Low-Income Women Often Battle Perinatal Depression Alone

The odds that a woman will face depression during or shortly after pregnancy are about the same as the chances that her baby will have blue eyes.

“It’s not a rare occurrence,” says Darius Tandon, medical social sciences and associate director of the Institute for Public Health and Medicine’s Center for Community Health. “We know that economic instability increases the risk of perinatal depression and that disparity is compounded when access to care is lacking.”

A trained community psychologist, Tandon also serves as editor-in-chief of *Progress in Community Health Partnerships*, the only peer-reviewed academic journal solely focused on community-based participatory research.

Perinatal depression — which occurs between pregnancy and a child’s first birthday — affects an estimated 1 in 7 women according to the US Department of Health and Human Services. Of even more concern is that just 15 percent of affected women access treatment, meaning more than a half million women receive no help every year. In severe cases, women suffering from perinatal depression are at increased risk of doing harm to themselves or their baby. continued page 2...

Economic Hardship Linked to Health Decline in Youths

Northwestern researchers have found that the more time black teenagers spent experiencing economic hardship during the Great Recession, the worse their health.

“We know that African Americans experience a disproportionate share of disease burden in our society,” says Edith Chen, psychology, and Institute for Policy Research (IPR) fellow. “This research advances our knowledge of the specific biological processes that may be altered in youth whose families experience economic hardship.” Chen is the first author of “The Great Recession and health risks in African American youth,” a study published in March in *Brain, Behavior, and Immunity*.

The study’s authors believe it to be the first to use an economic event as context for continued on page 6...

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Perinatal depression — which occurs between pregnancy and a child’s first birthday — affects an estimated 1 in 7 women according to the US Department of Health and Human Services.
“Many women who have elevated depressive symptoms but don’t meet criteria for major depression receive scant attention from their healthcare providers,” says Tandon. “Mothers who are symptomatically or clinically depressed endure a host of bad outcomes when untreated and their children are also likely affected in long-term ways we’ve yet to study.”

Tandon recently began work on two studies to evaluate the effectiveness of a home visiting program designed to curb postpartum depression in low-income women. Collaborators at Northwestern include Jodi Ciolino, preventive medicine; Jacqueline Gollan, psychiatry and behavioral sciences; and J.D. Smith, psychiatry and behavioral sciences. Tandon will also add undergraduate and medical students to his research team in the near future.

The Mothers and Babies Program — a curriculum created at Northwestern to help pregnant women and new mothers better cope with stress — has previously been shown to reduce depressive symptoms and prevent major depression when implemented in a group format while women are still pregnant. Over the past decade, thousands of women throughout the United States have been introduced to the program. In Florida, Tandon and colleagues will train home visitors from throughout the state to examine if a one-on-one approach can achieve similar results.

“Home visiting programs provide various services to pregnant women and new mothers and, thus, are an innovative and potentially viable setting by which mental health interventions can be delivered,” says Tandon.

This two-year project, which began July 15, is a collaboration among the Feinberg School of Medicine, Florida Association of Healthy Start Coalitions, the Florida Department of Health, and Florida State University’s Center for Prevention and Early Intervention Policy. It is being funded by a $400,000 grant from the Robert Wood Johnson Foundation and the Florida Healthy Start Coalition.

In Illinois, Tandon will work with a network of home visiting providers that serve a racially and ethnically diverse group of perinatal women. The goal is to determine if the Mothers and Babies Program can be delivered using paraprofessional home visitors. Paraprofessionals receive training in care delivery but are not necessarily licensed child development or mental health specialists.

Currently, there are no interventions led by non-health or non-mental health professionals that have been determined to be effective in preventing the onset or worsening of postpartum depression among low-income women.

“This project was selected for Patient-Centered Outcomes Research Institute (PCORI) funding not only for its scientific merit and commitment to engaging patients and other stakeholders, but also for its potential to fill an important gap in our health knowledge and give people information to help them weigh the effectiveness of their care options,” says Joe Selby, PCORI executive director.

“We look forward to following the study’s progress and working with Northwestern to share the results.”

