

ASU

DEPARTMENT OF PSYCHOLOGY

INSIDE:

BARRETT HONORS THESIS AWARD

Isabel Strouse wins Departmental and
College Honors Thesis Award

WHO HIT IT LAST?

Egocentric Temporal Bias in
Basketball

INVISIBLE LABOR IN MOTHERS

The Hidden Stress at Home



GET PSYCHED, VOL 2 ISSUE: 2

Outstanding Students & Research

TABLE OF CONTENTS:

- 3 Isabel Strouse receives Barrett Award for outstanding research**
- 7 Who Really Hit the Ball Out of Bounds?**
- 10 Invisible Labor in Mothers**
- 13 Social Media Breaks**
- 15 Childhood Trauma and Drinking**
- 18 How to Best Replicate Studies**
- 20 Undergrad helps families in need**
- 23 It's OK to Not Be OK**
- 25 Launching a Student Success Center**
- 28 Changing Problem Drinking**
- 30 Sleepovers Reduce Stress in Shelter Dogs**
- 32 More Than Just Memories: A New Role for the Hippocampus During Learning**
- 34 ASU SciHub Workshop Brings Science, Engineering and Art Experts Together**
- 36 Dean's Medalist Marianna Kaneris Fights Community Health Disparities**
- 40 Study Finds Lack of Mental Health Interventions for Ethnic Minority Youth**

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Psychology undergraduate receives Barrett award for outstanding research

By Robert Ewing

In the United States, approximately 8% of women between ages 15-44 are currently using long-acting and reversible contraception, such as an intrauterine device (IUD).

This number has doubled in the last decade and is expected to rise.

Isabel Strouse, a psychology and biology double major at Arizona State University, evaluated whether use of an IUD had any effect on learning and memory. The project was her senior research thesis, and it won the Barrett Honor's College Award for Outstanding Research.

Strouse will be recognized at ASU's Convocation on Saturday, May 4 at Wells Fargo Arena in downtown Tempe.

Strouse's senior research thesis, "An Evaluation of the Levonorgestrel-Releasing Intrauterine Device and Its Impact on Cognitive Function in a Rat Model," also won the ASU Department of Psychology Honors Thesis of the Year award. Student theses underwent a rigorous evaluation from three external examiners: Robert Leeman, Associate Professor in Health Education and Behavior at the University of Florida, Sarah Kucker, Assistant Professor of Psychology at Oklahoma State University and Jill Daniel, Professor of Psychology and Director of the Tulane Brain Institute at Tulane University.

Strouse carried out her research on IUDs in the Behavioral

Neuroscience of Memory and Aging Lab under the mentorship of the 2018 AZ Biosciences Educator of the Year, Heather Bimonte-Nelson. The Bimonte-Nelson research group studies aging and memory, with a focus on how hormones like estrogen impact memory across the female life span. The research in the Behavioral Neuroscience of Memory and Aging lab is relevant to understanding both normal and abnormal aging processes, such as with Alzheimer's Disease.

Related: Bimonte-Nelson Lab Links Hysterectomy to Memory Deficit

Strouse discovered Bimonte-Nelson's lab the summer after her freshman year at the University of California Los Angeles. She transferred to Barrett, the Honor's College at ASU as a sophomore and started working in the lab. Strouse said she was immediately hooked by the Bimonte-Nelson team because of the infectious energy of the research group and the chance to design a research study of her own.

"My participation in the Bimonte-Nelson laboratory has been one of the greatest highlights of my time in college. I not only had the opportunity to be heavily engaged in research that stimulated my own scientific interests, but I was also always surrounded by compassionate, driven, supportive people who were asking important preclinical questions about women's health. It provided me with a model of a collaborative and team-oriented scientific community, a newfound appreciation for the research process, mentors who I know I can always turn to, and friendships that will last a lifetime," said Strouse.

The device Strouse studied was a Levonorgestrel-releasing IUD (Levo IUD).

"It is currently claimed that the IUD exerts effects only locally, so only in the tissue of the uterus. But, we know there are connections between the brain and uterus, and there is also a relationship between steroid hormones and cognitive function in both rats and humans," Strouse said. "We instead hypothesized that use of the Levo IUD would result in systemic effects, particularly impacting cognition, in addition to local alterations to the uterus."

Strouse's research experience was like a rollercoaster ride. The surgical procedure her research project required had never been done before, let alone by an undergraduate student scientist. When Strouse went to confirm the IUD placement in the end of the study, she discovered that many animals had actually expelled their IUDs over the course of the study. Strouse was devastated initially, but her attitude quickly changed.

"This experience helped me realize that this is how science goes, and often the questions that come about from unexpected findings can be even more interesting than the initial questions you had," Strouse said.

Strouse had initially thought she uncovered a strong link between the IUD and learning and memory.

"Because we do not know when during the experiment the IUDs were expelled, we could not attribute the behavioral effects we found to the presence of the IUDs," said Strouse.

The expulsion of the IUDs prompted new questions, like what factors could have contributed to the expulsion and whether even transient exposure to an IUD could affect cognitive performance.

"I have mentored nearly 100 undergraduate students since I started my laboratory about 13 years ago, and I have mentored a wide range of students," said Bimonte-Nelson, professor of psychology. "Isabel is brilliant, engaged, motivated, creative and has a great scientific mind. She easily rises to the top of all the undergraduates I have ever mentored. She thrives in challenging environments, she pushes herself to be her very best, she works wholeheartedly as a team member, and she elevates the caliber of those around her!"

She might as well have a time turner

When she is not working in the Bimonte-Nelson lab, Strouse advocates for Camp Kesem, a student led national non-profit that raises funds to take children affected by cancer to camp during the summer. Students like Strouse are responsible for raising all the funding and acting as camp counselors for the many children who have parents who are currently experiencing or have experienced cancer.

"Kesem provides a support network and safe space for children to feel that they are not alone in their struggles, and know that they will always have a place marked by unconditional love to turn to," she said. "Its mission hits close to home

and I would not be who I am today without the people I have met through Kesem.”

Strouse has also been involved in a student organization called One Love, which aims to educate college students about the early warning signs of unhealthy relationships. The organization also helps support students who have experienced domestic abuse.

But her service does not end there. Strouse has experience in clinical service, previously volunteering in the emergency department of a hospital as well as traveling to Ghana to administer medical care to rural villagers in the Volta Region. She is also a Student Success Coach in the new Psychology Student Success Center. In the center, Strouse tutors fellow undergraduates on subjects like writing, statistics and other upper division psychology concepts.

We asked Strouse a few questions:

Q: What made you interested in Psychology?

I started college as a Biology major but have always been very interested in physiology and the integration of body systems. I started working in Dr. Bimonte-Nelson’s Behavioral Neuroscience of Memory and Aging laboratory the summer between my freshman and sophomore years. The relationship between behavior and biology, which I have had the opportunity to learn about and directly observe through my research experience, as well as my growing attraction to understanding the brain as a control center for nearly all

body systems, is what sparked my interest in pursuing psychology as a dual degree.

Q. What made you choose ASU?

In addition to starting only as a Biology major, I also started college at UCLA. When I came home for the summer between my freshman and sophomore years and started working in Dr. Bimonte-Nelson’s laboratory, I was immediately drawn to the sense of community, support, and collaboration both in the lab and throughout the Psychology Department as a whole. Being a community-oriented student, and excited about the research I was participating in, I decided to transfer from UCLA to Barrett at ASU. I have been endlessly grateful for this decision ever since, and especially grateful for the support of Dr. Bimonte-Nelson and the role model she has been to me over the past 3 years. Each opportunity I have been lucky to have in my time here has made me feel incredibly tied to and welcomed by the community of passionate, hard-working, and supportive students, faculty, and staff at ASU.

Q. What was your favorite class/ professor?

My favorite class was Physiological Psychology, taught by one of my favorite professors, Dr. Whitney Hansen. I loved Physiological Psychology because it provided the perfect interdisciplinary crossover between biological mechanisms and psychological outcomes, which is my own area of interest. I had the opportunity to take both this class and Research Methods with Dr. Hansen, as well as be her undergraduate teaching assistant for Physiological Psychology and work with her in the inaugural year of the Psychology Student Success Center. I have loved each of these experiences because of her. To the core, she is an engaging and supportive mentor, a driven and dedicated scientist and faculty member, and a huge role model to me.

Q. What is the best advice you can give an undergraduate at ASU?

The best advice I can give to an undergraduate at ASU is to get as involved as possible in anything that sparks your interest. Everything you contribute to the ASU community, you will get back even more. There are so many incredible opportunities and resources at a school this big, and even though ASU’s size can be intimidating

at the beginning, finding pockets of like-minded people with whom you share interests will make campus feel a lot smaller and more intimate. Even if you venture into something that you decide is not for you, it will help you find the things and people you love. I believe there is no such thing as an entirely bad experience, because, at the end of the day, all experiences only help you to further understand yourself and what you are looking for. Always pursue what you are passionate about, even if it feels stressful at times, because your passions will drive you to find success, lifelong friendships and mentors, and happiness at ASU.

Q: What are your plans after graduation?

After graduation, I will be taking a gap year. I am applying to medical school this summer, and hope to ultimately pursue a career in neurosurgery. During my gap year, I will be working as a medical scribe in a clinical setting.

Q: If someone gave you \$40 million to solve one problem, what would you tackle?

