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COUNTERING MISINFORMATION WITH PSYCHOLOGICAL SCIENCE

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- Catalyzing the further development of psychological science
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INTRODUCTION

Misinformation presents a distorted picture of reality. At a casual glance, misinformation may seem plausible and even contain kernels of truth. This is merely a semblance, however, as closer, more critical examination reveals. Without such careful scrutiny, misinformation hobbles public understanding of critical topics such as climate change, vaccine efficacy, election integrity, and more. Members of the public, however, often lack the necessary background to identify misinformation, while science communicators and policymakers often lack the skills needed to debunk misinformation once it has taken root. This white paper attempts to address these shortcomings by collecting the best and most relevant psychological science research on misinformation. The object is that stakeholders and the public will be able to apply these findings to better evaluate and communicate news and information regardless of its source and emotional impact. In *The Demon Haunted World*, famed astronomer and author Carl Sagan outlined what he called a "baloney detection kit," steps that people could follow when evaluating claims. In the same spirit, the Association for Psychological Science developed this white paper as a "misinformation prevention kit" for policymakers, the scientific community, the media, and the public. In addition to a summary of salient information, the paper also presents science-based solutions to combat misinformation and recommends several action items to catalyze next steps.

Solutions Backed by Science

- **Prebunking**: Promoting skeptical consumption of media can help audiences become more resistant to misinformation.
- **Debunking**: Misinformation is highly resistant to change, but compelling corrections, when repeated, can make a difference.
- **Enabling positive behaviors**: When there is a pressing need to change behaviors, as with encouraging COVID-19 vaccinations and other public health measures, interventions should target behavior directly by making positive choices easier to make.

Next Steps

- **Summit on misinformation**: Convening key stakeholders, both public and private, to develop a science-based action plan to counter misinformation
- **Public-awareness campaign**: Developing and disseminating tailored, publicly engaging video, audio, and social media information on how to recognize and counter misinformation
- **Call for additional research**: Identifying gaps in understanding, building on promising results with continued research, and conducting critical analyses of the current body of knowledge

THE STATE OF MODERN MISINFORMATION

Rumors, conspiracy theories, and deceptive propaganda have long presented twisted views of reality to misinform and manipulate the public. The speed and spread of modern misinformation, however, have significantly magnified these threats to weaken the public's ability to tell truth from fiction and act accordingly (Kozyreva et al., 2020).

What is often overlooked is that social media platforms and search engines are for-profit enterprises. Their primary goal is to generate revenue, not to inform the public (Kozyreva et al., 2020). To maximize profits, online platforms manipulate audiences into continuously engaging with content without regard for the accuracy of the content being consumed.

Although online environments offer many social benefits—including a level of remote connectivity that has proved essential to the continued functioning of society throughout the COVID-19 pandemic—they have also amplified many of the harmful tendencies already present in print, radio, and television media and human psychology more broadly (Kozyreva et al., 2020).

Even when these harms are unintentional, they can develop rapidly and grow resistant to correction. Preliminary news reports generated by the 24-hour news cycle, which are often incomplete and unverified, can spread rapidly online and become fixed in the public imagination, rendering them resistant to correction even as new information comes to light (Lewandowsky et al., 2012). A potent combination of the content-recommendation algorithms common on platforms like Facebook and YouTube, which aim to keep audiences engaged by serving up "likable" content similar to what they've viewed already, paired with users' own preference to engage with people who share their existing beliefs can also contribute to the creation of one-sided "echo chambers."

In these self-contained ecosystems of information, even highly uncommon beliefs—such as claims among "flat Earthers" that there is a global conspiracy to hide the fact that the world is flat—are presented without opposition, leading to the perception that a sizable number of other people share the same views (Lewandowsky et al., 2012). This further enables the spread of misinformation through the development of "multiple realities" tailor-made for particular audiences, in which "alternative" facts and narratives that cater to peoples' wishful thinking and political biases may be accepted as objective truth with little or no evidence (Kozyreva et al., 2020).