PCORI, an independent, nonprofit organization authorized by Congress in 2010, has awarded $2.1 million to the project. PCORI’s mission is to fund research that will provide patients, their caregivers, and clinicians with the evidence-based information needed to make better healthcare decisions.

“The reality is that a lot of the environments in which low-income women reside are lacking critical healthcare services,” Tandon says. “By bringing mental healthcare into the home, we can hopefully serve more women and lesson the effects of depression for generations to come.”
We’ve enjoyed a beautiful summer at Northwestern so far. For many of us, that means we have embraced the chance to get out of our offices, classrooms, and laboratories a little more while the weather cooperates. We can check back in January to compare notes about the local climate, but for now the sun is shining, the temperature is seasonally warm … and the jackhammers are rattling the bedrock.

No doubt, as you’ve explored campus, both in Evanston and Chicago, you have encountered the sights and sounds of construction. The signs proclaim that we’re “Building a Better Northwestern” — and that is absolutely true — but we all understand that this progress comes with a convenience cost. I can personally attest to the noise around the Rebecca Crown Center as we resurface the plaza. The University is making a vital investment in its long-term future through these necessary infrastructure enhancements. For example, Northwestern’s research enterprise will be that much stronger because of renovations to Hogan Hall, the Mudd Building, and the Tech AB Infill. Similarly, the new Kellogg building and the Simpson Querrey Biomedical Research Center are state-of-the-art structures designed to spur world-class scholarship and science.

These and the many other improvements on our campuses are noisy. They can be disruptive. They are also vital to Northwestern’s enduring success and impact as a global research university. (You can keep track of all these projects by visiting our frequently updated construction website.)

Of course, the University’s administration recognizes that there is a balance between our short-term and long-term goals. We understand the imperative to provide space and resources today so that our faculty, postdocs, and graduate and undergraduate students can pursue their discoveries and education right now. There are huge investments of your time, energy, and ideas in today’s investigations. We take these considerations very seriously. Yet, we also must balance the here-and-now against tomorrow’s challenges and opportunities. For Northwestern to continue to thrive as a top-tier research institution, we must bolster our physical assets while we keep making investments in talent development. In fact, those physical resources are one key to attracting and retaining top talent. Facilities are crucial for breakthrough discovery to occur — especially given the reality of how high-impact, collaborative research happens.

As we build and renovate, we are also taking a careful look at how we use our existing spaces, seeking to optimize that space as wisely as possible. This is particularly important since Northwestern is geographically constrained. We simply don’t have the luxury of untapped acres of land onto which we can expand. So we are strategic, both in terms of what we construct and how we use our current resources.

I know it isn’t always easy to look out your window and regard the rumbling bulldozer or seemingly endless fencing that was not there yesterday. It is certainly not easy to manage delicate laboratory experiments while the ground is trembling — even if we do our best to regard all these phenomena as tangible signs of progress.

Together, though, we really are Building a Better Northwestern. And together we will succeed in balancing the University’s present and future needs.

Vice President for Research

TALK BACK!
WE WANT TO HEAR FROM YOU. SHARE YOUR COMMENTS AND IDEAS HERE.

Research Note: Building a Better Northwestern, for Today and Tomorrow
Origins: Exploring the Journey of Discovery
Konrad Kording uses the power of Big Data and interdisciplinary research to reveal how the brain processes information

Konrad Kording is chipping away at your head.

He wants a breakthrough in inner space, and he's using Big Data to explore a very small place: the vast-yet-tiny network of some 80 billion neurons in the average human brain. His efforts aim at revealing new insights into how the nervous system processes information.

A physicist by training, Kording is also a data science expert with a passion for harnessing data analytics and cross-disciplinary inquiry in his Bayesian Behavior Lab, home to an array of researchers with interests in biology, applied and theoretical mathematics, cognitive science, metascience, and more. Kording wants to push the boundaries of neurological research and spur innovation that can result in numerous benefits — including in settings such as the Rehabilitation Institute of Chicago (RIC), where he is a research scientist in addition to his role at Northwestern in physiology and physical medicine and rehabilitation.