If someone gave me \$40 million to solve one problem, I would dedicate it to supporting families affected by cancer. I lost my dad to cancer when I was 10, and since coming to college, I have gotten involved with an organization called Camp Kesem. Kesem is a completely student-led national nonprofit that supports children through and beyond a parent's cancer, and has been one of the most rewarding and fulfilling organizations I have gotten involved with at ASU. Although most people think about cancer patients as those most affected by the disease, the impact it has on the family as a whole, and especially children, can be devastating. I would want to donate the money to supporting Camp Kesem and finding other ways to help families struggling with cancer.

Q: What was your favorite spot on campus?

My favorite spot on campus is Noble Library. I have spent many nights (and sometimes through to the next morning) at Noble studying with friends, working on papers, or completing homework assignments. Usually, this also meant a lot of laughter and good conversations with people that are dear to me. For me, Noble is a symbol of all the hard work and dedication we have put into these past few years of our lives, and a reason for the successes that we have had throughout college.

Q: What is your hometown?

My hometown is Paradise Valley, Arizona.





Who really hit the ball out of bounds?

By Kim D'Ardenne

ASU study finds self-centered bias in time perception of physical touch

The shot clock reads 0:05 in Game 7. Two players — one in yellow, the other red — hurtle towards the edge of the court, hands outstretched, chasing the ball. It sails out of bounds, and the play ends. Both players insist to the referee that the other touched the ball last. The crowd roars.

Deciding which player touched the ball last to determine possession is difficult because the event lasted only fractions of a second. But a wrong decision can impact the outcome of a game.

Players' reactions in situations

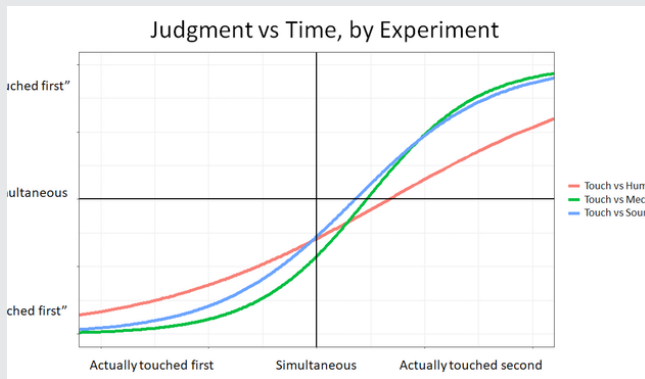
like this are often attributed to acting skills, even among professionals, but a team of Arizona State University psychologists wondered if both players might actually experience touching the ball first. [In a paper published April 24 in Science Advances](#), the researchers tested how people interpret the timing and sequence of physical touches.

“When two players hit the ball out of bounds, there are frequently arguments between them about who touched it last,” said Ty Tang, an ASU psychology graduate student and first author on the study.

While it is possible that a player could lie in an effort to get the ball back, Tang and his graduate

adviser Michael McBeath, professor of psychology, thought it could also be possible that both players really do experience hitting the ball first.

“With this clever study, Tang and McBeath zoom in on those moments that millions of sports fans look at every day,” said neuroscientist and New York Times best-selling author David Eagleman, who is an expert in time perception. “What would have previously been marked up to deceit or misjudgment has now been brought into the realm of basic neuroscience.”



What we perceive is not always reality. The research team created three tests to look at how people experience the order of perceptual events, like nearly simultaneous physical touches.

In the first experiment, two people sat across from each other at a table with a divider that prevented each participant from seeing the other. When a light flashed, the participants used their right index finger to quickly touch a sensor on the back of the other person's left hand. Each participant then pushed a button to indicate whether they had touched the other person's hand first or vice versa. The pair repeated this sequence 50 times, each time the light flashed. The light flashed at random times, and the participants were not told whether they were correct in their assessment of who had touched first.

When the touches happened at the same time both participants strongly believed they touched the other person earlier, answering 67% of the time that they were first.

"Even when the other person's touch was 50 milliseconds earlier, it was still perceived to occur at the same time as one's own touch," Tang said.

The second experiment replaced one of the people with a mechanical device that tapped the participant's hand. The third experiment had participants determine whether they touched first or a beep sounded first. These two follow-up experiments tested whether the presence of people was necessary and if the timing effects found in the first experiment generalized to other senses.

The results were the same: People always insisted they touched first. In the second and third experiments, there was again a 50-millisecond delay between the actual external touch or beep and when the participants felt it.

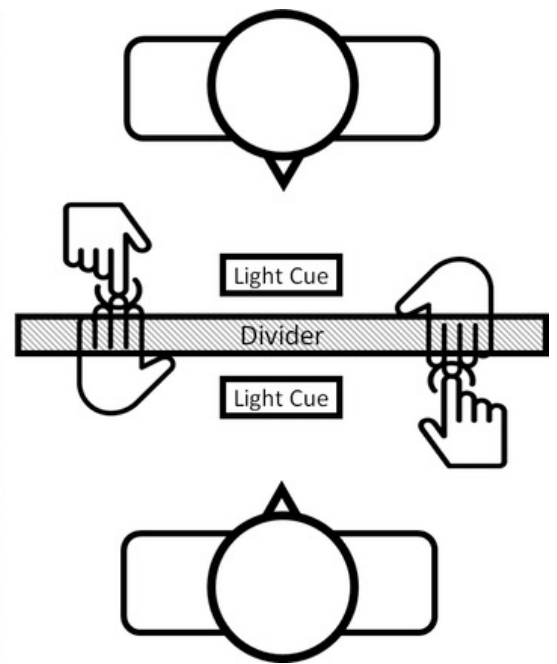
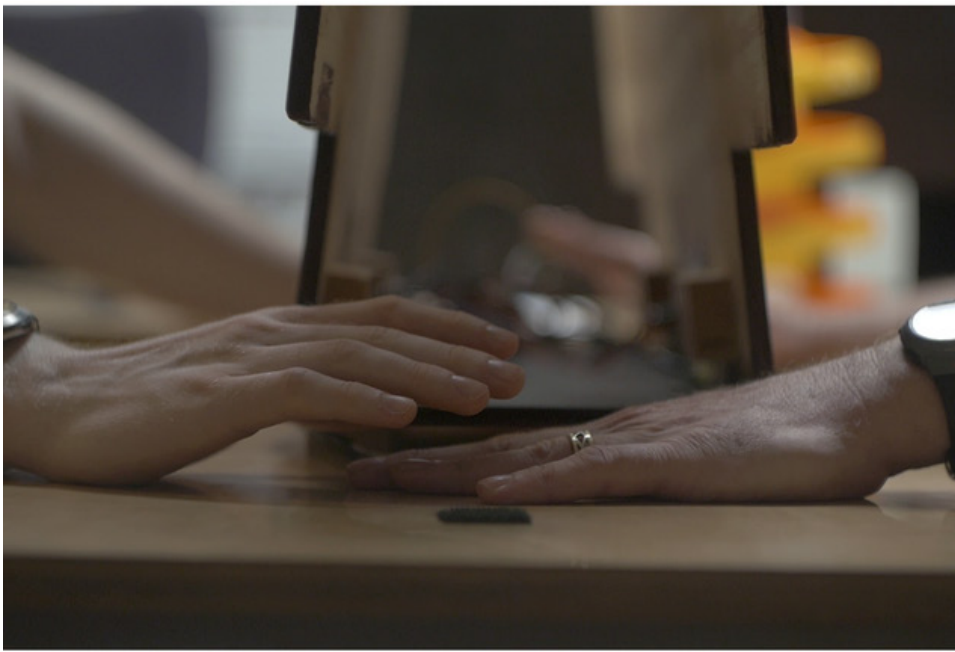
"The 50-millisecond time delay makes a lot of sense because we know the brain is always predicting our actions and perceptions," McBeath said. "People are generally accurate in the real-time perception of their own actions, like hitting and catching a baseball, but we need a little extra time to process something unplanned, like an unexpected tap on the shoulder. When something is unexpected, there is a slight perceptual delay while the brain figures it out."

The findings from the study suggest the experience of an event a person initiates and one that happens to them are different. People seem to sequence these events in time by prioritizing their own action.

"Although we tend to think of time as something the brain passively tracks, in fact it is something the brain actively constructs. Studies like this demonstrate that our notion of when something happened is subjective — and is biased in clear, measurable ways," Eagleman said.



This study was funded by Arizona State University and the Global Sports Institute at ASU.



Volunteers sat across from one another with a divider in between. When the light flashed, participants tapped one another and made a judgment about which tap happened first. Sensors on their hands recorded the actual times when the touches occurred. Rob Ewing, Arizona State University



Above: Professor Michael McBeath and Graduate Student Ty Tang. Credit: Robert Ewing



Invisible labor can negatively impact well-being in mothers

By Kim D'Ardenne

Study finds women who feel overly responsible for household management and parenting are less satisfied with their lives and partnerships

Knowing who needs to be where, on what day and at what time. Buying a bigger pair of pants before a child outgrows what is currently hanging in the closet. Always having a jar of unopened peanut butter on hand.

These caregiving tasks require mental and emotional effort and are examples of the invisible labor women contribute in caring for their families. Researchers from Arizona State University and Oklahoma State University examined how invisible labor impacted the well-being of a

sample of American women. The work will be published Tuesday in *Sex Roles*.

"Until recently, no one stopped to think about Mom herself," said Suniya Luthar, Foundation Professor of psychology at ASU and senior author on the study. "We need to attend to the well-being of moms if we want children to do well, and also for their own sakes."

Quantifying the invisible

Though men participate in housework and childcare more today than in the past, women still manage the household, even when they are employed. Because this unequal burden can affect the mental health of women, the researchers decided to study

how the management of a household was divided among partners and how the division of labor affected women's well-being.

