strangers (Spadaro et al., 2020). Institutional trust can be further divided into trust in government (e.g. courts, executives, and law enforcement), trust in other public or quasi-public institutions (e.g. education providers, mass media, and scientists), and trust in the private sector (e.g. employers and providers of goods and services; Bornstein & Tomkins, 2015). It is worth noting that specific forms of trust, such as trust in scientists and trust in government, are not completely uncorrelated, although empirical findings generally reveal that associations between them are relatively weak (e.g. Algan et al., 2021; Capasso et al., 2022). These different forms of trust are presented in Figure 1.

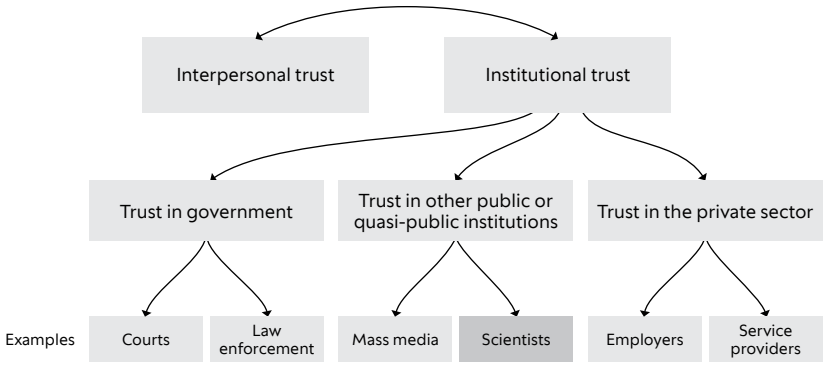

Figure 1: Different forms of trust

Thus, trust in science and scientists is a relatively narrow construct that refers to the belief that scientific research results are an honest and accurate reflection of the work of researchers (Committee on Science Engineering and Public Policy, 2009). People who trust science believe that scientists are honest and reliable, and they believe in the capacity of scientists as providers of information (Wilholt, 2013). In general, this type of trust leads to a greater willingness to accept new information from scientists as trustworthy and relevant.

Factors underlying trust in science

Trust in science varies across cultures (e.g. Algan et al., 2021; Roozenbeek et al., 2020) and among individuals depending on a range of other characteristics. While previous research offers some insight into the factors that affect trust in science, only a few of these factors have been empirically investigated. These factors can be loosely divided into two categories – ideological and cognitive factors.

In terms of ideological factors, we first note that research shows that higher political conservatism is consistently linked with lower trust in science and scientists (Nadelson et al., 2014; Nadelson & Hardy, 2015; Plohl & Musil, 2021, 2023; Rutjens et al., 2018b). Interestingly, this link was only established in recent decades, perhaps in part due to the recent rise of prominent conservative political figures who publicly devalue the importance (and truth) of scientific evidence (Rosenbaum, 2020). Second, research consistently shows that people who are

more religious are less likely to trust science (Chan, 2018; Johnson et al., 2015; Plohl & Musil, 2021, 2023; Rutjens et al., 2018a, 2018b). In contrast to the association between science and political conservatism which is relatively recent, the relationship between science and religion has always been tense because the two approaches offer different and often contradictory answers to a range of fundamental life questions. Science and religion, because they in some sense challenge each other's authority, rarely coexist in the same people, and particularly not in religious believers who are highly dogmatic or orthodox (Rutjens et al., 2018a). Third, recent studies emphasise the important role of conspiracy ideation (or belief in conspiracy theories) which is defined as an unnecessary reliance on conspiracy theories in cases where other explanations are far more plausible – for example, the belief that the COVID-19 pandemic was caused by 5G technology (Aaronovitch, 2009; Freeman et al., 2020). Research generally shows that those with higher levels of conspiracy ideation also tend to have less trust in science (Lewandowsky et al., 2013; Rutjens & Lee, 2020), which is not surprising. People who are prone to endorsing conspiracy theories often see scientists as members of a group that colludes with other powerful groups, distorting results and spreading beliefs that benefit such groups (Rutjens et al., 2018a).