Kording's lab pursues a variety of inquiries, yet mostly with a focus on data analysis and Bayesian methods. (Bayesian logic seeks probabilistic inferences using prior knowledge to predict future occurrences.) The team studies how people move and how those movements are affected by environmental uncertainty. They also build computational models to calculate how people could move better, or could learn to move optimally.

One of the most daunting research challenges Kording and his colleagues tackle through Bayesian algorithms is recording the electrical transmission of neurons, a key to unlocking the secrets of consciousness. The scientists can and do make such measurements, but making them at sufficiently large scale is another matter. President Obama's BRAIN Initiative has geared up to develop the technical capabilities to record a million neurons simultaneously. A related DARPA-run program is even more ambitious: it's looking to create a miniaturized wireless tool to stimulate 100,000 or more neurons. If successful, the outcomes could hold promise for revolutionary interfaces to aid people who are paralyzed.

Getting there won't be easy, and some researchers consider the attempt a "moon shot," but a worthy one. After all, says Kording, millions of neurons are involved in movement across many different areas of the brain.

Kording was born in a suburb of Darmstadt, Germany, in a family that prized learning: his father is a university professor, his mother a teacher, and his brother an astrophysicist. Kording's spouse, Ioana Marinescu, is an economist at the Harris School of Public Policy and a member of the National Bureau of Economic Research. Kording earned his doctorate in physics in 2001 from the Federal Institute of Technology in Zurich and joined Northwestern in 2008. Since 2014, he has served as research scientist at RIC and also has a courtesy appointment in Northwestern's biomedical engineering department. Research News connected with Kording to learn more about his background and work.

What is one of your memorable moments of childhood discovery?

One of my favorite experiences was participating in the German science competition "Jugend Forscht," a national event with multiple rounds. It's pretty popular in Germany and hosted by Bitburger beer. Our project simulated the growth of trees. Today, I still simulate biological systems. Looking back, I always wanted to be a scientist.

Who were early role models who helped shape your career path?

Horace Barlow was my first big hero. He's a British neuroscientist who had a deep way of thinking about brains. Barlow argued that you could not understand parts of the brain until you understand what they are for. He said: "The bird's wing accelerates downward the air flowing past it, producing an upward force sustaining the weight of the bird. What would be an alternative description of a [sensory neuron]?

Did you ever meet Barlow?

Yes, and there is a fun story behind that. I was going to a conference on using natural visual stimuli in the US as a young PhD student. I knew the work of Bruno Olshausen, who was one of my other heroes. He had just discovered a very simple theory that describes much of the visual system. So I emailed Bruno to see if I could visit his lab. Not only could I visit, but I could stay at his place. I was converted to Bayesianism during that visit. While I was there, Horace Barlow visited and he and Bruno conducted a joint and extremely clever vision experiment.

Your research takes on two of the most complex scientific challenges: understanding the brain and understanding Big Data. What led you down this daunting path?

I guess as a physicist I cannot resist the urge of models. As an empirically minded person I cannot resist the urge of data. I always found complex systems interesting. Data only leads to insight if we have models. In fact, data cannot resist the urge of data. As an empirically minded person I cannot resist the urge of data. I always found complex systems interesting. Data only leads to insight if we have models. In fact, data itself is not even usually interesting to the human mind. The problem about modeling the brain is that it consists of many pieces, each of which may have different rules, and all useless without the others. This is very difficult. In fact, a recent paper of ours that showed that with our techniques it would even be hard to understand a microprocessor (on BioRxiv). This paper became very popular for demonstrating this.
What’s been a “eureka!” moment for you professionally?

Eureka moments are not real in science. Only in movies do scientists have eureka moments; I have never witnessed one in science. We are all just getting by with a very fuzzy understanding that crystallizes extremely slowly.

Fair point. Then, in studying neurons — at both an individual and aggregate level — what’s been most surprising?

I think that the fact that the brain is very good at subconscious statistics is probably the most interesting finding.

Your investigations include a focus on how the nervous system handles uncertainty effectively. Can you share a basic insight into this point?

Whatever we learn about the world is noisy. And incomplete. Of all the things in the universe we thus noisily observe just a tiny bit. And yet, we have this model about how the world works. That is an amazing statistical problem. It was beautifully set up by people like Plato and Helmholtz. Now we are in the position where we can mathematically formulate and empirically test such ideas.

