

CHILDHOOD RESIDUE IN  
THE AGING BODY

A LIFETIME OF  
LEARNING

NEW RESEARCH ON  
LIFESPAN DEVELOPMENT

# Observer

VOL. 34, NO. 6 • NOVEMBER/DECEMBER 2021

A BETTER UNDERSTANDING OF THE MITOCHONDRIA IN THE CONTEXT OF **AGING**, AND BRAIN AGING IN PARTICULAR, MAY HELP TO IDENTIFY THERAPEUTICS THAT COULD IMPROVE AGING **OUTCOMES** AND EVEN PREVENT NEURODEGENERATION. SUCH UNDERSTANDING MAY ONLY BE POSSIBLE IF **INTERDISCIPLINARY** TEAMS THAT INCLUDE BIOLOGISTS, NEUROSCIENTISTS, AND PSYCHOLOGICAL SCIENTISTS, AMONG OTHERS, WORK **TOGETHER**.

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SPECIAL ISSUE: **MOBILITY AND OPPORTUNITY ACROSS THE LIFESPAN**

*a publication of*

**aps**

ASSOCIATION FOR  
PSYCHOLOGICAL SCIENCE

[psychologicalscience.org/observer](https://psychologicalscience.org/observer)

# Observer

ISSN: 1050-4672  
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**SUBMISSIONS:** The *Observer* accepts original manuscripts, announcements, and first-person narratives for publication; manuscripts must be original and should not have been published or scheduled to be published elsewhere. The *Observer* editorial calendar is at the discretion of the editor, and the *Observer* does not guarantee publication. Submissions should be sent via email to [apsobserver@psychologicalscience.org](mailto:apsobserver@psychologicalscience.org). The *Observer* reserves the right to edit all content for length and style.

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**ON THE COVER:** A better understanding of mitochondria and strategies directed at improving mitochondrial quality and function could have far-reaching benefits for aging individuals. See related article beginning on page 39. Cover art and other images throughout this issue (with the exception of author photos and graphics from APS research) are from Getty Images.

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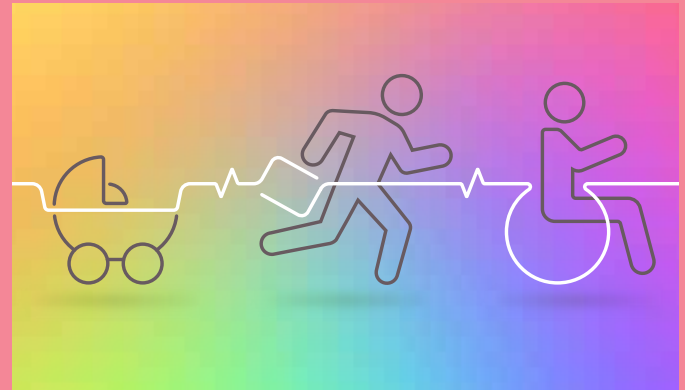
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“Older adults are capable of rallying their attentional resources as well as, and sometimes better than, young adults. But they do so selectively. ”  
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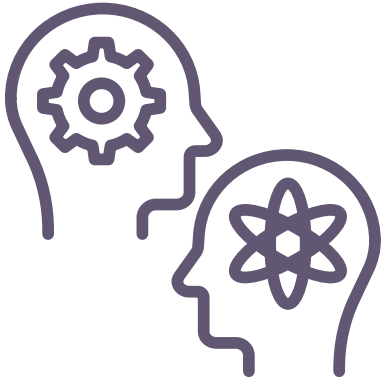
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“When you take on a big social problem ... there isn't a single discipline that's going to solve it.”  
—LAURA CARSTENSEN, IN CONVERSATION WITH JENNIFER L. EBERHARDT, PAGE 8

## SOCIETY NEEDS SCIENCE— AND SCIENCE NEEDS SOCIETY



**A**dditional research frequently improves our understanding of a phenomenon. Importantly, it is also frequently the case that many past research findings are unused by decision-makers who are working—often rapidly—to make decisions that will inform personal or community health, safety, and well-being. To better ensure that accurate and modern insights into human behavior are used to inform these decisions, scientists must strengthen our connections with the public.

The Association for Psychological Science works daily to foster conversations and build relationships between the psychological science community and the public. In fact, as part of our current strategic planning work, we are considering how we can better facilitate the engagement of psychological scientists in public policy decision-making processes around the world and how we can ensure that findings from psychological science are available to and used by decision-makers—whether they are in industry, in government, or around a kitchen table.

Earlier this year, in response to increased anti-Asian racism, APS partnered with Newswise, a news-

distribution service, to convene an expert panel that provided journalists with an opportunity to discuss the issue directly with psychological scientists who could explain relevant research. We organized this discussion to help journalists improve their reporting and to introduce them to scientific experts for future consultation. Our podcast, *Under the Cortex*, along with the *Current Directions in Psychological Science* podcast and various webinar programs are other channels APS uses to share psychological science with the public and to provide insights that help scientists understand the priorities of research funding organizations.

Recently, APS launched the Global Collaboration on COVID—an initiative for which hundreds of APS members from around the world have volunteered their time, expertise, and talent to help us collectively understand how psychological science has (or has not) contributed to responses to the COVID-19 pandemic. The initiative will also identify knowledge gaps discovered because of the pandemic. This work will be the foundation upon which we will frame recommendations for members of the psychological science profession, the broader scientific community, research funding organizations, educators, and other decision-makers. Also in 2021, APS expressed concerns to the U.S. Congress about the U.S. government's lack of engagement with behavioral scientists in its response to the pandemic. As a result of our advocacy, the House of Representatives included language in funding legislation it is considering (awaiting final passage at the time of this writing) that urges the Secretary of the Department of Health and Human Services (DHHS) to ensure that psychological scientists are involved at all levels of the department's response to COVID-19 and future public health crises. Of significance, DHHS is home to the National Institutes of Health, Centers for Disease Control and Prevention, Public Health Service, and Substance Abuse and Mental Health Services Administration, among other important agencies and offices.

APS recognizes that a strong and robust psychological science that enjoys the public trust must reflect human and cultural diversity. Psychological science is unique among disciplines as it includes scholars working to understand the psychological dimensions of equity, diversity, and inclusion. APS can do more than share these research findings with other fields or the public. As a community, we must also address barriers, biases, and injustices within the profession. One of the ways in which APS will help tackle these issues is by doing what we do best—highlighting, recognizing, and celebrating

**APS recognizes that a strong and robust psychological science that enjoys the public trust must reflect human and cultural diversity. Psychological science is unique among disciplines as it includes scholars working to understand the psychological dimensions of equity, diversity, and inclusion.**



## UP FRONT: LETTER FROM THE EXECUTIVE DIRECTOR

outstanding scientific research. Recently, in honor of pioneering researcher and APS James McKeen Cattell Fellow James S. Jackson, APS established the James S. Jackson Lifetime Achievement Award for Transformative Scholarship to recognize other outstanding researchers who are advancing our understanding of historically disadvantaged racial and ethnic groups and/or the psychological and societal benefits of racial and ethnic diversity.

Other ways in which APS is tackling enduring and systemic problems is by highlighting issues and stimulating conversations with the goal of finding solutions. This issue of the *Observer*, for example, includes the second article in a three-part series: “Psychological Science Needs the Entire Globe.” We are pleased that the *Observer* provides a forum for our members to discuss these important issues, but it is not our only venue for these important conversations. Our annual convention and various online programs and platforms will continue to provide spaces for the scientific community to raise concerns and explore strategies for resolving these issues. APS’s strategic plan will provide a framework for how we can

most impactfully contribute solutions to these long-standing problems.

Addressing bias and promoting equity are priorities for APS journals as well. APS Fellow David Sbarra, the new editor-in-chief of *Advances in Methods and Practices in Psychological Science*, discussed his commitment in an interview in this issue of the *Observer* (see page 72). APS’s journal editors and the APS Publications Committee are constantly considering how they can improve journal operations to advance the frontiers of psychological science in a more inclusive and unbiased fashion.

We are excited that in 2022 we will again be able to meet in person at our annual convention in Chicago, Illinois. We recognize that travel or health challenges may prevent some members from joining us there, which is why we are re-envisioning our convention to deliver a hybrid in-person and virtual program. We are also exploring novel ways to strengthen engagement with community-based groups and other organizations located in the cities we visit. Many of these organizations can benefit from the scientific insights and opportunities associated with our annual convention. Equally important, our science can be strengthened by learning how it is (or could be) used to solve real-world problems.

The past 20 months have been stressful for everyone around the world, and COVID-related challenges will remain for some time. APS’s leadership and staff look forward to working with our members as we collectively contribute to efforts to “reopen” our communities, define new “normals,” and promote the advancement of psychological science—for the benefit of science and society. I welcome your suggestions and thoughts on these or other topics. ●



Robert E. Gropp, PhD  
Executive Director  
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### QUOTE OF NOTE

*“The group I’m announcing today represents America’s—and the world’s—foremost experts in their field ... experts in agriculture and social science, immunology and mathematics, cybersecurity, nanotechnology, and more.... Because of their extraordinary intellect, their wide range of experiences, and their unprecedented diversity, this PCAST will see new possibilities”*

—U.S. President Joe Biden, announcing members of his Council of Advisors on Science and Technology (PCAST), a group of 30 external advisors who make science, technology, and policy recommendations to the White House. APS Past Board Member Jennifer Richeson has been named to this eminent council. Read more at [bit.ly/richeson-pcast](https://bit.ly/richeson-pcast).



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## CALL FOR SUBMISSIONS AND REGISTRATION NOW OPEN!

Whether you attend the 2022 APS Annual Convention on-site in Chicago, Illinois, or virtually from anywhere in the world, don't miss your chance to submit your research and register at special early discounted rates!

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## STAY IN THE LOOP!

[psychologicalscience.org/convention2022](https://psychologicalscience.org/convention2022)

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## Much More ONLINE



### *Under the Cortex:* Research Roundup

Catch up on the latest interviews exploring psychological science, including a skeptical "deep dive" on the Myers Briggs Type Indicator with APS Fellow Dan McAdams of Northwestern University. Listen at [psychologicalscience.org/news](https://psychologicalscience.org/news).



### Utilizing Pathway Programs Along Your Academic Journey

Learn how pipeline programs can support scholars from diverse ethnic, gender, and economic backgrounds, and see other early-career webinars, at [psychologicalscience.org/webinars](https://psychologicalscience.org/webinars).



### Reminders of Years Left Motivate Older People

For successful messaging to older adults, ditch the stereotypes and help them savor the present. Read more at [psychologicalscience.org/reminder-of-years](https://psychologicalscience.org/reminder-of-years).



### *Perspectives on Psych Science:* Microaggressions Edition

These small, sometimes unintended behaviors can reduce well-being while reinforcing harmful stereotypes. Read and listen at [psychologicalscience.org/understanding-microaggressions](https://psychologicalscience.org/understanding-microaggressions).



### *Current Directions in Psychological Science* Podcast

Journal Editor Robert Goldstone invites researchers to dive deeper into the compelling insights behind their recently published research. Listen at [psychologicalscience.org/news/podcast-news](https://psychologicalscience.org/news/podcast-news).





## How Age Magnifies Experience

Cross-cultural differences in aging spotlight the need for policies unique to each country's population and social context. Read at [psychologicalscience.org/cross-cultural-aging](https://psychologicalscience.org/cross-cultural-aging).



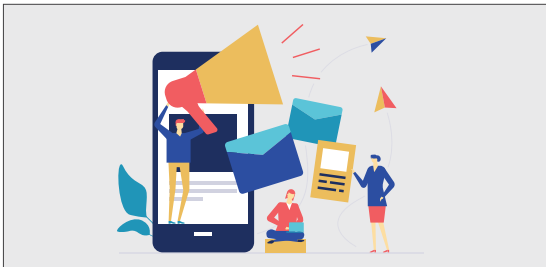
## Members in the Media

Visit [psychologicalscience.org/mitm-archive](https://psychologicalscience.org/mitm-archive) to view media coverage of our members' research and to learn more about how they are sharing psychological science with the public.



## From Aging to Aging Well

An interdisciplinary group of scientists shares findings on what it means to age successfully. Read at [psychologicalscience.org/aging-well](https://psychologicalscience.org/aging-well).



## More Member News

Read about APS Fellows being selected for prestigious awards and appointments, as well as notable losses among the psychological science community. Visit [psychologicalscience.org/observations](https://psychologicalscience.org/observations) and follow APS on Twitter (@PsychScience).



## The Cognitive Upside of Aging

Big data is allowing researchers to track the development of cognitive skills across the lifespan with greater accuracy than ever. Read at [psychologicalscience.org/upside-of-aging](https://psychologicalscience.org/upside-of-aging).

## CHARTING A NEW MAP OF LIFE

A conversation between Jennifer L. Eberhardt and Laura L. Carstensen about lengthening life expectancies, recasting the built environment, and rethinking social norms.



Photo credit: Nana Kofi Nti

The average global life expectancy has more than doubled since 1900, but constructive changes to the world itself—from the built environment to cultural norms and expectations about work, education, and inter-generational relationships—have not kept up. APS President Jennifer Eberhardt and APS Fellow Laura L. Carstensen, a Stanford University psychology professor and founding director of the Stanford Center on Longevity, explored the cross-disciplinary thinking and subsequent changes needed to help people “feel a sense of belonging and purpose and worth” during every stage of longer lives.

*Eberhardt and Carstensen spoke on September 28.  
Edited excerpts of their conversation follow.*

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**EBERHARDT:** One of the big themes running through your work is the distinction between aging and longevity. Let’s start by talking about that distinction.

**CARSTENSEN:** People use these words interchangeably, but aging actually refers to the biological processes that occur as the years pass, and longevity is the metric, or how long we’re living. The recent changes that we’re living through are about longevity much more so than aging. It’s not that we’ve changed as a basic organism in fundamental ways. Rather, scientific advances, public health, and public education changed the world so that more of us are making it to old age.

**EBERHARDT:** You do a lot of your work through the Stanford Center on Longevity. What problems was the center set up to address?

**CARSTENSEN:** The meta challenge is that we added roughly 30 years to life expectancy in a single century, yet failed to change the world in commensurately dramatic ways. Our ancestors in the 20th century handed us a gift with no strings attached, an extra 30 years for the average person. We tacked them on at the end—only old age got longer. And now we cry, “The sky is falling,” because we’re going to have all these old people who don’t save enough, don’t work enough, and get sick. What we’re arguing is that the life course is a social, cultural construction. We can put these extra years anywhere we want, and we can then begin to chart a course forward that identifies the challenges that come about because of longer lives and start finding solutions. It should not be focused only on old age. Rather we need to envision healthy, engaged century-long lives and modify the world so that most people achieve them.

**EBERHARDT:** As a society, what are some of the steps we can take to become what you would call longevity-ready?

**CARSTENSEN:** We must recognize that we are living in a world that was quite literally designed for young people. Only 4% of the population was over 65 in 1900. The depth of the steps that we take as we go up and down the stairs to get to a subway was based on the presumption that its users were

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APS President **Jennifer L. Eberhardt** is Morris M. Doyle Centennial Professor of Public Policy and Faculty Co-Director of Stanford SPARQ. She studies race and inequality in a wide variety of places, including law enforcement agencies, courts, schools, neighborhoods, and workplaces. She is the author of *Biased: Uncovering the Hidden Prejudice That Shapes What We See, Think, and Do*. Eberhardt may be contacted at [president@psychologicalscience.org](mailto:president@psychologicalscience.org).

20-something-year-olds. Think about the distances we traverse at airports to quickly get from one airline to another and make a flight connection. The tacit assumption? Young people are really fast. That's who our world is built around. The knowledge in libraries about illnesses and diseases is about acute diseases that kill young people, and not so much about the chronic diseases that afflict older people.

In a very broad sense, we need to very quickly build a culture, build up that knowledge base, recast the physical environment and deeply rethink social norms so that the culture that supports us allows people to feel a sense of belonging and purpose and worth for 100 years. That's the new metric our children today will very likely reach. It's our duty to make sure that the world that we live in supports these longer lives.

**EBERHARDT:** What about changes in education and the workplace?

**CARSTENSEN:** Education certainly has to change. Our educational systems were built for young people. We didn't have public education in the United States until the early 20th century, and initially states required children to complete only a few years of school. Now high school is the end of required education, when you're reaching 17 or 18 years old. Even if you extend your formal education into your mid-20s, that doesn't make sense if your working life extends for many decades, especially during a historical time when information generation and technological advances are so rapid.

It did make sense, however, if you were going to live to 50, which

was the case at the beginning of the 20th century. It made sense to follow those kinds of norms: get an education early; get a job; work like a dog; retire, if you're lucky, for a couple years; and then die. You try to make sure your kids survive, and you launch them off to start their own families, and so on. Again, it made a lot of sense for lives half as long as the ones we have. But if we're going to live for 100 years, we're going to work a lot longer. That means we need to learn a lot longer, and we should rethink what the educational system is about. We need to continue to learn throughout our lives.



**Laura L. Carstensen**

**EBERHARDT:** Through your center, you're developing what you call a New Map of Life. Tell me a bit about that project.

**CARSTENSEN:** When we founded the Center on Longevity in 2007, we organized our work around three domains: mind, which included emotion, cognition, and social engagement; mobility, which was about physical fitness and the ability to physically navigate the world; and financial security. We argued that those were three legs of a stool, and shoring up all three legs could ensure that most people reach old age physically fit, mentally sharp, and financially secure. We got a lot of work done within these domains, but one thing we kept observing was that if we did a project, say, on financial security, it really involved cognition and physical fitness. And when we worked on physical fitness, we realized it's easier to stay fit when you have a lot of money than when you're poor.

So we kept seeing these connections. And then there were other influences that we weren't addressing that you and I have been talking about—the culture and what we need to know and how we need to change. We decided in 2018 that we needed to be more imaginative and to think more creatively about what kind of world would support very long lives. We gathered about 50 experts from every academic discipline you can imagine: pediatricians, geriatricians, health economists, psychologists, sociologists, climate scientists, educators, but also philanthropists, business leaders, policymakers. We met together at Stanford for 2 days and charged them with saying, "What would a 100-year life look like if it was super high quality? What would you be doing when you were 70, when you were 80? 90? How would childhood, adolescence, middle age need to change to get there?"

We had a fabulous meeting. But as we were leaving the building, a number of us said, "If what comes out of this meeting is that we say we all had a great

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APS Fellow **Laura L. Carstensen** is a professor of psychology at Stanford University, as well as the Fairleigh S. Dickinson Jr. Professor in Public Policy and founding director of the Stanford Center on Longevity. Her research program includes theoretical and empirical study of motivational and emotional changes that occur with age and the influence such changes have on cognitive processing. An elected member of the National Academy of Medicine, she has served on the MacArthur Foundation's Research Network on an Aging Society and the National Advisory Council on Aging at the National Institute on Aging. Her awards include a Guggenheim Fellowship, the Kleemeier Award, and the Richard Kalish Award for Innovative Research, and she is the author of *A Long Bright Future: Happiness, Health, and Financial Security in an Age of Increased Longevity*.

time for 2 days and then walk away and forget about it, then we really failed."

So next we raised funds to support nine postdoctoral fellows at the Center on Longevity. Each came from a discipline with expertise in one of the domains that we had identified as essential to supporting long life. They were charged with developing reports that analyzed the current state of the domain and developing recommendations that would ensure that more people were able to live healthy, thriving long lives.

They just completed their 2-year postdocs, and it was a fabulous program. We all met each week (by Zoom, after COVID) to provide a multidisciplinary bird's-eye view of longevity with experts from all over the world. One of the most beautiful things about this program is that the fellows came to know each other and interact across disciplinary lines. For example, the neuropsychologist who studies childhood talked to the folks who analyze environmental exposures that lead to dementia in old age. This was where it got really exciting.

The fellows finished their reports in June, and we hired Karen Breslau, a writer, to weave the reports into a single story. This is what we're calling the New Map of Life, which we plan to launch in November. In short, we're just about ready to take it on the road to policymakers, educators, and thought leaders to begin a substantive conversation about the world changing in pretty profound ways.

**EBERHARDT:** Wow, that sounds incredible. People often try to achieve that goal of working across disciplinary lines, but often it seems the gaps are too great. You managed to pull this off for 2 years. I wonder if a lot of that had to do with the fact that your project was so problem focused, and people were very interested in that problem.

**CARSTENSEN:** That's completely right. You know this better than just about anybody because of your work. When you take on a big social problem, whether it's policing or the need for deep culture change around longevity, there isn't a single discipline that's going to solve it. There isn't one expert who knows the answer. It takes multiple voices and perspectives to solve it and still more to implement needed changes. I think you're exactly right that when people try to set up multidisciplinary programs in a generic way, it often fails. I think that's because people struggle to talk across their languages, views, and perspectives. But boy, when you're trying to solve a problem, and you're sitting across the table from an engineer who says, "Just define what the problem is, we'll build it, we'll get there," you want everybody at the table. That's what made this project so exciting.

**EBERHARDT:** What policies do you hope to change as a result?

**CARSTENSEN:** There are lots of relevant policies spanning living wages and educational opportunities. But it isn't just policies. I think we often turn to the government to fix things. If the federal government was going to really address these issues, it would have had to start about 25 years ago, and it didn't. We certainly need to rethink governmental policies at the federal and state levels, but we also need educators, families, and communities. We need neighbors to talk to neighbors about ways that they might change their relationships. I think this effort will be successful only if we can involve lots of different perspectives and leaders and influencers. Employers will need to create new ways of working where people will stay in the workforce into their 70s and 80s and be able to do so successfully. That's not necessarily a federal solution but one driven more by the private sector.

**EBERHARDT:** In what ways might older people improve the workplace climate? Many people view what it means to age as being all doom and gloom, but your view is completely different. How do you attach your view to the workplace and the workplace climate in particular? What does age diversity in the workplace bring?

**CARSTENSEN:** That is a great question. I think the workplace will be central to changing the trajectories of our lives. And to your point that people think about aging as this slow and steady downward slide, we now know that that's not true. There's tremendous heterogeneity in how well people age and how functional they are as they grow older. We know it's possible for people to arrive at the ages of 80 and 90 and be actively involved in communities and workplaces. But the majority of people are not following that kind of a trajectory. We have learned a great deal about the factors that influence whether people do well or poorly across those years.

The challenge is to make changes that benefit the people who need it most. I sometimes find myself saying, "If we were just trying to make things better for the top 1% or the top 10%, we wouldn't have a lot of work to do." If you've got a lot of education, you're respected at work, you're a leader in your field, you're okay and you'll be fine. That's not necessarily true if you work in manufacturing and your job is becoming more physically difficult by the year, or you're uncertain about whether you'll have a job a year from now. Or if you're trying to balance two different jobs with the stress of taking care of your family. That's a recipe for not doing well with age.



The exciting thing is that we know a lot about the factors that lead to the heterogeneity in aging. We know a lot about what leads people to be functionally healthy in their advanced ages versus functionally disabled. And the workplace may account for some of this. There's an analysis from some of our colleagues, Jeff Pfeffer and others at the Stanford Graduate School of Business, where they argue that the workplace can account for up to a third of the difference in life expectancies by social class. We spend a lot of time in the workplace and are affected by its social health and physical health. Are you being exposed to toxins? Can you get good, nutritious food? Are you beaten down over the years, or are you able to remain healthy in doing your job?

Those are things that affect the rest of people's lives, not to mention the quality of their lives while working. So we need to rethink work. Healthy workplaces would help people be more financially secure, more emotionally healthy, and certainly more physically healthy.

**EBERHARDT:** What are some ideas about changes needed in the workplace that will bring about not just longer lives but lives that are more fulfilling, where people are healthier for longer?

**CARSTENSEN:** When I talk about working longer to public groups, usually I hear groans when I say, "Of course we're going to work longer. We're living longer." And then I say, "How about if we work better? Let's forget about retirement for a minute and imagine 6-hour workdays and 4-day workweeks. Anybody willing to trade that for a 65-year-old retirement age?" And just about everybody's like, "Yeah, I'm in." So we can work very differently; we can make the workweek more humane.

Here's an area, though, where government policies could be very

**People struggle to talk across their languages, views, and perspectives. But boy, when you're trying to solve a problem, and you're sitting across the table from an engineer who says, "Just define what the problem is, we'll build it, we'll get there," you want everybody at the table. That's what made this project so exciting.**  
—Laura L. Carstensen

helpful: If we had higher wages, we could work fewer hours and have higher quality of life. We're also thinking about employers having more flexible hours and providing on-the-job training that lets workers exit the workforce for a while and then reenter. The burden of caring for very young children often falls on women who need to reduce their work hours or step out of the workplace, which subsequently hurts their financial security. Some start-up companies are focused on retraining and helping people get back in once they've left a particular occupation.

**EBERHARDT:** That makes me hopeful. I feel like our expectations about living have changed rapidly from when I was coming of age to what I see in my sons—even how they think about things like the expectation of staying at a job for your whole life or being committed to one profession. That's all changed. I think the hurry has changed, too—like the hurry to get a driver's license or to start or finish college. It's all different because they're not thinking, "The rest of my life is contingent on these four years in college."

**CARSTENSEN:** I think even just as recently as 10 years ago, when a high school graduate said to her parents, "I'm going to take a year off before I go to college," the expectation would be you're never going to college. Now people think gap years are a great idea, and I absolutely agree.

One of the things I learned a lot about through this project involves early childhood. Over the same years that life expectancy got longer, we started putting lots of pressure on really young ones to prepare for college—basically when they're 4. We've got kids getting signed up for elite preschools before they're born and being told they need to do 2 hours of homework when they're in second grade. We just got 30 extra years of life handed to us. How about if we let the kids go outside? Climb the trees, develop healthy habits about sports and physical activities. This isn't to say they won't go to school, but it doesn't have to all happen so intensely or all at once. In early childhood, we just think it'd be terrific if we let kids be kids for a while. You hear about a nature deficit among children. We cut recess from school, we also cut art, we cut music. When we've got more time, why not invest? Invest in those kids so they don't learn to dislike education at very young ages. Instead, help them thrive and enjoy those early years as much as possible.

**EBERHARDT:** I agree. And enjoy later years as well. I feel like school shouldn't be confined to K–12 or to college. If we're moving out of these different environments and the world is changing so quickly, the whole idea of being a lifelong learner seems more important than ever. Who becomes an educator? ➔

What's defined as school and what's education, you know what I mean? People were expected to get all the information we need in life in college, and then just go off and work. You're ready for the world; you don't need to continue to grow and develop. Now the world is changing so rapidly that you can't get all you need in 4 years.

**CARSTENSEN:** I completely agree. Again, flash back 100 years and the unit of production in this country was mostly the family farm. You could learn most of what you needed by eighth grade: reading, writing, some arithmetic. With that, you could probably run the farm pretty well, in part because technologies weren't changing at the speed they are now. (This wouldn't apply for somebody running a farm today, by the way, because farms now require all sorts of technical, advanced knowledge.) One hundred years ago, our educational system was built around helping people get through 50 years of life in jobs that they would get and keep, and just get better at this one task. If it's making widgets, you make more and get better at it over time.

That's not what jobs are anymore. Jobs and technologies are changing at the same time, so we need to find a way for people to continue to learn and be engaged and productive throughout much longer working lives, where the speed of change is much, much faster.

**EBERHARDT:** Speaking of technology, your New Map of Life explores the role that technology can play in healthy aging. It's not just technology changing the world, but technology changing us: who we are, what we're capable of, what we can expect. Could you talk about that?

**CARSTENSEN:** I think the potential of technological and biological advances is breathtaking at this point in history. We're living longer lives at a time when

science and technology are right there to make them higher quality, and it's exciting. But the way we operate today in terms of health is really about disease treatment. In the United States, we have 27 National Institutes of Health, and except for one on childhood and one on aging, they're all focused on a disease. Health care is kind of a euphemism there, because we're not investing a lot in health. We invest in the treatment of disease.

The good news is that technologies are being developed that advance our ability to monitor our physical health long before there's a disease present. They let us know early on if something's changing in our respiration, or if our glucose levels are too high—and before we develop diabetes. When we eat certain foods, we can get immediate feedback about how it's changing our body. If somebody says, "You know, you're drinking a little bit too much wine," you go, "Yeah, but I'll probably be okay." And you don't see any changes, but what if we could see those numbers immediately after a meal? We know, as psychologists, that having that kind of feedback early is much more effective than saying, "Well, your odds just went from 1 in 10 that you might get a disease to 2 in 10."

**EBERHARDT:** As we're more aware of these tools that we didn't have access to before—even technologies that track sleeping—we'll be better positioned to make healthy changes and course correct.

**CARSTENSEN:** I think the future of health care is really caring about our health and doing what we can to improve it. There are so many possibilities. There's talk of a pill that you swallow with a microcamera that can see your insides all the way through. Remarkable technologies are being developed that could help us head off disease before it actually develops.

**EBERHARDT:** I'm wondering if you feel that having access to these technologies will also help us to change our narratives about aging. Evidence of all these benefits to aging doesn't match what people have in mind about what it means to get old. Even the workplace, for example, has things like mandatory retirements. Despite counterevidence, people have these notions and narratives that are hard to dismantle. What can we do to change the narrative of what it means to age in a healthy way?

