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Health Communication and Behavioral Change During the COVID-19 Pandemic

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Abstract

The COVID-19 pandemic challenged the public health system to respond to an emerging, difficult-to-understand pathogen through demanding behaviors, including staying at home, masking for long periods, and vaccinating multiple times. We discuss key challenges of the pandemic health communication efforts deployed in the United States from 2020 to 2022 and identify research priorities. One priority is communicating about uncertainty in ways that prepare the public for disagreement and likely changes in recommendations as scientific understanding advances: How can changes in understanding and recommendations foster a sense that "science works as intended" rather than "the experts are clueless" and prevent creating a void to be filled by misinformation? A second priority concerns creating a culturally fluent framework for asking people to engage in difficult and novel actions: How can health messages foster the perception that difficulties of behavior change signal that the change is important rather than that the change "is not for people like me?" A third priority entails a shift from communication strategies that focus on knowledge and attitudes to interventions that focus on norms, policy, communication about policy, and channel factors that impair behavior change: How can we move beyond educating and correcting misinformation to achieving desired actions?

Keywords

health communication, behavioral change, social identity, pandemic

The COVID-19 pandemic exposed critical deficiencies in public health communication around the world. Here, we focus on the United States as an example because we cannot do justice to a broader integration within the word limits of this article. In the United States, Dr. Rochelle P. Walensky, the director of the Centers for Disease Control and Prevention (CDC), acknowledged the failures of the communication policy implemented by the CDC during the pandemic. Although the CDC (2019a) had crisis and emergency risk communication guidelines, it lacked a strategy to move Americans from basic information to timely action at the speed and scale required by the pandemic. To complicate matters, local and state health departments often lacked strategic infrastructure (e.g., social media accounts) to communicate and implement a public health response (Sauer et al., 2021). These limitations, we argue, were amplified by low civic science literacy in the United States. Civic science literacy entails the ability to find, make sense of, and use information about science or technology to engage in a public discussion of policy choices involving science or technology (Miller et al., 2022).

One problem with developing a fast strategic response was that most health communication research describes how to communicate about relatively stable risks and clear precautionary measures. Accordingly, it offered limited insights into how to communicate about novel and rapidly changing risks associated with uncertain remediation measures (Fazio, 2021). In the United States, President Trump initially compared the coronavirus to the common cold and the flu, for which

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people's mental models suggest only mild effects and discomfort. Without a mental model reflecting the danger of the situation and the logic underlying changing health recommendations, the public often found the mitigation measures unnecessary and perceived changes in the recommendations as proof of incompetence. These problems were compounded by misinformation and frequent disagreements among experts. One example is hydroxychloroquine. It received emergency authorization early in the pandemic (U.S. Food & Drug Administration, 2020a). After testing, the FDA and the CDC categorically advised against its use (U.S. Food & Drug Administration, 2020a). This switch, however, was not reflected in the public sentiment, and Americans' belief in the medication persisted (Stanglin, 2020; U.S. Food & Drug Administration, 2020b). Another example is masking. The CDC explicitly discouraged masking early in the pandemic (CDC, 2020; Godoy, 2020). After new evidence emerged, the CDC reversed course and promoted masking as essential after April 2020. Later, the CDC masking recommendations were tied to the level of COVID-19 community transmission, which resulted in different recommendations across time and communities (Brooks & Butler, 2021; National Center for Immunization and Respiratory Diseases, 2021a, 2021b; Wamsley, 2021).

A second problem arose from the personal difficulties associated with the pandemic. To limit their health risks, people had to be willing to persist in doing novel hard things and face uncertainty with optimism that the hardships were not for naught. For this to happen, they needed to hear messages that helped them make sense of the difficulty and what it implied for people like them. Compared with some non-Western societies, Americans are generally more likely to think of difficulty as signaling impossibility (O'Donnell et al., 2023) and less likely to think of life hardships as chances for self-improvement (Kiper et al., 2023; Yan et al., 2023). But independent of their chronic orientation, people adopt the latter perspective when they see the difficulty as identity congruent. This perception can be fostered through suitable messages. Unfortunately, the public health messaging included few targeted attempts to produce suitable messages.