More cynically, political forces may knowingly exploit psychological blind spots to intentionally sow disinformation—a form of misinformation that is created to harm an individual or group or to sway public opinion toward a particular political ideology (Kozyreva et al., 2020). Disinformation can spread rapidly in online environments, but its use has a long and disheartening history. In a classic example, the tobacco industry promoted claims that cigarettes were not toxic despite possessing compelling evidence of the link between smoking and lung cancer (Lewandowsky et al., 2012).

RECOMMENDATIONS

Apply influencers' interventions: Prebunking and debunking tactics can disrupt self-contained ecosystems of misinformation, but only if the message is championed by trusted members of the in group.

Target sources: Influencer intervention must occur in the sources and channels favored by proponents and consumers of misinformation.

Disarming interactions: Messages, messengers, and associated media must be approachable and nonthreatening to group and individual identity. Confrontational tactics trigger outrage and anger, preventing the penetration and retention of messages.

Vaccine Hesitancy and Resistance

Vaccine misinformation is not a new phenomenon. From polio to smallpox, as new vaccines have emerged, so too have anti-vax voices. Countering this historical trend, however, has taken on new urgency as anti-vaccination activists attempt to undermine broad acceptance of vaccines—not only for COVID-19 but for countless other vaccine-preventable diseases.

The talking points of vaccine misinformation are as varied as they are ominous: damaging side effects, inferiority of approved vaccines to so-called natural immunity, and sinister motives to impose control over the public through genetic or other biological manipulation.

The impact of these efforts is evidenced in the lagging numbers of vaccinations following the initial wave. In December 2020, when coronavirus vaccines were not yet widely available to the public, 73% of American adults reported that they were open to getting vaccinated eventually, and, as of January 2022, 77% of American adults reported having received at least one shot (Kaiser Family Foundation, 2022). The percentage of Americans who have reported actively refusing to get vaccinated against COVID-19 has remained largely unchanged, however, hovering at a stubborn 15% over the previous year.

Perhaps the most infamous piece of modern antivaccination misinformation—the widely disproved claim that routine childhood vaccines cause autism spectrum disorder—can be traced back to a highly flawed 1998 study that has since been retracted and has failed to replicate on numerous occasions (Lewandowsky et al., 2012). And yet the myth persists, demonstrating just how correction-resistant vaccine misinformation can be.

WHY WE ACCEPT MISINFORMATION AS FACT

Psychological science has uncovered many factors that can make people vulnerable to misinformation at both the societal and individual level.

Societal Factors

1 The Structure of Online Environments

Online platforms encourage users to consume and share content by pressing our "psychological hot buttons" (Kozyreva et al., 2020). The most shareable media often capture our attention by focusing on negative emotions like fear, disgust, and moral outrage. Influencers, for good or ill, can publish content directly to social media, personal websites, and other platforms with little to no oversight or fact-checking. Without knowledgeable gatekeepers, opinion can appear as fact and misinformation can be monetized and weaponized.

2 Information Overload

The unending tsunami of new content can also contribute to a sense of information overload (Kozyreva et al., 2020). Many platforms encourage users to engage shallowly with the many sources competing for their attention, rather than slowing down to consider the accuracy of the information being consumed.

3 Failed Retractions and Debunking

Misinformation is highly "sticky," limiting the effectiveness of retractions and other attempts to debunk false information once a person has accepted an idea as accurate (Lewandowsky, 2012). Retractions that simply label a previous statement as incorrect can backfire by causing individuals who believe the misinformation to focus on generating their own counterarguments, inadvertently strengthening their existing beliefs (Chan et al., 2017). This is particularly likely when rejecting the misinformation would conflict with a person's existing worldview and political beliefs (Murphy et al., 2019).

Individual Factors

1 Age

Anyone can be taken in by misinformation, but research suggests that users ages 65 and older view and share the majority of misleading "fake news" on social media platforms like Facebook and Twitter (Brashier & Schacter, 2020). In addition to being less experienced with digital media than "online natives," older adults may prioritize social connection over accuracy when communicating online.