**CARSTENSEN:** That's the million-dollar question, right? If ageism persists and we don't give people opportunities to remain engaged or active, we kind of build this self-fulfilling prophecy. We've talked to a lot of employers over the years at the Center on Longevity because we do see the workplace as an area that is ripe for intervention. Employers will say, "Well, older workers are just not as sharp as younger workers. They're not as current as younger workers." And then we say things like, "And do you have training for older workers?" And they say, "Oh, well, we stop training at about 45, because we don't want to invest because they're going to retire." So we have these cyclical patterns of not training older workers who then may not stay up to speed. This needs to change.

I'm really excited about some research on mixed-aged work teams that I think will make employers much more interested in retaining older workers. What we're finding is that all-young work teams and all-old work teams are less productive than mixed-aged work teams. The idea is that people of different ages and backgrounds working together do better than just a bunch of young people or just a bunch of old people. That's exciting, because what we're really facing today is not so much an aging society, it's an age-diverse society.

We've "rectangularized" what used to be a population pyramid, with lots of young people and very few old people. Today, we have almost even numbers of people in this country at every age. To me, this is an incredible opportunity because you can match the skills, strength, desire, and ambition of young people with the knowledge, experience, and prosocial tendencies that we see more in old people. You can imagine all sorts of problems in the world that could be best addressed by a mix of those qualities. For the first time in human history, we've got it; we've got that many generations alive at the same time. If mixed-age work teams are more productive than all young or all old, it's not going to take long to convince employers that older workers are contributing a lot.

**EBERHARDT:** Although I do worry about that, because the same is said about racial diversity: Where you have racially diverse teams, they perform better, they make fewer mistakes, they're more creative. We've known this for many years now, but people resist the information. I just wonder, what would lead people to accept the benefits that come from age diversity?

**CARSTENSEN:** It's a really good point, and it's possible that we'll run into similar kinds of roadblocks. Part of what's going to help is that the workforce is actually shrinking, so we have fewer workers to fill positions. People's attitudes toward older workers tend to change when they're running out of workers. Joe looks a lot better than we thought he did when we had a long line of people ready to take his place. I also am excited about the possibilities of young and old working together because older workers share many values with the youngest workers today. They want flexibility and to work in jobs that match their social values more than in the past, when people were taking jobs

**We've "rectangularized" what used to be a population pyramid, with lots of young people and very few old people. Today, we have almost even numbers of people in this country at every age. To me, this is an incredible opportunity because you can match the skills, strength, desire, and ambition of young people with the knowledge, experience, and prosocial tendencies that we see more in old people.**

**—Laura L. Carstensen**

to make the most money. If the oldest and youngest workers share these basic values about what they want, I think that will also contribute to them wanting to work together. And to the extent that teams are saying, "Yeah, we want some of those [older or younger workers] to make our team better and to make life better," I think they'll feel positive outcomes.

**EBERHARDT:** Wow, that's pretty cool. Have there been any studies to look at whether people in academia live longer? You don't have the same kind of forced retirement, and you're doing what you love to do. It seems the quality of life would lead you to be healthier physically, maybe.

**CARSTENSEN:** It absolutely does, in so many ways. Academics tend to live in neighborhoods that are safer, around places that have good, nutritious food. There are lots of advantages, but the one that I think is very important is what you just mentioned—it's about identity and purpose. If you're a chemist and you retire, it's not like you're not a chemist anymore. Whereas if you're a bookkeeper and you retire, you're not a bookkeeper anymore. When people pursue occupations where their identity is about their work, their work helps support their emotional lives in really important ways. Professors live significantly longer than the average person in the population. So do artists, symphony conductors, and Catholic nuns. People whose work is who they are live longer, and we think it may have something to do with the sense of purpose and belonging to a group of people who value what you do.

**EBERHARDT:** Is there anything else you want to share about the work that you're doing?

**CARSTENSEN:** The opportunity here is enormous. Longer lives mean we have more time to spend with our loved ones, to chase our dreams, to realize our goals. Living longer is a terrifically wonderful gift. We have this extra time, and it's really up to us find ways to make sure it improves quality of life at all ages and stages. The great thing about this challenge is that if we address it, life gets even better at all stages. But we need to be creative and think out of the box. If we do, we can make century-long lives the best thing that ever happened to us.

**EBERHARDT:** What a note to end on—very inspirational! I just love what you do. Thanks for taking the time and sharing your wisdom and your work with APS. ●

## Aging Impairs Inhibitory Control Over Incidental Cues: A Construal-Level Perspective

*Liat Hadar, Yaacov Trope, and Boaz M. Ben-David*

**O**lder adults' purchasing decisions appear to be more influenced by peripheral product features than by central and goal-relevant features, this research indicates. Compared with older adults, younger adults were more willing to pay more for a product with superior central, desirable attributes (e.g., a coffee maker able to brew a variety of coffee types) than a product with superior peripheral, feasible attributes (e.g., a coffee maker that is easy to use and reliable). Younger adults were also more satisfied after completing a high-desirability/low-feasibility task than a low-desirability/high-feasibility task and after experiencing a goal-relevant product than a goal-irrelevant product.

*Psychological Science*  
<https://doi.org/10.1177/0956797621998316>



### PSYCHOLOGICAL SCIENCE

## Disproportionate School Punishment and Significant Life Outcomes: A Prospective Analysis of Black Youths

*Edith Chen et al.*

**B**lack individuals with higher self-control who attend schools that disproportionately punish Black students may be more academically oriented in late adolescence and have better adult life outcomes at the cost of physical health, this study suggests. In an 18-year longitudinal study, Chen and colleagues tracked Black youths from age 11 to age 29. They found that individuals with higher self-control and, consequently, higher academic orientation who attended schools that disproportionately punished Black students completed more schooling, had higher incomes, and exhibited better mental health in

adulthood than their counterparts with lower self-control. However, these same individuals were also more likely to develop adult insulin resistance, which is related to cardiometabolic disease.

<https://doi.org/10.1177/0956797621998308>

## Anger Damns the Innocent

*Katherine A. DeCelles, Gabrielle S. Adams, Holly S. Howe, and Leslie K. John*

**A**ngrily denying an accusation might lead other people to perceive guilt, this research indicates. DeCelles and colleagues examined how people use anger as a signal of guilt in different types of accusations (e.g., serious vs. trivial, physically aggressive vs. not physically aggressive) and contexts (e.g., more formal vs. less formal). They found that online panelists as well as professionals such as fraud investigators use

suspects' angry responses to accusations as cues of guilt. In reality, anger is a cue of innocence rather than guilt; accused individuals are angrier when they are falsely accused than when they are guilty.

<https://doi.org/10.1177/09567976211004545>

## Do People Prescribe Optimism, Overoptimism, or Neither?

*Jane E. Miller, Inkyung Park, Andrew R. Smith, and Paul D. Windschitl*

**P**eople generally recommend that others feel optimistic about desirable events but not overestimate the likelihood of those events. Participants read scenarios about protagonists facing uncertain events with a desired outcome (e.g., winning an award) and indicated whether the protagonist should be optimistic or pessimistic about the event and how likely the protagonist



should expect the positive outcome to be. Participants endorsed optimism but did not recommend overestimating the likelihood of desirable outcomes. These results suggest that how people are asked about optimism affects their response and that they do not tend to endorse biased optimism.

<https://doi.org/10.1177/0956797621994770>

### **Nonsymbolic-Magnitude Deficit in Adults With Developmental Dyscalculia: Evidence of Impaired Size Discrimination but Intact Size Constancy**

*Nirit Fooks, Bat-Sheva Hadad, and Orly Rubinsten*

Adults with developmental dyscalculia (DD; a learning disability affecting the acquisition of arithmetic skills) show impairments in size discrimination but intact size consistency even when visual depth cues may alter the perceived distances to objects, this research suggests. Adults with DD and typically developing adults chose which of two spheres, accompanied by visual depth cues, was the largest. Compared with typically developing adults, adults with DD were less sensitive to subtle differences in sphere size but showed stable size representations despite variations in perceived distances, indicating that a core deficit in the mental representation of nonsymbolic magnitude may underlie DD.

<https://doi.org/10.1177/0956797621995204>

#### **CLINICAL PSYCHOLOGICAL SCIENCE**

### **Inferences Training Affects Memory, Rumination, and Mood**

*Baruch Perlman et al.*

Perlman and colleagues used a cognitive-bias modification procedure to train participants to make causal inferences. Participants imagined

themselves as the main character in negative social, academic, and occupational scenarios; each scenario was accompanied by a positive or negative causal inference. When asked to make inferences for new negative scenarios, participants made inferences that reflected their positive or negative training. Participants also fabricated memories about the inferences congruent with their training valence. Training had immediate effects on negative mood and rumination, but not after the recall of autobiographical memories. In participants with high levels of depression, training influenced inferences about autobiographical memories.

<https://doi.org/10.1177/21677026211009886>

### **Influences of Caregiving on Development: A Sensitive Period for Biological Embedding of Predictability and Safety Cues**

*Dylan G. Gee and Emily M. Cohodes*

Gee and Cohodes present evidence for a sensitive period during infancy and toddlerhood when caregiver inputs that are predictable and associated with safety may become biologically embedded, influencing the developing children's corticolimbic circuit involved in emotion regulation. The researchers propose that these early caregiver inputs make the corticolimbic circuit more receptive to later caregiver influences, including caregivers' external regulation of the child's emotions. When children experience early adversity that disrupts the predictability and safety associated with caregivers during the sensitive period, caregivers' influence on their neural and behavioral development might be diminished.

<https://doi.org/10.1177/09637214211015673>

### **Defining and Measuring Meditation-Related Adverse Effects in Mindfulness-Based Programs**

*Willoughby B. Britton, Jared R.*

*Lindahl, David J. Cooper, Nicholas K. Canby, and Roman Palitsky*

Mindfulness-based programs use meditation and other mindfulness techniques to treat psychological issues, such as stress or depression, but do these programs also have adverse effects? Britton and colleagues measured meditation-related side effects following three variants of an 8-week program of mindfulness-based cognitive therapy. Results indicated that 58% of participants experienced meditation-related adverse effects, and 37% reported that the adverse effects had negative impacts on their daily functioning. Lasting bad effects occurred in 6% to 14% of participants and were consistent with signs of dysregulated arousal (e.g., insomnia, anxiety, and dissociation).

<https://doi.org/10.1177/2167702621996340>

### **Extending Expectancy Theory to Food Intake: Effect of a Simulated Fast-Food Restaurant on Highly and Minimally Processed Food Expectancies**

*Jenna R. Cummings et al.*

Reducing the positive emotions that individuals might expect to get from eating highly processed foods may improve dietary choices, this research suggests. Participants entered a simulated fast-food restaurant or a neutral office space; completed questionnaires about anticipated emotional effects of food; and performed a bogus taste test of chips, cookies, carrots, and grapes. Afterward, they were left alone to help themselves to any remaining food. Compared with participants in the neutral space, those in the fast-food restaurant had more positive expectancies for highly processed food, which led them to eat more chips and cookies than minimally processed foods such as carrots and grapes.

<https://doi.org/10.1177/21677026211004582>



**CURRENT DIRECTIONS IN  
PSYCHOLOGICAL SCIENCE**

**Decomposing the Motivation  
to Exert Mental Effort**

*Amitai Shenbav, Mahalia Prater  
Fabey, and Ivan Grabek*

**A**chieving goals and completing tasks tend to require mental effort, something that people have varying motivation to exert. Shenbav and colleagues describe efforts to understand what determines motivation using the expected-value-of-control (EVC) model. This model simulates the process people use to weigh the costs and benefits of exerting mental effort, which, in turn, informs their motivation to exert a certain amount of mental effort. The EVC can predict different sources of variability in motivation, such as past experiences or perceptions of performance efficacy shaped by one's environment, among others.

<https://doi.org/10.1177/09637214211009510>

**Three Perceptual Tools for  
Seeing and Understanding  
Visualized Data**

*Steven L. Franconeri*

**F**ranconeri examines how people use their visual system to process data visualizations and extract patterns and relationships from figures and graphics depicting data. He argues that viewers use at least three core perceptual tools to see and understand data visualizations—extraction of statistics, extraction of shapes, and comparisons—and that the selection of each tool can influence which patterns the viewers see and how they understand them. Franconeri explains each tool's strengths and weaknesses and proposes that a better understanding of

these tools may lead to the design of more effective data visualizations.

<https://doi.org/10.1177/09637214211009512>

**Individual Differences in the  
Intensity and Consistency of  
Attention**

*Nash Unsworth and Ashley L. Miller*

**U**nsworth and Miller suggest that attention intensity (the amount of attention allocated to a task) and attention consistency (how consistently attention is allocated to a task) are important aspects for how attentional abilities vary among people. They review evidence for how intensity and consistency are related to each other and influence task performance. They also show how several factors, such as arousal or motivation, can lead to variations in intensity and consistency, which, in turn, help to explain variation in working memory, learning, and control.

<https://doi.org/10.1177/09637214211030266>

**Illusory Essences: A Bias  
Holding Back Theorizing in  
Psychological Science**

*C. Brick, B. Hood, V. Ekroll, and L. de-Wit*

**B**rick and colleagues suggest that there might be a pervasive bias in most psychological science fields—the assumption that essences explain psychological phenomena—that might prevent theoretical progress. They theorize that psychological concepts (e.g., intelligence) are assumed to represent definable categories with an underlying essence that can create the illusion of understanding. Brick and colleagues suggest four strategies for avoiding essentialism in theory development: (a) transparently discuss what is known about mechanisms, (b) evaluate contextual and contingent explanations, (c) explicitly test phenomena for a common underlying cause, and (d) consider using unfamiliar words as construct labels.

<https://doi.org/10.1177/1745691621991838>

**PERSPECTIVES ON  
PSYCHOLOGICAL SCIENCE**

**Personality Change Through  
Arts Education: A Review and  
Call for Further Research**

*Michael P. Grosz, Julia M. Lemp,  
Beatrice Rammstedt, and Clemens M.  
Lechner*

**G**rosz and colleagues reviewed the literature on how arts education affects personality change. Evidence from the 36 studies examined suggested that arts-education programs may foster extraversion and conscientiousness but not self-esteem. These effects appeared to be stronger in early and middle childhood than in preadolescence and adolescence. However, when analyzing only true experiments, the evidence of arts education's effects on personality was very limited. Given the heterogeneity of studies and the mixed findings, the current evidence is inconclusive. The authors suggest that more research on arts education and personality change is needed.

<https://doi.org/10.1177/1745691620986135>

**A Signal Detection Approach  
to Understanding the Identifi-  
cation of Fake News**

*Cédric Batailler, Skylar M. Brannon,  
Paul E. Teas, and Bertram Gawronski*

**B**atailler and colleagues discuss how signal detection theory (SDT) can help with understanding and disentangling two different aspects in the identification of fake news: the ability to distinguish between real news and fake news, measured by a discrimination parameter (*d'*), and response biases to judge news as real or fake regardless of news veracity, measured by a criterion parameter (*c*). The researchers reanalyzed existing data sets to illustrate the use of SDT in fake-news research and deliver insights into how partisan bias, cognitive reflection, and prior exposure influence discrimination and bias in the identification of fake news.

<https://doi.org/10.1177/1745691621991852>

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## ADVANCES IN METHODS AND PRACTICES IN PSYCHOLOGICAL SCIENCE

### Summary Plots With Adjusted Error Bars: The *superb* Framework With an Implementation in R

Denis Cousineau, Marc-André Goulet,  
and Bradley Harding

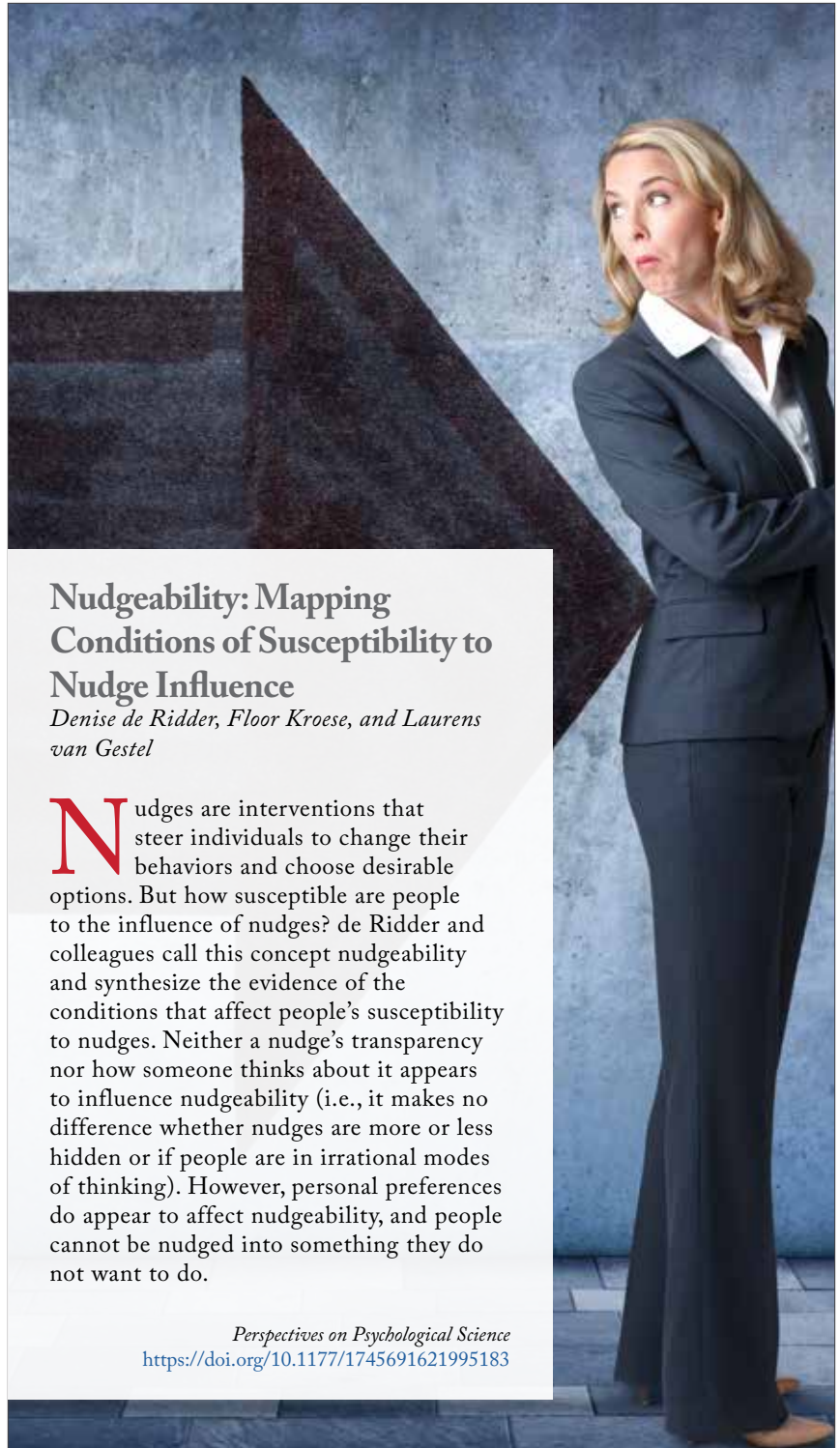
In figures showing data, error bars conveying confidence intervals provide limited information about the precision of estimated results. For instance, confidence intervals do not allow the reader to compare results between groups, between repeated measures, when participants are clustered, and when the population size is finite. Thus, inferences from such error bars can be at odds with conclusions derived from statistical tests. Here, Cousineau and colleagues propose adjusting confidence intervals so that they reflect the experimental design and sampling strategy used. To facilitate the creation of plots with error bars reflecting the adjustments, the researchers developed *superb*, an open-source library for R.

<https://doi.org/10.1177/25152459211035109>

### A Primer on Bayesian Model- Averaged Meta-Analysis

Quentin F. Gronau, Daniel W. Heck,  
Sophie W. Berkbout, Julia M. Haaf,  
and Eric-Jan Wagenmakers

Gronau and colleagues discuss an alternative to frequentist meta-analysis—Bayesian model-averaged meta-analysis. In Bayesian model-averaged meta-analysis, researchers combine the results of four Bayesian meta-analysis models: fixed-effect null hypothesis, fixed-effect alternative hypothesis, random-effects null hypothesis, and random-effects alternative hypothesis. Given the data, each of these models has different plausibilities to address whether the overall effect is different from zero and whether there



### Nudgeability: Mapping Conditions of Susceptibility to Nudge Influence

Denise de Ridder, Floor Kroese, and Laurens  
van Gestel

Nudges are interventions that steer individuals to change their behaviors and choose desirable options. But how susceptible are people to the influence of nudges? de Ridder and colleagues call this concept nudgeability and synthesize the evidence of the conditions that affect people's susceptibility to nudges. Neither a nudge's transparency nor how someone thinks about it appears to influence nudgeability (i.e., it makes no difference whether nudges are more or less hidden or if people are in irrational modes of thinking). However, personal preferences do appear to affect nudgeability, and people cannot be nudged into something they do not want to do.

*Perspectives on Psychological Science*

<https://doi.org/10.1177/1745691621995183>

is between-study variability in effect size. By combining the models according to these plausibilities, Bayesian model-averaged meta-analysis takes

into account model uncertainty and avoids the need to select a fixed-effect or a random-effects model. ●

<https://doi.org/10.1177/1745691621991852>





NOMINATION DEADLINE

FEBRUARY 28, 2022

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The University invites nominations from throughout the world by individuals, professional associations, university administrators, and publishers or editors of journals and books in Psychology. Self-nominations are not permitted. Upon receipt of their nomination, nominees will be notified about the award conditions, the selection process and the supporting materials needed.

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2021 Robert Plomin



## A CLOSER LOOK AT NIH'S HIGH-RISK, HIGH-REWARD RESEARCH PROGRAM

The High-Risk, High-Reward Research Program at the U.S. National Institutes of Health (NIH) is designed to function like a “venture capital space” by accelerating the pace of research with the potential to transform medicine and human health. Three panelists from the NIH Common Fund, part of the Office of Strategic Coordination—Program Leader Ravi Basavappa, Program Officer Becky Miller, and Health Science Policy Analyst Makyba Charles-Ayinde—spoke about the opportunities for this program to support psychological science during an APS funding-focused webinar recorded August 11.

There are four High-Risk, High-Reward initiatives, explained Charles-Ayinde, with the same core criteria: Although no preliminary data are required, projects must be unique, transformative, and cross-cutting, with the potential to move the needle on big issues related to basic, applied, or clinical behavioral and social sciences. Past projects related to substance abuse, for example, have focused on how neighborhood structure and mental health contribute to addiction and how the brains of people who use opiates regulate their bodies to promote survival.

“Even if you feel like your idea is really out of the box, we do encourage those applications,” Charles-Ayinde said.

Each of the four High-Risk, High-Reward initiatives has its own additional requirements:

- The **Pioneer Award** supports individual scientists at any career level in tackling major challenges in behavioral and biomedical research from a new direction. The award provides \$700,000 per year for 5 years.



- The **New Innovator Award** supports early-career investigators within 10 years of their doctoral degree or clinical training who haven't received an NIH award before and want to pursue innovative, high-impact research. The award provides a total of \$1.5 million in funding over a 5-year period.
- The **Transformative Research Award** supports individuals or teams of scientists looking to carry out unconventional research with the potential to create or overturn fundamental paradigms. The award provides a flexible budget.
- The **Early Independence Award** allows early-career scientists to skip the traditional postdoc in favor of pursuing independent research at a host institution. The

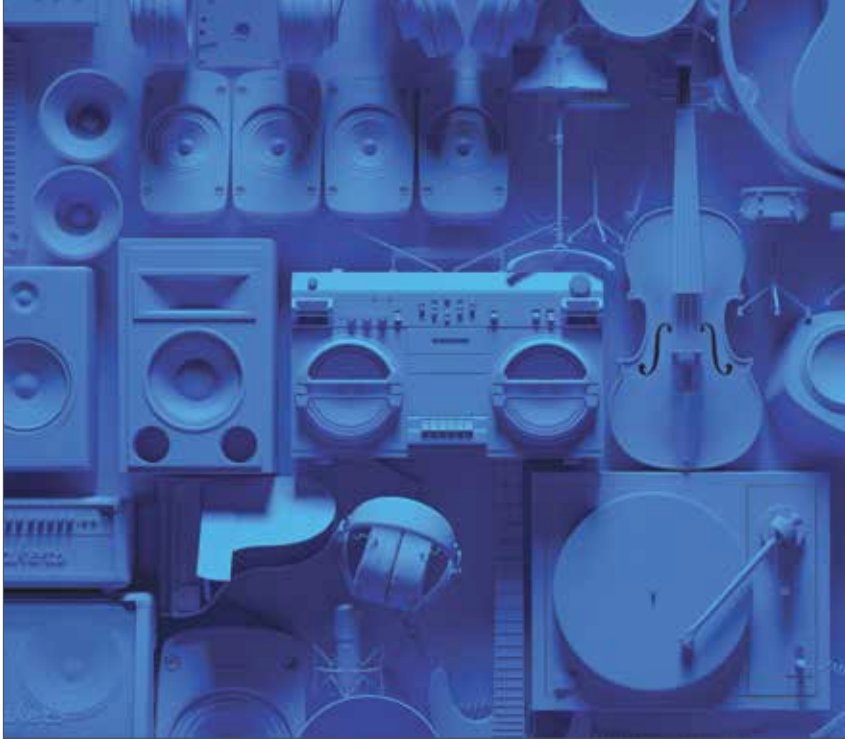
award provides up to \$250,000 in funding over a 5-year period.

“As an advocate for behavioral and social sciences, I'm always really thrilled when a science-wide program like High-Risk, High-Reward takes the time to welcome and invite members of our field to apply and participate,” said APS Director of Government Relations Andy DeSoto during the webinar.

For more information on these awards, visit the High-Risk, High-Reward website at [commonfund.nih.gov/highrisk](https://commonfund.nih.gov/highrisk). There will be a High-Risk, High-Reward Research Symposium in Bethesda, Maryland, from June 8 to 10, 2022. ●

*See page 32, Inside Grants, to learn about one project funded by this program.*

# THE BRAIN'S 'PREDICTION MACHINE' ANTICIPATES THE FUTURE WHEN LISTENING TO MUSIC



Whether listening to a concerto by Bach or the latest pop tunes on Spotify, the human brain does not wait passively for the song to unfold. Instead, when a musical phrase has an unresolved or uncertain quality about it, our brains automatically predict how the melody will end.

Past ideas on how the human brain processes music suggested that musical phrases are perceived by looking backward rather than forward. New research published in *Psychological Science*, however, suggests that the human brain considers what has come before to anticipate what comes next.

"The brain is constantly one step ahead and matches expectations to what is about to happen," said Niels Chr. Hansen, a fellow at the Aarhus Institute of Advanced Studies and one of two lead authors on the paper. "This finding

challenges previous assumptions that musical phrases feel finished only after the next phrase has begun."

Hansen and colleagues APS Fellow Laurel Trainor (McMaster University), Peter Vuust (Aarhus University), and Marcus Pearce (Queen Mary, University of London) focused their research on one of the basic units of music, the musical phrase—a sequence or pattern of sounds that form a distinct musical "thought" within a melody. Like a sentence, a musical phrase is a coherent and complete part of a larger whole, but it may end with some uncertainty about what comes next in the melody. The new research shows that listeners use these moments of uncertainty, or high entropy, to determine where one phrase ends and another begins.

"We only know a little about how the brain determines when things start

and end," said Hansen. "Here, music provides a perfect domain to measure something that is otherwise difficult to measure—namely, uncertainty."

To study the brain's musical predictive power, the researchers had 38 participants listen, note by note, to chorale melodies by Bach. Participants could pause and restart the music by pressing the space bar on a computer keyboard.

The participants were told that they would be tested afterward on how well they remembered the melodies. The first part was the baseline to determine understanding of musical phrasing.

In a second experiment, 31 different participants listened to the same musical phrases and then assessed how complete they sounded. The participants judged melodies that ended on high-entropy tones to be more complete—and lingered on them longer.

"We were able to show that people have a tendency to experience high-entropy tones as musical-phrase endings. This is basic research that makes us more aware of how the human brain acquires new knowledge not just from music, but also when it comes to language, movements, or other things that take place over time," said Haley Kragness, a postdoctoral researcher at the University of Toronto Scarborough and the paper's second lead author.

Over the long term, the researchers hope that the results can be used to optimize communication and interactions between people—or, alternatively, to understand how artists are able to tease or trick audiences. ●

See the full article online with references at [psychologicalscience.org/observations/predicting-music](https://psychologicalscience.org/observations/predicting-music).

# THE FUTURE IS BRIGHT: VIVID IMAGINATION IS LINKED TO MENTAL HEALTH

**W**hen you imagine your future, what do you see? In a recent study of goal-directed imagination published in *Clinical Psychological Science*, answers ranged from passing exams and traveling the world to reaching new fitness goals and strengthening relationships with friends and family. But to participants with depression, the future looked much dimmer, if they could imagine it at all. In the words of one participant experiencing a major depressive episode:

“Everything is just so blurred, it’s just like blackness ... That’s probably why I don’t set goals—because I don’t see anything.”