The most studied cognitive factor is education level. Education is considered a cognitive, as opposed to ideological, factor mainly due to the idea that trust in science may require some forms of knowledge regarding the scientific process, and this knowledge is generally attained in the educational system (Rutjens et al., 2018a). While some studies have found education to be positively associated with trust in science and similar variables (Hornsey et al., 2021; Morgan et al., 2018; Nadelson et al., 2014), other studies have found practically no association between the variables (Plohl & Musil, 2021, 2023). A recent article sheds some light on why these findings are mixed. Drawing on a sample of more than one-hundred thousand participants from various countries, the researchers found that the positive association between education and trust in science depends on social context. In particular, an association between education and trust in science and scientists was practically non-existent in highly corrupt countries (Alper et al., 2023). While other cognitive factors have not been extensively researched, a recent

study by our research group tested the incremental value of cognitive reflectiveness (i.e. the degree to which an individual is capable of intuition inhibition and deliberate thinking; Toplak et al., 2011) and intellectual humility (i.e. non-threatening awareness of one's own intellectual fallibility; Krumrei-Mancuso & Rouse, 2016) in predicting trust in science, after controlling for other known factors of trust in science. We found that an aspect of intellectual humility, openness to revising one's viewpoint, emerged as one of the key predictors of trust in science (Plohl & Musil, 2023).

Potential consequences of low trust in science

Low trust in science can reduce public support and funding for science, which decreases the probability of scientific discoveries and negatively impacts social well-being (Muñoz et al., 2012). On the individual level, it may decrease a person's motivation to learn about scientific findings or may even cause the complete rejection of scientific findings (Gauchat, 2012). This can be particularly problematic in the case of complex topics that are poorly understood by the general public, as poor comprehension and confusion often encourage people to rely on intuitive feelings of trust or distrust (Scientific American, 2010). Moreover, trust in science is thought to play a vital role in how highly emotional and personally relevant topics are perceived, including areas such as health and climate change (Nadelson et al., 2014).

Since empirical research on the potential outcomes of the level of trust or distrust in science only emerged during the COVID-19 pandemic, trust in science-based decision-making research is for the time being somewhat limited to the area of health and, even more specifically, COVID-19.

There is now convincing evidence that people's trust or distrust in science had a critical role in determining their compliance with COVID-19-related guidelines and their decisions regarding vaccination. Our study (Plohl & Musil, 2021), which tested a structural model including various potential predictors of compliance with COVID-19 guidelines and was conducted during the first months of the pandemic, was one of the first studies to empirically link trust in science to individual responses during the COVID-19 pandemic, and specifically to compli-

ance with prevention guidelines (e.g. regular handwashing, avoiding social gatherings, and staying home when sick). The results showed that perceived risk associated with COVID-19 and people's level of trust in science independently predicted their compliance with COVID-19 guidelines. Moreover, trust in science played the role of a mediator between more general socio-demographic variables (political conservatism, religious orthodoxy, conspiracy ideation, intellectual curiosity) and compliance with the guidelines. The socio-demographic variables contributed to compliance only indirectly via trust in science (Plohl & Musil, 2021). Similarly, our follow-up study showed that trust in science was again positively associated with compliance with COVID-19 guidelines, and also with the intention to get vaccinated against COVID-19. In fact, of all the included variables (scientific literacy, health literacy, education level, religiosity, political conservatism, conspiracy ideation), trust in science was the strongest correlate of both COVID-19-related outcomes (Plohl & Musil, 2022).

Studies from other researchers mostly support these conclusions. For example, the important role of trust in science in determining compliance with COVID-19 prevention guidelines and COVID-19 vaccination also emerged in two large cross-cultural studies (Pagliaro et al., 2021; Roozenbeek et al., 2020). A recent longitudinal study conducted on representative samples from twelve countries showed that trust in science was the key driver of individual support for and compliance with COVID-19-related preventive measures and favourable attitudes toward vaccination. The key role of trust in science has been further supported by experimental data (Algan et al., 2021).

The potential outcomes of trust or distrust in science most likely extend to other health behaviours and beyond. First, a few studies (albeit limited) conducted prior to the COVID-19 pandemic highlighted the role of trust in science in explaining vaccination decisions in the context of HPV and other viruses (Keelan et al., 2010; Yaqub et al., 2014). The notion that trust in science could shape other health-related decisions is also supported by our recent study, which showed that trust in science correlates with a range of recommended health-related behaviours, including healthy eating, physical activity, constructive stress management, and general health responsibility (Plohl & Musil,

2022). Second, although empirical research is lacking, we argue that the important role of trust in science may also be carried over to how people deal with climate change. Similar to the sphere of health, the discussion of climate change is riddled with conflicting information, and levels of trust potentially determine what we believe and take into account when shaping our behaviours (Brewer & Ley, 2013). In their recent paper, Perkins et al. (2021) specifically point out that the conclusions drawn from social behaviour during the COVID-19 pandemic could be used to prepare for dealing with climate change, with one of the key lessons being the importance of trust in science. They argue that ignoring scientific findings, overestimating one's own knowledge (the Dunning-Kruger effect), and acting according to one's own distorted perceptions and interests have become major obstacles to tackling climate change, and that successfully dealing with current and future situations arising from this problem will only be possible if trust in and reliance on science and scientists is strengthened. Ojala's (2021) arguments are similar, emphasising the importance of considering trust in science when studying climate engagement.