"Even though women may be physically doing fewer loads of laundry, they continue to hold the responsibility for making sure the detergent does not run out, all the dirty clothes make it into the wash and that there are always clean towels available," said first author Lucia Ciciolla, who earned her doctorate from the ASU Department of Psychology with Keith Crnic and Stephen West. Ciciolla now works as an assistant professor of psychology at Oklahoma State University.



“Women are beginning to recognize they still hold the mental burden of the household even if others share in the physical work, and that this mental burden can take a toll.”

The researchers surveyed 393 American women with children under age 18 who were married or in a committed partnership. The sample included women mostly from middle-upper-class homes who were highly educated, with more than 70 percent having at least a college education.

The team measured the division of household labor by asking questions about who was in charge of three sets of tasks: organizing the family’s schedules, fostering children’s well-being and making major financial decisions. The researchers looked at how these tasks affected the women’s satisfaction with spouses or partners and their satisfaction with life overall. The team also looked at how invisible labor was linked to feelings of being overwhelmed and feelings of emptiness in the women’s everyday lives.

A mother’s work is never done

In the category of family routines, almost nine in 10 women answered they felt solely responsible for organizing the schedules of the family, which Luthar said is an extremely large percentage, given 65 percent of the women were employed. At least seven in 10 women answered they were also responsible for other areas of family routines like maintaining standards for routines and assigning household chores.

The women who indicated they were in charge of the household reported they felt overwhelmed with their role as parents, had little time for themselves and felt exhausted.

“Sole responsibility for household management showed links with moms’ distress levels, but with the almost 90 percent of women feeling solely responsible, there was not enough variability in the data to detect whether this association was statistically significant,”

Luthar said. “At the same time, there’s no question that constant juggling and multitasking at home negatively affects mental health.”

A large percentage of the women also felt that it was mostly they who were responsible for being vigilant of their children’s well-being and emotional states. Almost eight in 10 answered they were the one who knew the children’s schoolteachers and administrators, and two-thirds indicated it was they who were attentive to the children’s emotional needs. Yet, instilling values in children was a shared responsibility. Only a quarter of women said they were solely responsible, and 72 percent said that this was generally shared equally with partners.

The invisible labor of ensuring the well-being of children did, in fact, show strong, unique links with women’s distress. This category clearly predicted feelings of emptiness in the women. It was also associated with low satisfaction levels about life overall and with the marriage or partnership.

“Research in developmental science indicates that mothers are first responders to kids’ distress,” Luthar said. “That is a very weighty job; it can be terrifying that you’re making decisions, flying solo, that might actually worsen rather than improve things for your children’s happiness.”

Financial decisions were also listed as shared responsibilities, with just over 50 percent of the women answering they made decisions about investments, vacations, major home improvements and car purchases together with their partner. Because other studies have found participating in financial decisions to be empowering, the researchers predicted it would be positively associated with women’s well-being. But financial decision-making was unexpectedly associated with low partner satisfaction, which the research team attributed to the addition of this job on top of the already high demands of managing the household and ensuring the children’s well-being.

Fixing an unequal burden

Experts on resilience in children agree that the most important protection for kids under stress is the well-being of the primary caregiver in the family, which is most commonly the mother. Mothers must also feel nurtured

and cared for if they are to have good mental health and positive parenting behaviors. When women feel overly responsible for the invisible labor of running a household and raising children, it can negatively impact their overall well-being.

“When mothers feel supported, they can have the emotional resources to cope well with the demands they face,” Ciciolla said. “Being able to address inequalities in invisible labor can allow women and families to create households that are more functional and less burdensome, and can also spare women mental gymnastics to find the space and time to care for themselves.”

In addition to talking about invisible labor, Luthar emphasized that mothers must maintain dependable, authentic connections with others who are supportive. Randomized clinical trials have shown that regular support groups with mothers in the workplace led to reductions in distress, burnout at work and the stress hormone cortisol.

“Resilience rests, fundamentally, on relationships,” Luthar said. “As this is true for children, it is true for mothers who tend them.”

This work was supported by the National Institutes of Health (R01 DA014385 and R13 MH082592) and by Authentic Connections and the Rodel Foundation. The content is solely the responsibility of the authors and does not necessarily reflect the official views of the funding agencies.



A man with short brown hair, wearing a light blue checkered button-down shirt and dark trousers, stands with his arms crossed in front of a modern building with large glass windows. The building is reflected in the windows. There are some trees and a paved area in the foreground.

Can social media breaks make you more productive?

By Robert Ewing

This coming football season, the Arizona Cardinals will take social media breaks every 20 minutes during meetings. While Head Coach Kliff Kingsbury's decision might seem counterproductive — at least according to the reaction of sports commentators — scientists who study attention laud it as a step in the right direction.

Arizona State University's Matt Robison, a postdoctoral scholar in the Memory and Attention Control Lab is an expert on sustained attention.

"Whenever you ask someone to do a task for a long period of time, their performance tends

to suffer the longer that they spend on that task," Robison said. "Meetings are a perfect example."

The prefrontal cortex — the part of the brain behind the forehead — is thought to be responsible for the ability to focus and pay attention. But, a tiny brain area called the locus coeruleus, or LC for short, works with the prefrontal cortex and plays an important role in how people pay attention. The LC is located deep in the brainstem and is only about a centimeter in size. Neurons in the LC release norepinephrine throughout the entire brain, which contributes to how alert and attentive people are.

Robison wants to know how the LC contributes to sustained attention. He is testing how the

LC might interact with brain areas and networks of brain areas involved in attention. To do this, Robison uses electroencephalography (EEG) to measure the brain's electrical activity from regions like the prefrontal cortex. He tracks where people look and the size of their pupil as an indirect way to track what the LC is doing when people pay attention or become distracted.

When people participate in a task that requires a high level of attention, Robison finds the EEG and pupil size signals degrade as time passes, which suggest

the LC might not be connecting well with the prefrontal cortex and other brain attention networks. When Robison sets up experiments designed to create mental fatigue, people report feeling less alert and less motivated to keep paying attention. But when people can take breaks, Robison finds their performance on the task recovers quickly, and so do the EEG and pupil size signals.

“There are published studies suggesting that breaks are a good strategy to maintain attention,” said Robison. “Coach Kingsbury might be on to something.”

Robison does not think the implementation of social media breaks suggests problems with attention for a specific generation. He said the availability of distractions has increased though. Social media usage has never been higher, with over 79% of Americans actively using social media for over 3 hours a day on average.

“The attention systems of each generation are largely the same, and so are the attentional abilities,” Robison said. “This generation growing up today has much more at their disposal to distract them, like cell-phones, television and the internet. All these things are now available at the drop of a hat.”

Sustained attention was as much of a problem when Kurt Warner was quarterback as it is today.

“If we can design our education and work spaces while recognizing that sustained attention is difficult for everyone, we can optimize our learning and productivity just by designing around our natural limitations,” Robison said.





Psychology graduate researches link between childhood trauma and impaired control over drinking

By Robert Ewing

Depression and anxiety disorders affect almost 20% of the American population, including 25% of children between 13 and 18 years old.

Emily Bobel, an undergraduate psychology major at Arizona State University, wanted to find out if depression could be a missing link connecting childhood trauma and problems with alcohol consumption.

Bobel's senior honors research thesis, "The Exploration of Depression as a Mediating Mechanism Between Trauma and Alcohol Problems" looked at whether depression could explain why individuals who

suffered childhood trauma experience impaired control over drinking and other negative drinking outcomes later in life. Because feelings of shame and self-concealment behaviors have been linked to impaired control and problem drinking, Bobel also looked at whether individuals who experienced childhood trauma have behaviors like heavy episodic drinking or other alcohol-related problems later in life.

"We thought depression, which is an internalizing disorder, and impaired control could be an additional explanation for the relationship between childhood trauma and drinking behaviors," Bobel said.

Childhood abuse comes in many forms and can include emotional,

physical, sexual, verbal, financial or cultural abuse. According to ChildHelp, a Phoenix-based nonprofit dedicated to helping victims of child abuse and neglect, over 6.6 million children are referred to state child protective services each year, and a report of child abuse is made every 10 seconds.

Bobel's thesis research showed emotional abuse was strongly related to depression and negative drinking behaviors.

"Emotional abuse was more



strongly related to depression and impaired control than any of the other kinds of childhood trauma in our college student sample,” she said.

Related: ASU researchers identify role for inflammatory marker in cognitive decline tied to child abuse

For her senior thesis, Bobel worked in ASU’s Social Addictions Impulse Lab (SAIL) with lab director Julie Patock-Peckham, a research assistant professor in the Department of Psychology and Barrett Honors Faculty. Research in the SAIL Lab seeks to understand the root causes of addiction in adulthood, including from internal sources like anxiety or depression or external sources like a personality disorder.

“Emily is a talented writer and presenter, and we depend on her a lot in the SAIL lab,” Patock-

Peckham said. “Everyone in the SAIL lab is very proud of her and all that she has accomplished in the last year.”

We asked Bobel the following questions about her time at ASU:

Question: What made you interested in psychology?

A: I’ve always been interested in helping people and finding out why they end up in their current situations. I feel like psychology does both of these things very well. It’s been very interesting for me to study how something that happens to you so early on in life can affect your behavior so many years later, and sometimes not for the best.

Q: What made you choose ASU?

A: I chose to attend ASU because the weather here is much nicer than it is in Michigan, where I’m from. I was also accepted into Barrett, The Honors College and wanted to take advantage of all the opportunities Barrett had to offer.