They aren’t alone. Beau Gamble (University of Auckland, New Zealand) and colleagues found that, among 153 adult participants in New Zealand, those with higher well-being were able to more vividly describe what it would be like to achieve their goals. In addition, those who imagined more positive future scenarios were likelier to report high well-being 2 months later, whereas those who struggled to imagine a bright future were likely to remain depressed.

“Imagination is clearly an adaptive ability—and one that might be better harnessed to help individuals reach the futures they want,” Gamble and colleagues wrote. “These findings may have implications for the design of goal- and imagery-based interventions to reduce depressive symptoms or increase positive aspects of functioning.”

The researchers began by asking participants to list their short-, medium-, and long-term goals. After selecting their two most important goals for each time period, participants spent 3 minutes imagining and



verbally describing a future scene in their life related to each one.

Participants also rated the attainability and importance of each goal and the joy or sorrow they expected it to evoke, in addition to completing a series of questionnaires on well-being and depression. Two months later, the participants completed the questionnaires again and reported their goal progress.

Overall, participants who considered their goals attainable and central to their identity were found to report higher well-being, whereas participants who perceived their goals as less under their own control or less likely to bring them joy were more likely to be depressed. Critically, the participants who perceived their goals as more attainable and important also described the future more positively—and that capacity for imagining a positive future was the

strongest predictor of mental health 2 months later.

“We found strong associations between many aspects of goal setting and imagination and well-being and depressive symptoms,” Gamble and colleagues wrote. “Effects were evident whether examining depressive symptoms correlationally or when comparing individuals with clinical levels of depressive symptoms with individuals with symptoms of no clinical significance.” ●

## Reference

Gamble, B., Tippett, L. J., Moreau, D., & Addis, D. R. (2021). The futures we want: How goal-directed imagination relates to mental health. *Clinical Psychological Science*, 9(4), 732–751. <https://doi.org/10.1177/2167702620986096>

# THE BURDEN OF THE COVID-19 PANDEMIC MAY MOTIVATE OUTBREAKS OF VIOLENT PROTEST AND ANTIGOVERNMENT SENTIMENT



**T**he COVID-19 pandemic is the most severe global health crisis of the 21st century. While media reports and policy directives tend to focus on the health and economic aspects of the pandemic, new research suggests that the pandemic is also destabilizing the fundamental relationship between citizens and the state.

“The pandemic has disrupted our normal way of living, generating frustrations, unprecedented social exclusion, and a range of other concerns,” said Henrikas Bartusevičius, a researcher with the Peace Research Institute Oslo and coauthor on a paper published in *Psychological Science*. “Our investigations show that the psychological toll of living through a pandemic also stoked antigovernment and antisystemic attitudes that led to political violence in a number of countries.”

Bartusevičius and his colleagues asked 6,000 adults from the United States, Denmark, Italy, and Hungary if and how the COVID-19 pandemic

had negatively affected their health, finances, relationships, and rights. The interviewees were asked to report if they felt dissatisfaction with their societies and governments and whether they were motivated to engage in or had already engaged in protests or political violence.

The results from this survey uncovered striking associations between the psychological burden of COVID-19 and highly disruptive sentiments and behaviors, including the use of violence for a political cause. The research revealed less consistent correlations between the COVID-19 burden and the motivation to engage in peaceful forms of activism.

“We were also surprised to find that COVID-19 burden does not need additional triggers to motivate political violence,” said Bartusevičius. “It is seemingly enough on its own.”

The researchers conceptualized COVID-19 burden as the overall psychological toll of living through a pandemic. It’s the sum total of in-

dividual stresses a person experiences during a pandemic and the responses that governments take against it, such as lockdown measures.

The researchers found that in the United States specifically, those experiencing a higher COVID-19 burden were also more likely to report engagement in political violence during the Black Lives Matter protests and counterprotests. The pandemic and associated lockdowns may have contributed to the frustrations that were unleashed in these events, the researchers said.

“This is the first time in the modern era that highly individualized Western democracies have faced a major pandemic,” said coauthor Michael Bang Petersen, a researcher at Aarhus University in Denmark. Before the pandemic, there was little knowledge about how societies would respond to or cope with such a crisis. “Our research presents one of the first pieces of evidence on the disruptive potential of pandemics and associated lockdowns,” he said.

The researchers did find differences across nations, with Danish respondents reporting the lowest COVID-19 burden and Hungarian respondents reporting the highest. However, there were no notable differences in the effects of COVID-19 burden across the four countries, when it comes to antisystemic attitudes and motivations to engage in political violence. ●

See the full article online with references at [psychologicalscience.org/observer/pandemic-protest](https://psychologicalscience.org/observer/pandemic-protest).



## REFUGEES OFTEN SUFFER LASTING TRAUMA. MEDITATION MAY HELP.

New research published in *Clinical Psychological Science* suggests that mindfulness-based trauma recovery for refugees (MBTR-R), a trauma-sensitive and socioculturally adapted group intervention, can significantly reduce refugees' and asylum seekers' rates and severity of posttraumatic stress disorder, depression, anxiety, and multimorbidity, with no evidence of adverse effects. The study involved a small sample—131 Eritrean asylum seekers residing in Israel—but its findings offer hope for overcoming well-documented barriers to effective mental health interventions for these and other vulnerable populations.

“We are in the midst of a global mental health and human-rights crisis,” wrote the researchers, led by Anna Aizik-Reebs, a doctoral student in psychology at the University of Haifa. “Relative to the scale, scope, and urgency of this still-growing crisis, our collective capacity to care for these survivors via evidence-based mental health interventions tailored to refugees and asylum seekers is strikingly limited.”

### Trauma-sensitive adaptations

The study involved both male and female asylum seekers who reported severe histories of trauma, including torture, rape, sexual abuse, and the murder of family members and friends, along with high rates of postmigration living difficulties, including fear of deportation, insufficient money for food or rent, and worries about homelessness. Recruited over the course of a year, 158 participants ages 20 to 48 were randomly assigned either to a condition involving 9 weeks of MBTR-R or a waitlist-control condition. After attrition, the



full sample comprised 83 MBTR-R participants and 48 control participants.

The MBTR-R intervention consisted of nine 2.5-hour weekly sessions for groups of 10 to 20 participants, plus a postintervention assessment 1 week later and a follow-up visit 5 weeks later. Participants received systematic training in formal and informal mindfulness practices. Critically, the practices incorporated trauma-sensitive adaptations—for example, in a “safe place” meditation practice, participants were trained to focus their attention on neutral, safe, or calming objects when feeling overwhelmed or numb, and loving-kindness and self-compassion practices provided ways to cope with fear, self-judgment, guilt, shame, and hostility.

The group sessions were adapted socioculturally as well. For instance, cultural mediators from the refugee community who were familiar with mindfulness practices worked alongside instructors and translated guided practices and group discussions into

the participants' native Tigrinya in real time. In addition, the groups were conducted for and led by men and women separately.

Results supported the efficacy, generalizability, and safety of MBTR-R. For example, relative to those in the control group, participants assigned to the MBTR-R intervention demonstrated significantly less posttraumatic stress, depression, and anxiety both 1 and 5 weeks afterward. They also demonstrated marginally significant increases in subjective well-being at the postintervention assessment, though not at the later follow-up. None of the reported therapeutic effects were moderated by age, gender, education, traumatic-stress history, or living difficulties. ●

See the full article online with references at [psychologicalscience.org/observer/refugee-meditation](https://psychologicalscience.org/observer/refugee-meditation).

# UNDERSTANDING ‘SCIENTIFIC CONSENSUS’ MAY CORRECT MISPERCEPTIONS ABOUT GM FOODS, BUT NOT CLIMATE CHANGE



Despite mountains of evidence that genetically modified foods are safe and climate change is real, many people still doubt these and other well-established scientific findings. Unfortunately, there seems to be no easy way to correct misinformation in the minds of the public.

New research published in the journal *Psychological Science* finds that a two-step process—first explaining what “scientific consensus” means and then explaining what most scientists have to say about a specific subject—is effective at changing misconceptions about the safety of genetically modified foods. This approach, however, is not as effective at changing beliefs about humanity’s impact on the climate.

“Contrary to overwhelming scientific evidence, some people still believe that genetically modified food is unsafe or that climate change is not caused by humans,” said Aart van Stekelenburg, a communication scientist at Radboud University in the Netherlands and lead author on the paper. “We wanted to

study if first helping people understand and identify scientific consensus could help change their beliefs and lead them to a better scientific understanding.”

Van Stekelenburg and his colleagues used an online crowdsourcing platform to select 1,500 U.S. participants who believed that genetically engineered food is worse for one’s health than non-engineered food or that climate change is not primarily caused by human action.

The participants were first presented with an infographic about the value of scientific consensus and how to identify it. They then read a news article about a scientific consensus that contradicted their beliefs.

The researchers found strong evidence that when it came to genetically engineered food, this two-step communication strategy was successful in correcting misperceptions

“We presented this infographic together with a news item in which the scientific consensus had already emerged. In the case of genetically

modified food, it worked even better when people were simultaneously informed of the facts and given an explanation about how scientific consensus works,” said van Stekelenburg. “When it came to reports about climate change, the results were less clear, which is why we’re not so sure whether this strategy would be so helpful when informing people about this topic.”

Van Stekelenburg believes that this may be because people in the United States have less trust in climate scientists than in biomedical scientists. “It may be that because there is less trust, the emphasis on consensus among climate scientists has also had less influence on the convictions of climate naysayers.”

## Reference

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*. Advance online publication. <https://doi.org/10.1177/09567976211007788>

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*University of Oregon*

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# STRESSED TEENS BENEFIT FROM COPING ONLINE, BUT A LITTLE GOES A LONG WAY



New research published in *Clinical Psychological Science* reveals that teenagers (ages 13–17) in low socioeconomic settings who spend a moderate amount of time online after a stressful experience deal with adversity far better than those who spend many hours online or avoid digital technology altogether.

“Adolescents are smart, and they make use of technology to their own advantage. Because adolescents in disadvantaged settings tend to have fewer local supports, the study sought to find out whether online engagement helped reduce their stress,” said lead author Kathryn Modecki, of Griffith University’s Menzies Health Institute and School of Applied Psychology. “There has been a tendency to assume that technology use by teens is negative and harmful, but such a broad assumption isn’t borne out by what we know about the developmental stage of adolescence.”

To gather firsthand data on teens and technology, the researchers provided iPhones to more than 200 adolescents living in low socioeconomic settings. The teens were instructed to report on their technology use, stressors, and emotions five times a day for a week while using the iPhones exactly as they would use personal smartphones. The data were used to compare the emotional states of adolescents who used technology moderately, excessively, or not at all when coping with stress.

The results revealed that adolescents who engaged with technology in moderation in the hours after a stressful situation bounced back more readily and experienced smaller surges in negative emotions, like sadness and worry, compared to adolescents who didn’t use technology or who routinely used technology as a coping mechanism.

“We found a just-right ‘Goldilocks’

effect in which moderate amounts of online coping helped mitigate surges in negative emotions and dips in happiness,” said Modecki. “In the face of daily stressors, when adolescents engaged in emotional support seeking, they experienced better short-term stress relief.”

According to the researchers, the online space serves not just as a short-term distraction but as a resource for adolescents to find support and information about what is troubling them. By leveling the playing field for accessing that information and support, this coping strategy may be especially pertinent for teens in low-income settings. ◉

## Reference

Modecki, K. L., Duvenage, M., Uink, B., Barber, B., & Donovan, C. (2021). Adolescents’ online coping: When less is more but none is worse. *Clinical Psychological Science*. Advance online publication. <https://doi.org/10.1177/21677026211028983>



# CHRONIC PAIN TREATMENT SHOULD INCLUDE PSYCHOLOGICAL INTERVENTIONS

**P**ain is the body's way of alerting the brain to injury and disease. Without a robust pain response, physical trauma could go unnoticed and untreated. Some people, however, experience chronic pain that lasts long after an injury has healed or has no easily identifiable cause.

Unfortunately, treating chronic pain with over-the-counter and prescription medication has its own health risks, including adverse side effects and addiction. In the latest issue of *Psychological Science in the Public Interest (PSPI)*, a team of researchers explores how psychological interventions can be part of a comprehensive plan to manage chronic pain while reducing the need for surgeries and potentially dangerous medications.

"There are several effective non-medical treatments for chronic pain, and psychological treatments emerge among the strongest of these," said Mary Driscoll, a researcher at Yale University and first author on the issue's main article. "People who engage in psychological treatments can expect to experience meaningful reductions in pain itself as well as improvements in physical functioning and emotional well-being."

## The current state of care

In many cases, the causes of chronic pain are unknown, and the use of traditional medical interventions, such as pain medication and surgery, may give little to no relief—or make the condition worse. People with chronic pain often report frustrations with health care systems and health insurance, which tend to be dismissive or unsuccessful in addressing their complaints.

Psychological treatment may reduce the need for medications, surgeries, and other invasive treatments that can be costly, ineffective, and even

dangerous. And research suggests that the effects of psychological treatment can be maintained for a lifetime.

"People with pain should feel empowered to select the psychological treatment that is most appealing," said Driscoll. "Once they do, finding a psychotherapist who can provide this care and with whom they can establish a meaningful connection will be a key factor in obtaining benefit."

## Psychological treatments

Research has shown that psychological factors can play a role in the onset, severity, and duration of chronic pain. For those reasons, several psychological interventions have been shown to be effective in treating chronic pain.

In the article, Driscoll and her colleagues describe the interventions that have been most widely studied by the pain community, including:

- Supportive psychotherapy, which emphasizes unconditional acceptance and empathic understanding
- Relaxation training, or the use of breathing, muscle relaxation, and visual imagery to counteract the body's stress response
- Biofeedback, which involves monitoring patients' physiological responses to stress and pain (e.g., increased heart rate, muscle tension) and teaching them how to down-regulate these responses
- Hypnosis by a trained clinician, which may induce changes in pain processing, expectations, or perception and incorporates relaxation training
- Cognitive-behavioral therapy, in which patients learn to reframe maladaptive thoughts about pain that cause distress; change unhelpful behaviors, such as isolation and



inactivity; and develop helpful behavioral coping strategies (e.g., relaxation)

- Mindfulness-based interventions, which help to disentangle physical pain from emotional pain via increased awareness of the body, the breath, and activity
- Psychologically informed physical therapy, which integrates physical therapy and cognitive-behavioral therapy

The *PSPI* report also addresses topics such as integrated pain care, or the blending of medical, psychological, and social aspects of health care; the future of pain treatment; and improving the availability and integration of pain-management strategies. ◉

## Reference

Driscoll, M., Edwards, R., Becker, W., Kaptchuk, T., & Kerns, R. (2021). Psychological interventions for the treatment of chronic pain in adults. *Psychological Science in the Public Interest*, 22(2), 52–95. <https://doi.org/10.1177/15291006211008157>

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# POLICY IN ACTION: NAVIGATING BEHAVIORAL AND WELL-BEING PUBLIC POLICY

*Perspectives on Psychological Science* paper charts course through ethics, politics of interventions.

Interested in how governments can leverage behavioral science? “Be Happy: Navigating Normative Issues in Behavioral and Public Policy,” a paper recently published in *Perspectives on Psychological Science*, reviews the promises and pitfalls of different approaches.

In the paper, integrative scientist Mark Fabian (Bennett Institute for Public Policy, University of Cambridge) and social and political geographer Jessica Pykett (University of Birmingham) examine two methods to leverage behavioral science for societal good. “Behavioral public policy,” or BPP, refers to the application of behavioral strategies to help overcome individuals’ cognitive or behavioral biases and motivate optimal decisions or actions. Fabian and Pykett contrast this approach with “well-being public policy,” or WPP, which focuses on the mental states of individuals or populations and aims to improve life satisfaction.

Through the paper, the authors seek to establish principles for normative applications of BPP and WPP—that is, how these approaches can or ought to be used to influence public policy. First, they explore behavioral interventions such as “nudges,” which aim to improve individuals’ decision-making by changing how choices are presented. These interventions are often built on a philosophy of libertarian paternalism, or the idea that institutions should seek to manipulate individuals’ behavior while upholding their freedom of choice. Scholars of BPP-type behavioral interventions suggest that if these interventions are to be used, they must be effective, respect individuals’ autonomy, be

transparent, and improve welfare.

Fabian and Pykett raise a series of critiques about BPP and the application of behavioral insights and nudges. Among these critiques is the observation that nudges generally do not allow individuals to learn about their own biases that lead to undesired behaviors. These interventions can also be problematic when pushed by policymakers who assume that they know what is best for individuals, as advised by behavioral scientists—rather than through true public debate or consensus decision-making. Fabian and Pykett warn of the risks of such a technocracy or “psychocracy.” They also note that some recent studies have not been able to replicate certain popular behavioral interventions.

The authors then examine WPP, which seeks to employ “happiness interventions” aimed at improving the mental health of groups, as well as “government well-being budgeting,” or budgetary policies that prioritize population-wide life satisfaction over economic indicators alone. Although the effectiveness of WPP is still being tested, the authors note that this approach is more mindful of individuals’ preferences and values. They also observe that WPP, like BPP, should be transparent.

What’s the best way to deliver WPP interventions? Fabian and Pykett suggest the application of “boosts”:

[Boosts] focus on improving citizens’ capacity for self-guidance. Broad categories of boosts include skills training, explicit persuasion and information representation, and assistance for subjects to inculcate habits or

routines based on psychological science that promote welfare through, for example, financial literacy, risk assessment, health-promoting choices, informed decisions, and [self-regulation].

According to the authors, the boost philosophy sees individuals’ decision-making not as irrational behavior to be corrected but rather as a capacity based on rationality, with the ability to be improved. Boosts aim to teach the ability to make better decisions over time, which may lead to increased well-being. The authors point to the Healthy Minds program ([hminnovations.org](http://hminnovations.org)), founded by APS William James Fellow Richard J. Davidson (University of Wisconsin, Madison), as a demonstration of the effective use of boosts in action.

BPP and WPP both have their uses, as Fabian and Pykett show. However, different sets of expectations and other considerations should govern their application. The authors’ article sheds light on those considerations, as well as some of the ethical and political factors that come into play when psychological science is applied to policymaking. ●

*Learn about some of the ways that psychological science is affecting public policy at [psychologicalscience.org/policy/psychological-science-in-policy](https://psychologicalscience.org/policy/psychological-science-in-policy).*

## Reference

Fabian, M., & Pykett, J. (2021). Be happy: Navigating normative issues in behavioral and well-being public policy. *Perspectives on Psychological Science*. Advance online publication. <https://doi.org/10.1177/1745691620984395>

# COMBINING POLICY WORK AND TEACHING

A final dispatch from OES

By Heather Kappes



**Heather Kappes**

I'm writing this as I transition from being a full-time fellow at the Office of Evaluation Sciences (OES) to being an academic affiliate who will contribute a few hours a week to a few specific projects. I'm also getting ready to dive back into teaching at the London School of Economics and Political Science after a year away. So I'm thinking about how to balance project time and teaching time, and how to find the synergies that will help me make the most out of both.

The projects I've worked on this past year at OES have given me a better understanding of some of the myriad ways "policy" is actually made. From what I've seen, psychology research influences the design, implementation, and communication of government programs much more often than it shapes the wording of legislation. For

example, we're wrapping up a project looking at how documentation burdens affect the equitable distribution of small business relief funding. This work may shape decisions about what documentation to require in future programs. I'm looking forward to talking about this work with students and helping them brainstorm about applications of the psychology research I cover in the courses I teach.

My experience this year will also shape how I curate that research: how I make decisions about what to put in my syllabi and what to leave out. Even more than before, I will focus on covering findings that are robust, as indicated by being preregistered, having been replicated, or being openly shared and critiqued. There's too much at stake in the policy world to spend time applying weak ideas.

Fortunately, there are a growing number of people in the psychological sciences who are pushing us to improve our methods and reanalyzing and critiquing older research to help us understand its limitations. I'll be covering their approaches in my teaching with the hope of developing students into informed skeptics. Whether or not they themselves go on to work in public policy, I think we'll all be better off.

I didn't expect to spend so much time during my year at OES writing, but I've learned that communicating scientific ideas and findings to government administrators is often done with a memo or a report. Producing effective documents for this audience

requires a good grasp of plain language. I know that as an instructor, I often struggle with the curse of knowledge—once you understand a topic, it's hard to explain it in an accessible way to those who don't. Policy work helps build the plain-language communication muscle in ways that I expect will help with teaching.

I've also found that working on large collaborative projects with external partners forces good planning and time management in ways that many academic collaborations, with their often indeterminate roles and vague timelines, don't. Over the coming year, I'll be combining ongoing OES project work with teaching and my own research (as well as personal and family

**Even more than before, I will focus on covering findings that are robust, as indicated by being preregistered, having been replicated, or being openly shared and critiqued. There's too much at stake in the policy world to spend time applying weak ideas.**

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**Heather Kappes** has a PhD in social psychology from New York University and is an assistant professor of marketing at the London School of Economics and Political Science. During the 2020–2021 academic year, Heather served as a fellow at the Office of Evaluation Sciences, part of the U.S. General Services Administration, as well as a visiting behavioral insights scholar at APS. She can be reached on Twitter (@heatherkappes) or by email at [hkappes@lse.ac.uk](mailto:hkappes@lse.ac.uk).



obligations). I'll need to stay balanced and protect my time.

One concrete tool I'll use for that borrows from an OES practice: using running notes for each project. Skimming these notes before a meeting can prevent the need to spend the first half-hour rehashing "where did we leave off last time?" These notes are also a way to make sure key decisions are documented in one place.

Of course, an academic's biggest challenge is often saying no to new

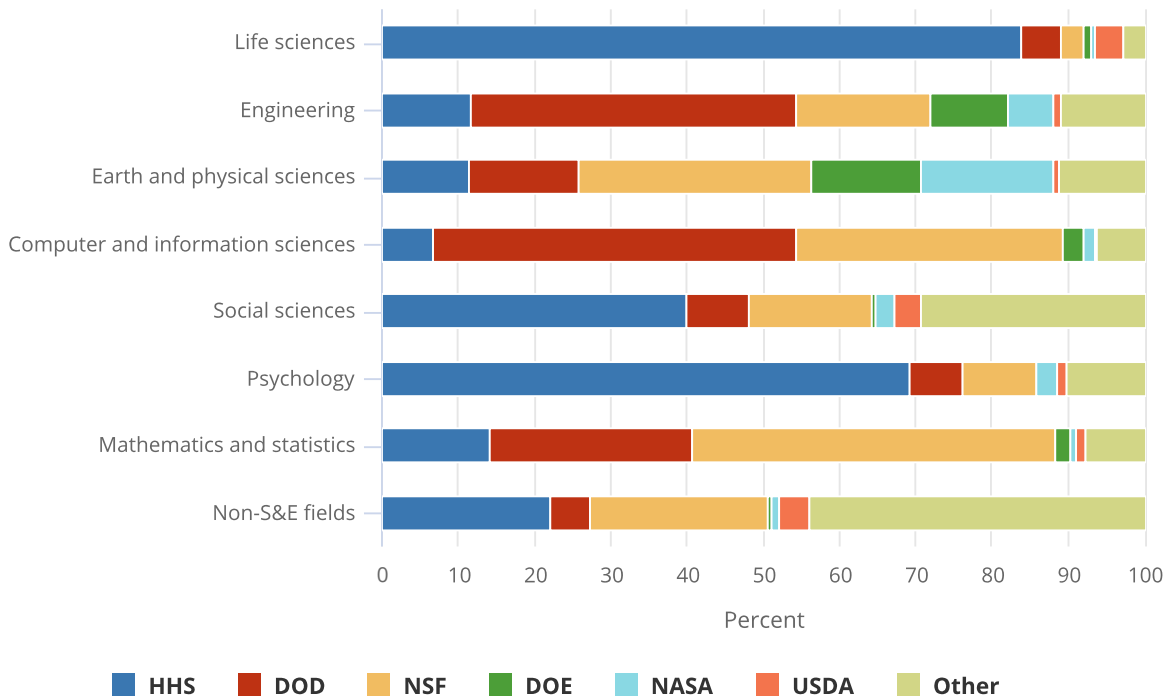
and interesting projects in order to protect time to make progress on existing ones. To that end, I find it helpful to think about my obligations to the students or colleagues who are waiting for the time and energy I promised them. In the world of policy-relevant research, it might also be helpful to think about obligations to beneficiaries who are served by the programs you're working on. I'll try that over the coming year when new interesting projects come my way!

This is my final installment of "Notes From a Fellow." I hope these dispatches have helped some readers to get a feel for what it's like to work with a government team. I'd be happy to talk to those who have questions or want to share ideas. You can find me on email ([h.kappes@lse.ac.uk](mailto:h.kappes@lse.ac.uk)) or Twitter ([@heatherkappes](https://twitter.com/heatherkappes)). ●

See the entire series online at [psychologicalscience.org/tag/notes-fellow](https://psychologicalscience.org/tag/notes-fellow).

BY THE NUMBERS

**U.S. FEDERALLY FINANCED RESEARCH AND DEVELOPMENT EXPENDITURES**



Ever wonder which federal agencies support the largest proportions of psychology research and development in the United States? A new publication by the National Science Board, the independent body that oversees the U.S. National Science Foundation, reports that the U.S. Department of Health and Human Services supports the majority—nearly 70 percent.

National Science Board. (2021). *Science and Engineering Indicators 2022: Academic Research and Development* (NSB-2021-3). National Science Foundation. <https://nces.nsf.gov/pubs/nsb20213/>

# NATIONAL INSTITUTES OF HEALTH HIGH-RISK, HIGH-REWARD RESEARCH PROGRAM

**Stony Brook University's Jessica Schleider shares how her innovative research produces new insights into the clinical science of COVID-19.**

The National Institutes of Health (NIH), part of the U.S. Department of Health and Human Services, is one of the premier funders of medical and health research. Its High-Risk, High-Reward program supports creative researchers pursuing highly innovative research with broad impact. Projects are supported in NIH's priority areas of biomedical, behavioral, and social science fields.

Jessica Schleider completed her PhD at Harvard University, where she was trained as a clinical child and adolescent psychologist. After completing a 1-year clinical internship at Yale Medical School, she began as a tenure-track assistant professor of psychology at Stony Brook University. Here she founded and directs the Lab for Scalable Mental Health ([schleiderlab.org](http://schleiderlab.org)). Schleider is beginning her fourth year in this position.

Her current NIH funding is through the Office of the Director's High-Risk, High-Reward Research Program via a 5-year Early Independence Award (DP5). Her main project is titled "Harnessing Network Science to Personalize Scalable Interventions for Adolescent

Depression." Through the Early Independence Award, she was also able to secure a COVID-19 Competitive Revision Award for a supplementary project titled "Testing Scalable, Single-Session Interventions for Adolescent Depression in the Context of COVID-19."



## Jessica Schleider

### What are you researching?

The overall goal of my research program is to address the longstanding discrepancy between high need for youth mental health care and low access to evidence-based treatment. My lab team and I develop brief, accessible interventions for youth mental health problems, with a focus on single-session interventions (SSIs). We explore how and for whom these brief interventions work best and test novel approaches to dissemination. We are actively testing a suite of digital and provider-delivered SSIs, which address interconnected targets: youth cognitions, such as beliefs about personal traits that are malleable (vs. fixed) and perceptions of agency and self-efficacy, and family processes, such as caregivers' expectancies for

psychotherapy and adaptive parenting behaviors. Our long-term goal is to harness these targets to build and test brief, effective interventions to mitigate the individual, familial, and societal burden of youth mental health problems.

One set of results I'm excited to share are those of our largest-yet randomized trial of digital, self-guided SSIs for adolescent depression. In light of rapidly expanding youth mental health needs during the COVID-19 pandemic, I secured an NIH COVID-19 Competitive Revision Award (linked to my DP5 grant) to test the effects of two of our SSIs: Project Personality, which teaches growth mindset (that symptoms and traits are malleable), and the ABC Project, which teaches behavioral activation (that values-based actions can improve mood). We studied 2,452 high-symptom adolescents during the pandemic (50% youth of color; 80% sexual/gender minority youth). We found that both online SSIs led to significant decreases in adolescent depression across 3 months ( $d_s = 0.18$ ) compared with an active, supportive placebo SSI. Further, both SSIs improved post-intervention hope and agency, supporting the notion that these SSIs effect change by instilling perceptions of control and efficacy. An invited revision of the manuscript reporting trial results is under review, and our preprint is available at [psyarxiv.com/ved4p/](https://psyarxiv.com/ved4p/).

In terms of ongoing NIH-funded work to enhance the precision of SSIs, through my Early Independence Award project, which is ongoing through 2024, we are exploring whether within-person symptom patterns (which we are building from experience-sampling data) predict differential response to SSIs that target distinct symptoms of adolescent

### Grant Information

- **Country/Region:** United States
- **Organization:** National Institutes of Health
- **Grant Mechanism:** High-Risk, High-Reward Research Program
- **Amount:** Covers up to \$250,000 in direct costs per year for up to 5 years

depression. For instance, youth for whom behavioral symptoms (e.g., activity withdrawal) are central within their symptom networks may respond best to an SSI designed to increase positive activity engagement. By comparison, youth for whom cognitive symptoms (e.g., hopelessness) are central might respond best to an SSI designed to strengthen self-efficacy and hope. Results may yield a means of matching youth to individually optimized SSIs—which would be quite helpful, given the literally hundreds of ways in which adolescent depression can present!—and the trial will have the longest follow-up of any SSI randomized controlled trial to date (2 years).