2 Assumption of Truth

People tend to operate under the assumption that the information other people, and even unknown sources, present to them is accurate (Lewandowsky et al., 2012; Pennycook et al., 2020; Rapp 2016). In the absence of fact-checking or having a specific reason to doubt the quality of a source, people are unlikely to expend the cognitive effort necessary to critically evaluate information (Kozyreva et al., 2020; Lewandowsky et al., 2012).

3 Overestimating Our Own Knowledge

People are not always accurate judges of their own knowledge (Atir et al., 2015). People who perceive themselves to be experts on a topic, regardless of their actual expertise or education, are more likely to claim familiarity with made-up concepts.

4 Prioritizing Potential Hazards

Individuals tend to prioritize information about potential hazards, and this bias has been found to be stronger in people who are more politically conservative (Fessler et al., 2017). In humans' evolutionary past, acting on information about potential harms may have helped people to survive in uncertain circumstances. In modern societies, however, this tendency can cause people to act on misinformation about potential dangers despite clear evidence that a threat does not actually exist. In the case of COVID-19 vaccination, misinformation about potential hazards can interfere with how people appraise risks related to infection with the virus and the use of vaccines to prevent it (Brewer et al., 2017). These appraisals may involve the perceived likelihood of becoming infected, the possible severity of the infection, and confidence about vaccines' effectiveness as well as their potential side effects. Overall, however, the extent to which an individual expects they would regret *not* getting vaccinated if they were to get sick appears to most strongly predict vaccination.

5 Social Norms

The social norms based on these perceptions of risk—such as rates of vaccination or mask wearing—appear to spread through social networks, causing people to emulate behaviors they perceive as more common within their social groups (Brewer et al., 2017). People also tend to weigh the risk of infection or illness against the loss of social standing within their circle of friends, which means they may evaluate the social benefit of not vaccinating as outweighing the risk of contracting COVID.

6 Worldview

People with "science-skeptical" attitudes are more motivated to reject scientific consensus, such as evolution or the existence of human-caused climate change, on ideological grounds (Hornsey, 2020). People with a higher need to live in a structured world are also more likely to attribute journalistic errors to international conspiracy than accidental misrepresentation (Axt et al., 2020). People of any political affiliation are more likely to accept misinformation that aligns with their worldview (Kozyreva et al., 2020; Lewandowsky et al., 2012; Murphy et al., 2019).

SOLUTIONS BACKED BY SCIENCE

Psychological scientists have identified several types of interventions that appear to measurably improve our ability to reject and reconsider misinformation. In addition to the interventions outlined below, policymakers can help create an "internet for citizens" by regulating online environments in ways that empower users to control their digital lives, maintain privacy, and more easily determine the quality of sources (Kozyreva et al., 2020). In the past several years, for example, the European Union increased its regulation of data security and introduced a Code of Practice on Disinformation, but regulations must continue to adapt alongside the world's digital landscapes.

Prebunking

Although debunking misinformation requires individuals to let go of false beliefs they may have already incorporated into their worldview, "prebunking" can help prevent these beliefs from taking root in the first place by "inoculating" an audience against misinformation before exposure (Kozyreva et al., 2020).

Prebunking can take many forms, including warning tags on content that may contain misinformation and public education about the prevalence and effects of misinformation, as well as how to evaluate the accuracy of sources more effectively (Kozyreva et al., 2020; Lewandowsky et al., 2012). Informing the public about the manipulative strategies used to spread political disinformation can also help to render these tactics less effective (Kozyreva et al., 2020).

Debunking

Misinformation is highly resistant to correction, but steps can still be taken to more effectively debunk inaccuracies once an audience has accepted them as fact.