The interpretative void was quickly filled by other sources. Some of them framed preventive behaviors as politically motivated attempts to limit individual freedoms. Conservative media was a common source of this alternative framing (Albarracin et al., 2022; Jamieson & Albarracín, 2020). If the measures were political, then following or refusing to follow them could be a signal of identity. Indeed, how one handled social distancing, masking, and vaccinations became an expression of one's political identity (van Bavel et al., 2023). Neither the CDC nor state and county health departments were prepared for this onslaught of messaging that reframed the public health response to COVID-19 as a political attempt to control the population rather than apolitical measures to safeguard citizens (Government Accountability Office, 2022; Weixek, 2021). This left the public vulnerable to an "infodemic" of disinformation and conspiracy theories (World Health Organization, 2020) that identified an out-group as the creator of the problem and offered a set of culturally fluent ways to make sense of a novel and uncertain situation (Oyserman & Dawson, 2020).

A third complication arose from overly optimistic assumptions about the link between knowledge and behavior. Most research on health communication seeks to improve the public's understanding of health information and health risk. This focus would be sensible if knowledge and risk perception were strong predictors of action. They are not (Albarracín, 2021; Albarracin et al., 1998). Knowledge is a weak predictor of behavior, whether the knowledge is fact based or conspiracy based (Biddlestone et al., 2022). The implication is that to influence and sustain health behaviors for the long haul, it is necessary to consider normative approaches, policies, communication about policies, and integrating citizens into a trustworthy system of care.

In what follows, we elaborate on these issues and offer recommendations based on communication efforts tested in relation to the COVID-19 pandemic, other infectious diseases, or other areas. Table 1 lists things to do and things to avoid. We already noted creating a culturally fluent model based on prior knowledge of disease and being explicit about the difficulties in calls to action and their congruence with important identities.

Communicating What the Problem Is and What to Do About It When Neither Is Certain

Creating a culturally fluent and identity-congruent mental model

For public health communicators tasked with reducing the spread of infection, the first goal is to inform the population about a new pathogen and what to do about it. To be effective, the information needs to be clear, concrete, and sufficiently complete for the public to build a mental model (Byrne & Johnson-Laird, 1989; Johnson-Laird, 2013) of disease transmission and prevention (Jee et al., 2015; Sax & Clack, 2015; Table 1, Recommendation 1). People make sense of the unknown and abstract by building on the known and concrete. This is a task well suited to metaphors of and analogies to familiar health threats. Choice of analogy and metaphor always matters but may be particularly critical for people with low levels of basic health literacy (Institute of Medicine [US] Committee on Health Literacy, 2004)

Table 1. Recommendations for Health Communication

Do: Create a frame for understanding	
1	Communicate a mental model of community transmission that builds on prior cultural knowledge including metaphors and analogies that are accessible to populations with different educational levels.
2	Frame calls to action in terms that recognize and interpret difficulty in identity-relevant ways.
Do: Build a sense of increasing certainty and progress	
3	Communicate disease prevalence rather than changes in infections, particularly when changes are positive.
4	Communicate emerging consensus information through weight-of-evidence statements.
5	Communicate consensus about the personal health decisions by experts (e.g., percentage vaccinated against a disease).
6	Communicate positive norms and positive changes in norms.
7	Communicate about positive policies (e.g., increased funding for vaccination).
Do: Plan for communication in an age of misinformation	
8	Assume and address head-on potential political polarization.
9	Prebunk as possible.
10	Debunk frequently disseminated claims.
11	Ignore misleading claims that have received little attention.
Avoid: Spreading misinformation	
12	Avoid communicating a false sense of consensus about complex issues (e.g., duration of immunity from a new vaccine).
13	Avoid repeating fringe positions.
Do: Improve material conditions for success	
14	Provide free health care to cover vaccinations and side effects.
15	Provide coverage for people staying home for postvaccination recovery and sick days.
16	Reduce channel factors by allocating case managers to support/accompany those who need help navigating making and getting to vaccine appointments and handling potential side effects.
17	Consider using mandates to change norms about behaviors with low uptake.

and science literacy (Laugksch, 2016). Failure to present a clear model of the disease or useful analogies or metaphors for the disease and the process of mitigating risk leaves the public uncertain.