### **How has NIH funding supported your research efforts?**

Receiving an Early Independence Award has totally transformed the speed and scope of the research my lab can conduct. Receiving R01-equivalent funding in 2019, a year into my faculty position, allowed me to hire full-time postbaccalaureate and postdoctoral staff, better support my graduate students, and pursue large-scale randomized clinical trials of new, promising interventions I had designed. It would have been very challenging, if not impossible, to fund projects of this scope and size without Early Independence Award funding—and traditional funding mechanisms likely wouldn't have supported the project given the experimental nature of the ideas we're exploring (i.e., using individualized symptom networks to predict response to different single-session mental health programs). I suppose that's exactly the point of the award, though—to fund “high-risk, high-reward” research that likely wouldn't be fundable through other channels. I'm extremely grateful for the opportunities this grant has provided to catalyze my career and to grow and fully support my research team and trainees.

### **What was the grant application process like for the High-Risk, High-Reward Program?**

The application was long, complicated, and unusual for NIH grants (but entirely worth it in the end!). The Early Independence Award must be submitted *before* an applicant enters a full-time, tenure-track academic position. As a result, I wrote my application while working as a full-time clinician at Yale School of Medicine (i.e., during my clinical internship year), in between receiving a job offer from Stony Brook and my official start date as an assistant professor. I spent nights and weekends for about 4 months preparing the application, the format of which was unlike other NIH grants I'd worked on. Specifically, about half of the grant involves arguing why you are prepared to “skip postdoc” and make the most out of R01-level funding at an earlier-than-usual career stage; the other half goes toward describing your project, the ways in which it is innovative, and how it could potentially lead to major discoveries in your area of research. In addition to these sections, I also needed to obtain 10 to 15 letters of support from Stony Brook faculty and administrators, in order to demonstrate my future institution's commitment to support me and my work. So, it was a lot of organizing, reaching out to future colleagues I hadn't yet met, and forcing myself to “dream big” in terms of the science I thought would be most impactful in my area.

### **What have you been able to do with High-Risk, High-Reward funding that you don't think you'd be able to do with a more traditional grant mechanism?**

The premise of my lab's work, that SSIs can meaningfully reduce mental health problems, is unusual and somewhat new in and of itself within clinical psychology. Combining SSI research

## **The application was long, complicated, and unusual for NIH grants (but entirely worth it in the end!).**

with network science to predict individual-level intervention response is not something I've seen written about at all! I would have needed considerably more pilot data, which would have taken me years and many small-scale grants to collect, to have any chance at securing funding for my idea through traditional R-series mechanisms. I am extremely grateful that the NIH took a chance on me and my ideas, allowing me to pursue them infinitely more efficiently and effectively than I otherwise could have.

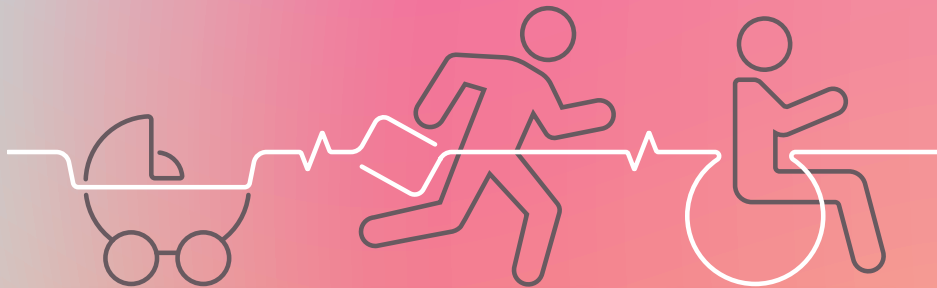
### **What advice do you have for researchers applying for grants from NIH?**

First, I'd suggest gathering as many examples as possible of successful NIH grants written by others, ideally from scientists who use methods similar to yours. This has been the single most helpful step I've taken in preparing NIH grants. Second, I always think it's valuable to seek informal feedback on your Specific Aims and Research Plan documents from colleagues in fields outside your own. If a fellow researcher without content expertise in your subfield can immediately grasp your project's design, importance, and public health value, you can rest assured that you've done a good job communicating your ideas. ●

*Find more information on the NIH High-Risk, High-Reward website: [commonfund.nih.gov/highrisk](https://commonfund.nih.gov/highrisk)*

*Also see page 19 for coverage of an APS webinar on the program.*

# MOBILITY AND OPPORTUNITY ACROSS THE LIFESPAN







# CHILDHOOD RESIDUE IN THE AGING BODY

Research links early experiences to late-life health,  
often independent of the decades in between.

By Scott Sleaf

**M**uhammad Ali once described old age as “a record of one’s whole life.” But childhood may encompass some of the most pivotal aspects of that record.

Two decades worth of research points to a formidable link between our earliest life experiences and our health in old age. Scientists have associated a childhood spent in poverty, for example, with a variety of medical conditions at age 50 and older.

Investigators are mining massive longitudinal data sets that tie our earliest life experiences to the quality of our physical and cognitive health in late life. In addition to a breadth of psychology specialties, this integrative research incorporates epigenetics, epidemiology, endocrinology, molecular biology, and several other fields. The body of work correlates *specific* aging-related illnesses with adverse childhood experiences, often independent of circumstances later in life.

## The role of socioeconomic

Among the longitudinal data mines yielding new insights on childhood experience and late-life health is the Survey of Health, Ageing and Retirement in Europe (SHARE), part of the European Strategy Forum on Research Infrastructures funded by the European Commission, the German Federal Ministry for Education and Research, and the U.S. National Institute on Aging. Since 2004, SHARE has been tracking 140,000 people age 50 and older in Europe. The study began with 11 Western European countries and has incorporated Eastern European nations in subsequent waves.

SHARE’s ambidirectional design—both retrospective and prospective in scope—is one of the study’s outstanding features, said Boris Cheval, a University of Geneva



## Findings suggest that childhood deprivation can leave a particularly deep imprint on women's health late in life, in part through cultural influences.

psychological scientist who has produced many findings using SHARE data.

“It allows us to examine the association between early-life SEC [socioeconomic circumstances] and the evolution on multiple health indicators (physical health, cognitive health, mental health) across aging (i.e., from 50 to 96 years),” Cheval told the *Observer* via email. “This is not possible with most of the prospective cohort designs that have a shorter follow-up (e.g., between 15 years).”

Using SHARE, Cheval has worked with researchers from a breadth of scientific fields to glean insights into possible predictors of health status in old age. He and his colleagues have applied four indicators of the SEC in which participants grew up:

- occupational position of the household’s main earner
- number of books in the home
- overcrowding in the home
- housing quality

“The use of these rich indicators of early-life SEC is really nice in comparison with most data sets that often have a crude assessment of early-life SEC, such as the main occupation of the father only,” Cheval explained.

This research has uncovered several physical and cognitive conditions that correlate with the four childhood circumstances. Some of the most disturbing health problems—respiratory problems, cognitive deficits, muscle weakness—are seen in people who reported growing up in low-income settings, noted University of Ottawa neuroscientist Matthieu P. Boisgontier, who collaborates with Cheval (Cheval et al., 2018, 2019).

One study found that people who grew up in more *affluent* households had a heightened risk for certain cancers after age 50—skin and breast cancer among women and colon and rectal cancer among men. Those results held even after the researchers adjusted for SEC in adulthood. But the research team acknowledged that the results may be skewed by socioeconomic differences in health behaviors that make it harder to detect cancer; for example, poorer adults face more barriers to early screening, so their cancer simply may go undiagnosed (van der Linden et al., 2018).

## Gender and culture

SHARE-based research has also illuminated how gender and childhood cultural environments connect with health behaviors. Findings suggest that childhood deprivation can leave a particularly deep imprint on women’s health late in life, in part through cultural influences. Psychological scientist Aina Chalabaev at Grenoble Alpes University in France and her colleagues, including Cheval and Boisgontier, checked SHARE participants’ responses to questions about their daily physical activities, such as walking or physical labor, as well as childhood SEC. The sample encompassed 46,000 adults from 20 European nations and Israel, giving the scientists data from both wealthy and poor societies.

The results showed that at 73 years of age—the midpoint of the participant sample’s age range—women who grew up poorer were less likely than their male counterparts to be physically active. And the reason was more cultural than material. It wasn’t the sheer lack of resources their parents or caregivers needed to facilitate their participation in school sports or other physical activities. It was that the cultures largely associated with poorer societies simply did not encourage physical activity for girls (Chalabaev et al., 2021). The results will be reported in a forthcoming issue of *Psychological Science*.

“Cultural factors, such as social norms and sex roles, may lead women and men to have differential access to health behaviors, with physical activity being more socially acceptable in men than in women, especially in disadvantaged SECs,” the researchers wrote.

## Biological roots

Scientists have also unearthed some early stress-related *biological* triggers for health problems in old age.

Scientists like APS Fellow Charles A. Nelson III (Harvard Medical School and Boston Children’s Hospital) have described how childhood adversity becomes “biologically embedded” in our physiology and can predispose us to disease across the life course. Nelson coauthored a 2017 article calling for better clinical screening for early-life adversity (Berens et al., 2017).

Researchers have already amassed considerable data on the biological impact of childhood adversity. APS Fellows Elissa S. Epel of the University of California San Francisco, Terrie Moffitt of Duke University, and Janet Kiecolt-Glaser of The Ohio State University are among the psychological scientists at the forefront of this work. They’ve identified cellular changes associated with aging-related diseases such as osteoporosis, diabetes, stroke, cardiovascular disease, and some cancers. In a recent study, Kiecolt-Glaser and colleagues showed that adults who were abused before the age of 18 experience steeper rises in inflammation than do adults with no history of abuse (Renna et al., 2021).

## Childhood adversity and cognition

Researchers also have discovered a possible impact of childhood trauma on brain health in old age. Psychological scientist Andrew J. Petkus (University of Southern California) led a team of researchers who drew on data from two samples of older adults, most diagnosed with an anxiety or depressive disorder. The researchers used the Early Trauma Inventory Self Report-Short Form to measure the adults' experience with different types of child abuse and trauma. The team also administered a battery of tests to measure attention, memory, executive function, and other cognitive skills and examined measures of cortisol, physical health, and depressive symptoms. They found that the adults reporting childhood trauma performed more poorly on the cognitive measures compared to those reporting no trauma (Petkus et al., 2018).

In addition, clinical neuropsychologist Kylie Radford led a multidisciplinary team that surveyed roughly 300 Aboriginal Australians, ages 60 to 92, collecting reports on health, cognition, and social history—including childhood trauma. Radford and colleagues found the highest levels of late-life dementia and psychiatric problems among those who had experienced more childhood stress and adversity. The results add to previous findings showing a link between childhood struggles and cognitive decline across samples in the United States, Sweden, the Netherlands, and Central Africa (Radford et al., 2017).

## Beyond biology

Research also traces some late-age health conditions to early interactions with family and peers. Psychological researchers William J. Chopik (Michigan State University) and Robin Edelstein (University of Michigan) found a link between happy memories of childhood and self-rated health in midlife and old age. The scientists combined data on 22,000 U.S. residents from two longitudinal surveys—the National Survey of Midlife in the United States and the University of Michigan's Health and Retirement Study. The surveys, which collected responses from nationally representative samples, included questions about parental relations, overall health, and symptoms of depression. Compared to participants who reported unhappy childhood memories, participants who said they received parental affection in early childhood rated themselves healthier over time (Chopik & Edelstein, 2019).

Childhood health problems can also influence attitudes about health among older adults, according to a study led by APS Fellow Jacqui Smith of the University of Michigan. Smith's research focuses on the links between health and attitudes about aging. In a recent study, Smith and research associate Marina Larkina collected information from more than 5,770 adults ages 50 to 98 who participated in the Health and Retirement Study. They looked for any chronic-

## Social Determinants of Health a Priority for U.S. Congress

The Congressional Social Determinants of Health Caucus, recently formed by a bipartisan group of nearly 30 U.S. Representatives, will explore ways to fund new programs and leverage existing U.S. government services to improve human health through a better understanding of social factors.

*Social determinants of health*, as defined by the U.S. Health Resources and Services Administration, are conditions in people's environments that affect their health, functioning, and quality of life. These environments include where people are born, live, learn, work, play, worship, and age. Studies linking early-life experiences to late-life health illustrate some of the many ways that psychological science contributes to society's understanding of this crucial topic.

At the time of writing, APS's government relations team is in touch with caucus leaders, affirming the value of the study of social determinants of health and encouraging that psychological science—and the behavioral sciences broadly—be included at every level of future congressional action on the topic. Specifically, APS is encouraging the caucus to support additional scientific research on social determinants and ways of ameliorating their effects.

Social determinants of health are increasingly a global priority. For instance, in January 2021, the World Health Organization's director general noted their relevance as contributors to resilience and emergency preparedness, especially as related to the global impacts of COVID-19.

—Andy DeSoto

*APS Director of Government Relations*

Read more:

[congressionaldohcaucus.org/  
who.int/health-topics/social-determinants-of-health](https://congressionaldohcaucus.org/who.int/health-topics/social-determinants-of-health)



illness diagnoses the participants had received before age 16 and self-ratings of childhood health. They controlled for childhood family income and demographic variables. Their analysis indicated that a childhood diagnosis of chronic illness soured an individual's perceptions about their advancing age (Smith & Larkina, 2020).

## Combining the data sets

Most recently, scientists have embarked on a unique initiative that will bring together large longitudinal studies in the United States, the Republic of Ireland, and Northern Ireland. The international collaboration will explore the influence of social, economic, psychological, environmental, and behavioral circumstances in childhood on gene expression and health later in life.

The project includes the Health and Retirement Study as well as the Irish Longitudinal Study on Ageing and the Northern Ireland Cohort for the Longitudinal Study of Ageing. Scientists involved in the collaboration hail from the University of Southern California; the University of Michigan; Trinity College Dublin; the University of Minnesota; the University of California, Los Angeles; Yale University; and Queen's University Belfast. They plan to expand on previous epigenetics research pointing to childhood poverty, neglect, and violence as contributors to lasting changes in genes.

All these findings have sizable public health implications. As the discoveries expand, childhood history may be a key measure in assessing individuals' risk for illnesses associated with aging. There may come a day when our formative years are a routine part of screening for dementia, heart disease, arthritis, and other ailments. ●

*Scott Sleek is a freelance writer in Silver Spring, Maryland, and the former Director of News and Information at APS.*

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## MIGHTY MITOCHONDRIA

Does the powerhouse of the cell also hold the secrets to healthy aging?

By Ludmila Nunes, APS staff writer

**M**itochondria have attracted the fascination of biologists for decades, from their discovery by Swiss histologist, anatomist, and physiologist Albert von Kölliker in the mid-1800s through the pioneering studies of bioenergetics in the 1950s, 1960s, and 1970s. In more recent years, many psychological scientists and neuroscientists have also become fascinated by the role of these specialized cellular structures in brain processes—specifically, changes in the aging brain. Several multidisciplinary research explorations have been reported in APS journals. For example, Bonnie J. Kaplan (University of Calgary) and colleagues investigated the relationship between mitochondrial functioning and mental health in a 2015 article in *Clinical Psychological Science*, and in a 2019 article in *Current Directions in Psychological Science*, APS Fellow David Geary (University of Missouri) proposed that the functioning of mitochondria might link intelligence, health, and aging.

Here's a look at emerging research at the intersection of biology, psychological science, and neuroscience on the organelle that continues to fascinate researchers across fields.

### From powerhouses of the cell to agents of cellular death

Mitochondria are cell parts—organelles—with a characteristic double membrane. The number of mitochondria in a cell varies by organism, tissue, and cell type. Mitochondria exist in all human cells except red blood cells.

One of the most striking facts about mitochondria is that they have some DNA of their own (in humans, it is supposedly inherited only from the mother, although a recent study found possible evidence for paternal ➔

## Exploring the Mitochondrion

Mitochondria are cell organelles that exist in most eukaryote organisms (i.e., living organisms composed of one or more cells whose genetic material is contained within a distinct nucleus). The number of mitochondria in a cell varies; they exist in all human cells, except red blood cells, for example, and are especially abundant in liver, muscle, and neuronal cells (e.g., Rango & Bresolin, 2018).

Each mitochondrion is composed of different parts, including an outer membrane, an inner membrane, cristae (formed by the foldings of the inner membrane), and a matrix (the fluid-filled space within the inner membrane). The mitochondrion's membranes are composed of proteins and polarized layers of lipid molecules (i.e., with a positive charge on one side of the membrane and a negative charge on the other side).

### Timeline of mitochondria discovery:

- Around 1857: Albert von Kölliker, a Swiss researcher known mostly for his studies of the neuron and the inner structure of the brain, appears to have been the first to identify groups of granules with membrane (i.e., mitochondria) in the cells of insect muscles (Lehninger, 1964).
- 1890: German histologist Richard Altmann recognized the pervasive presence of these granules, concluding that they were elementary organisms living inside cells and carrying out vital functions. He called them “bioblasts.”
- 1898: Carl Benda, a German microbiologist and pioneer in the use of the microscope to study the internal structure of cells, observed hundreds of small bodies forming long chains in the cytoplasm of eukaryotic cells. He called these structures mitochondria (mitochondrion in the singular)—the combination of the Greek words “mitos” and “chondros,” meaning thread and granule, respectively.
- 1940–1946: Belgian-American cell biologist Albert Claude used refined centrifugation methods to isolate mitochondria from the rest of the cell.
- 1948–1951: American biochemist Albert Lehninger and students Eugene Kennedy and Morris Friedkin demonstrated the bioenergetic role of mitochondria in the cell, including oxidative phosphorylation, the chemical process in which cells use enzymes to oxidize nutrients and produce energy.
- 1952–1953: Romanian-American biologist George Palade, acclaimed as the founder of modern cell biology, published the first high-resolution images of mitochondria, allowing a detailed description of the organelles.
- 1957: American cell biologist Philip Siekevitz wrote “Powerhouse of the Cell” for *Scientific American*, coining a term still in use today.

For historical reviews, see Ernster & Schatz (1981) and Pagliarini & Rutter (2013).

inheritance of mitochondrial DNA; Luo et al., 2018); they also possess the ability to transcribe DNA and synthesize proteins. These and other unique characteristics make mitochondria similar to bacteria; in fact, researchers have proposed that mitochondria were originally bacteria that ended up establishing a symbiotic relationship with microbes—living inside them, providing them with energy, and ultimately allowing them to evolve into organisms composed of multiple cells with nuclei, including humans (Kramer & Bressan, 2018).

Beginning with the first observation of mitochondria in the 1800s and through the late 1970s, scientists uncovered many of the details on how mitochondria generate energy (adenosine triphosphate, or ATP) and power cells. But by the 1980s, despite that decades-long interest, mitochondria were no longer a hot research topic. In 1998, however, *Science* published a special issue that revived the scientific community's enthusiasm. At the time, several labs had established that mitochondria and mitochondrial proteins played an important role in programmed cell death (for a review, see Green & Reed, 1998).

In the following decades, researchers went on to detail the role of mitochondria in cell death and aging and how mitochondrial dysfunction is involved in both rare and common human diseases. Beyond their role in bioenergetic processes, or how energy is supplied to and used by cells, mitochondria play a big role in the storage of calcium ions, which are important for signaling between cells, the coordination of hormones, and the release of neurotransmitters. Given their important role in cell metabolism, mitochondrial dysfunctions have been related to diseases affecting virtually every organ and system in our bodies, and in 1994, the term “mitochondrial medicine” came into use (Kaplan et al., 2015). Moreover, given the susceptibility of mitochondrial DNA to oxidative

stress, mutation, and the high-energy demands of the brain, it is not surprising that mitochondrial dysfunction in mitochondrial DNA has been associated with some mental disorders (Kaplan et al., 2015), attracting the attention of neuroscientists and psychological scientists. The resulting research has shown that “mitochondria might spend their days as the ‘powerhouses of the cell’ but clearly moonlight in an array of other activities,” wrote David J. Pagliarini (Washington University School of Medicine at St. Louis) and Jared Rutter (University of Utah) in 2013.

## Mitochondria in the brain

In a 2018 article in *Perspectives on Psychological Science*, Peter Kramer and Paola Bressan (University of Padua) reviewed the evidence for associations between mitochondria functioning and mental dysfunction. For instance, they noted, mitochondria provide energy for neurons to fire and help to regulate the chemical reactions required for this process. Every time a neuron fires, sodium ions enter it. If enough sodium enters, channels open to let calcium ions enter the neuron as well. For the neuron to fire again, both sodium and calcium ions must leave it. Mitochondria then temporarily lock the calcium in and provide energy for other cell structures to also lock the calcium ions. But if the mitochondria happen to accumulate too much calcium, they will destroy themselves and the host neuron. This can occur when neuron firing is excessive, as in the case of epileptic seizures.

When this process occurs as it is supposed to, rising calcium levels can make a neuron more responsive to future stimulation. Likewise, reduced calcium levels can make neurons less responsive. Mitochondria affect these responsiveness changes, known as “synaptic plasticity,” by either strengthening or eliminating energy connections. ATP can also function as a neurotransmitter—for example, signaling pain by telling the cells to “spill” ATP after an injury and activating receptors outside of the affected cells (Wirkner et al., 2007). In addition, mitochondria produce precursors of steroid hormones and neurosteroids that can affect learning, memory, and mental health. And when hormones and neurotransmitters are excessive or no longer needed, mitochondria have the task of breaking them down or storing them away.

## Consequences of dysfunctional mitochondria

What happens when mitochondria become damaged or dysfunctional? Citing Boesch et al. (2011), Kramer and Bressan noted that not only can damaged mitochondria be repaired, but if the repair fails, parts that are still working can be recycled. Pairs of malfunctioning mitochondria fuse together, reconfigure, and come apart again, creating one

mitochondrion with purely functional components and another with components that are damaged or destroyed (Youle & van der Bliek, 2012). However, cells with too many dysfunctional mitochondria become dysfunctional themselves; at that stage, they instruct their mitochondria to kill them and then self-destruct. When this process is disrupted, disease can result.

Because the human brain consumes at least 20% of the energy mitochondria generate and neurons’ oxidative metabolism is 10 times faster than that of other cells (Bélanger et al., 2011), mitochondria dysfunction can affect it greatly. Neurons are always using energy, especially at synapses, and when mitochondria become dysfunctional, they have to be destroyed and replaced, either at the synapse or after being transported away. Failures in those processes of destruction and transport have been linked to neurodegenerative diseases (Martinez-Vicente, 2017), the onset of both Alzheimer’s and Parkinson’s (Correia et al., 2016; Shlevkov & Schwarz, 2017), and even schizophrenia and depression (Dehesi et al., 2013), Kramer and Bressan noted.

Dysfunctional mitochondria can produce higher levels of reactive oxygen species (ROS; reactive chemical molecules that contain oxygen and are generated by normal breathing processes), which cause oxidative stress and can damage cell structures, DNA, RNA, and proteins (Lei et al., 2014). ROS-induced damage contributes to cell death, neurodegenerative diseases, and even normal aging. Higher concentrations of ROS have been linked to attention-deficit/hyperactivity disorder (ADHD; Ceylan et al., 2012), bipolar disorder (Andreazza et al., 2008), paranoid schizophrenia (Dietrich-Muszalska et al., 2012), and autism spectrum disorder (Frye & Rossignol, 2011).

Additionally, a 2008 study connected mitochondrial function with depression and somatic symptoms. Specifically, Gardner and Boles showed that reduced ATP production (as noted, a mitochondrial function) was linked to more severe somatic symptoms in patients with chronic depression. Given these results, “severity of somatic complaints may be a marker of low ATP production and perhaps also the severity of mental symptoms,” wrote Kaplan and colleagues in 2015. Kramer and Bressan also explored how the consequences of dysfunctional mitochondria for neuronal functioning may help to explain why “schizophrenia patients are often depressed, autism patients are often anxious, Down syndrome patients tend to develop premature dementia, and current depression predicts dementia later on.”

## When mitochondria age

Understanding how mitochondria contribute to human brain functions may also shed light on their influence in both healthy brain aging and some aging-related neurological diseases.



**Mitochondria might spend their days as the “powerhouses of the cell” but clearly moonlight in an array of other activities.  
—Pagliarini and Rutter (2013)**

Biochemist Denham Harman characterized aging as a progressive accumulation of changes that are ultimately responsible for “ever-increasing susceptibility to disease and death” (Harman, 1981). His “free-radicals theory of aging” (1956) posited that aging, as well as age-associated degenerative diseases, is a consequence of free radicals (the ROS produced by mitochondria) attacking cells and tissues. Specifically, an imbalance between ROS production and antioxidant defenses (another mitochondria function) can impair cellular function. This phenomenon has been observed not only in normal aging but in many pathological cases involving mitochondrial dysfunction (see Grimm & Eckert, 2017).

In addition, cells lose their ability to recycle organelles and macromolecules with advancing age. This too leads to mitochondrial dysfunction, evidenced by impaired ability to provide energy to cells and increased oxidative stress that, in turn, damages mitochondria Rango & Bresolin, 2018. Mutations in our mitochondrial DNA also increase as we age and can eventually lead to cells’ death (see Rango & Bresolin, 2018).

Other researchers have associated aging with mutations in mitochondrial DNA in the dopaminergic neurons of a specific region of the brain, the substantia nigra (e.g., Kravtsov et al., 2006). Similar mutations are found in patients with Parkinson’s disease (Rango & Bresolin, 2018), a neurodegenerative disorder with symptoms such as rigidity and resting tremor. In primates, neuronal senescence (a process by which neurons age and stop dividing but do not die) has been associated with altered mitochondrial function and motor decline: Older animals had less motor activity than younger animals and reduced ATP synthesis in the substantia nigra and putamen (Pandya et al., 2015). These findings are especially relevant because about half of individuals over 85 years old show mild signs of Parkinson’s (Biskup & Moore, 2006). Overall, changes associated with mitochondria dysfunction appear to be linked to both Parkinson’s and aging (Rango & Bresolin, 2018).

Further, damaged mitochondrial DNA in the substantia nigra may contribute to some movement issues that arise with age, along with other aging outcomes. In a study with

mice, researchers found evidence that rodents with damaged mitochondrial DNA showed decreased dopaminergic neurons and signs of aging that included osteoporosis, kyphosis (i.e., hunchback), and weight loss (Trifunovic et al., 2004).

Research has also shown that mitochondria change their shape through regulated processes of fusion and fission (lengthening and shortening, respectively) and actively move between neuron parts (e.g., Chan, 2012). These morphological and functional changes are affected by extracellular signals and the metabolic environment and may influence the cellular aging process.

In a 2014 article in *Proceedings of the National Academy of Sciences*, Yuko Hara (Icahn School of Medicine at Mount Sinai) and colleagues explored the relationship between aging, mitochondria morphology, and cognition in rhesus monkeys. They found that in the brain area associated with working memory, young monkeys had normally shaped mitochondria, whereas older monkeys had many abnormally shaped mitochondria as a result of oxidative stress. The presence of these abnormally shaped mitochondria was associated with declines in working memory. However, estradiol, a hormone with an antioxidant effect, was shown to reverse both this presence and working memory impairment. Thus, Hara and colleagues’ findings suggest that “hormone replacement therapy benefits cognitive aging, in part, by promoting mitochondrial and synaptic health in the PFC [prefrontal cortex].”

## Neurodegenerative diseases and mitochondrial dysfunction

Age is the main risk factor for neurodegenerative disorders (Niccoli & Partridge, 2012), including Alzheimer’s disease, which starts with cognitive symptoms such as difficulty remembering recent events and, as the disease progresses, results in loss of bodily functions and death. The prevalence of Alzheimer’s among Americans 65 or older is expected to grow from 6 million today to 12.7 million by 2050, barring medical breakthroughs to prevent, slow, or cure the disease (see the Alzheimer’s Association’s 2021 Alzheimer’s Disease Facts and Figures report). Unsurprisingly, mitochondria have also been implicated in Alzheimer’s disease.

One of the earliest signs of Alzheimer’s disease, appearing even before the onset of histopathological markers and symptoms, is a reduced uptake of glucose, consistent with changes in the brain’s bioenergetic processes (Gibson & Shi, 2010). Studies have indicated that in patients with Alzheimer’s disease, the rate of glucose metabolism in brain regions involved in memory processes, such as the hippocampus and temporal and parietal lobes, is reduced by 20% to 30% (Kapogiannis & Mattson, 2011). Although research is ongoing, some investigators have proposed the “mitochondrial cascade hypothesis” to explain the onset of



Alzheimer's (Swerdlow & Khan, 2004). According to this hypothesis, genetic factors influence a host of mitochondrial functions that, in turn, convey susceptibility to Alzheimer's. Consequently, mitochondrial dysfunction is the primary trigger of the cascade of events that lead to the disease. This hypothesis is still being tested, but mitochondrial morphology and number, bioenergetic processes, mitochondrial biogenesis (i.e., the formation of new mitochondria), and mitochondrial transport and destruction (i.e., mitophagy) do all appear to be impaired in patients with Alzheimer's disease (for a review, see Cenini & Voos, 2019).