Q: What was your favorite part of campus?

A: My favorite part of campus is the balcony on the student

services building. You can barely see it when you walk past from the ground, so people don't utilize the space a lot. Whenever I go up there to study it's basically empty, so you can study with a view and little to no distractions!

Q: What was your favorite class?

A: My favorite class was an Inside Out Prison Exchange honors course called Men and Feminism. It was a discussion-based course that consisted of eight Barrett students and 10 men from the Maricopa Reentry Center. I have never felt more connected to a group of people or learned so much about a topic that is so important in our society in such a short period of time.

Q: What is the best advice you can give an undergraduate at ASU?

A: The best advice I can give to an ASU undergraduate is to get involved as soon as possible and take advantage of all of the resources ASU has to offer. I also would encourage them to take classes in a bunch of different subject areas to see if there is something that interests them that they wouldn't have thought of otherwise. The privilege of education is one that should never be taken for granted.

Q: What are your plans after graduation?

A: I plan to take some time to determine what my greatest interests are and how I can turn them into a career that satisfies my desire to help others. I will most likely pursue a graduate degree in clinical psychology and focus my research on correctional psychology.

Q: If someone gave you \$40 million to solve one problem, what would you tackle?

A: If someone gave me \$40 million dollars, I would try to determine the most effective methods to reduce recidivism rates in the U.S. I would love the opportunity to travel to other countries with more effective prison systems and determine if we could implement their practices here in the U.S. I would also want to address mental health care for prisoners, as I feel that getting treatment can be an effective way to help people leave a criminal lifestyle in their past.





New ASU psychology professor studies how best to replicate scientific experiments

By Kim D'Ardenne

If a scientific finding cannot be replicated, can it be true? The replication of experimental findings is a crucial part of the scientific method and is first taught in elementary school science lessons. But researchers from psychology, economics, marketing and medicine have recently struggled to reproduce many findings, giving rise to the so-called “replication crisis” in science.

The reasons why findings might not replicate are numerous and complicated. Though a few instances of scientific fraud have received a lot of attention in the media, a more common reason why a finding might not replicate is the improper or ineffective use of statistics.

Most replication attempts rely on one kind of statistic to determine whether a finding reproduces. This narrow definition

of replication can lead to problems, as Arizona State University's Samantha Anderson knows. Anderson recently joined the Department of Psychology as an assistant professor, and one of the focuses of her work is how the sample size, or amount of data in an experiment, can affect whether a study replicates.

“There are several ways to assess whether a replication study is successful or if it has failed, but right now most people are deciding if a replication is successful in the same way,” said Anderson, who with her doctoral adviser recently won the 2018 Tanaka Award for the best paper from *Multivariate Behavioral Research*, the flagship journal of the Society of Multivariate Experimental Psychology.

“It is important to expand the definition of what it means to replicate a study.”

Anderson also works on improving how

experiments are reproduced using traditional definitions of replication.

Planning appropriate sample sizes with an easy online tool

The statistic that most replication studies rely on is the “p-value,” which gives information about how likely a scientific result is. When researchers attempting to reproduce a study duplicate the original sample size and then compare p-values, the replication attempt can fail even if the finding is actually reproducible.

Figuring out how much data are needed for an experiment or replication might seem straightforward but actually requires thinking about terms like signal and statistical power.

“You want a sample size that is large enough to detect the signal you are looking for, among noise and even errors in the data,” Anderson said. “The probability of you finding that signal is the statistical power.”

Determining the necessary sample size for a study can be challenging because it requires information about the magnitude of the effect being studied, which scientists call the “effect size.” Sometimes scientists might not know much about the signal they are hoping to detect. To replicate an experiment, many researchers logically start by using the effect size reported in the original study because that is the best available information on the magnitude of an effect. But Anderson said using sample effect sizes from published studies at face value can actually cause unintended problems because of publication bias. Scientists rarely, if ever, publish experiments that did not work, so the sizes of published results tend to be skewed higher than they actually are.

Another source of unintended problems in figuring out sample sizes is uncertainty, which exists because experiments often have to measure an effect from just part of a population. For example, politician approval surveys use a small subset of the electorate, usually just a few thousand people, to infer how the American population feels.

To combat publication bias and unravel the best

way to handle uncertainty in data, Anderson worked with Ken Kelley at the University of Notre Dame to develop an online tool to make sample size calculations easy for researchers.

The tool, called the “bias uncertainty corrected sample size” or BUCSS for short, is based on statistical methods that were published decades ago and several publications from Anderson’s doctoral research. The BUCSS tool can help researchers plan sample sizes for new experiments and replication studies.

“We developed software that accounts for biases and uncertainty that can result in incorrect sample sizes,” Anderson said. “The BUCSS tool is designed so people can use it without thinking about the equations and math behind it.”

Before coming to ASU, Anderson earned her doctorate at Notre Dame. She started graduate school pursuing her degree in clinical psychology but soon realized she loved methods research. Anderson completed her doctorate in quantitative psychology and won the 2017 Psi Chi/ APA Edwin B. Newman Graduate Research Award, which acknowledges the best research paper from a psychology graduate student.





Psychology undergraduate strives to help families and kids in need

By Robert Ewing

Have you ever wondered how infants convert a bunch of different sounds into language? Among all the other sounds a baby hears growing up, how do they know which ones are useful for learning speech?

Emily Smith, who will graduate with a double major in psychology and human development from Arizona State University, completed an honor's research thesis on just these questions. Smith worked as a researcher in the Learning and Development Lab with Viridiana Benitez, assistant professor of psychology.

The lab studies how young children learn generally. Recently, Benitez and her research team found that toddlers learned new words better when they were in a predictable situation. Smith's senior

research project built on this work, by looking specifically at how interruptions affected word learning.

"Infants have to take in so much information, and we wanted to look at how that information affected the process of word learning," Smith said.

Her thesis, "The Role of Interruption on Infants' Fast Mapping Abilities," examined how word learning can be a fast but fragile process in infants. She presented her research at a poster session in the Department of Psychology and was recently recognized as a finalist for the ASU Department of Psychology Honors Thesis of the Year.

"My senior research project was the first real experience where I applied everything I have learned at ASU. It was a culmination of personal

and academic accomplishments, and it feels great to be recognized as one of the top theses in the Department of Psychology,” Smith said.

The Learning and Development Lab research team interrupted 16-month-olds during a word learning task. The infants were not able to learn a new word when the researchers moved the infants’ bodies, like standing them up from a chair, or when there were flashing lights.

Smith was fascinated that learning words could so easily be interrupted by environmental factors, like whether an adult moved the infant.

“Word learning can be so easily disrupted by so many factors,” Smith said.

Smith and Benitez said these results demonstrate that word learning in chaotic environments can be challenging for infants because they do not know where to direct their attention. The findings could also have implication for how young children are taught language.

Benitez said she was thoroughly impressed with Smith’s work.

“It was truly a pleasure to work with Emily on this project. Throughout every step she was driven and insightful,” Benitez said. “With only a little guidance, she dove right into the problem and came up with a creative solution. Her work on the project was truly outstanding, and I have no doubt she will be successful in her next endeavor.”

Question: What made you interested in psychology?

Answer: I have always known I wanted to work with people and learn more about their thoughts and behaviors. I especially wanted to learn about families and child development. Completing a double major in psychology and family and human development has taught me so much about how children and families learn and get along, and how to solve and



Above: Psychology undergraduate student Emily Smith

treat problems when they arise.

Q: What made you choose ASU?

A: I was destined to go here: I have a T-shirt from elementary school that says "Future Sun Devil."

But honestly, ASU offered me great scholarships that made my college education feel so much more accessible and achievable than if I had chosen another school. It was only after I started attending that I learned how many opportunities ASU has and about the mentorship opportunities the professors offer their students.

Q: What was your favorite part of campus?

A: I get nostalgic now walking through Barrett where I lived as a freshman. I love the grounds and the dining hall, and it brings back fun memories with the friends I've made.

Q: What was your favorite class/ professor?

A: It's so hard to pick just one! The professors who have had the biggest impact on me were the ones who encouraged me to step outside my comfort zone and be active in my education, including my human event Professor Dr. Mack, my thesis directors and mentors Dr. Benitez and Dr.

Glenberg, and my clinical psychology Professor Dr. Davis.

Q: What is the best advice you can give an undergraduate at ASU?

A: Get involved with anything and everything you're interested in. Figuring out what you want to do in life is no easy task, and I realized that finding something that sparked curiosity, joy and excitement wouldn't happen unless I was active in my own personal growth and discovery. Plus, ASU offers literally everything, so you're almost certain to find something you're interested in.

Q: What are your plans after graduation?

A: I will be working as a case manager at a mental health agency in Mesa, working with children and their families to help coordinate services and treatment. I also plan to go to graduate school in a year to become a child clinician or a marriage and family therapist.

Q: If someone gave you \$40 million to solve one problem, what would you tackle?

A: I would pour it all into integrated health care or combining the care of mental and physical health into one cohesive system. Mental health and wellness are becoming more widely accepted as important issues for everyone, not just those with mental illness. I think treating mental health as a complement to physical health, rather than as separate, is the next natural step.





Taking the message 'It's OK to not be OK' global

By Kim D'Ardenne

Nietzsche and Kelly Clarkson have it wrong: What doesn't kill you might not make you stronger.

And that is OK, according to Arizona State University's Frank Infurna.