- Keep retractions and other attempts to correct misinformation straightforward and focused, but don't stop at simply labeling information as false (Lewandowsky et al., 2012). Effective retractions provide the audience with a new narrative of the events in question (Chan et al., 2017), including an explanation for why and how the prior misinformation occurred (Lewandowsky et al., 2012). Conspiracy theories and other forms of misinformation often provide audiences with a clear-cut explanation for events where one was previously perceived to be lacking. Corrections need to fill those gaps in order to supplant audiences' existing beliefs.

- Information that is more familiar to us feels truer. Repeat retractions to counteract this familiarity effect (Lewandowsky et al., 2012; Wahlheim et al., 2020).

- Instead of challenging audiences' worldview or other beliefs, corrections should aim to present the new narrative in a narrowly focused way that affirms the audiences' existing values (Lewandowsky et al., 2012). A real-world example of this is packaging the need to address climate change as an opportunity to create green industry jobs for audiences that are not motivated by environmental stewardship.

Fostering Positive Behaviors

Attitudes and beliefs doubtlessly influence our behavior, but few interventions that target only attitudes and beliefs have been found to consistently change behavior (Brewer et al., 2017). When there is a pressing need to change behavior, as is the case with COVID-19 vaccination and other public health measures, experts suggest that interventions should target behavior directly. This can be particularly effective when the desired behavioral change conflicts with an audience's worldview (Lewandowsky et al., 2012).

One strategy that has been shown to shift behavior, according to Anastasia Kozyreva (Max Planck Institute for Human Development) and colleagues, is "choice architecture," which uses psychological science to design the presentation of options or choices in ways that make certain choices and behaviors easier to follow through on (Kozyreva et al., 2020). Although it is possible to use choice architecture to influence an audience's behavior without their knowledge or consent—a strategy used by many platforms online—the researchers strongly suggest countering misinformation with interventions that are transparent to the audience. This allows people to remain active, autonomous participants in their own education and decision-making while advancing societal well-being.

These strategies include:

- **Technocognition**: In the context of misinformation, this involves using cognitive science to introduce additional "friction" to online environments (Kozyreva et al., 2020). Whereas technological innovations generally focus on increasing the speed and simplicity of communication, technocognition takes the opposite approach, intentionally slowing the rate of communication so that people have time to consider the quality of information they are sharing. Examples include limiting how often people can post content and requiring users to pass a reading-comprehension quiz before commenting on an article.

- **Nudges**: These can range from passive design choices, like putting graphic warnings on cigarette packages, to proactive public-education campaigns in which individuals might be shown statistics and other information related to the health risks caused by smoking (Kozyreva et al., 2020). Nudges are generally built into the environment in which a decision will occur, automatically exposing the target audience to the intervention (Lewandowsky et al., 2012). Simple reminders about the need to consider the accuracy of headlines before sharing content online, for example, have been shown to reduce the spread of misinformation (Pennycook et al., 2020; Roozenbeek et al., 2021).

- **Boosts**: These encourage the public to become "choice architects" of their own environments by equipping themselves with the knowledge and skills necessary to make more reasonable decisions about which information to trust and share (Kozyreva et al., 2020). Topic-specific education on the value of scientific consensus, for example, has been found to help people reduce the false belief that genetically modified foods are unsafe (van Stekelenburg et al., 2021). This intervention was not found to increase people's belief in human-caused climate change, however, suggesting that highly politicized anti-science views may be more resistant to this kind of correction. General skill building, such as education on how to accurately interpret statistics, can also help reduce susceptibility to misinformation across domains (Kozyreva et al., 2020). Other potential boosts relevant to misinformation include encouraging people to:

    - **Self-nudge**: taking control of our device settings and physical environment—for example, turning off notifications, hiding or deleting applications, and placing devices where we can't see them to reduce use
    - **Practice deliberate ignorance**: choosing not to engage with certain sources or platforms to cut out excessive, low-quality information

Behavioral Interventions to Increase Vaccination

A number of interventions designed to counter vaccine hesitancy by reducing logistical barriers to care can help close the "intention–behavior gap" in settings where vaccines are affordable and readily available to patients (Brewer et al. 2017).