Public health communications also benefit from connecting recommendations with valued social identities and culturally fluent behaviors (Table 1, Recommendation 2). Doing so contributed to the success of misinformation campaigns that connected with the identities and cultural sensibilities of large sectors of society, including people who saw themselves as conservatives. Identities reflect people's sense of who they are and include personal aspects (e.g., being responsible, caring, patriotic, and conscientious) and social aspects (e.g., being a parent, a teacher, and an American) of the self (Oyserman et al., 2009). When people face mortal threats, they turn to their social groups for comfort, protection, and guidance (Jetten et al., 2001; Oyserman, 2007). Which group memberships come to mind and how they inform a situation and action is sensitive to situational cues (Oyserman, 2009; Oyserman et al., 2006, 2007). One way in which group membership comes to mind is through intergroup contact and perceived discrimination from other, more powerful, elite groups (Jetten et al., 2001; Oyserman, 2007). These processes can motivate group members to highlight how their group is distinct from these other groups. In doing so, people may take up behaviors that are quite costly for themselves (Bowles, 2009; Buss & Portnoy, 1967) and/or their group (Cooper, 2017; Oyserman et al., 2007). In the case of COVID-19, Republican opinion leaders mobilized fellow Republicans to act against health officials by framing the guidelines as part of an oppression by liberal elites and government officials (Collinson, 2020). The specific action of not getting vaccinated capitalized on antivaccination religious sentiments that preceded the pandemic (Kuru et al., 2022). In the United States, not wearing a mask and refusing vaccinations became Republican things to do. These were costly signals—in terms of morbidity and mortality, they clearly increased risk for conservatives and their leaders (Mitropoulos, 2022).

The link between identity and action is the take-home point here. Messages that connect beliefs and specific behavioral recommendations to identity-relevant themes and concerns are easier to process and feel more compelling (Oyserman & Dawson, 2020). Messages that fail to do so are less persuasive. Worse yet, messages that are identity incongruent are likely to elicit resistance and resentment. It is therefore important to frame desirable preventive behaviors in ways that are identity congruent. An action can feel identity congruent to different identities, but if the connection is not made, people may infer that what is congruent with one social identity may be incongruent with another one (Oyserman et al., 2007). Accordingly, when party elites suggested vaccination, Republicans were more willing to do so, as revealed in a preregistered experiment exposing Republicans to these messages (Pink et al., 2021).

Initially, Democrats and Republicans could each frame taking public health precautions as in-group identity congruent, even if for different reasons—group loyalty or caring for individuals. This possible consensus quickly diverged when former President Trump and Republican opinion leaders suggested that public health precautions should be considered an identity-signaling choice. They homed in on wearing a mask and refraining from public gatherings as impositions by liberal groups. Republican constituents concurred, as reflected in partisan gaps in the perceived severity of COVID-19, believed effectiveness of masks (Gadarian et al., 2021; Mitchell et al., 2020), the willingness to mask (Gelfand et al., 2022), and, eventually, partisan differences in the COVID-19 death rate (van Bavel et al., 2023).

The key point is not that different people should be targeted with different messages, which can itself undermine credibility, but to consider ways in which identity signaling can reach across members of the public. Identity-signaling choices are particularly impactful when linked to cultural themes including honor, individualism, and communitarian or collective values (Oyserman, 2017). Each of these could be linked to taking or refraining from action. In the United States, conservatives linked individualism to a juxtaposition of personal choice and government intervention, instead of taking personal responsibility for the well-being of one's family, a theme that conservatives emphasize in most other domains. Indeed, 40% of Americans reported not wearing a mask because they saw that choice as part of being individualists (Vargas & Sanchez, 2020). This perception reflected the messaging of Republican thought leaders (van Bavel et al., 2023) and was not a necessary outcome of the health issues at hand.