Infurna, who is an associate professor in ASU's Department of Psychology, is known for challenging how psychologists study resilience, which is the pathway back to normal following adversity. Many of the research studies looking at how people respond to adversity suggest that people are largely unaffected by events like the death of a loved one or loss of a job.

Last summer, Infurna and Suniya Luthar, Foundation Professor of psychology, demonstrated that the way researchers analyze their data matters. Infurna and Luthar showed the most common response to adversity was actually a substantial dip followed by a gradual return to the level of psychological functioning before the event.

Other research studies have reported that people experience positive changes following adversity, called post-traumatic growth, but many of these studies also suffer from design problems, researchers say. In a recent *Current Directions in Psychological Science* article, Infurna and coauthor Eranda Jayawickreme from Wake Forest University explain problems

with existing research and suggest changes to advance the study of resilience and post-traumatic growth.

Researchers who study post-traumatic growth after adversity often rely on people to tell them about what happened in the aftermath. This method is called retrospective assessment and can be problematic because people can misremember how they handled the adversity. Retrospective assessments also often include only one data point, which can make inferring how people respond difficult.

There are some studies that have looked at the response to adversity prospectively, by periodically assessing people before and after adversity. When an adverse event happens, the researchers then have information about the response before and after the event. The difference in how studies happen is important because when retrospective and prospective methods are compared, they usually give different results.

"So much research on studying post-traumatic growth has been done using a retrospective assessment that asks people how the adversity has changed them after the fact, but when findings from retrospective and prospective designs are compared, the correlation is nonexistent," Infurna said. "There needs to be more

research done using prospective research designs that follow people both before and after the onset of the adversity.”

With support from the John Templeton Foundation, Infurna and Jayawickreme are working to disrupt how scientists worldwide study how people respond to adversity. The duo lead the Pathways to Character study, which advocates for using prospective methods to study whether and how people change following adversity. The project has spread \$2 million in funding across the globe, to 10 research groups in the United Kingdom, the Netherlands, Germany, Canada and at universities across the United States. Each group is prospectively studying how people from across adulthood and old age experience and respond to adversity.

“The goal of the Pathways to Character project is to jump-start the study of resilience and post-traumatic growth using prospective designs. We want to have an influx of prospective studies, and if the findings ruffle feathers all the better,” Infurna said.

**What doesn't
kill you
might not
make you
stronger.**

**And that is
OK**





COACHING FELLOW



STUDENTS IN DATA

Above: Thato Seerane, Xochitl Smola, Lauren Ott and Isabel Strouse with Senior Lecturer, Whitney Hansen

Philanthropic gift helps ASU psychology launch new center that supports student successes in data analysis and writing

By Robert Ewing

The combination of “data” and “statistics” might not sound exciting, but careers relying on data and statistics are projected to grow by 30 percent through 2024. Moreover, the National Association of Colleges and Employers identifies oral and written skills as core competencies for college graduates and as pivotal for future employment.

To equip students with the skills they will need to handle data and communicate effectively, the Arizona State University Department of Psychology launched the new Student Success Center (SSC). The center provides students enrolled in the foundational courses (PSY 101, 230, 290) and upper-division psychology courses with individualized coaching to improve both their data analysis/interpretation skills and their writing.

“Being able to collect and analyze data and being able to communicate ideas effectively are critical not only for success in psychological science, but also for success in most careers. If we are to be invested in our students — which we are — we need to invest in helping them develop these skills,” said Steven Neuberg, Foundation Professor of Psychology and chair of the department.

The SSC is supported by the Robert B. Cialdini Leap Forward Fund. The fund allows

the psychology department to take innovative risks, like the SSC, that would not otherwise be possible.

The goal of the center is to prepare undergraduate psychology students for success in academics and well beyond. Student success coaches, who have excelled in the courses they are helping with, will staff the center. The center will also offer workshops led by faculty, graduate students and other undergraduate students on topics like mindfulness, building a resume and coping with stress.

“The Student Success Center is unlike other options at ASU because our coaches are advanced psychology students. They have taken the classes, have mastered the content and understand how statistical and writing techniques should be applied in psychology courses,” said Whitney Hansen, senior lecturer in the Department of Psychology and supervisor of the SSC.

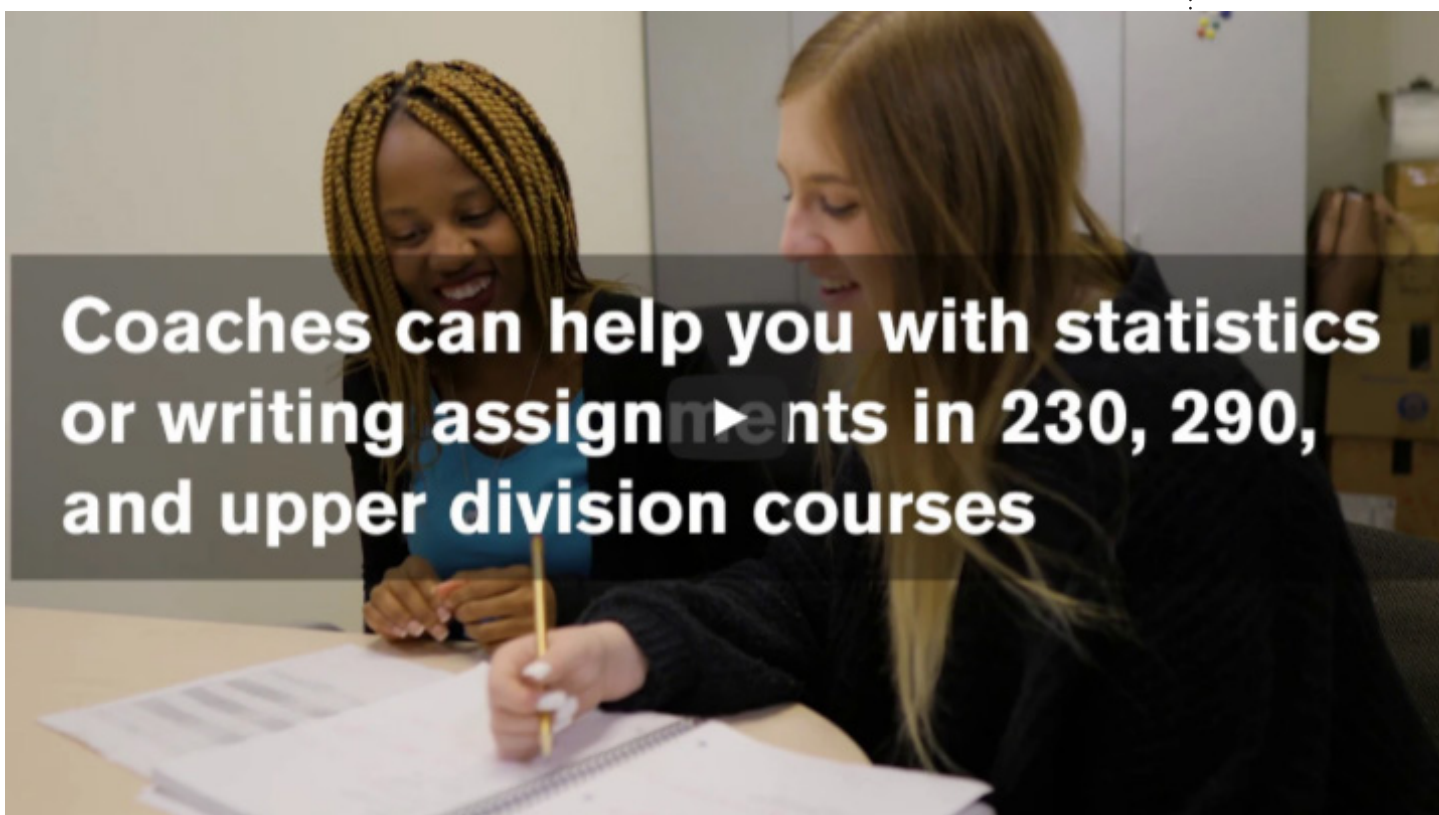
Appointments are available 40 hours per week, in the psychology advising office or in virtual classrooms during the evenings and weekends.

“We aim to provide the resources that students need in this changing educational environment, outside of the classroom and discussion sections,” said Dawn Phelps, assistant director of academic services for the psychology department.





Top:
Xochitl Smola and
Isabel Strouse
Bottom: Lauren
Ott and Thato
Seerane



**Coaches can help you with statistics
or writing assignments in 230, 290,
and upper division courses**



Changing problem drinking behaviors in college students

By Robert Ewing

ASU Department of Psychology brings successful evidence-based program to campus.

“Animal House” and “Van Wilder” are fictional accounts of college, yet the role alcohol plays in these two film comedies is rooted in reality and can have consequences that are far from funny.

According to the National Institutes of Health, almost 60 percent of college students ages 18 to 22 drank alcohol in the past month. About 66 percent

of students nationwide who drink also engaged in binge drinking, which is five or more drinks in a single setting for men and four or more drinks for women. The effects of alcohol in college often continue beyond the party or the bar: About 1 in 4 students also reported academic consequences from drinking, such as lower grades or missing class entirely.

Because of sobering statistics like these, clinical psychologists in the Arizona State University Department of Psychology are actively working on implementing a new and innovative way to address problem alcohol use in students.

With support from the Robert B. Cialdini Leap Forward Fund, the researchers are bringing the Brief Alcohol Screening and Intervention for College Students (BASICS) to the ASU campus. The BASICS program was created at the University of Washington and is an evidence-based, educational program that addresses problematic alcohol use in college students. Research has repeatedly demonstrated students drink less and experience fewer alcohol-related negative

consequences after completing the BASICS program.