Before the COVID-19 pandemic, several brief interventions were found to increase vaccine uptake:

- Recommendations from primary care doctors and other trusted healthcare practitioners
- Framing vaccination as the default option—for example, by interacting with patients under the assumption that they want to be vaccinated or notifying patients about pre-scheduled vaccination appointments
- Reminder systems that notify patients when they are due to be vaccinated and allow them to schedule an appointment immediately by phone

WORDS FROM AN EXPERT

DAVID N. RAPP, NORTHWESTERN UNIVERSITY

Encouraging evaluative mindsets, whether through brief interventions or even K–12 education programs, can help people approach media more skeptically, researcher David N. Rapp (Northwestern University) said in an interview with APS. Inaccuracies can be challenging to undo once they have been incorporated into a person's larger knowledge network, explained Rapp, who studies reading and misinformation. One strategy people can use to more thoroughly interrogate ideas is engaging in "lateral reading," or reading multiple sources to verify overlapping information.

Rapp further suggests that future research could inform a more thorough model of how and why misinformation has such problematic consequences. Some open questions include:

- What are the long-term consequences of exposure to inaccurate ideas?
- How do different types of misinformation, such as declarative statements ("the capital of Idaho is Boston") versus assertions ("seatbelts don't save lives"), get processed differently?
- What can news organizations (and social media influencers and platforms) do to give voice to different perspectives without inadvertently misinforming the public by creating a sense of false balance? For example, debates pitting climate-change scientists against deniers, which became common in the early 2000s, may have inadvertently increased the deniers' credibility, causing the American public to perceive their anti-science views as more viable than they really were.

NEXT STEPS

This white paper summarizes research-based guidance on identifying and combating misinformation. Even with this guidance, long-term and multipronged strategic programming is needed to effect change.

Various public and private organizations have independently developed programs to combat misinformation. Each of these efforts adds to a growing body of knowledge and best practices. As yet, however, there is no coordinated plan to share these resources or actively encourage collaborations to combat misinformation. To address these gaps, APS proposes the following next steps to build a broader coalition of institutions and individuals dedicated to combating misinformation.

1 Summit on Misinformation

This white paper can serve as a catalyst to convene a multistakeholder summit on misinformation. The goal of this meeting would be to build new links among experts, share resources among existing programs, identify best practices, and encourage the dissemination and uptake of science-based research on misinformation.

2 Public-Awareness Campaign

Research has identified ways that individuals, corporations, and the media can minimize the spread and impact of misinformation, these recommendations are now widely known and adopted. However, the public remains largely unaware of the hallmarks of misinformation and the strategies to recognize and critically analyze false claims. With support from foundations and federal agencies, an alliance of universities, corporations, media outlets, and scientific societies can develop and deploy well-funded programs based on expertly crafted messages. Successful, multi-institutional public-awareness campaigns such as DiscoverE and the USA Science and Engineering Festival can be emulated to address misinformation and disinformation.

3 Call for Additional Research

APS and its journals support scientific research on misinformation and enable its publication and dissemination. More can be done, however, to identify gaps in our understanding, build on promising results with continued research, and perform critical analyses of the current body of knowledge. Recommendations on additional research would be one of the main tracks of a summit on misinformation.

Online environments are often designed to discourage users from considering the quality of the information they consume and share. Misinformation that feeds into our cognitive blind spots and biases can be tricky to undo, but psychological science provides several evidence-based interventions. These include prebunking misinformation by educating audiences on how to consume media more skeptically, crafting more convincing retractions and counterarguments by presenting new narratives that address the concerns of specific audiences, and bypassing beliefs by targeting behavior change directly. Taken together, these and future findings can help individuals defend against misinformation while empowering the public to make more informed decisions.

