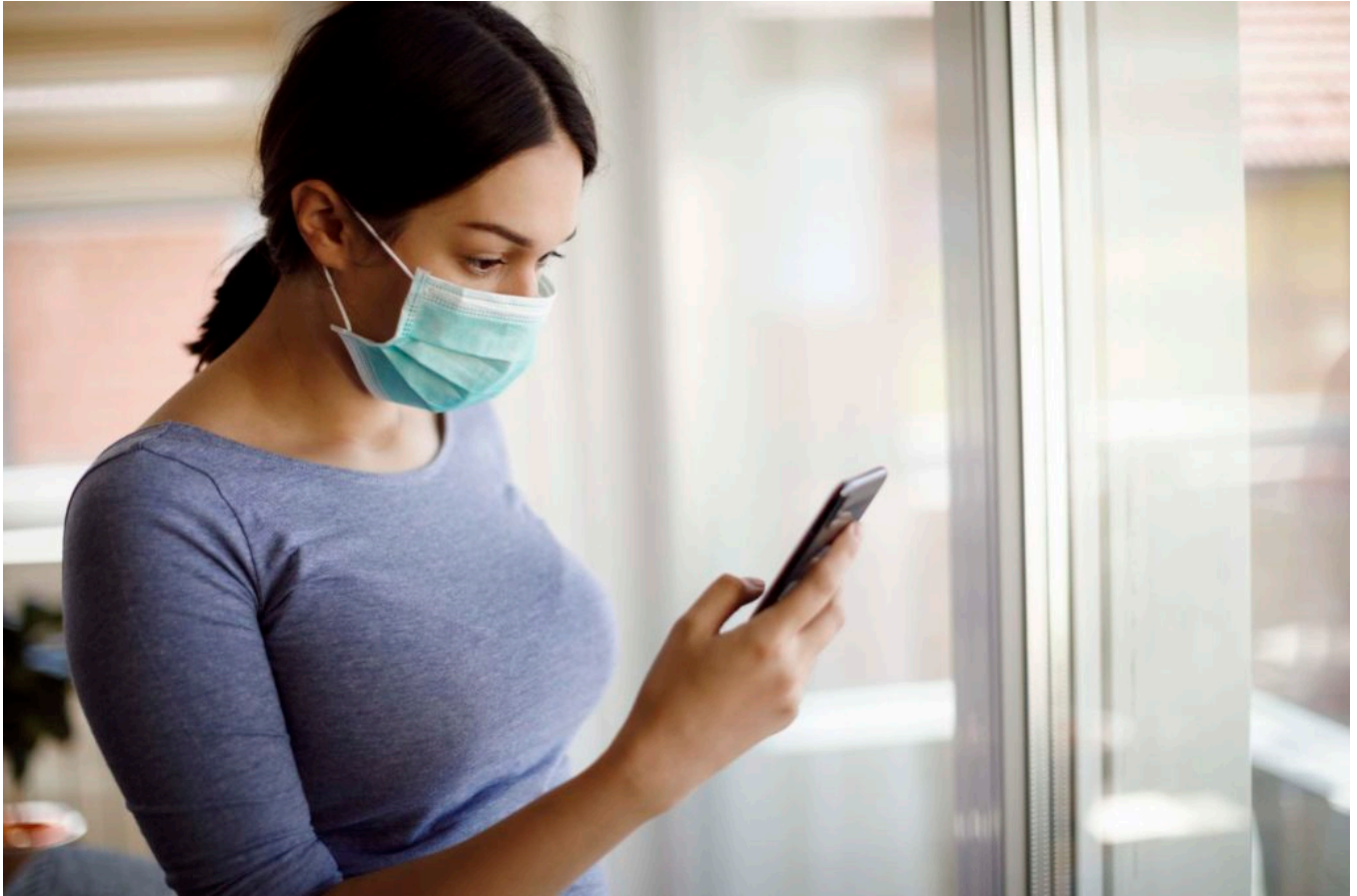


Memory Makes It Hard to Fight Pandemics. But We Can Always Strive to Remember Lessons Learned

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Contact tracing—a process used to interrupt transmission of contagious diseases by identifying and managing people who have been exposed to others with such diseases—has become an important public-health tool during the COVID-19 crisis. But the nature of human memory often undermines the ability of traditional contact tracers to quickly find and obtain accurate information from infected people. An alternative is digital contact tracing, an unobtrusive, vigilant, and accurate record of risk of exposure, typically implemented through apps that individuals opt into or download onto their phones, which should outperform traditional contact tracing on every measure. So why has it delivered on only a fraction of its potential amid COVID-19? In a webinar on September 8, a multidisciplinary panel explored how psychological science might contribute to understanding digital contact tracing, maximizing its capabilities in the future and otherwise improving preparedness for future pandemics.