Though the program is brief — it consists of two in-person interviews that are about an hour long — it has a high long-term success rate. Four years after participating in the BASICS program, over 67 percent of high-risk college students had improved or resolved their problem drinking behaviors.

“Consequences of risky college drinking include the potential for physical injury, motor vehicle crashes, academic and legal consequences, mental illness, physical and sexual assault, increased suicide attempts and even death,” said Matthew Meier, assistant clinical professor and associate director of clinical training in the ASU Department of Psychology. “By offering the BASICS program to ASU students who are at risk for developing alcohol problems, we can prevent many of these negative consequences and create a safer environment on campus and in our surrounding community.”

The two sessions that form the backbone of the BASICS program teach students how to make better decisions about alcohol use by making sure they clearly understand the risks associated with problem drinking. The program also focuses on how to individually motivate

each student to change problem drinking habits, develop skills to moderate their drinking and promote healthier choices in general. Students also receive personalized feedback on ways to reduce future risks that could lead to alcohol misuse.

ASU students can voluntarily participate in the BASICS program, or students may be referred by the dean of students, ASU Police or ASU Housing.

Making BASICS happen at ASU

During the winter break, the psychology department hosted a BASICS training program led by George Parks, founder and CEO of a private training and consultation firm called Compassionate Pragmatism.

For three days, ASU clinical and counseling psychology, social work and behavioral health graduate students received training on skills and techniques to implement the effective and nonjudgmental BASICS program. Everyone who completed the program with Parks earned a BASICS training certification.

“The BASICS training program allowed our graduate students to be trained how to provide an evidence-based intervention and qualifies them to train others,” Meier said. “This training, and the implementation of the BASICS program, will help make the community as a whole safer by reducing alcohol abuse.”



Sleepovers reduce stress in shelter dogs

By Kim D'Ardenne



Of the estimated more than 4 million dogs that end up in animal shelters each year, about half a million are euthanized. To increase the number of shelter dogs that are adopted, Arizona State University's Canine Science Collaboratory studies what happens in animal shelters and how it affects dogs.

The research team just finished looking at how sleepovers, or short-term foster care, impact the stress response and rest patterns of shelter dogs. The study, published in PeerJ on March 27, was conducted in collaboration with shelters in Arizona, Utah, Texas, Montana and Georgia.

"We are trying to improve the lives of shelter dogs by helping them finding loving homes," said Clive Wynne, professor of psychology and head of the Canine Science Collaboratory.

A weekend to the workweek

The idea to study sleepovers came after a trip to Best Friends Animal Sanctuary in Utah. The sanctuary has a long-standing sleepover program in which volunteers take dogs home overnight. The ASU research team and their collaborator Erica Feuerbacher of Virginia Tech decided to test if such short-term foster care experiences were beneficial to shelter dogs.

"We wanted to understand what effect sleepovers had on dogs' behavior and if being away from the shelter environment, even temporarily, potentially reduced the stress they experience," said Lisa Gunter, Maddie's Fund Research Fellow in the ASU psychology department and first author on the study.

The team tracked the dogs' stress by measuring the stress hormone cortisol before, during and after sleepovers. Even though the five participating shelters were very

different — some care for 600 dogs a year and others more than 6,000 — the cortisol levels for all the dogs decreased during a sleepover. When the dogs returned to the shelter, their cortisol levels were the same as before. Gunter said the sleepovers were like a weekend away from work: They provided a short break from the stress of living in a shelter.

"It was an open question if it would be stressful for dogs to come back to the shelter after being away for a weekend but because of this study, we know a sleepover is a very welcome break," said Debbie McKnight, vice president of field and animal welfare at the Arizona Humane Society (AHS). AHS was one of the five shelters that participated in the study. "The sleepovers let us find out so much

about how a dog behaves in a home, and that knowledge helps us match them to their forever home.”

AHS has continued using sleepovers because they benefit the dogs and are an easy way to introduce new volunteers to fostering.

Noisy neighbors

Dogs who live in homes sleep approximately 14 hours each day, while dogs in shelters only sleep just under 11 hours each day.

“Trying to sleep in a shelter is like trying to sleep with noisy neighbors,” Gunter said. “You can’t get in a good nap during the day.”

To understand the impact of short-term foster care on rest patterns of shelter dogs, the research team outfitted dogs from the shelters in Arizona, Montana, Georgia and Texas with an activity-tracking collar. The longest rest period was during the sleepover, but even after returning to the shelter, the dogs rested longer than before.

Because sleepovers reduced dogs’ cortisol levels and increased their time at rest, Gunter said shelters that do not currently have short-term foster programs should give sleepovers a try. Potential adopters often use information from foster volunteers when making decisions about whether to bring a dog home.

But, sleepovers are just one piece of the puzzle to improving the lives of shelter dogs. The Canine Science Collaboratory is also studying how to keep dogs out of shelters and to transform the experience once they are there. The team is currently studying other programs that allow dogs out of shelters, like field trips and long-term foster care. With a grant from Maddie’s Fund, they are enrolling 100 animal shelters across the country in a study to understand how foster care impacts the dogs in shelters, organizations that implement foster programs and the staff and volunteers who make them possible.

Rachel Gilchrist, ASU psychology graduate student in the Canine Science Collaboratory, and Feuerbacher, assistant professor of animal and poultry science at Virginia Tech, also contributed to the study. The work was funded by Maddie’s Fund.





More than just memories: A new role for the hippocampus during learning

By Kim D'Ardenne

ASU and Stanford study shows how the hippocampus provides information to other brain areas during learning.

Avid hikers know to be cautious of plants with leaves made up of three leaflets if they are red in the spring or fall. Parents worldwide know the precarious relationship between proximity to bedtime and roughhousing with their children.

How do hikers know to link the color of a leaf with the season to determine if it is poison ivy? How do parents know to link the time of day with a child's excitement level to determine the success of a

bedtime routine? Just like Pavlov's dogs salivated when a bell rang, people learn to recognize poisonous plants or prevent toddler tears of exhaustion by forming associations among details in their surroundings and what happens.

Researchers from Arizona State University and Stanford University analyzed patterns of brain activity in humans and discovered a previously unknown role for the hippocampus, a brain area important to memory, in forming associations during learning. The study was published on March 6 in *Nature Communications*.

"This study has important implications for understanding how the brain's memory systems contribute to learning and decision-making" said Vishnu Murty, an assistant professor of psychology at Temple University who was not involved with the research. "The findings could help us understand the complexity of

decision-making deficits in populations where the focus has mostly been on memory deficits, like Alzheimer's disease, other psychopathology disorders and normal aging."

When people learn, they build associations among features — like the time of day and mood of a toddler — to predict an outcome, like whether or not roughhousing will end in tears.

"These associations have a big influence on behavior," said Ian Ballard, who recently earned his doctorate in neuroscience from Stanford University and is first author on the paper. "But in the real world, objects or events

are defined by more than one feature or combinations of features, and we wanted to understand how the brain builds associations over similar configurations of features.”

To unpack how the brain might handle the problem of building associations over such complex, real-world information, the research team focused on a small brain structure that looks like a snail shell.

A tiny yet powerful brain area

The hippocampus is approximately one-third the size of a gumball, and this small brain structure is crucial for memory formation. Without it, people cannot form new memories about facts or events, like what day it is or the names of coworkers. During memory formation, the hippocampus represents individual details of an event, like where you parked your car, to be as different as possible from each other.

“One challenge with memory is that it is hard to distinguish similar experiences. So, if you use the same parking garage at work every day, you have to remember which floor and space to go to at the end of the day,” said Samuel McClure, associate professor of psychology at ASU and senior author on the paper. “The problem is that it is easy to confuse where you parked on different days. The hippocampus is critical for remembering the combination of where and when.”

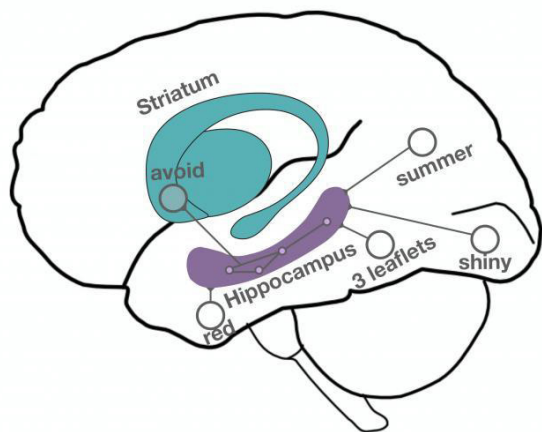
How the hippocampus forms memories provided a mechanism for how complex combinations of features could be represented in the brain, but whether the small, coiled structure actually contributed to how people learn about the world was an open question.



poison ivy (summer)



poison ivy (fall and spring)



Above: The hippocampus is necessary for forming new memories, and researchers from Arizona State University and Stanford University have found another role for this brain structure in learning. The hippocampus (purple) sent important information to brain areas responsible for learning, like the striatum (teal). Specifically, the hippocampus kept track of associations between features in the environment, like the fact that poison ivy plants, with their three leaflets, are red in the fall and spring but are green in the summer. This association between color and leaf shape is necessary to learn to identify poison ivy and not mistake it for plants that look similar, like boxelder (not pictured) that also has three leaflets but is green in the spring. Image credit (top) “Poison ivy” by Stilfehr is licensed under CC BY-SA 3.0. (bottom) “Poison ivy foliage during autumn leaf coloration in Ewing, New Jersey” by Famartin is licensed under CC BY-SA 4.0.