### Keeping mitochondria healthy

Although research on mitochondria and their relationship with aging is still nascent and cannot offer conclusive recommendations, two interventions have shown promise for improving the outcomes associated with aging mitochondria: targeted pharmacological approaches, such as antioxidants (e.g., ginkgo biloba), and lifestyle changes (Cenini & Voos, 2019).

Regarding lifestyle changes, Martin Picard (University of Pennsylvania) and APS William James Fellow Bruce S. McEwen (The Rockefeller University) suggested in a 2014 commentary in *Proceedings of the National Academy of Sciences* that exercise and other forms of physical activity may benefit the brain by supporting healthy mitochondrial dynamics and inducing mitochondrial biogenesis. "Our repertoire of approaches to promote brain adaptability and preserve brain function with aging should benefit from a bioenergetic perspective of how the brain works and dynamically responds to its environment," Picard and McEwen wrote.

Likewise, Kramer and Bressan highlighted the importance of lifestyle choices for slowing down aging-related declines.

**Sleep** may help to detoxify the brain by eliminating beta-amyloid, a substance that harms neurons and mitochondria when accumulated in excess (Huang et al., 2012). Lack of sleep can damage mitochondria, interfere with

learning and memory, and ultimately lead to dementia and death (see Kramer & Bressan, 2018).

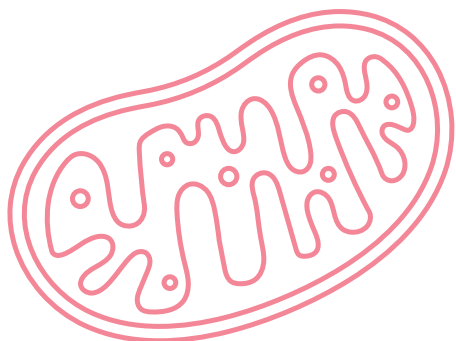
**Exercise** appears to keep mitochondrial DNA healthy, with fewer mutations, among other benefits (Cao et al., 2012). During prolonged exercise, the body and brain continue to expend energy while the usual source of that energy, glucose, is depleted. When this happens, mitochondria must use a different "fuel," creating a chain of reactions that ultimately trigger the production of brain-derived neurotrophic factor (BDNF), a protein that stimulates the growth and repair of neurons and synapses.

**Eating moderately** may also promote mitochondrial reproduction and ATP generation and protect cells, including neurons. These effects probably occur via the same glucose-depletion mechanism that operates when one exercises (e.g., Gano et al., 2014).

**A balanced diet** can also reduce mitochondria's oxidative stress and contribute to healthier mitochondria and cells (Cenini & Voos, 2019). For instance, the Mediterranean diet—characteristically high in olive oil, unrefined grains, fruits, vegetables, and fish—appears to be associated with a reduced incidence of Alzheimer's disease (e.g., Karstens et al., 2019).

**Stress management** (e.g., through meditation or other relaxation techniques) can reduce free-radical damage and protect mitochondria, supporting the production of ATP and its use by cells (Bhasin et al., 2013). Chronic and intense stress can counteract BDNF, increase free-radical production, and reduce mitochondria's capacity to create ATP and lock in the calcium needed for cellular energy production.


Moving beyond these approaches, a better understanding of the mitochondria in the context of aging, particularly brain aging, may help to identify therapeutics that could improve aging outcomes and even prevent neurodegeneration (Grimm & Eckert, 2017). Such understanding may be possible only if interdisciplinary teams including biologists, neuroscientists, and psychological scientists, among others, work together to learn more about the central role that mitochondria appear to play in all human functioning. Placing mitochondrial functioning at the core of many physical, psychiatric, and neurological diseases, as well as normal aging, "may be useful for identifying genetic and environmental influences on the development of intelligence and rate of age-related declines in cognition," wrote Geary in his 2019 article in *Current Directions in Psychological Science*. What's more, he continued, "the emerging mitochondrial therapies for specific diseases (e.g., Alzheimer's) might prove to be broadly useful, specifically, for the amelioration of environmental and age-related compromises to health and cognition." ◉



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## A LIFETIME OF LEARNING

Age-related changes in healthy adults may owe more to shifting priorities than cognitive decline.

By Kim Armstrong, APS staff writer

Older adulthood is often portrayed as a time for slowing down—whether by choice, as we retire to live closer to loved ones or in a more agreeable climate, or by necessity, as our recollections of information new and old become increasingly foggy. Recent research in *Psychological Science* suggests, however, that this fog may not arise as an inevitable result of normal aging. Instead, wrote Karra D. Harrington (The University of Melbourne) and colleagues, undetected neurodegenerative diseases such as Alzheimer's and other forms of dementia may bias measures of how brains change with age, leading researchers and society at large to underestimate the cognitive abilities of healthy adults ages 65 and older.

“Given the relevance of the findings from this study to individual and societal attitudes about aging and the ramifications of those attitudes for the health and well-being of older adults, it is vital that models of cognitive aging be reconsidered from the context of preclinical neurodegenerative disease,” Harrington and colleagues explained.

The researchers examined how undiagnosed early neurodegenerative disease may bias measures of older adults' cognitive abilities. Their study involved 199 people ages 65 to 89 who were participating in ongoing studies at the Knight Alzheimer's Disease Research Center. To participate in this particular study, individuals had to have an initial clinical dementia rating of 0 (out of 3) and to have undergone three procedures in a previous study at the



center: a PET scan and a spinal tap, both of which can be used to measure dementia biomarkers in the fluid around the brain (in this case, amyloid- $\beta$  and tau), as well as a structural MRI, which can be used to detect decreases in brain volume and thickness associated with various forms of dementia.

Participants completed an assessment of their cognitive abilities at the beginning of the study and then once annually for an average of 6 years. Within 2 weeks of each appointment, they also provided a blood sample and a cerebrospinal fluid sample and received additional neuroimaging. Each participant attended the assessments with a friend or family member, which allowed the researchers to interview both parties about changes in the participant's cognitive abilities over the past year.

Overall, older participants were more likely to start the study with dementia biomarkers and greater neurodegeneration. Throughout the course of the study, each additional year of age was found to correlate with reduced processing speed, working memory, and semantic memory—but when the researchers looked only at participants without dementia biomarkers, these effects disappeared, and individuals' episodic memory was actually found to improve with age.

“This information should be used to inform expectations of older adults at the broader societal level, to enhance self-care practices for older adults, and to encourage clinicians to seek explanations for failing cognition in older adults,” Harrington and colleagues wrote.

That's not to say that aging doesn't cause changes in cognition, but research is increasingly demonstrating that, in healthy adults, these differences may be less about memory loss and more about how our brains' priorities change as we age.

## (Re)learning what to learn

Age-related declines in memory and other cognitive processes get so much focus, wrote APS Fellow Margaret E. Beier (Rice University) in a recent article in *Current Directions in Psychological Science*, it's a wonder people over 30 are still working, learning, and generally enjoying their lives. But of course they are.

“Although the narrative of decline with age may align with personal experiences of forgetting names and difficulty keeping up with new trends, this narrative does not jibe with equally salient personal experiences of productivity and development through the life span,” Beier continued. “In daily life, people continue to be productive contributors to society as they age, and some become increasingly productive.”

There is no indication that job performance worsens with age, she added, and many people do not attain leadership positions until middle age or older adulthood, two

**In daily life, people continue to be productive contributors to society as they age, and some become increasingly productive.**

—Beier (2021)

realities that reflect our capacity for lifelong learning. In fact, in healthy adult samples, much of the difference may come down not to a decline in ability—what we *can* do—but to a shift in motivation—what we *will* do.

This process isn't a matter of intellectual laziness, but rather the result of one of the most fundamental aspects of learning: combining our existing knowledge with information from our environment in order to “learn what to learn,” wrote Rachel Wu (University of California, Riverside) in *Current Directions in Psychological Science* in 2019.

“Understanding what to learn is difficult when both relevant and irrelevant information compete for attention,” Wu explained. “Determining what to learn is important because learning relevant information helps the learner achieve goals, whereas learning irrelevant information can waste time and energy.”

As we age, our sense of what is worth learning narrows drastically, usually based on what has been important in the past, she continued.

In infancy, everything in our environment could be a potential source of essential information. We quickly acquire basic patterns from the environment in an open-minded way and use this information to learn more, such as learning about people, and then using people to learn more about the world.

Children continue to explore their environments openly and can be guided via patterns in the environment and by observing other people's actions, such as through explicit teaching, Wu wrote, but later in life, we begin to gravitate more toward exploiting our environment by leveraging our existing knowledge to shape our circumstances.

This can allow us to become and remain more efficient, but it is a balancing act, Wu noted. Although prior knowledge may help us in familiar, static environments, it can also hinder us in new situations where the same strategies are less effective, when environmental changes necessitate adaptation. When we do not adapt to new situations, Wu said, we become dependent on others to help us, which can be problematic, especially in old age.

For adults, who do not prioritize learning new skills to adapt, because learning can be challenging and not so enjoyable in the short term, this can eventually translate, for



example, to difficulty in learning (or feeling motivated to learn) how to use newer technologies such as smartphones and online banking platforms that, for many, have become necessities of modern life.

### Focusing on what matters

These changing priorities may also lead older adults to become less willing or able to put effort into learning “irrelevant mumbo jumbo” like the meaningless word pairs common in studies of memory, further skewing results in the lab, wrote APS Fellow Janet Metcalfe (Columbia University) and colleagues in *Psychological Science* in 2015.

Performance on learning tasks generally decreases with age in adulthood, but when Metcalfe and colleagues pre-

**Older adults are capable of rallying their attentional resources as well as, and sometimes better than, young adults. But they do so selectively.**  
—Metcalfe et al. (2015)

sented 89 participants with meaningful general-knowledge questions (e.g., “In what ancient city were the Hanging Gardens located?”), adults age 62 and older not only answered more questions correctly on the first try than participants ages 20 to 31 but were more likely to learn the correct answer after getting a question wrong.

Metcalfe and colleagues also used an electroencephalogram (EEG) to record participants’ brain waves, or event-related potentials (ERPs), while they answered questions, were informed of the correct answer, and were unexpectedly retested.

Young adults showed significantly stronger brain activity in response to feedback and retesting when they gave incorrect answers with high confidence, as opposed to low. Older adults, on the other hand, demonstrated similar ERPs in response to high- and low-confidence errors, suggesting that they paid equal attention to both error types, which may enhance learning, the researchers wrote.

“Older adults are capable of rallying their attentional resources as well as, and sometimes better than, young adults. But they do so selectively,” Metcalfe and colleagues explained. “Older adults may be particularly motivated to learn the truth, and capable of engaging their attention to this end.”

Michael Ramscar (University of Tübingen) and colleagues further examined how performance on linguistic

tasks changes with age. Their study, reported in *Psychological Science* in 2017, involved 40 native German speakers and 40 native Mandarin speakers who were also fluent in German. Half were ages 18 to 25 and half were 38 to 53.

Bilingual and monolingual young adults were found to recall both meaningful (e.g., “baby”-“cries”) and arbitrary (e.g., “jury”-“eagle”) word pairs in German at about the same rates. Older bilingual participants, however, were found to outperform monolingual German speakers on all but the most arbitrary word pairs. Surprisingly, older adults with doctoral degrees were found to recall fewer word pairs than adults with less education.

That pattern may reflect a cognitive cost of learning, Ramscar and colleagues wrote: People with more language experience become less sensitive to word pairs they have come to perceive as arbitrary. Although this process may hinder future language learning, that may simply be the price of linguistic specialization, rather than an age-related cognitive deficit.

“It is notable that the same pattern of learning the informative and neglecting the uninformative is also seen when infants lose their sensitivity to non-native phonetic distinctions in the course of learning a language, when it is not typically seen as cognitive decline,” the researchers explained.

## Learning on the job

We develop unique knowledge sets over our lifetimes through our education, work, and leisure activities, making adult intelligence a difficult concept to measure, Beier explained. Generally, though, people’s problem-solving abilities have been found to peak in early adulthood, and although our cognitive processing abilities start to slow down around age 30, our existing knowledge base only continues to grow, as Timothy A. Salthouse (University of Virginia) found in a 2019 longitudinal study of 5,000 adults. At the same time, we tend to shift from an achievement-oriented mindset that may prioritize extrinsic rewards, such as pay raises and promotions, to a more socioemotionally oriented mindset that pushes us to pursue intrinsic rewards, like enjoyment or interest, for their own sake.

Moreover, Beier added, other research has suggested that “as people age, they are increasingly likely to select goals aligned with their existing strengths, adapt their approach to achieving these goals by optimizing the resources that are available to them, and compensate for declines in resources by adjusting their approach or environment.”

Existing knowledge can also be used to support the learning of new information. In two studies of 141 and 199 adults ages 18 to 69, Beier and Phillip L. Ackerman (Georgia Institute of Technology) found that prior knowl-





edge was associated with self-paced learning about financial issues and cardiovascular health after reasoning abilities were accounted for. Notably, older learners learned just as much about cardiovascular disease as did younger learners, and learned more about financial issues.

Self-paced learning may be particularly valuable in a workplace context, Beier added. Allowing people to learn at their own pace may give older adults the time and space necessary to build on their existing knowledge and more fully process information. Giving older learners ample time to process content to be learned may also avoid activating performance-hindering stereotypes related to age and learning.

“Studies on lifelong learning suggest that, although they may need to expend more effort than younger learners, older learners can and do learn as much as younger learners when they expend that effort,” the researchers concluded.

### True or false?

Despite being highly motivated to seek out truth, older adults have also been found to be more susceptible to fake news and other forms of misinformation, wrote Nadia M. Brashier and APS William James Fellow Daniel L. Schacter in a 2020 article in *Current Directions in Psychological Science*.

Older adults’ existing knowledge gives them an edge when it comes to uncovering the truth, and yet Facebook users older than 65 were 7 times more likely to share links to fake news sites, Brashier and Schacter found. Although this pattern can be partly attributed to cognitive decline—older adults are more likely to forget where they learned information, for example—people also tend to become more trusting later in life and therefore struggle more to identify lies, the researchers explained. These cognitive traits, combined with their relative inexperience online, can make older adults more likely to take fake news at face value.

“Cognitive declines alone cannot explain older adults’ engagement with fake news,” Brashier and Schacter


concluded. “Interventions in a post-truth world must also consider their shifting social goals and gaps in their digital literacy.” ●

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# UP-AND-COMING VOICES: AGING AND LIFESPAN DEVELOPMENT

As part of the 2021 APS Virtual Convention, researchers had the opportunity to connect with colleagues and present their work to the broader scientific community in 15-minute Flash Talks. In this collection, we highlight talks by students and early-career researchers related to aging and development over the lifespan. View the video recordings online at [psychologicalscience.org/observer/aging-talks](https://psychologicalscience.org/observer/aging-talks).



## Age-Related Changes in Discounting and Everyday Behaviors With Delayed and/or Probabilistic Consequences

**Yu-Hua Yeh** (*Virginia Polytechnic Institute and State University*), **Joel Myerson**, and **Leonard Green** (*Washington University in St. Louis*)

### What did the research reveal that you didn't already know?

A common view is that human decision-making improves with age. However, the behavioral evidence for this putative change from studies with individuals in adulthood is not robust. The mixed findings may be due to methodological differences across studies, the types of outcomes used, and sample size (i.e., statistical power). One area of decision-making that is of significant importance involves intertemporal choice studied within a discounting framework in which individuals are asked to choose between a smaller immediate gain and a larger but delayed gain and between a smaller certain gain and a larger but uncertain, or probabilistic, gain. Choosing the smaller immediate gain and the larger uncertain gain is considered to be representative of impatience and risk-taking, respectively. Our research extended this approach by including choices involving losses as well as investigating age-related changes in everyday behaviors that involve delayed and/or probabilistic consequences. We found that the decrease in impatience and risk-taking with age was more prominent when the decision-making involved negative outcomes. That is, the improvement in decision-making across the lifespan—an increase in 'prudence'—was largely apparent when outcomes involved losses.

### How might your findings improve outcomes related to aging or, more generally, improve our understanding of lifespan development?

Our findings highlight the importance of considering decisions involving losses when studying changes in the decision-making process with age. Moreover, our findings suggest that the framing effect—a systematic influence on decision-making based on framing expected outcomes as gains or losses—may grow larger as people get older. Although the predicted

Bold type indicates authors of responses

relation requires further research, understanding changes in decision-making processes across the lifespan could facilitate the development of interventions that help individuals to make better life decisions.



### To Believe or Not to Believe: How Claimant Age and Perpetrator Status Affect White People's Perceptions of Discrimination Claims

*Amber D. Williams (California Polytechnic State University) and Dorainne Levy (Indiana University)*

#### What did the research reveal that you didn't already know?

Our study sought to understand how White adults perceive Black people who claim they have experienced racial discrimination in the face of a job- or academics-related rejection. Specifically, we wanted to understand how perceptions

differed depending on the age of the claimant (child, adolescent, or adult) and the role of the perpetrator (peer or authority figure). We have run two studies on this issue so far. In the first study, we found that adults were seen less positively than children and adolescents when claiming to have experienced racial discrimination. We sought to replicate these findings in a second study in which the discrimination scenarios were more uniform in order to rule out potential confounds. Our second study did not replicate the first study's findings. We hypothesize that this may be because the adult in the second study was a 22-year-old college student rather than an adult with a professional job. We are hoping to replicate the results from the first study by having the adult claimant be someone who has a job and is in their 30s.

#### How might your findings improve outcomes related to aging or, more generally, improve our understanding of lifespan development?

If our results from the first study replicate, our findings will have several implications for understanding how racial discrimination claims are treated in professional settings. Adults who are discriminated against in job settings may file lawsuits or speak to their human resources department. If they are perceived negatively for making such claims, they may be punished in a number of ways, including being passed up for promotions and opportunities, thus perpetuating a cycle of racial discrimination that may have consequences for one's career opportunities, wealth, etc. However, it is also possible that age is not a factor in people's perceptions, as we found in the second study. In that case, future research should examine mechanisms that may improve perceptions of people who discuss racial discrimination at various points in their lives and in various settings.



### The Effect of Aging on Working Memory: Longer Execution Times, Increased Interference, and More Serial Processing

*Yiyang Chen, Trisha Van Zandt, and Mario Peruggia (The Ohio State University)*

#### What did the research reveal that you didn't already know?

In this project, we used computational modeling to gain a better understanding of the differences between older and younger adults in working memory updating. One of the most interesting differences that we found was the level of preactivation used in

memory processes. In working memory updating, the participants need to store a series of information pieces in working memory, update some information when needed, and retrieve particular pieces of information out of the series based on the requirement.

We found that younger adults may be able to pre-activate the series of information by retrieval and simply read out the target information from the pre-activated batch upon requirement. In contrast, older adults may be more likely to ➡

## OPPORTUNITY ACROSS THE LIFESPAN: UP-AND-COMING VOICES

perform the memory processes serially with less use of pre-activation: see the requirement, retrieve the target information, and respond. Therefore, older adults may not be able to execute the memory processes as quickly and efficiently as younger adults.

### How might your findings improve outcomes related to aging or, more generally, improve our understanding of lifespan development?

Based on our findings, it may be worthwhile to further investigate if older adults commonly adopt a different style of information processing from younger adults. If so, it may be helpful to tailor specific information presentation formats to suit the processing styles of older adults. For example, presenting the information from social media in a piece-by-piece fashion to older adults, instead of the usual form of presenting it in clusters.



## Perceptions of Love and Sex Predict Relationship Duration and Satisfaction Among Young and Middle Aged Greek Adults

**Anthi Argyroudi** (*Aristotle University of Thessaloniki*), **Konstantinos Christos Daoultzis**, **Panos Kordoutis** (*Panteion University of Social and Political Science*), and **Elvira Masoura** (*Aristotle University of Thessaloniki*)

### What did the research reveal that you didn't already know?

Perceptions of love-to-sex associations may change across the lifespan while influencing relationship satisfaction and longevity. Sexuality is typically perceived either as an outcome or a prerequisite of love. According to a third perception, love and sex work in tandem. In 2002, Susan S. and Clyde Hendrick proposed four schemes organizing such perceptions: “love is most important,” “sex demonstrates love,” “love comes before sex,” and “sex is declining.”

Contrary to lay understanding, our research, with 631 Greek participants, found no difference between the groups of young (18–40) and middle-aged adults (41–65) in the four schemes, excluding middle-aged adult women, who stated that “sex is declining” more often than young women.

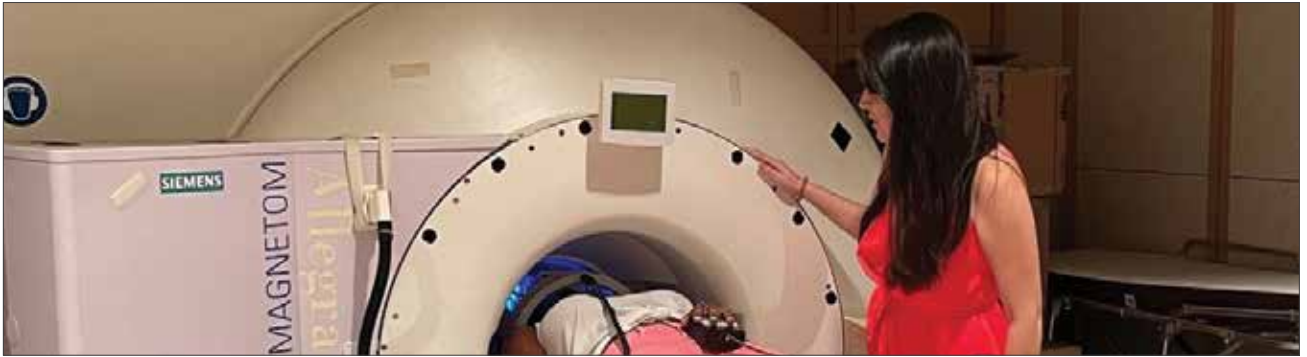
We also found similar relationship satisfaction predictors across age groups. Stronger perception that “sex is declining” predicted less satisfaction, whereas stronger perceptions that “love is most important” and “sex demonstrates love” predicted more satisfaction. Within groups, satisfaction increased with age among younger people but to a lesser extent within the older age group.

One common predictor of relationship longevity across age groups was “sex is declining,” with people in longer relationships more likely to report this perception. For young adults, “love comes before sex” and increased age was a positive predictor of relationship longevity. Young men were more likely to report shorter relationships.

### How might your findings improve outcomes related to aging or, more generally, improve our understanding of lifespan development?

Our findings challenge the stereotype that sex is more important than love to younger adults but not to older adults; we found no difference. Sex and love worked in tandem to yield satisfaction irrespective of age group. Sexual passion may coexist with companionate love in satisfying relationships. Although sex was found to be a prerequisite of relationship satisfaction and longevity, love is still important for relationship longevity among young adults. Interventions related to relationship satisfaction and longevity among young adults should emphasize that companionship built upon sex enhances satisfaction. Middle-aged adult women should be encouraged to explore more aspects of sexual satisfaction in their relationships, and young adult men to appreciate the contributions of longevity to companionate love.





## Reward-Motivated Memory Processes and Their Underlying Neural Mechanisms Change With Age

*Alexandra Ochoa Cohen (New York University), Morgan M. Glover (New York University), Camille V. Phaneuf (University of Michigan), Lila Davachi (Columbia University), and Catherine Hartley (New York University)*

### What did the research reveal that you didn't already know?

Research in adults has shown that reward enhances memory through mechanisms involving both subcortical and cortical brain areas, both during and after learning. Although there is a substantial amount of evidence indicating that both reward processing and associative memory change across development, few studies have examined how reward influences long-term memory formation across development from childhood to adulthood. We found enhancements in components of reward memory that were similar across all ages as well as specific to adolescence. We also examined brain activity using fMRI during and after reward association learning. We found that memory enhancements were linked to brain mechanisms that varied with age both during (“online”) and after (“offline”) learning. Specifically, we found evidence for potential age-related shifts from offline subcortical to online prefrontal cortical circuits supporting reward-motivated memory. These findings are consistent with theories of brain development suggesting that connections between subcortical brain areas mature earlier than connections between cortical and subcortical brain areas; moreover, they show that these developmental changes may have consequences for reward-related memory formation.

### How might your findings improve outcomes related to aging or, more generally, improve our understanding of lifespan development?

Our results highlight dynamic developmental changes in the brain mechanisms through which reward-related information is prioritized in memory from childhood to adulthood. Because memories guide our thoughts and actions, this work provides a foundation for future work examining how reward memories influence our behaviors across development. This area of research has the potential to inform learning strategies that can be leveraged to help adaptively shape memories for experiences and support healthy development. ●

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## GENDER, DOPAMINE, AND A CLOSED GAS STATION

A 69-year-old cognitive psychologist thought she had a "safe" retirement investment. What could go wrong?

By Helen Abadzi

**I**n April 2020, my husband and I received an unexpected email involving a small gas station in New Jersey that we had purchased in 2012. It was supposed to be a safe and management-free investment for retirees. But the pandemic had significantly reduced traffic, so the tenant company abruptly closed the pumps and walked away, leaving a mechanic who paid a small rent. Suddenly all the dreaded landlord responsibilities were thrust upon us.

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APS Fellow **Helen Abadzi** is a Greek psychologist who retired from the education sector of the World Bank and now teaches at the University of Texas at Arlington. She is interested in the automaticity of basic skills and in the behaviors exhibited under internet conditions.



Gas station leases involve sophisticated tenants who know how to protect themselves in disputes. Regulatory requirements are onerous, especially in New Jersey, which requires that attendants pump gas, adding significantly to costs and logistics. Despite the distance from our home in Virginia, we thought we could handle the challenge. Specifically, I thought I could.

I had no background in motor fuel technology, environmental science, or gas economics. I was 69 at the time, a Greek cognitive psychologist with a doctorate and fluency in 19 languages. I had retired in 2013, after 27 years as an education specialist at the World Bank. I was teaching a course on internet behaviors at my alma mater, the University of Texas at Arlington. I was also finalizing a textbook that uses evolutionary psychology, motivation neuroscience, and memory functions to clarify internet-based phenomena such as compulsive social media use and emotional manipulation in e-commerce and politics. When the gas station closed and my 6-month quest for solutions began, many chapters came alive.

Gas tanks must be either used or removed at great expense. Tanks, lines, and pumps must be inspected and repaired according to schedules required by the local authority (in our case, the New Jersey Department of Environmental Protection, or NJDEP). Steel tanks of earlier decades frequently leaked and polluted the groundwater. Our fiberglass tanks are newer and safe, but the property had earlier contamination that requires regular sampling and analysis. Unbeknownst to us, the tenant had not complied with these requirements. All told, the following tasks fell to me:

- securing a diagnostic environmental study and legal help to convince a large oil company to resume its monitoring responsibilities
- learning about and conforming to NJDEP rules for tank operation and for renewing the state-mandated tank insurance
- appealing high property taxes with appraisals, hearings, lawsuits, and written documentation
- finding a new tenant or a reasonable gas wholesaler, new attendants, new credit-card processing companies and equipment, and new accounting companies for workers' compensation

I quickly learned that gender complexities, compounded by ageist assumptions about my abilities, would greatly complicate the challenge of these new tasks.

### Male guilds versus solitary women

The evolutionary basis of the division of labor along gender lines may be controversial, but it is hard to ignore. It is hypothesized that Paleolithic males joined together

**I quickly learned that gender complexities, compounded by ageist assumptions about my abilities, would greatly complicate the challenge of these new tasks.**

in groups and hunted animals much bigger than any of them, using hierarchies and attack strategies. Females, who were usually excluded from hunting, gained reproductive advantages by competing against other females for male resources and therefore working alone or with female relatives (Buss, 2016). To this day, males tend to engage in cooperative competitiveness, often through fraternities and guilds in which they form alliances, defend one another, and jockey for higher status while ceding to leaders (Benenson & Markovits, 2014).

The motor-fuel industry relies on these stereotypical male abilities. It involves complex and expensive technology as well as hierarchies of distributors and dealers. Oil companies demand sales volume and long-term contracts, so people in this industry must collaborate to survive. During many discussions, men highlighted the brotherly bonds and reliable networks that helped them find a slightly better deal, pay off a loan, or repair equipment. Such benefits did not extend to a disconnected, aged female. In fact, men warned vaguely about unspeakable risks and offered services to “save” me. The friendliest and most informative gas distributor gave me the highest prices and said I should get used to losses. Expressions of distress raised opportunities for exploitation. In my youth in Greece, I had heard comments such as “a widow is selling a taxi” signaling cheap deals. The analogy became obvious.

Furthermore, network members sometimes refer clients as a favor to their colleagues. I was referred to providers who raised prices and refused to negotiate. A monitoring company normally selling service at \$100 per month demanded \$180 and wanted to repeat tank tests for an extra \$4,000. I often had to get my husband on the phone so that a male voice could be heard. The interlocutors seemed unaware of their biases.