Produced by the [APS Global Collaboration on COVID-19](#), the live webinar was moderated by Maryanne Garry, a psychological scientist and memory expert at the University of Waikato, New Zealand. Joining Garry were Lorraine Hope, a psychological scientist and expert in applied memory and interviewing, of the University of Portsmouth, United Kingdom; Marcel Salathé, an epidemiologist involved in the development of digital contact tracing, of the Digital Epidemiology Lab, École

Polytechnique Fédérale de Lausanne, Switzerland; and Tom Merritt, an independent tech podcaster and co-host of the Daily Tech News Show.

The APS Global Collaboration on COVID-19 convenes psychological scientists and other experts to assess how the field has contributed to combating the COVID-19 pandemic and to identify gaps in understanding that should be addressed through new research. Learn more about the initiative and view a recording of this and previous webinars at psychologicalscience.org/covid-initiative.

View a [recording of this webinar](#), including references to much of the research cited.

Memory is constructive—and that’s a pitfall of contact tracing

Traditional methods of contact tracing attempt to break infection chains by asking infected persons who they have been in contact with and then trying to inform these people of their exposure. In the case of COVID-19, contact tracing warns exposed individuals to take care of their health and to quarantine at home to avoid exposing others without knowing, Salathé noted.

This use of contact tracing highlights some of the real-life problems psychological scientists study, including the fragility of human memory. “Contrary to a popular myth ... memory does not work like a camera,” Garry explained. “Instead, when you try to remember something, you bring to mind a bunch of related thoughts and images and feelings and try and stitch them together. If it feels like a real memory, you call it a real memory,” often without even being aware that you’re doing so. The problem? This “stitching together” can help people develop memories that are accurate but also some that are completely false.

It’s not surprising, then, that traditional contact tracing hasn’t been successful in obtaining accurate and complete information from people, even from those who are fully cooperative. “People generally underestimate how difficult the task of remembering and reporting actually is,” said Hope. She identified five main challenges impeding the success of contact tracing: (1) omitting information, even if unwillingly; (2) reporting imprecise memories without enough useful details or actionable information; (3) including mistakes or reporting distorted memories; (4) being vulnerable to erroneous reporting (e.g., age can affect memory reliability); and (5) avoiding reporting some memories. Illness can also affect memory, including in the case of COVID-19.

Unfortunately, Hope explained, current contact-tracing protocols do not appear to take these memory challenges into account or use methods to promote more accurate memory and retrieval. However, she added, recent research indicates that contact-tracing protocols informed by cognitive principles known to enhance memory could improve the reporting of contacts by about 50%.

Digital contact tracing can circumvent memory inaccuracy

Despite the potential for knowledge from psychological science to improve traditional contact-tracing methods, the nature of the coronavirus (i.e., how it spread rapidly by infecting people who became contagious before showing symptoms) made digital contact tracing a more viable option. Garry neatly synopsisized a key advantage of digital contact tracing over traditional methods: “Your phone does some

of the paying attention and remembering for you.”

The basic idea of digital contact tracing, Salathé explained, was to use phones to support traditional contact tracing. That’s because most phones use Bluetooth technology, whose signal can be used to estimate distances between phones. Thus, identifying phones that have been close to the phone of someone infected can provide a way of contact tracing that does not rely on human memory and reporting alone.

He cited recent research on the efficacy of digital contact tracing that indicated an overlap between regions where contact-tracing apps were used more and regions with lower COVID-19 case counts.

But digital contact tracing also poses challenges, including privacy implications. “Such a system could quickly be abused,” said Salathé, who works directly on the development of digital tracing technologies and apps. While noting that developers do strive to preserve privacy, he acknowledged that people are understandably concerned about digital surveillance and that the safety of apps designed to trace people’s contacts has not been convincingly communicated.

Another challenge experienced with digital contact tracing is the fact that many of the world’s health care systems are still deeply analog (i.e., reliant on paper or on computer logs that are not part of an integrated network), hindering the ability of digital systems to trace and communicate potential exposures.

Perceptions of digital contact tracing hindered its use

Panelists also explored other disconnects between the capability of digital contact-tracing tools and how people reacted to them or used them. “On the one hand, digital contact tracing gave us this technology that made the accuracy of our memories less of an issue than with manual contact tracing,” said Garry. “But on the other hand, the same technology maybe helped to create some new problems.”