Integrating trust in science into broader models

Research consistently shows that distrust in science decreases the likelihood of adopting COVID-19-related health recommendations. Moreover, while evidence is scarce, the existing studies suggest that such attitudes and responses likely apply to other evidence-based recommendations as well. However, at the moment, there are no comprehensive models explaining the mechanisms underlying these associations. In other words, trust in science is not yet integrated into broader models aimed at explaining people's decisions in the health (persuasion) context. In this section, we explain how trust in science could be integrated into two well-known social psychological models, namely the Health Belief Model (Rosenstock, 1974) and the Intertwined Model of Reactance (Dillard & Shen, 2005).

The Health Belief Model is a widely cited and empirically supported health behaviour change model that aims to explain and predict health behaviour of individuals. The model proposes that the likelihood of engaging in health-promoting behaviour is determined by four factors.

The first two – perceived susceptibility to a condition (i.e. subjective assessment of the risk of developing a health-related problem) and perceived severity of contracting an illness (i.e. subjective assessment of the severity of a health-related problem) – describe the personal risks perceived by an individual. The remaining two – perceived benefits of recommended behaviour (i.e. subjective assessment of the value of engaging in a health-promoting behaviour) and perceived barriers to undertaking the recommended behaviour (i.e. subjective assessment of the obstacles to changing behaviour) – in contrast, describe the perceived value of engaging in a health-promoting behaviour. According to the model, these four central components are influenced by so-called modifying factors, such as personality and knowledge, as well as cues to action, such as public health campaigns (Janz & Becker, 1984; Rosenstock, 1974).

While the Health Belief Model does not explicitly mention trust in science, we argue that it can, first, be understood as one of the critical modifying variables (i.e. variables that facilitate or hinder constructive health behaviour). Theoretically, trust in science may be related to all four central components of the Health Belief Model, as people who trust science may be more likely to believe scientists' warnings about the spread and seriousness of diseases as well as their evidence regarding the effectiveness and safety of countermeasures such as vaccination. Such claims have already been supported in studies that found positive correlations between trust in science and perceived COVID-19 risks (e.g. Plohl & Musil, 2021). Second, trust in science may interact with cues to actions in determining whether people will choose to act in health-promoting ways. In other words, trust in science may determine whether cues to action are successful in persuading people to perform recommended behaviours; in cases when trust is low, cues to action may be ignored or actively disregarded. This idea can be further elaborated via the inclusion of trust in science in the psychological reactance theory framework.

The role of trust in science in psychological reactance theory

The psychological reactance theory was established to explain the motivational state that causes people to seek ways of regaining their sense of freedom after being faced with something that subjectively threatens

it (Brehm, 1966; Rosenberg & Siegel, 2018). The theory can be applied in various contexts, including health persuasion, where it sheds light on why persuasive messages can sometimes be ineffective and lead to unintended outcomes. This is explained in an elaborate way in the Intertwined Process Model (Dillard & Shen, 2005). The model posits that when persuasion poses a threat to people's freedom, a reaction in terms of negative cognitions (counterarguments) and emotions (anger) will occur, leading to more negative attitudes toward the persuasive message or its content, and in turn reducing the likelihood of the desired behaviour (Dillard & Shen, 2005; Rains, 2013).

The Intertwined Process Model mainly emphasises that characteristics of message (stimulus) determine whether reactance will occur and to what extent. On the other hand, research on individual characteristics associated with state reactance is less developed. Early ideas about such characteristics contributed to the emergence of a construct called dispositional reactance (sometimes also referred to as reactance proneness), which is defined as a person's trait propensity to experience psychological reactance (Hong & Faedda, 1996; Shen & Dillard, 2005). Previous studies show that people with high dispositional reactance are more likely to experience reactance after exposure to persuasive messages than people with low dispositional reactance (e.g. LaVoie et al., 2017). However, the concept of dispositional reactance, which is general in nature, does not consider nuanced but also important aspects, such as the source of the message and the recipient's perception of this specific source.