As already mentioned, the perceived culture and identity congruence of preventive behaviors is important because it influences how people respond to associated difficulties. When the behavior is seen as something that "we" or "people like me" do, emerging difficulties are interpreted as a signal that the task is important and worth attention (Oyserman, 2015; Smith & Oyserman, 2015). But if the task is not seen as identity congruent, difficulty becomes a signal that the task poses impossible demands—it is not the kind of thing that "people like me" can be expected to do. Experimental research and educational interventions converge on showing the reciprocal effects of identity congruence and interpretations of difficulty (for reviews, see Oyserman, 2019). During the COVID-19 pandemic, people experienced mask wearing as difficult, especially over long periods of time or while exercising or communicating with others (Esmaeilzadeh, 2022). Those who endorsed a difficulty-as-importance interpretation were more likely to report that they nevertheless wore masks and would continue to do so (Kiper et al., 2023).

In hindsight, public health communication might have been more effective with early multipronged culture- and identity-based messages. When a task or goal feels difficult to think about or implement, or when life feels hard, the challenges say something about who you are. Future research using this identity-based motivational lens is needed to develop tools to help people foresee and manage the difficulties posed by pandemics. Otherwise, difficulties may again foster the sense among large groups of Americans that preventive behavior is just not for them. Communication strategies that emphasize the ever-rising death toll rather than shifting prevalence rates may further undermine willingness to continue taking preventive action by suggesting that the effort is for naught (Table 1, Recommendation 3).

Each of these issues is magnified among Americans who feel stigmatized in their interactions with health care, including people who have low incomes, less education, lower health and science literacy, and a history of neglect and abuse at the hands of the medical profession (e.g., experiments without informed consent and forced treatment). For these groups, a well-intentioned effort to provide early access to vaccinations almost backfired. The speed with which vaccinations were made available to disadvantaged populations raised concern as to whether they were being offered early access to serve as test cases for elites (Ojikutu et al., 2020). This perception changed only after it became clear that elites were going to the underutilized sites to access vaccines meant for marginalized groups. The concerns of marginalized groups reflected their exposure to poorer health care and stigmatizing interactions with health professionals (Oyserman et al., 2014). Further research on better and earlier messaging that directly links to identity-based concerns about health care services and professionals is needed. A history of poor service and disrespect makes people distrust scientific and medical advice rather than accept it. People are less likely to interpret the difficulty of preventive measures as signaling importance if they perceive that the health system disrespects and stigmatizes their group. In this case, not only is more research needed, but so is more open access to health care to ensure that low-income, low-educated, and other Americans will not be as susceptible to misinformation or politization of health care in future pandemics.

Understanding scientific uncertainty: The experts can never agree

The uncertainties posed by a novel pandemic challenged the routines developed for responding to familiar health threats for which broad consensus exists among scientific and clinical experts. In general, one of the most effective strategies for limiting the appeal of individual dissenting voices is the communication of a high scientific consensus (Imundo & Rapp, 2022; Kohl et al., 2016). When a disease is less familiar, communicating an emerging consensus (Table 1, Recommendation 4) and focusing on what experts are doing in their own lives (Table 1, Recommendation 5) can reduce uncertainty.

Recognizing the need to reduce uncertainty, medical and health organizations stepped in to create pandemic consensus reports (Chiang et al., 2021; Van der Linden, 2015), and the African American members of the National Academies of Sciences, Engineering, and Medicine (n.d.) produced a video to highlight their consensus. Such steps are likely to make a difference. For example, participants in a longitudinal Czech study of COVID-19-vaccine uptake were more likely to vaccinate and boost when they learned that more than 90% of Czech physicians intended to do so than when they did not receive this information (Bartos et al., 2022). The success of this simple intervention suggests the need to develop strategies that can quickly document the emerging consensus of trusted experts, such as family physicians.

But broad scientific and clinical consensus on the specific nature, course, and outcomes of a novel health threat emerges slowly and changes multiple times as knowledge about the threat develops. Unfortunately, the public does not perceive this evolution as a sign that science is working the way it ought to work. Instead, it may see change in expert opinion as a marker of low credibility and high uncertainty, impairing the acceptance of the recommendations made. Empirically, just a few disagreeing experts are sufficient to call perceived consensus into question (Koehler, 2016). Taking advantage of media formats that highlight controversy to attract eyeballs, interest groups routinely exploit this dynamic by showcasing a disagreeing expert who provides memorable lines of dissent (Oreskes & Conway, 2011). In fact, people's consensus estimates primarily track how often they heard a claim, not from how many different sources they heard it—a single repetitive voice can sound like a chorus (Weaver et al., 2007). This familiarity bolsters confidence in the accuracy of the supposedly "consensual" claim (Imundo & Rapp, 2022; Kohl et al., 2016) and impacts later judgments (Foster et al., 2012). When fringe positions are presented, it is therefore important to avoid repeating them and to highlight the correct consensus information through weight-of-evidence statements (Imundo & Rapp, 2022; Kohl et al., 2016) (see Table 1, Recommendations 4 and 13).