For instance, developers may not have adequately considered how individuals would perceive digital contact-tracing apps. For example, Salathé noted, in Switzerland the most upvoted comment in the app store joked that the app used in that country was like “reverse Tinder” in that you would first be with someone, then the app would do something, and then you would be alone.

App design also differed between countries, possibly leading to different outcomes. The app used in Switzerland was designed to be boring; users didn’t have to do anything unless they got sick or had been exposed. In Germany, the app was constantly signaling exposure risk. These aspects of app design and how they might affect uptake weren’t considered, speakers said, noting that psychological science could have offered input on this.

Tom Merritt weighed in on how people react to technology and some of the misconceptions they may hold, noting that general suspicion of contact-tracing apps reveals a lack of trust in companies, governments, and technology itself.

“Telling people at length how exposure notification worked, how it stayed on devices, what information

it actually transmitted, what information it didn't, [and] how it was under your control didn't really stick. People still didn't quite trust it," recalled Merritt. He added that a lot of criticism came from tech enthusiasts who did not trust the tech companies developing digital contact tracing.

"There are a number of instances in which we might have exacerbated problems with language that conveyed restriction and reduction of freedom and government overreach," Garry said. Cognitive scientists, she noted, "know that the name we give to something really matters. It changes (1) what you pay attention to, (2) how you make sense of it, and (3) ... [even] what you remember." She cited a classic experiment (Anderson & Pichert, 1978) in which researchers asked participants to read a passage from the perspective of either a burglar or a potential home buyer. The researchers found that, although everyone read the same passage, the information recalled depended on the perspective participants had taken while reading it.

Collective memory will influence how nations respond to future pandemics

In preparation for this webinar, the group of experts had talked about collective memories—how groups (e.g., cultures, countries) remember their past. These collective memories are not necessarily personal memories but are more like stories that groups tell themselves about their past. Like most memories, collective memories can change over time. The notion of collective memory is important because it might broaden understanding of how countries will remember this pandemic in the future and how those memories may shape efforts to address future pandemics.

During the webinar, the presenters discussed a possible "ironic effect of collective memory." That is, some countries escaped the worst of the pandemic not because they did more of the right thing but because of idiosyncratic factors. When these countries remember the pandemic, they might have the collective memory that they did everything right and end up drawing the wrong lessons and planning poorly for a future pandemic.

For example, Hope noted the relevance of research on cross-cultural differences and COVID-19 outcomes by APS Fellow and former board member Michele Gelfand and colleagues (2021). Their research indicated that variation in cultural tightness and looseness—the degree to which cultures' strict social norms may lead to explicit or implicit rules that constrain behavior and are associated with punishments for deviance—appears to be associated with the incidence of COVID-19. Nations with high levels of cultural looseness were estimated to have five times the number of cases and almost nine times the number of deaths than nations with higher cultural tightness. This pattern of results emerged even when the researchers controlled for factors such as equality, access to vaccines, and age in population.

One explanation for these cross-cultural differences is that nations with more cultural tightness often have a history of experience with ecological disaster, disease, resource scarcity, or invasion. Thus, they might be better and more readily able to adopt cooperative behaviors. This pattern suggests that considering the past experiences of a nation and how it remembers its past might play into considerations when planning interventions in future pandemics.

Preparedness will be key to addressing future pandemics

Both Salathé and Hope highlighted that, in a memory context, it will be important to help people remember the pandemic so that they know how to behave and be better prepared for future events. More work should also be done on risk messaging to ensure it is relevant to the audience and their cultural norms.

Trust is another hurdle to overcome, Merritt said. Besides helping people develop trust in technology, it will be important to help them also trust the messaging. “We did great this time around in having engineers harness technology to do some things that we would never have been able to do without the technology,” he said, “but I would look at technology from end-to-end the next time and say don’t just bring the engineers. Look at what at what product marketers do as well to get people to accept their applications and their technology.”

Overall, the speakers identified several advances within psychological science and scientific understanding of memory that could help prepare for future pandemics:

- Improve contact-tracing protocols so that the information provided is more accurate.
- Inform more effective public communication to increase the uptake of valuable technologies like digital contact tracing.
- Provide insights about collective memory and cross-cultural differences that could shape how cultures and nations remember previous pandemics and thus react to new pandemics.

In addition, an awareness of the role that cognitive factors play during pandemic responses could have helped combat the COVID-19 pandemic. “Maybe looking forward, a better understanding or appreciation of basic cognitive psychology—how we think and how we make sense of information and new things—could have helped,” Garry proposed.

Feedback on this article? Email apsobserver@psychologicalscience.org or login to comment.

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