Complementing dispositional reactance with variables such as trust may thus improve our understanding of state reactance. This is supported by previous studies which found that the more participants perceived the source as trustworthy, the less likely it was for state reactance to occur (Song et al., 2018). While there are several specific types of trust, trust in science and scientists may be particularly important in the context of communicating evidence-based (health) recommendations, because scientists represent the ultimate source of such recommendations. As such, trust in science could influence the extent to which messages lead to psychological reactance and further moderate the association between message characteristics and state reactance (*Figure 2*).

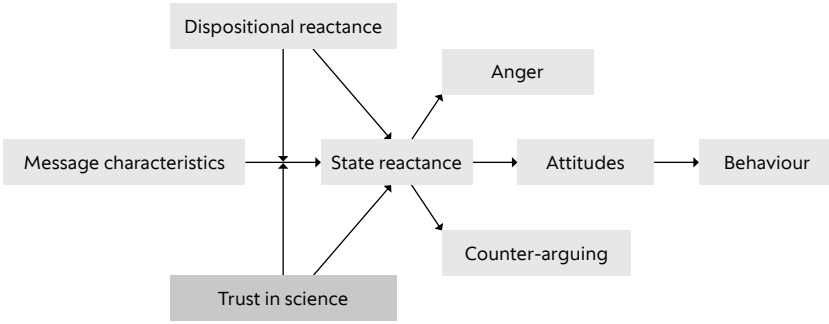

Figure 2: The role of trust in science in the Intertwined Process Model

We investigated this idea in our recent work (Plohl & Musil, under review). In this study, individuals were presented with either high- or low-threat messages promoting either mask-wearing to reduce the spread of COVID-19 or regular physical activity. First, the results showed that, regardless of the topic, psychological reactance and the associated outcomes (i.e. negative attitudes and low behavioural intentions) are more likely to occur after exposure to high-threat messages (as compared to low-threat messages). We call this the main effect of message characteristics. Second, we found that, compared to those who trust science, people who are distrustful of science experienced more intensive state reactance, more negative attitudes, and lower behavioural intentions after exposure to COVID-19 messages, but not after exposure to physical activity messages. We call this the main effect of trust in science, which appeared only in the case of COVID-19 messages. Second, we found that trust in science interacts with message characteristics in determining reactance and other message-related outcomes in the case of COVID-19 messages, but not in the case of physical activity messages. We call this the interaction effect. All of the conclusions remain the same when controlling for the role of dispositional reactance, highlighting that the role of recipients' trust in science goes beyond the role of the general propensity to experience psychological reactance. However, the results also reveal that the role of trust in science may be somewhat nuanced. The study reiterated that, as noted in section 2.2., trust in science seems to be particularly important in the case of poorly understood and highly emotional phenomena (such as the COVID-19

pandemic) that are characterised by a high amount of misinformation and strong emotional responses (Chou & Budenz, 2020; Shahi et al., 2021; The Lancet Infectious Diseases, 2020).

In sum, the findings of our unpublished study propose that when it comes to delicate issues like COVID-19, people who have less trust in science should be approached with public health messages that avoid threatening their freedoms. Messages crafted in such a way appear to generate less state reactance and encourage more willingness to adopt the recommended behaviours among people who distrust science and do not adversely affect those who do trust it. In the long term, such careful messaging may also contribute to increased trust in science among otherwise distrustful people (Plohl & Musil, under review).

From why to how: constructing scientific messages for distrustful recipients

Previous literature shows that several message features can make a message less freedom-threatening and thus diminish reactance, which may be especially important when communicating evidence-based guidelines to those sceptical of science. We will describe five of these features: freedom-threatening language, choice-enhancing language, gain-loss message framing, using narratives, and empathy (for an exhaustive review of message features associated with reactance, see Reynolds-Tylus, 2019b).