In response to robust evidence about the impact of repeating false claims, science journalists increasingly highlight the scientific consensus on an issue and refrain from deceptively "balanced" reporting that provides discredited positions a platform (Dunwoody & Kohl, 2017). However, this strategy is defensible only when the science on an issue is settled, not when the science is rapidly developing and changing. Science journalists have recognized this problem (Science Literacy Foundation, 2021).

Coupled with the emerging literature on civic science literacy, this poses an important agenda for psychological research: How can we communicate a mental model of science that normalizes changing insights and recommendations as a sign that science is doing its job? What kind of mental model of science will privilege scientific consensus over repetitive fringe positions? How can we prevent doubt and anomy in the public when experts keep changing their minds?

Addressing misinformation

Information that is at odds with scientific insight is an unavoidable part of the health information mix. Lewandowsky and colleagues (2020) reviewed what is known about combatting such misinformation. They provided evidence-based recommendations for after-the-fact correction ("debunking") and before-the-fact "prebunking" (Table 1, Recommendations 9 and 10). One possibility is to simply ignore a misleading claim, another is to attempt to debunk it, and a third is to attempt to reduce people's susceptibility to false claims. Any communication that repeats a false claim, even with the goal of debunking it, can have the ironic effect of spreading the claim to audiences not previously exposed to it (Schwarz et al., 2016). Hence, one possibility is to ignore misleading claims that have received little attention (Albarracin, 2022; see Table 1, Recommendation 11). For ignoring to be a successful strategy, public health communicators need to be able to predict when the public will be receptive to the misinformation. Receptivity may be greater when individuals are actively looking for information that counters public health messages or when the claims themselves are likely to be remembered and spread. Future research is needed to improve prediction on both counts.

An alternative to ignoring false claims is to attempt to debunk them and provide correct information (Chan et al., 2017). To reduce the possible impact of repeating a false claim, the current recommendation is to lead with the facts (Lewandowsky et al., 2020). After repeating the facts, warn that misinformation is coming, then explain why the misinformation is false, and finally, repeat the facts again (Lewandowsky et al., 2020). When possible, include a factual explanation of how the misconception arose (Lewandowsky et al., 2020). Opening and closing the communication with multiple statements of the facts reduces the chance that only the false claim will become fluent. More research is needed on how to craft affirmative statements that can negate false claims without having to repeat them.

Another alternative is to attempt to prevent misconceptions by reducing vulnerability to misleading claims that might be encountered in the future. As originally proposed by McGuire and Papageorgis (1961), prebunking involves exposure to a weak claim that recipients can refute and that prepares their defenses for later exposure to stronger claims. However, the term is now frequently used for interventions that fall under the rubric of media literacy and behavioral skills training. For example, van der Linden and colleagues (Roozenbeek et al., 2020) developed a video game in which participants are trained to identify common manipulations to reduce the likelihood that they fall prey to them on future occasions. Developing defensive skills is a promising avenue that can benefit from insights gained in other domains, including the use of role-playing in trainings of refusal skills in the areas of substance use and condom use (Fisher et al., 2002). Interventions that include "active" components are more efficacious at changing behavior than interventions that rely mostly on "passive" components (Albarracín et al., 2005). Techniques such as a "buyer beware" stance, slowing down and thinking about the information one encounters, assessing the quality and motives of information sources, and verifying claims (Roozenbeek et al., 2020) are all active skills that require practice. Unfortunately, even the most useful and well-practiced skills confer protection only when they are applied in the right moment, which is most likely when something about the message or the messenger feels wrong.