Would women be more helpful? In the gas industry, women mainly have peripheral roles as secretaries and clerks. Research on intrasexual competition (Arnocky & Vaillancourt, 2017) suggests that women do not readily stand up for their conspecifics. Some NJDEP staff helped, but most others did not. A female attorney sided with a blackmailing appraiser, an insurance agent exaggerated obstacles, and an environmental scientist refused to simplify a technical report. Whenever my husband got involved, he



got more information and better results. Men seem to get support from both other men and women, perhaps in hopes of future reciprocity.

## Emotions in the throes of the reward prediction gap

Being able to enter alliances and rely on comrades helps men relax and feel confident. When women face formidable alliances of men, they sense the odds. No wonder women tend to appear more anxious (Costa et al., 2001).

Anxiety may increase cortisol levels that stimulate hunger, particularly for women (Epel et al., 2001). After every frustrating conversation, I opened the fridge door. While writing a difficult text, I would frequently get up and eat something. My serotonin may have increased, but so did my weight. It took me a while to become conscious of the eating problem. And it gave me some insights into people's frequent difficulties with smoking cessation and weight management.

It was important to think of ingenious solutions or arguments in various circumstances. Research on creativity has some clear implications. Unusual solutions often emerge under conditions of urgency but also relaxation—for example, when people take showers (see Abadzi et al., 2014, for a review). So I cycled and walked while listening to foreign-language recordings and wrote ideas as they came.

As I slowly progressed in the various tasks, I became aware that I was being shaped by variable-ratio reinforcers. The process was similar to learning a video game. I had some early wins, such as an agreement from a large oil company to resume pollution monitoring. But as with video games, rewards became less frequent and were interspersed with reversals. Sometimes I resolved an issue unexpectedly; sometimes an unexpected problem arose. One night I went to bed assured that I had secured tank insurance, but I woke up the next morning to an email saying that the company had rejected the tanks.

Motivation neuroscience has shed light on how some actions get reinforced (or not), according to Skinner's reinforcement schedules. Dopamine is a neurotransmitter associated with excitement, positive or negative. The dopaminergic neurons in the basal ganglia compare reality to expectations and create a prediction gap (or error; Jang et al., 2019). The size of this gap leads us to attempt actions

that are doable but hard, and to give up, or to reject tasks deemed too easy (Salamone & Correa, 2012). However, motivation and emotion work in tandem. The amygdala, a brain region involved in how we experience emotions, has short-cut circuits to actions, some of which get activated in a few milliseconds (Klein-Flugge et al., 2016). The complex interplay of the various neurotransmitters creates momentary changes that we may not monitor efficiently. On top of that, working memory and attention spans are short and cannot keep track of all events. Therefore, somatic reactions and emotions can be under very limited conscious control, even by someone teaching the subject.

Large reward prediction gaps sometimes resemble the social media rollercoaster many people experience. They can trigger nonstop vigilance, obsessive thinking, and more unexpected prediction gaps. These are the hallmarks of addiction, which are hard to stop. I realized that anything can be addictive—even gas station logistics. This is also one way people gain expertise and derive pleasure from occupations that at first seem boring or unappealing.

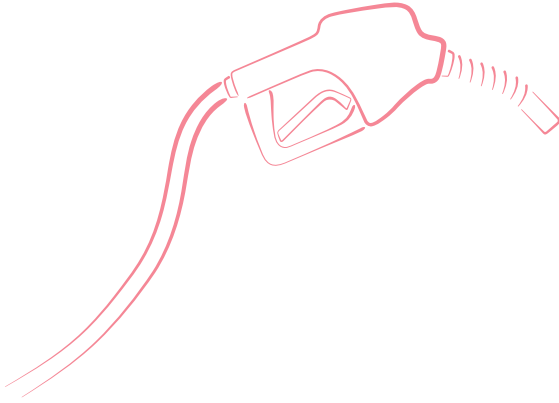
## The empowerment of technical expertise

To facilitate the tank registration and insurance, one insurance agent rather flippantly suggested that I get licensed as an underground storage tank operator. Being technically minded and handy with tools, I agreed. I took an online course and viewed YouTube videos on tank installations. I visualized opening the tank sump covers and looking at the parts inside. Then I took a challenging 2-hour online test. Many answers were not in the study materials and required me to search elsewhere as the last few minutes of the clock were ticking. High reading speed and much experience in multiple-choice tests proved critical. I passed.

I was suddenly overwhelmed by excitement and pride. At nearly 70 years I had been granted a back-door entrance to an exclusive club of younger men. Earlier, the long questionnaire required by NJDEP had seemed overwhelming, but now I could fill out all technical details knowing what everything meant. I registered the tanks in my name shortly before a deadline. Thereafter, my interlocutors took me more seriously.

There is certainly pride in knowing obscure topics. One evening at a Greek restaurant, I asked pointed questions about the cash register that left the owner astonished. I have repeatedly advised on problems of other gas stations. Incredibly, I now take pleasure and pride in reading groundwater-monitoring reports on various contaminants. I completed the equivalent of an undergraduate degree in about 6 months, and the information has significantly influenced my thinking in multiple areas.

**I realized that anything can be addictive—even gas station logistics.**



## The gender biases of challenging tasks

By February 2021, I had finished most tasks required to reopen the gas station. A qualified tenant had restarted gas sales, and I could go back to normal life. For a while, though, I found it hard to leave all this behind. The towering dopamine waves from unexpected losses and wins make ordinary life appear trivial and drab. Considering sunken costs, it's no wonder people find it hard to quit while they're ahead in a casino game.

But overall, my gas station odyssey has me alarmed at women's disadvantages in the workplace, particularly when faced with complex tasks. Not having a supportive group reduces solutions and negotiating power. Men in my position might have struck up friendships with lawyers and others and gotten better deals or free advice. Women daring to do the same may have been brushed off at best or harassed at worst.

Often, women try to compensate for male group advantages by improving themselves (Benenson & Abadzi, 2019). This is called "scramble" competition. As a lone woman, I managed to reasonably navigate the gasoline world, demonstrating that old dogs can, in fact, learn new tricks. On the other hand, the need for expertise in multiple areas reveals even more of a gender bias. Most men would not need to achieve what I did. Only a few people in the business become underground storage tank operators, and they do not need to do it to prove their mettle. It was perhaps the best a woman could do, but it does not compare with the efficiency of male guilds.

Gender differences in networking have not been widely researched, but implications are ubiquitous. For example, university science programs tend to be disproportionately male; women can certainly learn technical subjects, but they may be more likely to have to solve alone the challenging

problems that male students use to prove their competence to their comrades. Cooperative competitiveness continues in the work environment, often to the detriment of women who may have skimpier networks. Women are justifiably more likely to become risk-averse, face more financial problems, and accumulate fewer assets. One important consideration for the future concerns female networking and collaboration. Women would exercise greater personal effectiveness if they trusted and relied on other women. It is important to find ways to mitigate evolutionary trends through cultural change and education. ●

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# IN THEIR OWN WORDS: LIVES LOST IN 2021

**A**mong the losses felt throughout the course of 2021, friends, family, and colleagues have had to say goodbye to a number of remarkable psychological scientists who helped shape the field through their research and mentorship. In the following pages, we remember six of these individuals with selected excerpts from their published work.



## Albert Bandura

Stanford University  
December 4, 1925–July  
26, 2021

James McKeen Cattell  
Fellow and William James  
Fellow

See this article online to read more about Bandura's foundational findings on social learning theory.

“I began my career at the height of behaviorism. At that time, behavior was believed to be shaped and modified by response consequences. Psychodynamic theories dominated the clinical field and the popular culture. It was in this context that I was developing social cognitive theory, which is rooted in an agentic perspective. In this agentic approach, individuals are enabled and guided to take the steps to improve their lives . . . Unlike the tendency to focus on psychopathology in our field, social cognitive theory strives to develop and bring the best in others at both the individual and social system levels.”

2019, “Applying Theory for Human Betterment”  
*Perspectives on Psychological Science*

“During the course of evolution, humans developed an advanced cognitive capacity that enables them to enlarge their knowledge and competencies. They could do so rapidly through information conveyed by the rich array of models. Direct experience is a tough teacher. Learning from example

shortcuts laborious and costly trial and error. Many ages ago, Voltaire heralded the benefits of social modeling: ‘Is there anyone so wise as to learn by the experience of others?’”

2018, “Toward a Psychology of Human Agency:  
Pathways and Reflections”  
*Perspectives on Psychological Science*

“People are contributors to their life circumstances, not just products of them. Social cognitive theory rejects a duality between human agency and social structure. People create social systems, and these systems, in turn, organize and influence people's lives . . . Their advanced symbolizing capacity enabled humans to transcend the dictates of their immediate environment.”

2006, “Toward a Psychology of Human Agency”  
*Perspectives on Psychological Science*



## Ed Diener

University of Illinois at  
Urbana–Champaign,  
University of Utah, and  
University of Virginia  
July 25, 1946–April 27,  
2021

APS William James  
Fellow

See this article online to read a remembrance about how Diener became known as “Dr. Happiness.”

“Pointing out that well-being can and should be measured and then used as a bottom line for public policy has led to scientific and governmental progress. The next strides, in our opinion, will come from broadening well-being beyond purely subjective measures.”

2018 (with Martin E. P. Seligman), “Beyond Money:  
Progress on an Economy of Well-being”  
*Perspectives on Psychological Science*

## OPPORTUNITY ACROSS THE LIFESPAN: LIVES LOST IN 2021

“A lack of resources such as health, income, and social support is frequently associated with unhappiness. In contrast, the happiest individuals usually have an abundance of these resources and also are fortunate to come from societies with high social support, income, and [subjective well-being]. Many of our findings reconfirm the conclusions of past research, such as the importance of social support, being able to meet basic needs, and the benefits of health and lack of pain.”

2018 (with colleagues), “Happiest People Revisited”  
*Perspectives on Psychological Science*

“Positive psychologists and other psychological scientists can feel pride: From yesterday’s studies of the demography of happiness to today’s studies of happiness interventions and national well-being, happiness has matured. We have learned much about the roots and fruits of happiness. Yet the journey continues, with so much more to be learned.”

2018 (with David G. Myers),  
“The Scientific Pursuit of Happiness”  
*Perspectives on Psychological Science*



### R. Allen Gardner

*University of Nevada, Reno*  
February 21, 1930–August  
20, 2021  
**APS Fellow**

“Use of the hands, however, is a prominent feature of chimpanzee behavior; manipulatory mechanical problems are their forte.... In our choice of sign language we were influenced more by the behavioral

evidence that this medium of communication was appropriate to the species than by anatomical evidence of structural similarity between the hands of chimpanzees and of men.”

1969 (with Beatrix T. Gardner), “Teaching Sign Language to a Chimpanzee”  
*Science*

“For if the development of human verbal behavior requires any significant expenditure of biological resources, then it must confer selective advantages on its possessors. In order to confer any selective advantage, however, a biological trait must operate on the world in some way; it must be instrumental in obtaining benefit or avoiding harm.”

1984 (with Beatrix T. Gardner), “A Vocabulary Test for Chimpanzees (*Pan troglodytes*)”  
*Journal of Comparative Psychology*

“Without actually overcoming nature, we can still discover its laws and invent ways of utilizing them. Whether we are concerned with species identity of gender identity, eating habits or mating habits, survival skills or psychopathology, we must study the obligatory consequences of species membership as well as the arbitrary effects of experience. True discoveries offer new and unexpected possibilities for change. Contemporary discoveries in the ethology, neurology, and logic of the learning process offer just such new and counterintuitive possibilities.”

1988 (with Beatrix T. Gardner), “Feedforward versus Feedbackward: An Ethological Alternative to the Law of Effect”  
*Behavioral and Brain Sciences*



### Lila Gleitman

*University of Pennsylvania*  
December 10, 1929–  
August 8, 2021  
**APS Fellow and APS  
Mentor Award Recipient**

See this article online to read more about Gleitman’s innovative research on language and learning.

“If I had to summarize the odyssey that this succession of studies chronicles, the two-line conclusion might be: Language acquisition is obviously impossible, but somehow they do it. Empiricism is innate, but somehow we get over it.”

2019, “The Impossibility of Language Acquisition (and How They Do It)”  
*Annual Review of Linguistics*

“Children vary greatly in the number of words they know when they enter school, a major factor influencing subsequent school and workplace success. This variability is partially explained by the differential quantity of parental speech to preschoolers. However, the contexts in which young learners hear new words are also likely to vary in referential transparency; that is, in how clearly word meaning can be inferred from the immediate extralinguistic context, an aspect of input quality.”



2013 (with colleagues), “Quality of Early Parent Input Predicts Child Vocabulary 3 Years Later”  
*Proceedings of the National Academy of Sciences, USA*

“Verbs do not as a rule directly encode actions and events. If they did, grunting and pointing could substitute for elaborate human language systems. Instead, verbs encode acts and states of the world and of the mind under particular (and invisible) stances toward these adopted by the speaker . . . It is the infant’s natural appreciation of the syntactic structure and its mapping onto conceptual structure that provides this additional data source.”

1992 (with Henry Gleitman), “A Picture Is Worth a Thousand Words, but That’s the Problem: The Role of Syntax in Vocabulary Acquisition”  
*Current Directions in Psychological Science*



**Lee Ross**

*Stanford University*  
August 25, 1942–May 14, 2021  
**APS William James Fellow**

See this article online to read more about Ross’s work, including his “fundamental attribution error.”

“What people believe to be true and what they wish were true can be quite different. One way to resolve conflicts between belief and desire is to engage in biased reasoning in a way that brings beliefs about facts in line with heartfelt desires.”

2011 (with colleagues), “Wishful Thinking: Belief, Desire, and the Motivated Evaluation of Scientific Evidence”  
*Psychological Science*

“Ultimately, however, I came to recognize a still broader lesson, one involving a more general tendency of people to underestimate the impact of situational pressures and constraints on each other’s actions and outcomes. That lesson, moreover, pertains to assessments not only about individuals but also groups who either benefit from, or are disadvantaged by, their shared circumstances. . . .”

“Laypeople expect sadistic or weak people to obey evil orders and strong or principled people to disobey. They expect altruistic people to render assistance and selfish people to walk on by . . . They are unlikely to consider the possibility that artful manipulations of seemingly small contextual features have produced the behavior in question . . . Rather coincidentally, I happened to coin the term ‘fundamental attribution error’ (Ross, 1977, p. 187) to describe this penchant for dispositionist explanations.”

2018, “From the Fundamental Attribution Error to the Truly Fundamental Attribution Error and Beyond: My Research Journey”  
*Perspectives on Psychological Science*



**James H. Sidanius**

*Harvard University*  
December 11, 1945–June 29, 2021  
**APS Fellow**

“Preferences for hierarchical communal arrangements seem to generalize by shaping perceptions, attitudes, and behaviors similarly across relational domains . . . The more individuals prefer hierarchically organized

societal arrangements in which some groups are on top and others on the bottom, the less they show pro-social attitudes benefitting humans as well as non-human animals, or the natural environment.”

2021 (with colleagues), “Social and Ecological Dominance Orientations: Two Sides of the Same Coin? Social and Ecological Dominance Orientations Predict Decreased Support for Climate Change Mitigation Policies”  
*Group Processes & Intergroup Relations*

“Low SDO [social dominance orientation] can also be associated with higher prejudice, given the presence of intergroup fear . . . Our results indicate that an egalitarian and non-dominant worldview, as indicated by low levels of SDO, might not be sufficient to buffer the effects of fear on prejudice, at least not in the case of Islamophobia.”

2020 (with colleagues), “The Nature of Islamophobia: A Test of a Tripartite View in Five Countries”  
*Personality and Social Psychology Bulletin* ♦



## Psychological Science Needs the Entire Globe

# LET'S TALK ABOUT THE “C” WORD: COLONIALISM AND THE CHALLENGES OF PSYCHOLOGICAL SCIENCE IN THE DEVELOPING WORLD

When the field is ready to do the bedrock research necessary for generalizable psychological science, it will have to confront the inconvenient realities of where the science must take place.

*Second in a three-part series*

By Miguel Silan, Adeyemi Adetula, Dana M. Basnight-Brown, Patrick S. Forscher, Natalia Dutra, and Hans IJzerman

*In this three-part series, a team of researchers in Africa, Asia, Europe, and South America explores the longtime dominance of psychological science by researchers in Western, educated, industrialized, rich, and democratic (WEIRD) countries. Part 1, published in the September/October 2021 Observer, explored the problems with U.S. dominance specifically. The series will conclude in the January/February 2022 Observer.*

There are growing calls for diversity of samples and researchers, large-scale collaborations, and initiatives to make psychological science more representative and more generalizable to humanity (Apicella et al., 2020; Forscher et al., 2020; Hruschka et al., 2018; Medin et al., 2017; Rad et al., 2018; Syed, & Kathawalla, 2020). Yet discussions of the WEIRD problem in psychology will inevitably need to face the elephant in the room: colonialism.

### Colonialism: The elephant in the room

Colonialism and its role in mainstream psychology are minimally discussed as substantive topics in themselves—for example, as potential moderators for various social, developmental, and clinical explananda, such as well-being and self-identity (Bobowik et al., 2018; Krat et al., 2011; Okazaki et al., 2008). Colonialism is also only minimally tackled in metapsychology and current global reform movements. Part of this may be due to how daunting the issue is. How does one even begin to remedy it? As Pillay (2017) wrote, “the question of decolonizing psychology seems a sub-section of the more depressing question of whether or not we can decolonize society” (p. 136).

Further, the topic induces general discomfort—scholars from previously colonized countries don’t want to feel unnecessarily shackled by history, and scholars from previously (and, let’s be honest, currently) colonizing countries may feel some impotent guilt but have no tools to remedy the problem of colonialism. Alternatively, researchers may

be siloed in the daily academic grind, where hundreds of worries leave little energy to think about deep-seated and pervasive problems and inequalities.

Of colonial history’s many legacies, we will explore two primary impacts on psychological science: first, its effect on material reality (i.e., research infrastructure and funding), and second, its effect on the intellectual approaches across the developing world and the consequent countermovements that have tried to tackle colonialism in psychology.

### Material realities: Producibility crisis and differing research cultures

The global reform movement has justifiably focused on psychological science’s credibility and openness, creating what has become known as the replication or reproducibility crisis. However, before many previously colonized countries can tackle the reproducibility crisis, they must grapple with ensuring *producibility* in the first place (Doble et al., 2018). Research in many of these countries is underfunded (for details on African countries, see UNESCO, 2021; for details on some countries in the Arab region, see Saab et al., 2020 and Zebian et al., 2007). With the exception of a handful of top universities in these countries, there are few of the lab models that exist in countries with richer and more dominant research institutions. Moreover, there may not be a strong or coherent psychological science research culture within these countries, where psychology as a profession is often largely relegated to applied ➡

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occupations (see, e.g., Thailand and Indonesia: Kiling & Bunga, 2015; Sarwono, 2005; Tapanya, 2004). The public may not even use the term “psychology,” and the discipline might not be thought of as empirical or scientific. In East Africa, for example, psychology is seen as an artistic or humanistic discipline. Research in such countries can often be seen as something exclusive (Doble et al., 2018), further lowering the viability of involvement for both participants and potential researchers. Consider also the logistical difficulties of conducting research in developing areas, where something as “simple” as virtual meetings can be challenging because of poor internet connectivity.

Further, it’s been our experience that local methodologists and open science advocates face an uphill battle to educate and organize for the local adoption of global methods reforms. Open science is important, and it has clear benefits for researchers in developing countries (Adetula et al., 2020), but open science does not exist in a vacuum. The adoption of open science practices in research production can be beneficial only if there’s something to be open *about* in the first place.

Despite these limitations, there is great local theorizing and research being produced in these countries. For example, in the Philippines, the *ginhawa-pagdadala* (“burden-bearing”) model has been developed (Decenteceo, 1999), and in Nigeria the clinical village system was implemented successfully (Awaritefe, 2020; Nabel, 2017; see also Adebowale, 2009). Both of these lines of clinical work incorporate local cultural frameworks in understanding individual distress and suffering. They also provide interventions that are appropriate for the local population—in particular, for low-income and under-resourced individuals.<sup>1</sup> However, although great local research is done across developing countries, it is important to recognize the systematic inequalities that these researchers face that affect the production of their work.

## Intellectual approaches and indigenous psychologies

Beyond material realities, the legacy of colonial history has impacted the field’s intellectual approaches across countries. When psychology is just getting started as an academic field in a developing country, it is common for local scholars to perceive the discipline as imperial or colonial (see, e.g., Enriquez, 1988; Ojiji, 2015; Sinha, 1984), as psychological claims and methods may seem misleading or simply inapplicable in the local context (Adair, 2006; Kim et al., 2006; Pe-Pua, 2006). These criticisms were levied, for

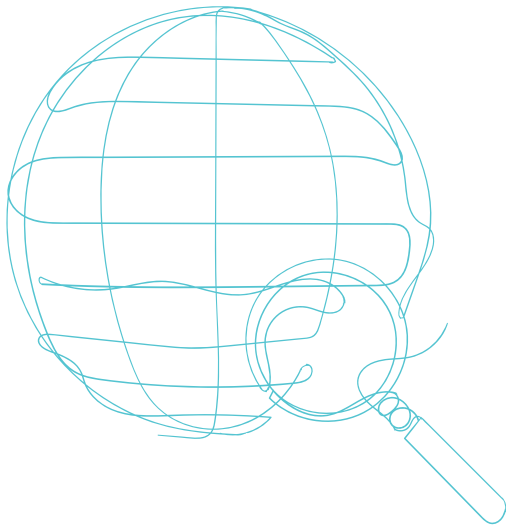
example, toward standardized tests that were imported and used but were neither translated nor adapted and toward research programs (e.g., rat-behavior studies) that could not solve pressing national problems but would benefit theory testing for U.S. and European research agendas. Besides these, there has also been the common experience of foreign researchers “parachuting” in to collect data but doing little to understand the local context (Pe-Pua & Protacio-Marcelino, 2000).

Since the 1970s, as a direct opposition to what was perceived as U.S. and European imperialism, various forms of indigenous psychologies have developed across the world, including in the Philippines, India, China, New Zealand, and the Arab region (Kim et al., 2006; Sinha, 1997). Indigenous psychology takes an approach that aims to explicitly anchor psychology on the orientation, experience, and thought of the indigenous people (i.e., culture bearers) being studied and as understood from their perspective (Pe-Pua & Wright, 2015). The indigenous approach takes into account local languages and sociocultural realities to understand people’s behaviors, thoughts, and affect within their local contexts (Enriquez, 1979; Kim et al., 2006; Pe-Pua & Protacio-Marcelino, 2000). This approach fostered the development of what were deemed culturally appropriate methods of data gathering, such as participant observation and ethnography. These methods (which are largely qualitative in nature) aim to gather high-quality data from participants with different cultural realities and from particular settings and populations (e.g., rural, illiterate, low socioeconomic status, or poorly educated) in which common psychology methods such as experiments and surveys are difficult to implement and take much longer to adapt to the local context to retain their validity. Indigenous psychology is often also tightly bundled with certain ethical positions—for example, that participants are on equal footing with the researcher.

Indigenous psychology also provides a way of rethinking how to do multisite studies, leveraging a more bottom-up approach that replaces or complements the top-down cross-cultural approach that is typical in the field. Top-down cross-cultural approaches have the vulnerability of presenting WEIRD situations to non-WEIRD societies and have a strong a priori assumption of comparability or equivalence across sites. In the typical cross-cultural approach, researchers aim to be as standard as possible across sites and treat culture as an external variable that causes variability in behavior. The cross-cultural enterprise therefore aims to “test the generality of existing [theories] by comparing the responses of different cultural groups on standardized measures of psychological processes” (Ellis & Stam, 2015). In contrast, the cross-indigenous enterprise aims to converge on (or show the lack of convergence of) universals through multiple independent explorations

<sup>1</sup> As examples of more recent empirical work in the Philippines, De Castro et al. (2020) assessed the impact of the COVID-19 pandemic using a large qualitative study of representative samples from Metro Manila, and Gastardo-Conaco (2012) explored psychological variables such as social representations and self-efficacy for Filipinos under poverty. However, indicative of the research infrastructure in the country, these two manuscripts are not available online.





among source cultures. It treats culture as co-constitutive of the individual (i.e., in some important manner, culture is “within,” or making up, the individual).

Despite the existence of cross-indigenous approaches, the indigenous psychology movement has had a minimal influence in mainstream psychology, which favors the cross-cultural approach for multicountry research. There are many justifiable criticisms of indigenous psychology (e.g., that it tends to reify culture and treat it as static; Bhatia & Priya, 2019; Hwang, 2005; Jahoda, 2016; Long, 2019). However, it has provided tools, perspectives, and a general historical case that takes on colonialism at the forefront.

So what? Why bother discussing these states of affairs? There is a mantra in clinical psychology: Etiology defines intervention. These problems are easily swept under the rug in the current culture of “convenient” research that prioritizes cross-sectional pen-and-paper approaches administered to university student samples, which has very limited applicability to understanding broader human functioning and behavior (Antonakis, 2017; Baumeister et al., 2007; IJzerman et al., 2020) even if these standard designs are used across multiple countries. As the field more seriously tackles problems of the consequences of colonialism and the dominance of the United States and Europe in research, it will inevitably have to make decisions about what it means to “partner with local institutions,” to plan for data gathering away from university samples, to obtain high-quality data from these nonconvenient samples, and to plan for collaborations’ sustainability, expertise sharing, on-the-ground research logistics, needed resources, and so on. That is, when the field is ready to do the bedrock inconvenient research for generalizable psychological science, it will have to confront the inconvenient realities of where the science must take place.

## Reform movement, big team science, and legacies of previous inequalities

The global reform movement in psychology has brought forth various calls for better measurement, theory, statistics, open science, and collaboration. Many of these reforms require a division of labor and big team science (Forscher et al., 2020). And for large-scale collaborations, diversity and generalizability are the *raison d'être*. However, large-scale collaborations also have vulnerabilities; as social activities, they are likely to reflect legacies of societal inequality, and unless existing biases are proactively countered, big team science may then perpetuate them.

For example, no first author of any current ManyLabs publications is affiliated with an institution in a developing nation. As we noted in Part 1 of this series, *The Problem With U.S. Dominance in Psychological Science*, even reform groups that are considered progressive by the field’s standards, such as the Society for the Improvement of Psychological Science, have starkly fewer members from the Global South. As one of us noted in his candidate statement for the Psychological Science Accelerator, “needing to rely on volunteer hours means that only researchers in more luxurious positions (i.e., those in richer countries, with a lower teaching load, and in situations where they don’t have to worry about their immediate physical safety) can be a candidate for leadership roles in large scale collaborations.”

Further, if big team science organizations begin with a heavy membership skew, they will be unlikely to expand their membership base outside those group boundaries without sustained, proactive measures. Skewed membership demographics may also make it harder for minority members to rise to positions of seniority, prominence, and influence.

In turn, as highlighted in our first post, the assumptions and biases that the research group brings with them affect which studies will be run, which methods will be employed, what aspects of human phenomena are explored, what constitutes good evidence, and ultimately, what problems are deemed worth solving.

Why bring up the sobering topic of inequalities? And, echoing Pillay (2017), can we change science without changing the world first? Many psychological scientists would find doing so too high a burden. The field already has to contend with nonreplications, *p*-value debates, learning advanced statistics, formal theory, programming, open science practices, philosophy of science, and large-scale collaborations. On top of all that, you want to change the world as well?

As the writers of this series, we have many ideas of how to go about making these fundamental changes (stay tuned for Part 3!). But no change can happen without eyes wide open to the problems that need tackling. This ➡



includes the need to understand how historical (colonial) forces have shaped where our science takes place: how they have affected material realities, research cultures, and people across the world—and how alternative intellectual approaches such as indigenous psychology have tried to do quality research in settings and populations left vulnerable in an unequal world. •

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See this article series online, and share your thoughts as well.

# NEW AMPPS EDITOR COMMITS TO GREATER TRANSDISCIPLINARITY, OPEN SCIENCE, INCLUSIVITY



**Dave Sbarra**  
University of Arizona

On January 1, 2022, APS Fellow Dave Sbarra will begin his tenure as the second editor of *Advances in Methods and Practices in Psychological Science* (*AMPPS*), APS's newest journal and, as of January 1, 2021, a fully open-access (OA) journal. A professor of psychology at the University of Arizona, Sbarra has built his career on research at the intersection of clinical, social, and health psychology, with a primary focus on close relationships and health. APS Publications Director Amy Drew recently asked Sbarra a few questions about his plans for the journal.