To identify how the hippocampus might contribute to how people form associations in the real world, the researchers designed a learning task that required participants to use combinations of features to predict whether an outcome would happen. A series of stimulus images, like a single face or a face paired with a building, appeared sequentially on a screen. The participants then had to predict whether a target image would appear after the stimulus images. The goal for the task was to respond as quickly as possible to any target image that showed up.



It was only the combinations of two stimulus pictures, like a face paired with a townhouse, that that could be used to predict when a target would appear. The individual stimuli, like the face image, were not useful for predicting by themselves.

As the participants worked through the task, the research team used functional magnetic resonance imaging (fMRI) to measure brain activity from the hippocampus and other brain structures known to be involved in learning. The team then examined the patterns of activity during the task and noticed something interesting about the activity in the hippocampus. It was the only brain structure that represented the stimulus images bound together, which is important because success on the task required forming associations about combinations to accurately respond to the target images.

“We found the hippocampus uniquely represented bound features: faces and houses were distinct from a face and house mingled together,” Ballard said.

A new way the hippocampus contributes to learning
When the research team looked at how the patterns of activity in the hippocampus were related to other brain areas, they found hippocampal activity was tightly correlated with activity in the striatum. Nestled beneath the

cortex, the striatum consists of three separate structures — the caudate, putamen and nucleus accumbens — and plays an important role in learning what predicts desirable outcomes.

“The hippocampus formed bound associations of multiple features that supported learning in the striatum about the configuration of multiple features in the environment,” Ballard said.

How the striatum handles information during learning is well known, but where all the information comes from is an open question. Ballard added that this study starts to chip away at

that question by showing the hippocampus provided information about combinations of features to the striatum and that information was used to learn how to succeed at the task.

Until recently, the brain was thought to have separate learning systems, but the findings suggest the hippocampal memory system and striatal reinforcement learning system are interrelated.

“It is really important to think of the brain as an interconnected structure, with different parts that work together to produce our impressive mental feats. Neuroscience and psychology have done a good job at understanding how individual parts work. It is exciting to start trying to figure out how they begin to work together,” McClure said. “We suspect that understanding both normal and diseased mental functions requires figuring out how all of the parts work together — or not.”

Anthony Wagner, professor of psychology at Stanford University, also contributed to the study. The work was supported by a Graduate Research Fellowship and Integrative Graduate Education and Research Traineeship from the National Science Foundation and with funds from Stanford University and ASU.



ASU SciHub workshop brings science, engineering and art experts together to change how we see the world

By Kim D'Ardenne

Sunlight passing through a glass prism makes a rainbow, but the rainbow colors we see are more than just red, orange, yellow, green, blue, indigo and violet.

Those colors are made of waves of light and are a very small part of a larger collection of energy-carrying waves called the electromagnetic spectrum. Some living things, like insects and crustaceans, can see other kinds of energy waves, but people are blind to the vast majority of the electromagnetic spectrum.

"Vision is our most developed sense and is our portal to the external world," said [Frank Wilczek](#), who is a Distinguished Origins Professor at Arizona

State University and the 2004 Nobel laureate in physics. "Yet, vision does not remotely exhaust the electromagnetic signals that arrive at our eyes."

But, are the other parts of the electromagnetic spectrum really beyond the possibilities of human vision?

ASU's [Science Hub](#) (SciHub) is working on an answer to that question. SciHub is co-directed by Wilczek, who is the Herman Feshbach Professor of Physics at MIT and has appointments at Stockholm University and Shanghai Jiao Tong University, and ASU's Lawrence Professor of Solid State Sciences [Nathan Newman](#). The goal of SciHub is to solve complex problems like

how to enhance vision by leveraging the resources and expertise ASU has to offer. The SciHub is supported by Michael Crow, president of the university, and Sethuraman "Panch" Panchanathan, executive vice president and chief research and innovation officer of ASU Knowledge Enterprise Development. The group is currently exploring how to expand the colors people can see.

The convergence of diverse groups of people — like scientists, engineers and artists — and ASU's resources will remove barriers to solving complex problems such as expanding human

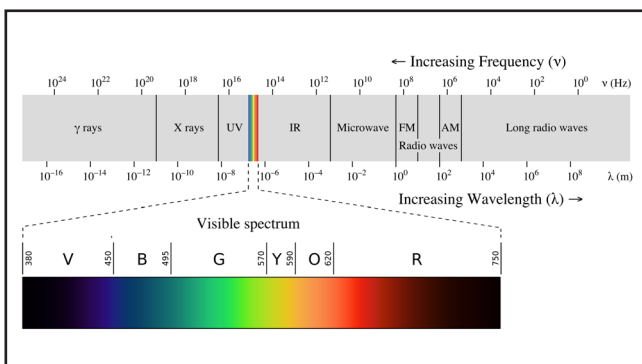
perception, Newman said.

An important step in the process of enhancing human vision will happen when experts from science, engineering and art gather for the [Science, the Arts and Possibilities in Perception \(SciAPP\)](#) workshop on March 6-8 at the Tempe Mission Palms Hotel. The workshop pairs talks from scientists, engineers, artists, designers and entrepreneurs with opportunities to listen to live music and view art. The SciHub is organizing the SciAPP workshop in collaboration with another ASU interdisciplinary group, the [Science of Art, Music and Brain Activity](#).

MORE: [SciAPP workshop schedule](#) | [Information and registration](#)

All that we do not see

Elementary school students often learn the acronym “Roy G. Biv” to help them remember the colors of the rainbow, but when a prism spreads out a beam of sunlight the number of colors in the rainbow is far greater than seven. Human vision condenses the color information that comes into our eyes into three dimensions: red, green and blue. The red, green and blue dimensions correspond to the three types of retinal cells, called cones, in the back of the eye that detect color.



The complete electromagnetic spectrum. The only part of the spectrum people can see is the portion colored as a rainbow. Animals like insects and crustaceans can see other parts of the spectrum, like ultraviolet (UV) light.

“Electromagnetic spectrum revised” by Philip Ronan Gringer is licensed under CC by SA 3.0.

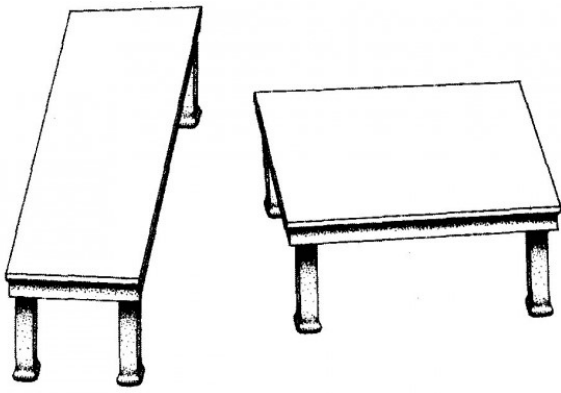
Like an artist mixing paint to create colors, the brain mixes the red, green and blue detected by the retinal cone cells into the different colors people see. Despite the sophistication of the human brain, people cannot tell the difference between the yellow that comes from sunlight separated by a prism and the yellow that comes from mixing versions of red and green together. And some people cannot see certain colors at all. These people are color blind because some of their retinal cone cells do not distinguish the red, green and blue dimensions.

Unlike the human eye, certain instruments commonly found in physics and engineering labs at ASU, called spectrometers, can tell the difference between the two versions of yellow and can detect the entire electromagnetic spectrum, not just visible light. Through SciHub, the scientists and students who operate these spectroscopic instruments are working on ways to help color blind people by adjusting the incoming electromagnetic spectrum to better match the receptors in their eyes.

“SciHub brings together people from science, engineering, art, machine learning, business and industrial design and also spans the educational spectrum,” Newman said. “We have a super team made up of prize-winning scientists, engineers and artists who work closely with graduate students, undergraduate students and high school students working on our projects.”

How we see the world can create illusions — and art

Condensing color information into red, green and blue is not the only way human vision changes incoming visual information. Because people live in a three-dimensional world, the brain automatically imposes 3D structures on everything people see. This constraint usually helps people to see the world accurately and faster but can also occasionally create visual illusions. Roger Shepard, one of the pioneers of cognitive psychology, studied visual and other illusions as a psychologist and an artist. Shepard is now the Ray Lyman Wilbur Professor Emeritus of Social Science at Stanford University, and his artwork, much of which is filled with visual illusions, will be featured at the SciAPP workshop on March 6.



A drawing from cognitive psychologist and artist Roger Shepard that shows how imposing three-dimensional structure on two-dimensional shapes can lead to visual illusions. The table on the left looks longer than the one on the right, but the tables are actually the same shape and size.

Image credit: "Tables" by Roger Shepard is licensed under CC by SA 4.0.

In his 1990 book "Mind Sights," Shepard wrote: "Without our bidding or even our awareness of its existence, (the nervous system) immediately goes to work on any visual input. ... We cannot choose to see a drawing merely as what it is — a pattern of lines on a flat, two-dimensional space."

One of Shepard's most famous drawings of a visual illusion shows two tables that are placed perpendicular to each other. Because the brain imposes 3D structure on everything people see,

the table on the left of the drawing looks longer than the one on the right. But, the two-dimensional images of the tables are in fact the exact same shape and size.