A complication with both debunking and prebunking is whether such approaches can overcome the appeal of messages that are identity congruent and culturally fluent (Oyserman & Dawson, 2020), as discussed later. Although in some domains, corrections appear to work well even when the false claims are partisan (Pennycook & Rand, 2019), science-relevant corrections do particularly poorly in domains that are politically polarized (Chan & Albarracin, 2023; Table 1, Recommendation 8). Also, cultural fluency has not been investigated. For example, people who score high on the Cognitive Reflection Test (Frederick, 2005) show better discernment between true and false claims, especially when the false claims have sensational headlines and come from questionable sources, warning signs that are commonly highlighted in media literacy training (Pennycook & Rand, 2021). Unfortunately, however, scoring high in cognitive reflection does not protect against misinformation that seems familiar because of repetition (de keersmaecker et al., 2020) or other fluency factors (Schwarz, 2018; Schwarz et al., 2021), further highlighting the need to better understand when people do or do not apply their critical reasoning skills. More research is needed to understand what triggers shifting to rule-based systematic reasoning and under what circumstances shifting improves public health response.

What not to do

Even though consensus is an effective tool to communicate knowledge, we do not recommend conveying a false sense of consensus (Table 1, Recommendation 12). Similarly, increasing the public's general suspicion to limit the acceptance of misinformation is clearly a double-edged sword. On the one hand, suspicion increases the likelihood that people approach a message more critically (Mayo, 2015) and notice misleading information (Lee et al., 2015). On the other hand, trust in government is necessary for efficient public health communication and possibly better pandemic outcomes (Devine et al., 2021). By the same token, frequent debunks and warnings about the threat posed by misinformation could increase distrust of all media, particularly among people high in distrust to begin with. This unintended effect of raising suspicion should be investigated in future work.

Communicating Actions and Communicating for Action

Perhaps because of the salience of the COVID-19 "infodemic" or the popularity of health education efforts, government interventions were often directed to information and risk perceptions instead of behavior. Rather than first pinpointing the strongest determinants of masking or vaccination, fighting misinformation and increasing vaccine confidence became the prime arsenal to fight COVID-19. However, according to the body of evidence from prior epidemics, such as HIV, and a large collection of studies of COVID-19, neither increasing information nor decreasing misinformation should have been the primary objectives (Albarracin, 2021; Albarracin et al., 1998, 2018, 2019). Indeed, social scientists studying intergroup relations are also calling for a science that focuses on the determinants of behavior rather than solely attitudes or beliefs (Brauer, 2023).

Consistent with the evidence of weak associations between knowledge and behavior, theories of behavioral change point to perceived behavioral control, behavioral routines, and structural and economic drivers of behavior, particularly for vulnerable populations with urgent needs of food, shelter, and basic security (Albarracín, 2021; Bandura, 1986; Fishbein & Ajzen, 2011; Fisher et al., 2006). From this perspective, misinformation and vaccine confidence should be only part of the picture when trying to change behavior. In fact, a recent comprehensive meta-analysis of interventions to increase vaccination uptake in the United States showed that, across all vaccines, including the one against COVID-19, only promoting access to the vaccine and introducing financial incentives increased efficacy (Liu et al., 2023).

Instead of addressing information and attitudes like vaccine confidence, communicating norms seems like a promising and often neglected avenue (Table 1, Recommendation 6). To begin, messages about the need for the public to perform a behavior can inadvertently communicate negative norms about that behavior, as shown by Cialdini (2003; see also Schultz et al., 2019). For example, substantively equivalent headlines about vaccination coverage can shape normative perceptions (Arya et al., 2023). Specifically, participants who read "59% of adults have received first COVID-19 booster shot" inferred a higher vaccination coverage than participants who read "41% of adults have not received first COVID-19 booster shot." The perceived vaccination consensus, in turn, influenced boosting intentions among the recipients of the information.

Particularly promising is the observation that people are sensitive to dynamic changes in norms. For example, informing an audience that the number of people who perform a proenvironmental behavior is rapidly increasing can strengthen behavioral intentions even when the absolute numbers are still small (Sparkman & Walton, 2017, 2019). Although not yet tested with masking or vaccination, the inference is that learning about an uptick is more likely to elicit the desired behavior than highlighting a still-low level of uptake, let alone emphasizing refusal. If the current prevalence of the desired behavior grew from 10% to 20%, one can emphasize (a) the remarkable doubling in the desired behavior, (b) the still-small absolute number, or (c) the problematic fact that 80% do not perform the desired behavior. Each is true. But option (a) is more helpful than options (b) and (c), which currently dominate media coverage.