**What goals do you have for *AMPPS* under your tenure? Do you envision any significant changes or additions to the journal in terms of policies or the types of research being published?**

First and foremost, let me say that it's an absolute honor to move into the position of editor-in-chief (EIC) at *AMPPS*. I'd like to congratulate Dan Simons and his entire editorial team, as well as the staff at APS and SAGE Publications, for such an auspicious start to the journal. In just 4 short years, the journal has had an incredible, meteoric rise, and the response I get when I ask most people about *AMPPS* is typically, "I love that journal!" This is one of the main reasons I pursued the EIC position: *AMPPS* has published some of my favorite papers in the last few years, and the chance to participate in and lead the continuation of this excellence—well, that was just too good to pass up. A big part of my enthusiasm for the journal is that it publishes papers that help us, as psychological scientists, do our work better. I consider myself an applied scientist who has a great interest in methods and quantitative methodology, and I view methods and statistics as the tools we need to do our jobs well. When I need to know how to use a particular tool—e.g., how to do a simulation well, how to specify a network model, or how to interpret the magnitude of my effects—I want to turn to an outlet that provides me with the most accessible and cutting-edge knowledge. This is what *AMPPS* is all about.

I have many goals for my term as EIC, and I'd welcome readers to check out my vision statement for the position. As outlined, my vision for the editorship rests on three goals: (1) preserving access to *AMPPS* and improving the accessibility of its papers; (2) maintaining exceptional content in *AMPPS* by promoting its papers, disseminating its findings, and actively recruiting new and innovative contributions; and (3) creating an inclusive process that brings underrepresented authors, reviewers, and editors into the fold. I'd love for people to engage with some of these ideas and to help continue the journal's history of excellence, as well as to grow in new and exciting ways. If you have ideas or suggestions, please write me directly ([sbarra@arizona.edu](mailto:sbarra@arizona.edu)) or find me on Twitter ([@dsbarra](https://twitter.com/dsbarra)).

**Are there any topics or subject areas you would like to see more of in *AMPPS*? Given your background as a clinical psychologist, should readers expect to see more clinically relevant articles during your term?**

Every new EIC brings a different lens to the journal they're leading. I am an eclectic and broad scientist, and I believe that modern psychological science hinges on *transdisciplinarity*. Accordingly, *AMPPS* will benefit from more contributions that cross psychological science with, for example, political science, economics, ecology, neuroscience, anthropology, molecular and cellular



See this article online for a link to Sbarra's candidate statement as *AMPPS* editor.



biology, genomics, and epidemiology; the journal can publish new ideas concerning metascience and theory building while also finding ways to improve the integration of ethnography and mixed methods. Although I do not envision *AMPPS* as the home for more traditional development and validation papers, a chief goal upon stepping into the EIC position will be to conduct a slow and methodical assessment of what the readership values. I will remain very open to feedback from the editorial team about the best content mission for the journal. In many respects, it is easy to come up with topical content ideas—here are a few, for instance: papers on scientometrics, exploratory data analysis, the philosophy of science, ambulatory methods, diversity science, scientific ethics, data management, research and epistemological triangulation, causal inference, signal processing, advances in longitudinal and dynamic modeling, bioinformatics, machine learning, and neuroscientific network modeling. For me, at least, ideas for good content are not as important as the pursuit of good content. I intend to make connections with people to encourage their submissions and to incubate good ideas.

**In its first 4 years, *AMPPS* has established itself as a leader in open, transparent scientific practices and reproducibility. What do you see as the journal's role in these efforts moving forward?**

Under my editorship, *AMPPS* will continue to be an absolute leader in open science. In general, I think *AMPPS* is doing incredibly well on this front, and we intend to stay the course. Dr. Simons and his team have already published some excellent large-scale replication studies. I hope we'll continue to be a visible leader in registered reports and meta-science as well. This latter point is something I

wish to comment on briefly here: Metascientific theory and conceptual papers will be welcome at *AMPPS*. Papers that help us understand the world of data better are welcome; process-style papers that make our work both more transparent and reproducible are welcome as well. Ultimately, these papers may be about how we work (or how we *should* work) than about methods, study design, or stats per se, but I think these could be fine contributions. I don't want to back myself into a corner before my term has even started, so I'll provide the obvious proviso that as long as our editors, editorial board, and/or reviewers find the piece worthwhile, it could end up in *AMPPS*.

**What are your plans to ensure diverse representation—among authors and the editorial board—across demographic and geographic categories and content domains, as well as among underrepresented or marginalized groups? Why is this diverse representation important for the journal?**

As a White, tenured, cisgender male professor at a prestigious public university in the United States, I am in a deeply privileged and powerful position. Like many well-meaning people, it took the tragic events of the summer of 2020 to wake me out of my stupor about the importance of diversity, equity, and inclusion (DEI). In the last year, I have spent considerable time reflecting on my privilege and trying to act in ways that can improve the circumstances of people who are underrepresented in our field and to open pathways for more inclusive voices. I have tried hard to go beyond performative messaging and to create meaningful behavior change in how I engage in and with DEI topics on a weekly basis.

My pursuit of the *AMPPS* editorship is the pursuit of a leadership position in the field, and I am compelled in this effort to bring discussions of inclusivity to the forefront of our journal. In my negotiations with APS around the editorship, I requested that we revise the associate editor structure of the journal to include a new position of deputy editor, who I hope will be a highly visible female scientist who not only shares my passion for the methods/stats content of the journal but also wants to spend time thinking through the critical issues of representation and inclusivity. When it comes to the editorial team, as well as possible, I want to include expertise from colleagues of different genders, racial/ethnic backgrounds, and geographic regions. Although the deputy editor and four associate editors for the journal are not set yet, I can say that I have invited four women and three Europeans into the masthead team. If you feel the journal can do a better job addressing some of these topics and have ideas for improvement, I'd love to hear from you directly.

***AMPPS* will benefit from more contributions that cross psychological science with, for example, political science, economics, ecology, neuroscience, anthropology, molecular and cellular biology, genomics, and epidemiology.**



There are two other social justice issues related to the journal that I'd like to comment on here. First, much is written about the strengths and limitations of the OA publication model. The current OA model at *AMPPS* is ambitious and ensures global access to the journal's content. That model, however, is unsustainable. Article processing charges shift inequities in the publication ecosystem from the users to the authors. APS and SAGE Publications currently subsidize our OA costs; the

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*Advances in Methods and Practices in Psychological Science (AMPPS)* is the home for innovative developments in research methods, practices, and conduct across the full range of areas and topics within psychological science. See all issues at [psychologicalscience.org/publications/ampps](http://psychologicalscience.org/publications/ampps).

journal can and will provide waivers if authors do not have funding to cover the \$1,000 OA fee. (So, please, request a waiver if you need one, and if publishing with us is cost prohibitive or you have any other concerns, contact me directly.) However, the big picture issue is that we need to come up with an equitable and sustainable OA model that works for authors and that will work for APS/SAGE going forward.

Second, psychological science has much to contribute to the global climate crisis. The climate crisis is a global emergency for the planet, and it is a global health emergency as well. Addressing climate change is critical for the promotion of social justice; the climate crisis is disproportionately impacting people from lower-resource communities and in the Global South. *AMPPS* can't be everything to everyone, and it's unlikely I am going to succeed in realizing all the ideas I am throwing against the wall for the journal, but I spend hours every day thinking about the climate crisis, and any professional activities I take will have this issue in mind. I don't know how to integrate this topic into the journal just yet, but we will do something related to the climate crisis. Anything less would be a waste of time and energy.

Lest I end on a sour note, let me reiterate my enthusiasm for moving into the EIC role at *AMPPS*, my hope that we will continue to publish exciting and innovative papers, and my desire to bring underrepresented reviewers, authors, and editors into the fold of the journal. ●

# CATTELL FUND RECIPIENTS CHASE BIG BREAKTHROUGHS

**T**he James McKeen Cattell Fund has recognized Kerry Jordan, Kimberly Noble, and Elizabeth Ann Simpson as its 2021–2022 Sabbatical Fund Fellowship recipients. As recipients of Cattell Fund Fellowships, the awardees will be able to extend their sabbatical period from one semester to a full year.



**Kerry Jordan**

*Utah State University*

**K**erry Jordan studies knowledge about quantities and numbers—not only in the laboratory under controlled conditions but also in messy, real-world circumstances. Humans, it turns out, are not the only animals who rely on a basic understanding of numbers to survive and thrive. Although Jordan has put plenty of effort into research on human numeracy, her James McKeen Cattell Fund Fellowship will allow her to focus on numerical cognition not among people but among coyotes.

Like humans, coyotes rely on numerical judgments to make everyday decisions—for example, choosing larger amounts of food. The uncertainties around human-subjects research in the wake of COVID-19 make Jordan's 2021–2022 sabbatical a perfect opportunity to take advantage of the semi-free-range coyote population at the National Wildlife Research Center's Utah Field Station, a resource available through her home institution, Utah State University.

Jordan previously has demonstrated that Weber's law, which is related to noticeable perceptual differences, governs coyotes' choices about resources, much as it does the choices of other species. Jordan's sabbatical will allow her the latitude to expand on this research by observing how numerical considerations influence coyotes' behavior under a variety of naturalistic circumstances related to time, season, social behavior, and interaction with humans.

Aside from deepening our understanding of decision-making and mathematical knowledge across species, Jordan's project has important implications for human-predator interactions in the current era of climate change and may bring important evidence to bear on strategies for protecting humans and wild animals from one another.

"Cognitive abilities such as enumerating and time are central to many psychological and ecological models of behavior, yet our knowledge of how these are affected by environmental fluctuations remains incomplete," Jordan said. "Funding the sabbatical for a whole year, rather than a single semester, is ... key to completing this research project, as I plan to examine predator decision-making about quantity across all four seasons."



**Kimberly Noble**

*Teachers College, Columbia University*

**I**t is no secret that the brains of children experiencing economic adversity often look different from the brains of children from more advantaged backgrounds. Kimberly Noble, an APS Fellow and past recipient of the APS Janet Taylor Spence Award for Transformative Early Career Contributions, has played a pivotal role in bringing this insight to the forefront of psychological science. Noble was the first researcher to use fMRI to study how variation in brain function relates to socioeconomic disparities. She has also led research that links performance on

language and memory tasks to variables in infants' and toddlers' home environments.

Currently, Noble is the lead neuroscientist principal investigator on the Baby's First Years study, a randomized controlled trial digging into the causal role that poverty plays in shaping child development. By comparing the development of children experiencing poverty whose mothers receive either large or modest monthly cash gifts for 52 months, Noble and her collaborators →

**Having two semesters unburdened by teaching and administrative responsibilities will provide me with the freedom to dedicate the time needed for training, piloting, and traveling to individual sites as needed.**  
—Kimberly Noble

hope to shed light on the extent to which income alone—as opposed to other circumstances that may co-occur with poverty—may cause the cognitive disparities to which children from disadvantaged circumstances are vulnerable.

Noble's Cattell Fund-supported sabbatical extension will coincide with planning the final round of data collection for the Baby's First Years project, which will take place when the children are 4 years old. "By having a full year of sabbatical leave, I will be able to fully focus on supervising this critical, culminating data collection and analysis effort," Noble said. "Having

two semesters unburdened by teaching and administrative responsibilities will provide me with the freedom to dedicate the time needed for training, piloting, and traveling to individual sites as needed."



## Elizabeth Ann Simpson

*University of Miami*

Although the first 2 years of human development are of great interest to pediatricians, parents, and researchers alike, the truth is that the behavior, cognition, and social skills of newborns have been the subject of few longitudinal studies—and the studies conducted to date have been limited by racially and ethnically homogenous samples.

Elizabeth Ann Simpson has set out to fill the gaps in our knowledge of social cognitive development among infants by conducting painstaking research from multiple perspectives. Her

sabbatical extension, supported by the James McKeen Cattell Fund, will allow her to make headway in two important areas of research.

In one line of work, Simpson will be analyzing longitudinal data on imitation among newborn humans and macaques. These data were collected as part of multiple projects funded by both the National Science Foundation and the National Institutes of Health. Her results will comprise the largest-ever laboratory study of neonatal primate imitation behavior and will rest on both physiological and behavioral variables. Among other important outcomes, Simpson's sabbatical work will strengthen the literature on neonatal mimicry across diverse contexts and demographically diverse groups.

In another line of work, Simpson will partner with infant caregivers for a preregistered online study of newborn behavior across the children's 1st year of life. This much-needed work will enrich the literature on neonatal mimicry outside of a laboratory setting. Simpson hopes that the study will lead to new tools for neonatal behavioral screenings and interventions. She intends to accomplish this goal by building on previous research in which she showed that facial-gesture interventions had beneficial effects on development for infant macaques.

Simpson's work is notable for her embrace of emerging tools and methodological innovations in psychological science. "Online technologies and open science practices decrease reliance on experimenters, reach newborns at home on their own schedule, and facilitate independent replication," she said. ◉



# APS TEACHING FUND SHOWCASE: MICROGRANTS FOR ONLINE LEARNING

In 2020, as the COVID-19 pandemic drove teachers and students out of the classroom and into Zoom calls attended from their bedrooms and couches, the APS Teaching Fund launched a Microgrants for Online Learning initiative to facilitate the dissemination of best practices for teaching psychological science remotely. The Teaching Fund Committee distributed more than \$20,000 in microgrants to support teachers moving classes online as a result of the pandemic. Here, the *Observer* highlights three of the resulting projects.

To learn more about each of these projects, see this article at [psychologicalscience.org/observer/teaching-fund-2021](https://psychologicalscience.org/observer/teaching-fund-2021). For more about APS's support of online learning resources, visit [psychologicalscience.org/microgrants](https://psychologicalscience.org/microgrants).

## Open pedagogy to make learning meaningful

**Jill Swirsky**, a developmental psychologist at Holy Family University, worried that the traditional education model might be particularly ill-suited to remote learning during the COVID-19 pandemic. An instructor may spend hours conceiving of an assignment that students spend hours completing, and then spend additional hours grading their work—only to



One video on Swirsky's project YouTube page (Psych Online: Open Approaches) outlines the open pedagogical practice known as social annotation, which uses technology to help students draw meaningful connections to text inline alongside their peers by practicing the strategies of academic writing in context.

have the final products discarded at the end of the semester. Swirsky hoped that open pedagogical practices (OPPs) could facilitate better online courses, but she also understood that teachers adjusting to life and work in a global pandemic might not have time to learn a new instructional method. To help, she produced a series of three videos that introduce OPPs.

OPPs aim to make learning more meaningful by helping students produce digital artifacts—such as blogs and e-portfolios—as a part of the learning process. Later, these assignments may become public resources or work samples that students can show to potential employers. Another OPP strategy, social annotation, asks students to take notes in a collective digital space where classmates can learn from each other's insights. In addition to allowing students to demonstrate their mastery of course material, OPP assignments help students to build technical skills. These methods also foster a classroom environment that rewards a variety of talents, such as social skills and digital skills, beyond writing, test taking, and memorization.

With help from project consultant Urooj Nizami and student video designer Darryl Loke, Swirsky produced brief tutorials that introduce OPP methods and provide practical advice for instructors interested in implementing social annotation and e-portfolio assignments. The videos have been distributed through a project YouTube channel (Psych Online: Open Approaches), APS, Temple University, and the Society for the Teaching of Psychology.

Swirsky welcomes feedback and perspectives from others:

[jswirsky@holyfamily.edu](mailto:jswirsky@holyfamily.edu).

## Health psychology gets personal

**David Sherman, an APS Fellow**, has been teaching health psychology at the University of California, Santa Barbara, for nearly two decades—but in 2020, something felt different. Sherman was struck by how relevant his course content had become to students' everyday lives as they collectively confronted COVID-19. He saw an opportunity to not only tie course content to students' experiences but also to document lessons from the pandemic for future students.

Sherman's Health Psychology & COVID-19 video series features 13 interviews with researchers, practitioners, and experts in the field of health psychology. For example, he speaks with Howard Leventhal of Rutgers University about what his previous research on the 1957–1958 flu pandemic can teach today's health psychologists about COVID-19. The series also features perspectives from researchers who were actively conducting research related to the pandemic, including Robert Kaplan of Stanford University, who discussed his work on COVID-19 testing, and Angela Duckworth of the University of Pennsylvania, who discussed research on mask-wearing. Other interviews include Traci Mann from the University of Minnesota on teaching health psychology during the pandemic, APS Fellow Robert Sapolsky of Stanford on stress during COVID-19, Nancy Sin of the University of British Columbia on the ups and downs of daily life during COVID-19, and practitioners who highlighted the connection of health psychology to their changing work experiences, such as Paige Farrenkopf of Yale University, who served as a contact tracer. A compilation video is also available that integrates excerpts from the interviews with themes from health psychology.



In a video series on her YouTube page, Buskirk-Cohen interviews researchers including Stacey Sinclair, a former member of the APS Board, and György Buzsáki, who delivered the 2020 APS Kavli Keynote Address.

Sherman's video series is publicly available online, along with a syllabus. The materials have been distributed through professional organizations such as APS and the Social, Personality, & Health Network.

Visit the project website at [labs.psych.ucsb.edu/sherman/david/gauchocast](https://labs.psych.ucsb.edu/sherman/david/gauchocast).

## Demystifying careers in science

**Allison Buskirk-Cohen** felt troubled by research showing that most undergraduate students do not feel that they belong in scientific fields. To show undergraduates that research is for everyone, she conducted 10 interviews with diverse, renowned psychological scientists. The interviews, now available on YouTube and on a dedicated website, focus on the researchers' personal lives and their personal paths as researchers. The project aims to inform and inspire future psychological scientists.

Along with these videos, the Making Research Personal website collects educational resources that complement the interviews, including instructions for reflections, questions, article analyses, and reviews of the researchers' websites. The site also provides specific learning outcomes drawn from standard psychology curricula and even matches potential courses with each researcher's interview, so that instructors and students can easily locate the interviews they might be interested in.

Buskirk-Cohen hopes that the digital resources encompassed by the Making Research Personal project will be valuable through the COVID-19 pandemic and beyond. She is proud that the virtual guest lectures connect students with top scientists in a cost-effective way and reinforce important psychological concepts.

To date, close to 1,000 users have visited the Making Research Personal website. A survey of student users suggested that the project provides valuable career insights and a better understanding of psychological research.

Visit the project website at [making-research-personal.info/](https://making-research-personal.info/). 



# CALL FOR APPLICATIONS

## *James McKeen Cattell Fund Fellowship*

Presented in partnership with

ASSOCIATION FOR PSYCHOLOGICAL SCIENCE

Application deadline: January 15, 2022

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For over half a century, the James McKeen Cattell Fund has provided support for the science and application of psychology. The Fund provides Fellowships to supplement faculty's regular sabbatical allowance provided by their home institution to allow for an extension of leave time from one to two semesters. Awards provide up to half of the recipient's salary for the academic year, with a ceiling of \$40,000.

### Eligibility requirements:

- Available to researchers in the broad field of psychological science who are tenured faculty members at colleges and universities in the US and Canada who are eligible, according to the regulations of their own institutions, for a sabbatical leave or its equivalent. Formal tenure confirmation must be in hand by February 1st of the application year.
  - Applicants must not have had a leave with pay for the 5 years preceding the requested sabbatical (medical or parental leave are considered exceptions), including the entire 2021-2022 academic year. Sabbatical requests must be for the Academic Year 2022-2023.
  - Prior recipients are not eligible
- 

Applications may be submitted online: [www.cattell.duke.edu](http://www.cattell.duke.edu)

# BECOMING A SOCIAL MEDIA SCIENCE CELEBRITY

By Charles Blue, APS staff

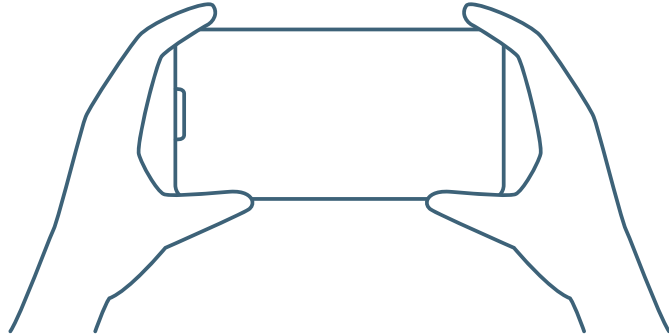
From biology and medicine to engineering and astrophysics, popular science spokespeople are few and far between. Only a small number have become household names, like Neil deGrasse Tyson, Brian Greene, Jane Goodall, and Bill Nye.

Each of these individuals has published popular books, appeared on television, and served as an expert on breaking news. They may not represent the forefront of research in their fields, but they spend much of their time outside of the lab communicating science. For elite science communicators, speaking fees can be as much as \$1,500 per minute.

However, most scientists who devote time to public outreach do so out of a passion to share their knowledge, not as a lucrative career choice. Even the most rudimentary outreach activities require considerable time and effort, from preparing a speech to writing an op-ed. This sort of grassroots science outreach can be both daunting and frustrating, especially with the ever-growing stream of antisience propaganda filling the public arena.

So how to be heard above the din of misinformation? By going to where most people interested in a subject get their information—social media, an ever-evolving collection of channels tailored to specific audiences.

Facebook and Twitter have both been around for about 15 years (almost an eternity in the online world), but they are no longer the reigning champs in the social media space. In 2020, they were overtaken by TikTok, the first non-Facebook-owned app to exceed 3 billion downloads. Other apps gunning for the number-one spot include Clapper, Vevo, and Twitch. For those



unfamiliar with the terrain, the environment can be a little intimidating. But if you're intrigued by the idea of developing a following, countering misinformation, and sharing the fruits of psychological science research online, it is possible to get started on firm ground and build from there.

The first step is to understand that there is competition for eyeballs. Every social media platform is teeming with content, and users' attention spans can be phenomenally brief. You need to create engaging content to build a following. Some of the leading content producers find success by interacting one-on-one with their followers. They monitor comments, treat posts and threads like conversations, and talk directly to individuals. This works best for those who are telegenic and add theatrical flair to their presentations. Some TikTok creators from the science world have hundreds of thousands of followers—an order of magnitude more than most best-selling science writers. If your choice is between being TikTok famous and featured in a magazine sold in major airports, choose the former.

The time commitment is considerable, but so is the return on investment. Most successful influencers post new content anywhere from several times a week to several times each day. In addition, they routinely engage with their followers by answering questions, creating new content to address requests, and responding to inevitable criticism.

To the last point, social media opens the floodgates to passionate opinions, which can at times devolve into personal attacks. How you deal with these comments is a personal choice: ignore them, block them, or engage with them. Each choice has repercussions. Ignoring or blocking a commenter can spark criticism. Engaging can encourage fierce debate that can derail productive dialog. However you respond will affect your brand and the demographics of your followers.

The benefits of these efforts, however, cannot be overstated. According to a 2018 Pew Research Center study ([pewrsr.ch/3AtoZlg](https://www.pewrsr.ch/3AtoZlg)), fully 26% of social media users follow at least one science-related page, and 44% say they encounter science news on social media they would not have seen anywhere else.

If psychological science is going to be part of the public debate on important issues—from climate change to vaccines to human rights—we need to be part of this online community. ●





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Employment Network to recruit candidates like you. Visit **[www.psychologicalscience.org/jobs](http://www.psychologicalscience.org/jobs)**

for additional job postings and to sign up for job listings by email.

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## ILLINOIS

### THE UNIVERSITY OF CHICAGO

### OPEN-RANK FACULTY POSITION IN SOCIAL PSYCHOLOGY

The Department of Psychology at the University of Chicago is seeking to build a new Social Psychology program. The department therefore seeks to hire prominent social psychologists who are interested in creating and developing such a program at the University of Chicago. This is an open rank search and we encourage all potentially interested applicants to apply. The new program will benefit from synergies with members of the Department of Psychology, researchers at the Center for Decision Research at the Booth School of Business, as well as the Committee on Education. Applicants must be social psychologists with an influential research record, and they should be interested in creating a world-class program that welcomes, respects, and supports a diverse community of scholars. The Division of Social Sciences and the Department of Psychology are committed to the creation and the support of such a program.

Candidates should apply online at the University of Chicago's Interfolio website at [apply.interfolio.com/93637](http://apply.interfolio.com/93637). Applications must include 1) a cover letter with contact information for at least three references; 2) a current curriculum vitae; 3) a research statement; 4) a teaching statement and 5) three representative publications. Ph.D. must be in hand by start of appointment.

The Search Committee will begin reviewing applications on November 20, 2021 and will continue to consider new applications until the positions are filled or the search is closed. Appointments may begin as early as July 1, 2022.

The Department of Psychology is dedicated to building a culturally diverse faculty and staff who are committed to creating and nurturing an inclusive community that welcomes, respects, and supports everyone, including those from underrepresented and marginalized groups.

We seek a diverse pool of applicants who wish to join an academic community that places the highest value on rigorous inquiry and encourages diverse perspectives, experiences, groups of individuals, and ideas to inform and stimulate intellectual challenge, engagement, and exchange. The University's Statements on Diversity are at <https://provost.uchicago.edu/statements-diversity>.

The University of Chicago is an Affirmative Action/Equal Opportunity/Disabled/Veterans Employer and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender identity, national or ethnic origin, age, status as an individual with a disability, protected veteran status, genetic information, or other protected classes under the law. For additional information please see the University's Notice of Nondiscrimination.

Job seekers in need of a reasonable accommodation to complete the application process should call 773-702-1032 or email [equalopportunity@uchicago.edu](mailto:equalopportunity@uchicago.edu) with their request.

## INDIANA

### INDIANA UNIVERSITY BLOOMINGTON

### VISITING ASSISTANT PROFESSOR

The Department of Psychological and Brain Sciences is seeking to fill three positions for visiting assistant professors to teach undergraduate courses in the areas of Introductory, Clinical, Social, Cognitive, or Developmental Psychology, and/or Neuroscience. The ideal candidate will be an experienced instructor at the college level with an interest in adding value to the undergraduate program. This will be a 1-year appointment, renewable for one additional year. The teaching load is five courses per year. Candidates with a PhD in Psychology, Neuroscience, or related field in hand at the time of appointment are preferred, but ABDs will be considered. Applicants should have documented teaching experience. Applicants should submit a letter of application that includes a statement of teaching philosophy and experience, evidence of teaching effectiveness, a diversity, equity, and inclusion statement, a curriculum vita, and three letters of recommendation. H1-B sponsorship is not available for this position.

Interested candidates should review the application requirements and submit their application at [indiana.peopleadmin.com/postings/11397](https://indiana.peopleadmin.com/postings/11397). Questions regarding the position or application process can be directed to: Jillian Odle-Araman, Assistant Director of Undergraduate Studies, at [jiodle@iu.edu](mailto:jiodle@iu.edu) or by mail at ATTN: Instructor Search, Department of Psychological and Brain Sciences, 1101 E. 10th Street, Bloomington, IN 47405-7007. Review of applications will begin January 3, 2022 and continue until the positions are filled. The position start date is August 1, 2022. Information about the department and the university is available at [psych.indiana.edu](https://psych.indiana.edu). The College of Arts and Sciences is committed to building and supporting a diverse, inclusive, and equitable community of students and scholars.

Indiana University is an equal employment and affirmative action employer and a provider of ADA services. All qualified applicants will receive consideration for employment without regard to age, ethnicity, color, race, religion, sex, sexual orientation, gender identity or expression, genetic information, marital status, national origin, disability status or protected veteran status.

## NEW HAMPSHIRE

### DARTMOUTH COLLEGE

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The Department of Psychological and Brain Sciences at Dartmouth College invites applications for a Faculty Fellow, a two-year residential postdoctoral appointment, that will convert automatically to a regular full-time tenure-track appointment as Assistant Professor. Faculty Fellows are part of a cohort of faculty committed to increasing diversity in their disciplines. We are interested in applicants whose research can connect to and/or bridge between any foci in our department including behavioral, cognitive, social and affective psychology and neuroscience. We are especially interested in candidates who have a demonstrated ability to contribute to Dartmouth's diversity initiatives in STEM research, such as the Women in Science Program, E. E. Just STEM Scholars Program, and Academic Summer Undergraduate Research Experience (ASURE). For more information about our department, see: [pbs.dartmouth.edu/](https://pbs.dartmouth.edu/).

Our department offers the best of a well-resourced, externally funded research university environment along with the integrative, collaborative, cross-disciplinary nature of a liberal arts institution. In particular, our state-of-the-art research and teaching facility houses human cognitive/social neuroscience and small-animal behavioral/systems neuroscience in the same community. Dartmouth is highly committed to fostering a diverse and inclusive population of students, faculty, and staff. We are especially interested in applicants who are able to work effectively with students, faculty, and staff from all backgrounds, including but not limited to: racial and ethnic minorities, women, individuals who identify with LGBTQ+ communities, individuals with disabilities, individuals from lower income backgrounds, and/or first-generation college graduates. The application includes a diversity statement where applicants should address how their teaching, research, service, and/or life experiences prepare them to advance Dartmouth's commitments to diversity, equity, and inclusion.

Applicants should have a PhD in Psychology or Cognitive, Behavioral, Systems Neuroscience, or a related field; or be ABD with PhD expected before the start date of their appointment as Faculty Fellow, anticipated to be July 1, 2022.

Please submit a letter of application, CV, research statement, teaching statement, diversity statement, and names and contact information for 3 references via Interfolio. Review of applications will begin November 1, 2021 and continue until the position is filled.