REFERENCES

Atir, S., Rosenzweig, E., & Dunning, D. (2015). When knowledge knows no bounds: Self-perceived expertise predicts claims of impossible knowledge. *Psychological Science*, *26*(8), 1295–1303. https://doi.org/10.1177/0956797615588195

Axt, J. R., Landau, M. J., & Kay, A. C. (2020). The psychological appeal of fake-news attributions. *Psychological Science*, *31*(7), 848–857. https://doi.org/10.1177/0956797620922785

Brewer, N. T., Chapman, G. B., Rothman, A. J., Leask, J., & Kempe, A. (2017). Increasing vaccination: Putting psychological science into action. *Psychological Science in the Public Interest*, *18*(3), 149–207. https://doi.org/10.1177/1529100618760521

Brashier, N. M., & Schacter, D. L. (2020). Aging in an era of fake news. *Current Directions in Psychological Science*, *29*(3), 316–323. https://doi.org/10.1177/0963721420915872

Chan, M. S., Jones, C. R., Hall Jamieson, K., & Albarracín, D. (2017). Debunking: A meta-analysis of the psychological efficacy of messages countering misinformation. *Psychological Science*, *28*(11), 1531–1546. https://doi.org/10.1177/0956797617714579

Fessler, D. M. T., Pisor, A. C., & Holbrook, C. (2017). Political orientation predicts credulity regarding putative hazards. *Psychological Science*, *28*(5), 651–660. https://doi.org/10.1177/0956797617692108

Hornsey, M. J. (3/30/2022). Why facts are not enough: Understanding and managing the motivated rejection of science. *Current Directions in Psychological Science*, *29*(6), 583–591. https://doi.org/10.1177/0963721420969364

Kaiser Family Foundation. (n.d.). *KFF COVID-19 Vaccine Monitor*. Retrieved n.d., 2022, from https://www.kff.org/coronavirus-covid-19/dashboard/kff-covid-19-vaccine-monitor-dashboard/

Kozyreva, A., Lewandowsky, S., & Hertwig, R. (2020). Citizens versus the internet: Confronting digital challenges with cognitive tools. *Psychological Science in the Public Interest, 21*(3), 103–156. https://doi.org/10.1177/1529100620946707

Lewandowsky, S., Ecker, U. K. H., Seifert, C. M., Schwarz, N., & Cook, J. (2012). Misinformation and its correction: Continued influence and successful debiasing. *Psychological Science in the Public Interest*, *13*(3), 106–131. https://doi.org/10.1177/1529100612451018

Murphy, G., Loftus, E. F., Grady, R. H., Levine, L. J., & Greene, C. M. (2019). False memories for fake news during Ireland's abortion referendum. *Psychological Science*, *30*(10), 1449–1459. https://doi.org/10.1177/0956797619864887

Pennycook, G., McPhetres, J., Zhang, Y., Lu, J. G., & Rand, D. G. (2020). Fighting COVID-19 misinformation on social media: Experimental evidence for a scalable accuracy-nudge intervention. *Psychological Science*, *31*(7), 770–780. https://doi.org/10.1177/0956797620939054

Rapp, D. N. (2016). The consequences of reading inaccurate information. *Current Directions in Psychological Science*, *25*(4), 281–285. https://doi.org/10.1177/0963721416649347

Roozenbeek, J., Freeman, A. L. J., & van der Linden, S. (2021). How accurate are accuracy-nudge interventions? A preregistered direct replication of Pennycook et al. (2020). *Psychological Science*, *32*(7), 1169–1178. https://doi.org/10.1177/09567976211024535

van Stekelenburg, A., Schaap, G., Veling, H., & Buijzen, M. (2021). Boosting understanding and identification of scientific consensus can help to correct false beliefs. *Psychological Science*, *32*(10), 1549–1565. https://doi.org/10.1177/09567976211007788

Wahlheim, C. N., Alexandr, T. R., & Peske, C. D. (2020). Reminders of everyday misinformation statements can enhance memory for and beliefs in corrections of those statements in the short term. *Psychological Science*, *31*(10), 1325–1339. https://doi.org/10.1177/0956797620952797

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