The first important message feature associated with state reactance is freedom-threatening language (sometimes also called controlling, dogmatic, domineering, or forceful language). This term refers to language that explicitly limits the autonomy of recipients by using directive phrases like "you must", "it is impossible to deny", and "stop the denial" (Rains, 2013; Reynolds-Tylus, 2019b). To illustrate public health messages containing high levels of freedom-threatening language, we quote a sample text used in the study by Dillard and Shen (2005, pp. 152): "As any sensible person can see, there is really no choice when it comes to flossing: You simply have to do it. In fact, the scientific evidence showing a link between gum disease and failure to floss is so overwhelming that only a fool would possibly argue with it... Flossing: It's easy. Do it because you have to! Set a goal for yourself to start to

floss every day during the next week (starting today)!" Previous research conducted in different health-related contexts (e.g. drug abuse, sunscreen usage, tobacco use) and aimed at various populations (e.g. adolescents, college students, and adults), consistently suggests that high freedom-threatening language (as compared to low freedom-threatening language) increases freedom threat and reactance, making public health messages containing such language less effective in achieving desired outcomes (Reynolds-Tylus, 2019b). The importance of using more implicit language was also recently demonstrated in the context of COVID-19 messages. For example, a study by Ma and Miller (2022) investigated the effects of freedom-threatening language on reactions to COVID-19 vaccination promotion messages. Results showed that persuasion was less successful when high freedom-threatening language (as opposed to low freedom-threatening language) was used. More specifically, high levels of freedom-threatening language led to a greater freedom threat, state reactance, source derogation, and generally less positive attitudes toward the message. The authors hence concluded that high freedom-threatening language should be avoided when promoting COVID-19 vaccination. Similar results were also obtained outside of the health context, for example in studies promoting energy conservation (Reynolds-Tylus, 2019a).

A language feature that is consistently linked to lower state reactance is more choice-enhancing language. Unlike freedom-threatening language, choice-enhancing language is generally linked to reduced reactance arousal (Reynolds-Tylus, 2019b; Rosenberg & Siegel, 2018). Such language can be integrated into messages in several ways. One option is explicitly providing behavioural alternatives in messages (e.g. providing two recommended responses instead of one or suggesting a longer list of possible actions and enabling message participants to choose the preferred action; Reynolds-Tylus, 2019b). However, the most-studied type of choice-enhancing language are pre-emptive scripts and restoration postscripts – short statements presented before (in the case of pre-emptive scripts) or at the end of a message (in the case of restoration postscripts) that reinforce the perception of autonomy by emphasising that the decision to comply with the message recommendations is the recipient's choice (Reynolds-Tylus, 2019b; Richards et al., 2020). Examples include statements such as: "The choice is yours",

"You are free to decide for yourself", and "It's up to you" (Miller et al., 2007; Richards et al., 2020). Several studies have concluded that adding pre-emptive scripts and restoration postscripts can reduce freedom threat and reactance in and outside of the health context (Bessarabova et al., 2013, 2017; Richards & Larsen, 2017). A recent study by Richards and colleagues (2020) investigated the relative effectiveness of two choice-enhancing strategies – pre-emptive scripts and restoration postscripts. Using an experimental design that varied freedom-threatening language, reactance-mitigation strategies, and health-related topics, the authors found that both pre-emptive scripts and restoration postscripts reduced state reactance which, in the next phase, also influenced attitude changes and behavioural intentions.

Both freedom-threatening language and choice-enhancing language using restoration postscripts were manipulated in our recent study (described in section 3.1) to create high and low threat messages, with results showing that people feel significantly less reactance after exposure to low threat COVID-19 messages. Similarities and differences between high and low threat messages promoting mask-wearing to reduce the spread of COVID-19 are outlined in Figure 3.

	High threat message	**Low threat message**
Similarities	Identical design. Identical insight: "Wearing face masks reduces the risk of infection by approximately 50%." Identical source: *The Science for Health Initiative.* Identical references supporting the scientific insight.	
Manipulation of freedom-threatening language	"STOP THE SPREAD OF COVID-19 AMONG THE MOST VULNERABLE!" "You must wear a face mask when visiting healthcare facilities."	"STOP THE SPREAD OF COVID-19 AMONG THE MOST VULNERABLE" "Please wear a face mask when visiting healthcare facilities."
Manipulation of choice-enhancing language	At the end of the message: "Masks are MANDATORY!"	At the end of the message: "Your decision matters."