Another way to promote social norms is to publicize policy changes—people interpret these changes as reflecting changes in social consensus (Table 1, Recommendation 7). For example, repeals of vaccine exemptions and increases in the level of funding for state vaccination programs predict increased normative support for vaccination over time (Fayaz-Farkhad et al., in press). As a test of causal process, when people are randomly assigned to learn about different vaccine policies, their belief about what is normative aligns with the policy they learned about (Fayaz-Farkhad et al., in press). Learning that a city will increase or decrease funding for its immunization program produces corresponding changes in perceived vaccination norms. So does learning that a state recommends against COVID-19 vaccination for children, as was the case in Florida.

People respond not only to norms but also to mandates that directly control individual behavior (Table 1, Recommendation 17). Thus, vaccine mandates lead to compliance even among people who are prone to experience psychological reactance (Albarracin et al., 2021; see also Fayaz-Farkhad & Jung, 2023). At the same time, among those not prone to psychological reactance, mandates influence behavior in part by increasing perceived benefits and norms. Future research should examine the success of policies that simply control behavior without shaping norms and perceived benefits. Reciprocal effects are possible—change in behavior may over time improve vaccine attitudes and norms.

Finally, access to health care is frequently the chief consideration for public health scholars, health economists, and public policy makers. During the COVID-19 pandemic, governments deployed one of the largest testing, treatment, and vaccination efforts ever. Many cities paid for Uber and Lyft rides to vaccination sites, vaccines were rolled out through pharmacies in record time, and many venues administered vaccines without appointments (see Fayaz-Farkhad & Jung, 2023). Yet this discussion rarely considered financial and psychological barriers that prevent people from acting. People who lack financial means or insurance may have felt that these messages and vaccination opportunities did not pertain to them. People with preexisting stress, depression, anxiety, and other mental health difficulties as well as substance use may need more support to use services. After all, even if free, using the service requires summoning the energy to leave home, arrange rides, and interact with others at a vaccination site. Policy possibilities include case managers to support or accompany vulnerable members of the population as they navigate the process from making appointments to getting to the vaccine (Table 1, Recommendation 15). They also include expanding free health care to cover any vaccine side effects and coverage for postvaccination recovery days (Table 1, Recommendation 14).

Final Remarks

Our analysis of health communication during the pandemic suggests both that, as a nation, Americans were largely unprepared for the crisis and that psychological scientists have much to contribute. Psychological scientists have a critical role to play in sharing what they know and in addressing numerous open questions as the world readies for future outbreaks. The many questions that require increased attention include the following:

1. How can we communicate a mental model of science that normalizes changing insights and recommendations as a sign that science is doing its job?
2. What kind of mental model of science will privilege scientific consensus over repetitive fringe positions?
3. How can we prevent doubt and anomy in the public when experts keep changing their minds?
4. How do we make decisions about when to debunk misinformation versus ignoring it and perhaps bypassing it to simply emphasize the positives about a behavior such as vaccination (Calabrese & Albarracín, 2023)?
5. Other than tailoring to individuals and targeting to specific groups (Albarracin & Glasman, 2016), what are the ways of highlighting identities that are important to the general population?
6. What are the optimal ways to support behavioral change in vulnerable populations?

We underscored three domains of current and required future research contributions: First, we considered mental models of science applying psychological understanding of how people reason about the unknown through analogies and about the abstract through metaphors. Second, we considered how motivation, self-regulation, and action can be triggered through culturally fluent identity-framed inferences from difficulty. Third, we considered creative forms of addressing misinformation and mitigating political manipulation. Lastly, we discussed how to develop an agenda that ensures actual adherence to health recommendations in addition to heightened learning or risk perception. This work should be conducted by teams of psychologists who can integrate expertise in social and cognitive issues as well as developmental and clinical aspects of disease prevention. Generated knowledge must enhance health justice and ensure that communication strategies succeed for all, including the most vulnerable groups of our society.

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