"We have a limited capacity to experience reality," said [Mike McBeath](#), a professor of psychology at ASU, one of the founders of the SAMBA group and part of the SciAPP organizing committee along with Wilczek and Newman. McBeath earned his doctorate from Stanford while working with Shepard. "Understanding how our perceptual systems filter the information coming in lets perception scientists, designers, artists and musicians 'play games' through visual and auditory illusions and also helps us develop new applications that expand and improve how we see or hear.



Video:
Nate Newman
and Michael
McBeath
share about
the upcoming
SciAPP
conference

A portrait of Marianna Kaneris, a young woman with long dark hair, smiling. She is wearing a blue sweater. The background is a blurred outdoor scene with trees and foliage.

Dean's Medalist fights community health disparities with language research

By Robert Ewing

Marianna Kaneris, an Arizona State University senior and a double major in psychology and biochemistry, was recognized on Dec. 11 as the Dean's Medalist for the Department of Psychology. The Dean's Medalist is the highest achieving student in the psychology department for the fall 2018 graduating class.

"I have plenty of peers who were equally deserving, so it is a great honor to be recognized as the Dean's Medalist," Kaneris said.

Her contributions to psychology go far beyond academics. Kaneris served her fellow students as a student assistant in the academic advising office and was a member of Psi Chi, the National Honors Society of Psychology. She also worked with Viridiana Benitez, assistant professor of psychology, in the Learning and Development Lab.

The Learning and Development Lab investigates how young children learn language using techniques like tracking where children look, observation and having the children play games on a computer or tablet. The goal of research in the Learning and Development Lab is to understand how young children learn in general and especially how they learn about the world surrounding them.

"Marianna is an exceptional student," Benitez said. "She's a fast learner, fully committed to her responsibilities in and out of the lab, and she really enjoys thinking about the research

questions and exploring new areas to learn. She did so well in the first semester in my lab that I asked her to stay on through the summer."

Kaneris said the Learning and Development lab was a perfect fit because of her experience with language learning: She grew up speaking Greek at home and studied French at ASU. She also loves working with children.

"Marianna takes initiative. When something needs to be done in the lab, she doesn't wait to be told to do it. She also gives feedback and ideas for how to make our research better," Benitez added.

In the future, Kaneris plans to pursue graduate studies in public health, focusing on health promotion in communities.

"There are a lot of health disparities in communities, and I would like to go into health promotion to help people to live happier and healthier lives," Kaneris said.

Question: What was your "aha" moment, when you realized you wanted to study the field you majored in?

Answer: I had been interested in health since my science classes in high school, and this interest led me to study biochemistry at ASU. I liked chemistry and was interested in learning about health on a molecular level. But then I took Psychology 101 my sophomore year of college and loved it. I decided to double major in psychology and biochemistry. Psychology plays an integral part in health as well, so it was a

natural fit for me and my interests.

Q: What's something you learned while at ASU that changed your perspective?

A: I learned to enjoy the journey, one day at a time. Life holds a lot of twists and turns, so learning to be grateful for the present is very important. Like a lot of students, I thought I had to know exactly what I wanted to do with the rest of my life on my first day of college. That's wonderful for those people who do know what they want to do, but for the others like me, I now know that it's OK to explore your options and figure things out along the way.

Q: Why did you choose ASU?

A: Having grown up in Phoenix, I had the opportunity to visit ASU when I was younger, and I loved the ASU environment and community. There was no question that this was the school I wanted to attend. Also, I have family members who are ASU alumni, so I knew that ASU provided the resources and opportunities for its students to succeed.

Q: Which professor taught you the most important lesson while at ASU?

A: I have been really fortunate to have had so many wonderful professors here at ASU; all have influenced me with their enthusiasm, approachability and encouragement. It is hard to choose just one! The most important lesson I have learned is to be positive

and always have enthusiasm in whatever I do.

Q: What's the best piece of advice you'd give to those still in school?

A: I would give two pieces of advice. First, believe in your abilities, and never give up on achieving your goals.

The second piece of advice is to use your time in college to step out of your comfort zone a bit and try new things. That could mean joining a club, getting involved in research or simply just introducing yourself and starting a conversation with one of your classmates sitting next you.

The best experiences and strongest friendships I have made throughout college have been from when I stepped out my comfort zone.

Q: What was your favorite spot on campus, whether for studying, meeting friends or just thinking about life?

A: My favorite spot for studying was the second floor of Noble at the tables by the windows. My absolute favorite part of campus is by the fountain in front of old main, especially in the mornings when the light hits the water; I find it so calming.

Q: What are your plans after graduation?

A: I plan on pursuing graduate studies next fall in public health with a focus on health promotion.

Q: If someone gave you \$40 million to solve one problem on our planet, what would you tackle?

A: I would address some of the health disparities across the world. I would try to ensure that everyone has access to clean water, nutritious food and basic medical resources.

A photograph showing the backs of three people (two adults and one child) standing on a rooftop or balcony, looking out over a city skyline at sunset. The sky is orange and yellow, and the city lights are visible in the distance.

Study finds lack of mental health interventions for ethnic minority youth in the US

By Kim D'Ardenne

Hispanic and Latino youth are more likely to drink alcohol at a younger age than their African-American and non-Hispanic Caucasian peers, but they are less likely to receive treatment for substance abuse.

African-American youth show more symptoms of attention deficit hyperactivity disorder than their Caucasian peers, but they are less likely to receive appropriate treatment for disruptive behaviors.

The suicide rate among Native Americans has been outpacing the rest of the country since 2003. Suicide is the second-leading cause of death among Native American adolescents, and there are very few effective interventions.

A research team of experts from Arizona State University, DePaul University and the University of Southern California has evaluated the effectiveness of interventions for mental health problems like substance use,

disruptive behaviors and suicide prevention in ethnic minority American youth. The study, which was commissioned by Division 53 of the American Psychological Association, will be published Feb. 12 in the *Journal of Clinical Child and Adolescent Psychology*.

"This careful study provides a benchmark for evidence-based interventions in minority youth, which is central to providing effective care to the diverse youth population and will be very useful to funders of research, payers of health care and family members," said Margarita Alegria, professor of psychiatry at Harvard Medical School and chief of the Disparities Research Unit at Massachusetts General Hospital. Alegria was not involved in the study. "This evaluation also sets the groundwork for the future, by identifying the need to focus on the development and evaluation of more interventions for minority groups that have not yet been addressed, like Asian-Americans, Native Americans and youth who do not speak English."

Ten years ago, there were zero evidence-based interventions for American ethnic minority youth that met the strongest criteria and were considered well-established.

Now there are four.

Well-established and evidence-based

To evaluate the effectiveness of mental health interventions for ethnic minority youth, ASU's Armando Pina, associate professor of psychology, worked with Antonio Polo, associate professor of clinical psychology at DePaul University, and Stanley Huey, associate professor of psychology and American studies and ethnicity at the University of Southern California. The trio rated evidence-based interventions designed to target problems like anxiety, depression, disruptive

behavior, substance use, trauma and stress reactions and self-harm or suicide. In total, the team evaluated 65 interventions that had either analyzed the impact on ethnic minority participants or been tested on a participant group that was at least 75 percent ethnic minority youth.

The highest rating was “well-established” and included interventions that were tested using randomized controlled experimental designs, had been replicated by more than one research group and demonstrated benefits to the youth that were statistically significant.

The four interventions that met the well-established criteria were designed to treat anxiety, disruptive behaviors and substance use in ethnic minority youth.

The team found cognitive behavioral interventions were effective at helping Hispanic and Latino youths experiencing anxiety. These interventions teach strategies to change problem thinking patterns and behaviors and often include social skills training.

Interventions that involved parents, called family therapy, helped African-American youth struggling with disruptive behaviors and Hispanic and Latino youth with drug- or alcohol-use problems. Including the family, school system or peer networks in therapy to address disruptive behaviors was also effective in helping African-American youth.

“Parents and caregivers need to know that for some of the most common problems children and adolescents face, there are well-established treatments that have been systematically tested,” said Pina, who was the lead author on the study. “They should demand children get these empirically supported treatments and interventions.”

From bench to bedside

On top of the four well-established interventions, the researchers identified other treatment programs that met less-stringent rating criteria and could be considered best practices in the future.

The analysis also determined which mental

health problems did not yet have effective interventions for ethnic minority youth and which minority groups were underrepresented. There were no well-established interventions for depression, trauma and stress reactions, self-harm, suicide or the co-occurrence of more than one problem, like anxiety and disruptive behaviors. And, none of the 65 studies analyzed by the research team included enough Asian-American or Native American participants to evaluate whether any of the interventions were robust for these populations.

Related: [Book provides a new framework for making sense of mental illness](#)

“Including Native American youth in research studies is important and requires working directly with tribal nations because they regulate research within their communities. Researchers must invest considerable time to build relationships and establish trust to gain tribal approval for a research study,” said Monica Tsethlikai, assistant professor in ASU’s T. Denny Sanford School of Social and Family Dynamics and an affiliate faculty member of the university’s American Indian Studies program. Tsethlikai was not involved in the study. “Native Americans also have a unique worldview that includes a metaphysical perspective of health and well-being that does not fit within Western interventions, so effective interventions would need to originate from a foundation of respect and reciprocity and would have to be congruent with the lived experiences of Native American youth.”

The team advocated for more research that includes underrepresented ethnic minority populations. Because the trajectory of an evidence-based treatment program from a research setting into the real world takes 17 years on average, the researchers also suggested future work should focus on the development of streamlined methods to develop interventions and test how well they work.

“Research should move outside of the lab and into the community,” Pina said. “Intervention scientists need to increase collaborations with established systems of care and real-world providers, who are under real-world constraints.”



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