For additional job openings at Dartmouth College, please see the Office of the Provost and Human Resources. To apply: [apply.interfolio.com/91998](https://apply.interfolio.com/91998)

# ASSESSING EGO-CENTERED SOCIAL NETWORKS IN FORMR: A TUTORIAL

Social networks encompass a wide array of interactions and relationships, and investigating social networks can provide information about attitudes and behaviors surrounding these relationships and interactions. In a recent article in *Current Directions in Psychological Science*, APS Fellow Julianne Holt-Lunstad (Brigham Young University) discussed the links between social networks and major health outcomes. She examined social connection in terms of its components—structure (e.g., network size, marital status), functions (e.g., social support), and quality (e.g., relationship satisfaction)—and showed that low levels of these components appear to be associated with increased health risks, whereas high levels appear to be associated with health protection.

The effects of positive social connections are evident throughout the lifespan, but research has supported the idea that they play a major role in healthy aging. In a 2015 article in *Current Directions in Psychological Science*, APS Fellow Karen Rook (University of California, Irvine) analyzed the health-related effects of social-network involvement during later life, “a time when risks for declining health and for the loss or

disruption of social relationships increase.” Rook set out to explore the relationship between social connections and health in later life, including the fact that older adults who experience chronic disappointment and conflicts in their relationships with others are at increased risk for health issues. She proposed that a comprehensive understanding of how social networks affect health and well-being in later life can help to “inform the design of interventions, when warranted, that seek to improve the quality of older adults’ social relationships.”

“One way of studying social networks is the assessment of ego-centered networks,” wrote Louisa Reins (University of Goettingen), Ruben Arslan (Max Planck Institute for Human Development), and Tanja Gerlach (University of Goettingen) in a 2021 article in *Advances in Methods and Practices in Psychological Science*. In such assessments, individuals report their number of interaction partners and their relationship with them, which can provide information about how social contexts influence individual-level outcomes. “Looking at ego-centered social networks makes it possible to learn more about the patterning of individuals’ social relationships and about how these relationships may change over time or across life transitions,” the researchers explained.

## A tool to assess ego-centered social networks

In their article, Reins and colleagues provide detailed instructions about how to set up a study involving ego-centered social networks online using the open-source software formr. This software allows participants to report the people they interact with in specific contexts, the attributes of these people, and their relationship with them. All materials in the tutorial are publicly available via the Open Science Foundation, at [osf.io/sgkwz](https://osf.io/sgkwz).

As an online survey framework, formr ([formr.org](https://formr.org); Arslan et al., 2020) allows for the implementation of simple cross-sectional surveys and complex longitudinal, dyadic, or experience-sampling studies. The platform consists of three main components:



A screenshot of formr’s homepage (<https://formr.org>), where researchers can find a free, online, open-source tool to assess ego-centered social networks.

## Cross-cultural research on social networks

Cross-cultural research on social networks throughout the lifespan has revealed different trends among older adults in different countries:

- Although Americans report having the largest social networks, with an average of 11.3 close relationships, their social networks tend to shrink and disperse geographically with age.
- Lebanese adults, who have the smallest, most local social networks (an average of 5.8 important relationships), often see those networks expand with age.
- Widowed or ill older adults in Germany and France have smaller social networks than their counterparts in Japan or the United States.

These findings highlight “a need for flexibility with respect to how policy is developed and implemented given the unique situational contexts of nations” (Ajrouch et al., 2017).



- The survey framework, which allows researchers to specify the information to be gathered (this information is specified in item tables, or spreadsheets imported from Excel or Google Sheets);
- The study control framework, which allows researchers to specify the design of their study and set up communication with the participants, including automated invitations, reminder emails, or personalized feedback;
- A utility R package, which allows researchers to enable complex survey features by executing R code and includes helper functions to organize and analyze collected data.

Two main advantages set formr apart from other programs that can be used to assess social networks: Its free and open-source nature makes it possible to easily share data, enhancing transparency and making it easier to reproduce studies, and its integration with R allows researchers to use their favorite packages to enable complex analysis and data visualization.

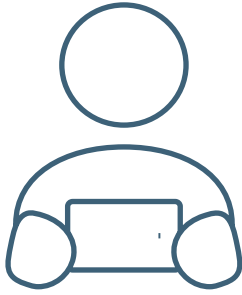
## Building a study in formr

In their tutorial, Reins and colleagues include a sample study and guide users through the different steps of its implementation. This sample study can also be used as a template to create new social-network studies. In the sample study, researchers wanted to know how people’s personalities are related to aspects of their support network and whether the degree of similarity between a person’s own personality and the network members’ personalities predict the amount of contact and experienced closeness.

Before implementing their own study, researchers should consider some questions:

- **What kind of ego-centered social network** do they want to assess? There are at least five types of (partly overlapping) ego-centered social networks: networks of close associates (i.e., people important to the focal person), exchange networks (i.e., people providing/refusing material or symbolic support), interactive networks (i.e., people interacted with in certain contexts or during a certain time), role-relation networks (i.e., networks defined by social roles), and global networks (i.e., all the people one knows). Researchers might also be interested in networks based on specific characteristics or behaviors (e.g., all the chess players one knows).
- **How will participants be guided in identifying their networks?** One possibility involves using name generators (i.e., prompts that instruct participants to list the people constituting the network in question). For example, in the sample study in Reins and colleagues’ tutorial, participants were provided with a set of situations that could require the support of others and were asked whom they would typically ask for help in these situations.
- **How many people can participants include in their network?** Researchers may want to consult previous studies that have employed ego-centered networks for typical as well as maximum network sizes.
- **What kind of additional information on network members** do the researchers want to gather, and with which measures? In the sample study, apart from having participants rate their own personalities, Reins and colleagues asked participants about the personalities of people in their network, their amount of contact, and their experienced closeness to those people.





Looking at ego-centered social networks makes it possible to learn more about the patterning of individuals' social relationships and about how these relationships may change over time or across life transitions.  
—Reins et al. (2021)

• **How to keep participants motivated throughout the study?**

One way to motivate participants to engage in an extensive network assessment might be by rewarding them with personalized feedback. In the sample study, participants received feedback about how they perceived their own personality compared with the personalities of their network members and how the time they had known their network members was related to how close they felt to them.

To prepare a study using formr, researchers can follow these steps:

1. Create a formr account.
2. Complete a survey spreadsheet that includes instructions (survey spreadsheets for the sample study can be downloaded as Excel files from [osf.io/sgkwz](https://osf.io/sgkwz)).
3. Upload the survey (in one or more survey spreadsheets).
4. Set up the study using the formr run function in the study control framework (this binds the different spreadsheets and elements that make up the study).

5. Test the study using the monkey mode, which allows for R code debugging.

While collecting data, researchers can track how many people have participated so far and check each participant's progress. The results are stored separately for every survey, with each row containing one participant's data and columns referring to the different survey questions plus information about survey participation (e.g., session ID, date, start and end time).

Reins and colleagues provide a detailed step-by-step guide on how to use formr and a template for survey spreadsheets. They also include sample code for creating personalized feedback and instructions for incorporating Graphical Ego-Centered Network Survey Interface (GENSI), a JavaScript-based module that allows participants to add social-network members to a graph as nodes connected by lines representing connections. Reins and colleagues also present a detailed list of previous studies on ego-centered social networks, which can provide information about the strengths and limitations of this type of research and may inspire new research questions. ●

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## Teaching *Current Directions* in *Psychological Science*

# THE ART OF THE STEAL

By David G. Myers

Hanoch, Y., & Wood, S. (2021).  
The scams among us: Who  
falls prey and why. *Current  
Directions in Psychological Science*,  
30, 260–266. [https://doi.  
org/10.1177/0963721421995489](https://doi.org/10.1177/0963721421995489)

Who among us has not, at some point, succumbed to a con? Perhaps we believed a too-good-to-be-true advertisement or an investment come-on. Or forwarded a fake social media post. Or believed an election-fraud claim. Or shunned a health-protecting vaccine. Or gave money to someone posing as a homeless veteran.

Scamming is big business, with an annual worldwide financial cost that has been estimated to exceed the U.S. government budget, report Yaniv Hanoch and Stacey Wood. Scammers likewise exact a huge emotional cost. A 2020 European Commission survey found that 79 percent of victims experience emotional suffering.

If your students presume that older people are the main targets of scammers, Hanoch and Wood have a surprise: "A growing body of evidence suggests that middle-aged adults [have] the highest rate of victimization." Young adults are most susceptible to work-from-home and business-opportunity scams. People in their 30s have been most likely to file COVID-related fraud complaints. People ages 35 to 44 have most often fallen victim to mass-marketing solicitations. And middle-aged women have been most



vulnerable to romance scams. Two caveats: Older adults do experience a high rate of online scams, and they tend to lose more money per incident—perhaps because, as Nadia Brashier and Daniel Schacter (2020) have noted, late adulthood entails “greater trust [and] difficulty detecting lies.”

In fact, despite stereotypes, no demographic characteristics are reliably associated with susceptibility to scams. For example, women are commonly believed to be more vulnerable to scams, but although they’re more likely to fall prey to sweepstakes scams, men are more vulnerable to foreign-lottery scams. Hanoch and Wood further note a greater victimization rate among people with higher incomes, which brings to mind American bank robber Willie Sutton's apocryphal answer to the question of why he robbed banks: "Because that's where the money is." Individual differences in impulsivity and self-control also affect susceptibility.

### Why are people scammed?

Ask your students a final question: *Which persuasion or influence tactics do scammers exploit?* Did your students anticipate some of the psychological principles that scammers hijacked?

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- *Truth bias.* Scammers exploit our default human reaction to believe what we hear, especially when it's repeated. As social creatures, we are disposed to learn from one another. Usually, trust pays off.
- *Authority.* Scammers may intimidate by claiming to be from a government agency (e.g., the IRS) or the police.
- *Scarcity.* By posing a limited number of prizes or amount of time, scammers pressure people to respond *now*. When people feel rushed, they don't take time to research before they act.
- *The foot in the door.* By inducing people to make small commitments at first—agreeing with a premise, disclosing information—scammers build momentum.
- *Sunk costs.* After victims transmit a small sum of money, scammers explain that more money is needed to complete the payoff, lest the victims lose their initial investment.
- *Shame.* Scammers are often hard to prosecute because chagrined victims resist admitting their naiveté.

We have only begun to study the scamming phenomenon, conclude Hanoch and Wood. With internet-enabled misinformation poisoning public politics as well as personal

## STUDENT ACTIVITY: SORTING SCAMS

To introduce Hanoch and Wood's review of the psychology of scamming (and to prepare students to think critically when approached by scammers), first ask: *Do you know someone who has been scammed? Have you ever been scammed?*

Next, ask students to describe the scam in a couple of sentences (without disclosing the victim's identity). As they do this—for instance, “My aunt was told she won a sweepstakes and then gave her bank account information to get the supposed prize”—list the scams on a display board (e.g., a fake girlfriend, charity, or prize).

Then ask students if they could identify categories of scams into which the examples fall—for example, romance scams, merchandise scams, rescue scams, easy-money scams, and identity-theft scams.

Finally, ask: *Does your experience—or do these examples—offer clues to who is most vulnerable to scams? How many of you think that scam victims tend to be older? Lower income? Less educated? Female?*

finances and emotions, more research is needed. “Gaining a deeper understanding of these issues is the key to being able to develop preventive programs and reduce the prevalence of victimization,” the authors write. Perhaps your students can brainstorm antidotes to scamming—such as training people to ask why an offer would be scarce and time-limited, test whether a caller represents a claimed authority, or recognize foot-in-the-door and sunk-costs tactics in real time. ●

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## EDITED BY C. NATHAN DEWALL

*Teaching Current Directions in Psychological Science* offers advice and guidance about teaching a particular area of research or topic covered in this peer-reviewed APS bimonthly journal, which features reviews covering all of scientific psychology and its applications. Visit this column online for supplementary components, including previous columns, classroom activities, and demonstrations: [psychologicalscience.org/publications/teaching-current-directions](https://psychologicalscience.org/publications/teaching-current-directions).

# WHEN FICTION BECOMES REALITY

By Cindi May and Michael Scullin

Benedetti, F. (2021). Placebos and movies: What do they have in common? *Current Directions in Psychological Science*, 30(3), 274–279. <https://doi.org/10.1177/09637214211003892>

They say you never forget your first time. Given the strong physiological responses of racing heart, sweaty palms, and heightened senses many people experience when... watching their first horror movie, vivid memories are not surprising. My [CM's] first scary movie was Steven Spielberg's classic *Jaws*, and for years afterwards I was reluctant to go in the ocean. To this day, John Williams' haunting theme music sends chills up my spine.

From one perspective, this is remarkable. I knew I was sitting in a theater and watching a made-up story on a screen, but my body reacted like I was on the boat with Chief Brody. Why? The fear elicited by movies like *Jaws*, *Psycho*, *The Purge*, and *Halloween* captures how fictitious realities can induce genuine physiological and psychological responses. People react to movies in powerful, measurable ways (Matsukawa et al., 2017; Tan, 2018; Yoshihara et al., 2016). And movies can elicit a wide range of emotional and behavioral responses, from heartache and weeping during films like *The Notebook* to joyous triumph and cheering during films like *Star Wars: A New Hope*. From a psychological perspective, one fascinating truth is that the tears, fears, joy, and laughter we experience when watching a movie are very real, even though we know full well that the movies that spark these responses are not.

Fabrizio Benedetti posits that our reactions to fictional movies offer a model for understanding placebo effects. Placebos are simulated interventions that can induce real therapeutic benefits for a variety of conditions, including pain, depression, itching, and irritable bowel syndrome (Colloca & Howick, 2018; Kaptchuk, 2018). Placebos have puzzled scientists and clinicians alike, but the efficacy of placebos is unsurprising when you consider that they are delivered through social and therapeutic rituals that create a psychosocial context—not unlike the fictitious reality of a movie.

Placebos can be delivered in one of two ways: through deception or open-label administration. In deceptive placebo treatments, recipients believe they are receiving a real treatment (e.g., pain relief, therapeutic intervention) when in fact the treatment is inert. Here, expectations may play an important role in the relief that recipients experience. New studies have demonstrated, however, that deception and expectation are not necessary to elicit the perks of placebos (Kaptchuk, 2018; Kaptchuk & Miller, 2018). With an open-label placebo, recipients knowingly receive a fake treatment. Here too, they can experience genuine physiological and psychological improvement, just as people experience strong emotions and behavioral changes when they watch a fictional film. Unconscious or automatic mechanisms like conditioning may drive this benefit, given that prior experience with the treatment ritual (e.g., taking a pill to relieve pain) seems to be an important precursor to success with a placebo (Benedetti, 2020).

Instructors can use film-related activities to help students recognize that genuine emotional and behavioral responses can be elicited from fictional contexts and consider the various mechanisms that might underlie placebo effects.

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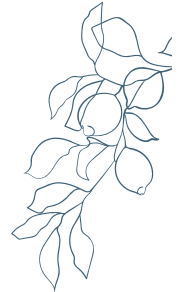
**Michael Scullin** is an assistant professor of psychology and neuroscience at Baylor University. His research investigates the interplay of sleep, cognition, and aging, with the overarching goal of translating psychological science into real-world benefits. In 2017, he was named an APS Rising Star. Scullin can be contacted at [michael\\_scullin@baylor.edu](mailto:michael_scullin@baylor.edu).



## STUDENT ACTIVITY: STRANGER THAN FICTION

### The Lemon Squeeze

Put students in pairs for this activity. Have one student in each pair watch 15 seconds of a video featuring a man biting into a lemon ([tinyurl.com/sourmouth](https://tinyurl.com/sourmouth); start at 1:33 and end at 1:48). The other student should watch their partner, ideally videotaping their response to the video. Many students watching the video will make a face of disgust, will salivate, or will even experience pain or discomfort in their mouths.



### Movie Trailer

As an additional activity, have students first determine their resting pulse rate and then complete the following scales:

On a scale from 1 (not at all) to 5 (very), I feel:

- \_\_anxious
- \_\_nervous
- \_\_frightened
- \_\_excited



Then have students watch the following movie trailer: [tinyurl.com/reallyscared](https://tinyurl.com/reallyscared).

As soon as the trailer is complete, have students measure their pulse rate and complete the scales again. Then have them discuss changes in their physiological and emotional states from pre- to post-movie trailer. Ask if they think they would experience fear, tension, anxiety, or excitement if they watched the full film and have them reflect on emotions they've experienced while watching other movies.

Noting that film clips and movies are fictional, ask students to discuss the psychological factors (e.g., expectancy, classical conditioning, reinforcement, social learning, cultural experience) that might mediate the responses to both film clips. If students were to design a film that elicited fear (or joy, sadness, heartache, etc.), how would they harness those psychological factors to create the biggest response? It may be helpful to remind them to connect their design suggestions directly to these psychological mechanisms, rather than relying on conventional film tropes.

Next, make the connection with placebos, describing both deceptive placebos and open-label placebos. Thinking about the same psychological mechanisms that drive our responses to movies, what aspects of a medical or clinical setting might contribute to placebo effects? Here, students might suggest factors like white coats, syringes, pills, mention of HIPAA rights, scrubs, and even the smells associated with hospitals and medical clinics. Have students design a protocol in which they think a placebo is most likely to be effective, explaining the science behind their design.

Finally, it may be worthwhile to discuss the potential downsides of the placebo effect. If a simulation or belief is sufficient to induce a measurable psychophysiological reaction, we may be more vulnerable to charlatans, scammers, or snake oil treatments (Benedetti, 2019). Although placebos may improve quality of life by reducing pain or alleviating discomfort, they do not cure disease or kill infection, and thus reliance on placebos rather than proven treatments could delay or prevent recovery from certain ailments. Understanding how and why placebos work, as well as their limitations, will help students consider how placebos can be used most effectively and ethically.



Yakeel Quiroz (left), an associate professor at Harvard Medical School, shares her work on psychiatry and neurology with a local radio station.

## CAREERS UP CLOSE: YAKEEL QUIROZ ON CROSS-CULTURAL ALZHEIMER'S RESEARCH

### Yakeel Quiroz

#### Spotlight

**Current role:** Associate professor of psychiatry and neurology at Harvard Medical School, 2020–present; director of the Familial Dementia Neuroimaging Lab and Multicultural Alzheimer's Prevention Program at Massachusetts General Hospital, 2015–present

**Previously:** Clinical fellow, instructor in neurology, assistant professor at Harvard Medical School, 2012–2020

**Terminal degree:** PhD in clinical psychology, Boston University, 2013

Recognized as an APS Rising Star in 2015

**Y**akeel Quiroz is an associate professor of psychiatry and neurology at Harvard Medical School. She also directs Massachusetts General Hospital's Familial Dementia Neuroimaging Lab and Multicultural Alzheimer's Prevention Program, where she is leading a longitudinal biomarker study of an extended family in Colombia with a gene that causes a unique form of early-onset Alzheimer's disease that may illuminate the progression and prevention of dementia.

#### Landing the job

I received a very competitive National Institutes of Health Director's Pioneer Early Independence Award right after I completed my PhD, which allowed me to launch my own lab at Massachusetts General Hospital in Boston and become junior faculty at Harvard Medical School.

After the Pioneer Award, I stayed at Massachusetts General Hospital and Harvard Medical School as an assistant professor, and then just recently was promoted to associate professor.

## Researching resistance

I have been studying a large extended family in Colombia, many of whose members have a rare mutation in a specific gene, presenilin 1, that causes early-onset Alzheimer's disease. More than 1,000 people in this family have this mutation, and [those who have it] almost always develop dementia in their 40s.

When I became an APS Rising Star, I was studying early brain changes in this family, mostly using fMRI and structural MRI. Since then, I have added more neuroimaging modalities and other biomarker measures to my research, which have allowed me to further characterize the age-related trajectory of physiological changes in the preclinical stages of Alzheimer's disease.

Most recently, my group discovered one individual with this genetic mutation who only started to show symptoms of dementia in her 70s. She was found to have an even rarer mutation (occurring in 1 in about 200,000 people worldwide) in another gene, APOE3 Christchurch, that may have protected her against dementia. This extraordinary case offers a truly unique opportunity to understand genetic resistance to Alzheimer's and is opening up completely new avenues

for Alzheimer's research and treatment. My research now includes the study of the APOE3 Christchurch mutation and other rare mutations that may explain resistance to dementia. By better understanding how this very small group of people in Colombia may have been protected from dementia for decades, we hope to develop better ways to prevent and treat Alzheimer's around the world.

## Mentoring for independence

I really enjoy mentoring junior colleagues. I serve as co-mentor for several PhD students from Boston University, and I also have research assistants, postdoctoral fellows, and junior faculty working with me in my lab. In addition to that, I am involved with the National Mentoring Research Network and several mentoring programs at my institution. I'm particularly interested in mentoring those who are from diverse and traditionally underrepresented backgrounds. Being a Latina neuroscientist myself, I believe I have a lot to offer to my mentees based on my own experiences, and I always make every effort to support them so that they can be independent and have successful careers.

## Finding support

Build a supportive community around you; choose a lab, research group, or institution with colleagues who respect you, value you for who you are, understand your needs and challenges, and can provide the support you need without judging you. Find great mentors and sponsors who can help you advance in your career.

## Integrating opportunities

I love being able to integrate my clinical and research work. It's quite a unique opportunity to be able to see patients with Alzheimer's disease one day a week and then spend the rest of the week thinking about ways to do research to find ways to prevent and stop that disease. My patients are my biggest motivation to do research and find a cure for this disease.

## Looking to the future

My research plans include developing new methods for the early diagnosis of Alzheimer's disease, validating novel modalities of treatments, and identifying new modifiers of Alzheimer's risk. ●



Do you know an early-career researcher doing innovative work in industry or academia who might be a good fit for Careers Up Close? Contact the *Observer* at [apsobserver@psychologicalscience.org](mailto:apsobserver@psychologicalscience.org).

# LEARNING THROUGH EXPOSURE

What therapists in training can learn from exposure therapy during a pandemic

By Ellen Finch

Over the last several months, have you continually feared that you might contract a serious physical disease or illness?” The patient stared at me incredulously and I stared back, confused. Then it hit me. “Other than COVID,” I added. I was on Zoom administering my first-ever diagnostic interview, kicking myself for making such a silly error. Of course this standard screening question for illness anxiety disorder sounded absurd during a pandemic. My frustration with myself quickly morphed into frustration with the situation—I was completing this difficult work over Zoom, feeling isolated and underprepared while crammed in a corner of my apartment that was masquerading as an office.

From that corner, I’ve trained virtually with two clinics that specialize in treating obsessive-compulsive and anxiety-related disorders with cognitive-behavioral therapy (CBT). A core tenet of CBT is exposure: asking patients to confront the precise thing they would most like to avoid. In short, exposure is doing something very difficult in the short term in order to improve our lives in the long term. The basic principles of exposure extend beyond the psychotherapy room, and I frequently like to apply what I’ve learned about exposure to challenges in my daily life. It’s never been more relevant, however, than during clinical training this past year.

I’ve come to see training to be a psychotherapist during COVID-19 as an excellent opportunity to practice exposure: doing something hard now that leads to solid, meaningful learn-



ing for the future. We can borrow from the field’s knowledge of exposures to approach the deeply challenging experience of remote training in a way that maximizes our learning.

**Embrace pushing beyond the norm.** A good exposure often means pushing past what would be considered normal in daily life (Gillihan et al., 2012). We ask patients to learn that they can handle something extreme so that quotidian events don’t phase them. For example, we may ask a patient with contamination OCD to touch a public toilet and then not wash their hands. We do so not because we want them to move through life caressing toilets, but because after that exposure touching a doorknob seems easy. Training during the pandemic follows this same pattern—it is doing something harder than the norm, which in turn provides us with an opportunity to learn that we can handle challenging clinical circumstances (and perhaps even enjoy them). If I can connect with a patient hundreds of miles away over a screen, surely I can connect with them when we’re sitting in the same room. If you can help a patient with contamination-based OCD when the entire world is obsessively washing their hands, certainly you can treat OCD in a world that is no longer saturated with pandemic precautions. Because what we are pushing ourselves to do now is beyond the norm, it provides us with the opportunity to broaden our clinical skill set beyond its typical boundaries.

**Track expectancy violations.** One of the most powerful cognitive tools during exposures is expectancy violation—highlighting the difference between what

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## By considering how reality contrasts with our original fears, we can process the meaningful progress we have made.

the patient expected would happen and what actually happened (Craske et al., 2014). What was the worst-case scenario you feared? Did it come true? If it did, was it as bad as you thought it would be? Noticing discrepancies in these domains solidifies new learning and highlights how anxiety may lead us astray. Although these contrasts can be straightforward in a 50-minute exposure, they are easy to miss when the object of our anxiety is our own slow-moving development. Consider thinking back to the fears that populated your mind when training first went remote and challenge yourself to notice how your expectations may have been violated. For example, did you worry that you would not be able to build a strong alliance over Zoom, and instead found that you've had multiple successful therapeutic relationships? Alternatively, have you watched a patient progress clinically despite your therapeutic alliance being mediated by

a computer screen? By considering how reality contrasts with our original fears, we can process the meaningful progress we have made.

**Resist excessive reassurance.** Particularly when things do not go as planned, it is extremely tempting to gain short term relief by cheerleading ourselves into certainty. *You will be just as effective of a clinician over Zoom as you would be in person! This pandemic won't interfere in your training at all—you've got this!* As we know from the exposure literature (and intuition), removing all doubt and fear only sets us up for failure (Gillian et al., 2012). Unabashed positive thinking denies reality and reinforces the false idea that errors are intolerable, whereas uncertainty leads to growth. We wouldn't reassure our socially anxious patient that other people like them, so let's not reassure ourselves that training during COVID will be perfect. Rather, we can accept that this period of our clinical training will likely be replete with disappointments and errors, and then lean into this uncertainty and grow more because of it.

**Celebrate successes.** To my knowledge, celebrating the successful completion of an exposure is not a formal component of any treatment manual. However, it is far and away my favorite part of this work. There is something wonderfully earnest about the pride one generates after pushing through a challenging exposure, and this pride undoubtedly fortifies a person's ability to move forward with an exposure plan. As a clinician, it is immensely satisfying and moving to see my patients experience that feeling, and I cannot imagine a successful exposure occurring without it. To this end, let's afford ourselves room for that same pride by acknowledging that training to be a psychotherapist is difficult, and that doing this training remotely is even more so. Though we cannot and should not deny the frustration and isolation we have all felt in our respective apartment corners, challenging ourselves in the short-term will undoubtedly help us, and the patients we aim to serve, in the long-term. This is worth celebrating. ●

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# STAVING OFF STEREOTYPE THREAT



**Keith Maddox**  
Tufts University

## What drew you to the study of stereotyping and discrimination?

As an undergraduate I took a social psychology course, and it was my first exposure to an academic topic that seemed to reflect some of my experiences growing up. I was fascinated by theories of categorization, as well as by the framing of stereotypes as hypotheses about people that can be applied in a seemingly all-or-none fashion. It provided a scaffolding for understanding that really resonated.

## What have been your most surprising or counterintuitive findings?

I don't think I've yet had a finding that has been counterintuitive, although I've had plenty of data that fail to support my expectations. One comes from some work I've been doing with a recent PhD, Dr. Jennifer Perry, and colleagues at Tufts. We've been exploring the role that skin tone plays in driving threat-related attentional

APS Fellow **Keith Maddox** is an associate professor of psychology at Tufts University. His research aims to further understanding of how stereotypic knowledge can impact the behavior and treatment of members of stereotyped groups.

bias toward/away from faces of Black men. We're finding that darker versions of Black faces are on average perceived as more threatening than lighter versions. We predicted that this would be associated with a pattern of early vigilance and late avoidance similar to that found with Black and White faces in a paradigm designed to test visual attention. In other words, we initially direct our gaze toward potentially threatening stimuli but later avert our gaze, possibly to help to regulate threat-related anxiety. However, darker skin tone was not consistently associated with this pattern. To me this means we don't fully understand the phenomenon, but this is where science gets interesting.

## How can psychological science help to mitigate the effects of bias?

I think we have to start with looking at ourselves in ways that involve both grassroots and organizational leadership efforts. We need to re-examine the assumptions underlying our research practices and incentive structures that lead to the production of psychological science. I was fortunate to be a part of an authorship team that contributed several thoughts to this debate, led by Dr. Alison Ledgerwood. After (or while) helping ourselves, we can help others by sharing our insights about the causes and consequences of bias. As a social psychologist, I believe this involves

helping people to realize the cognitive underpinnings of bias as well as how the social context (e.g., organizational, structural, societal) helps to create, exaggerate, and reinforce those biases. But psychological science can't do this alone. We must complement the work of other scientists, artists, and humanists to help to create narratives, exhibits, and demonstrations that resonate with people to help them recognize the need for large-scale intervention efforts.

## You've also shown how older adults can be susceptible to false memories acting in accordance with age-related stereotypes. Potential real-world implications for this research?

I think the operative word in that question is "can." In a study led by Dr. Amy Smith, older, educated, or retired adults showed the greatest susceptibility, with retirement status and education level as better predictors than age. Should we accept the status quo, stereotype threat can be associated with psychological disengagement, increased isolation, and avoidance of situations that might reveal these deficits. But we don't have to accept the status quo. There are ways to stave off stereotype threat through reframing and education among its potential victims, and we can work to dispel these stereotypes more broadly through increased information sharing and varied and accurate representations of older adults in our media. ●



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