Figure 3: Freedom-threatening and choice-enhancing language

Other ways of mitigating state reactance include gain-loss message framing, using narratives, and evoking state empathy. The literature on message framing generally distinguishes gain-framed messages that emphasise the advantages of adopting the recommended behaviours (e.g. "If you decide to get tested for HIV, you may feel the peace of mind that comes with knowing about your health."), and loss-framed messages that emphasise the disadvantages of failing to adopt the recommended behaviour (e.g. "If you don't get tested for HIV, you may feel more anxious because you will wonder if you are ill."; Apanovitch et al., 2003; Reynolds-Tylus, 2019b; Rothman & Salovey, 1997). While findings are not conclusive, multiple studies report that loss-framed messages elicit a greater threat to freedom and reactance. For example, Cho and Sands (2011) found that when advocating sun safety behaviour among adolescents, a loss-frame message produced a greater perceived threat to freedom and hence anger. Moreover, a web-based experiment by Shen (2015) showed that loss-frame messages increased reactance, while gain-frame messages decreased psychological reactance to skin cancer-related messages. Similar results were also obtained in the COVID-19 context. A large cross-cultural experimental study with more than fifteen thousand participants from eighty-four countries reports that framing COVID-19 messages in terms of potential losses (compared to potential gains) increased self-reported anxiety among recipients (Dorison et al., 2022).

The next tool is narrative communication, broadly defined as providing information through stories (Kreuter et al., 2007), which is being increasingly recognised as an alternative way of communicating that can alleviate some of the problems of more traditional scientific communication such as poor comprehension, low engagement, and low persuasiveness (Dahlstrom, 2014; Plohl et al., 2019). Another benefit of narrative communication may also be lower reactance, perhaps due to the persuasive intent being more implicit (Reynolds-Tylus, 2019b). For example, Gardner and Leshner (2016) investigated whether communicating diabetes self-care messages via stories can reduce psychological reactance and associated negative outcomes. They constructed various print messages with narrative stimuli; for example, people diagnosed with diabetes talking about their experiences and articulating the recommendations. The authors found that narratives led to a lower perceived threat to freedom, less psychological reactance (both anger

and counterarguing), more positive attitudes towards the message and the promoted behaviours, and higher behavioural intentions to comply with recommendations.

Narrative communication is also linked with another message feature that has previously been associated with lower psychological reactance, namely empathy – a state that can have affective (i.e. recognising, understanding, and experiencing the emotions that the characters experience and express in the narrative), cognitive (i.e. understanding, acknowledging, and adopting the characters' viewpoints), and associative aspects (i.e. experiencing reception and interpretation of the narrative from the inside, as if the events were happening to the recipients; Reynolds-Tylus, 2019b; Shen, 2011). Empathy-arousing message features specifically include vividness (e.g. concrete, visually appealing pictures in the message), realism (plausible narratives or narratives based on real stories), elements of pain and suffering (e.g. a character struggling in a difficult situation), and emotion expression (i.e. characters expressing their emotions explicitly and strongly; Shen, 2019). Previous research shows that experiencing state empathy (which can be a result of empathy-inducing message features) may reduce psychological reactance, which in turn leads to positive persuasive outcomes (Shen, 2010, 2011).

Conclusion

To summarise, this paper demonstrates evidence that trust in science is one of the crucial drivers of health-related decisions with distrustful people presenting a high-risk group that is less likely to comply with evidence-based recommendations. It is possible that such responses can be generalised to other areas. For example, trust in science may also be an important determinant of pro-environmental behaviour, and behaviours in other complex, emotional, and highly personally relevant contexts. Those who are – in addition to their low trust in science – characterised by being more politically conservative, religious, prone to conspiracy ideation, and low in openness to revising their viewpoint are more likely to disregard information coming from scientists and make decisions that can be harmful to them, others, or the environment. Therefore, it is important to explore how this population could be effectively addressed with science communication.

Some guidance for this can be found within the framework of psychological reactance theory, which posits that messages threatening people's subjective freedom lead to stronger negative cognitive-emotional responses and decrease the likelihood of complying with the communicated guidelines. Individuals differ in their proneness to experience reactance. As shown by our recent study, low trust in science increases the risk of experiencing reactance to messages describing contentious issues, such as COVID-19. However, the study also shows that this only occurs in the case of threatening messages, whereas responses to more implicit messages are comparable to those who trust science more. Hence, science communicators could benefit from tailoring communication based on trust in science and delivering low-threat messages to this audience group. This may be achieved by using low freedom-threatening language, features of choice-enhancing language (e.g. restoration postscripts), gain-framed messages, narrative communication, and empathy-arousing features. We believe that such careful messaging represents an essential step toward making science more accessible to those who may need it the most and building a resilient society capable of coping with diverse challenges.

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