Your research has used mobile phones and gaming technology to help patients in rehabilitation.

We all carry phones these days. So why not use them to diagnose diseases? It is a difficult machine learning problem, but that is what we do. And games — the biggest thing in rehabilitation is putting in time. Games are addictive. They make it easy to put in time, which is the one thing we know to actually be effective.

What is the biggest challenge for you in designing experiments?

Recording all the neurons in a mouse is a lofty goal.

Yes. I wrote a number of papers trying to estimate how difficult. In fact, we are not even close to fully recording the entire mouse brain! The current record is at a few hundred or maybe thousand neurons. The mouse has $10^6$ neurons. I figure out the physics and then I talk good experimentalists into doing great experiments.

That helps explain why your lab is so interdisciplinary. How does this contribute to your research success and how do you manage these relationships?

I mostly know data science. The only reason why I can be successful is the broad range of collaborations I have. It is crucial for us to understand our individual areas of expertise, and to know what our colleagues know. It is also important to estimate what is known by no one. One needs to handle the fact that collaborators can be wrong, but they may be wrong in an irrelevant way, which obviates the need to correct them. Also, taking the collaborators’ questions as real and important, even if they seem meaningless, is another key for successful engagement. Their questions are framed based upon their own domain field, which has a reason to care about a particular inquiry even if another field might not yet understand that inquiry. The hope is these relationships prove reciprocal.

What would most surprise a layperson about your research?

Understanding the brain is crazy difficult. Almost anything you read in the news about neuroscience is hyped over the top and does not actually survive critical thought. Models and data analysis approaches, as well as experiments, in neuroscience are getting so complicated that no one person has a good understanding anymore. The only way forward is enhanced specialization, and this is largely blocked by traditional ways of doing science. The classical model is that one alpha male experimentalist comes up with the idea, develops the methods, leads the experiment, and hires someone to do the data analysis. I think in the future this process may be divided into many pieces in different groups. It is hard to acknowledge that we are all clueless about most things and actually rely on other scientists.
investigating links with multiple immune and health measures among African American youth. America’s recent recession, which lasted for 18 months beginning in December 2007, began with a breakdown in the United States housing market and resulted in a global economic downturn in 2009.

Chen, Gregory E. Miller, psychology, and collaborators at the University of Georgia’s Center for Family Research examined epigenetic aging, allostatic load, and self-reported health in more than 300 black adolescents in Georgia from 2007 to 2010.

Epigenetic aging relies on DNA methylation profiling, which provides insight into the health and stability of cells. Research by Lifang Hou, preventive medicine, has shown that when a person’s epigenetic, or biological, age is older than their chronological age, the risk of contracting and dying of cancer rises. Allostatic load is a collection of biological measures that includes blood pressure, hormone levels, and body mass index. It’s meant to illustrate the wear and tear that the body endures during times of stress and has been linked to cardiovascular disease and obesity.

“Our findings are consistent with previous research demonstrating that the accumulation of economic hardship over time is associated with higher risk of heart attack and various inflammatory processes thought to underlie poor health,” says Miller, an IPR fellow. “The more time adolescents spent dealing with economic hardship, the higher their epigenetic aging, allostatic load, and the worse their self-report of health.”

The study findings highlight the role that macroeconomic conditions can play in the health of youth, but Chen cautions that longer-term longitudinal studies are needed to determine potential lasting health effects of economic hardship. IPR’s Center on Social Disparities and Health is focused on bringing together the social, life, and biomedical sciences to understand the origins, consequences, and policy solutions for contemporary health inequalities in the United States.

Chen’s research seeking to understand why poverty is associated with poor physical health outcomes in children has garnered national attention. She has also received numerous honors, including the American Psychological Association’s Distinguished Scientific Award for Early Career Contribution to Health Psychology. Miller has also been honored for his research on how stress affects health. In recent years, he has become especially interested in stressors that occur during early life and how these might influence disease risks across the lifespan.

This research was supported by grants from the National Institute of Child Health and Human Development; National Heart, Lung, and Blood Institute; and National Institute on Drug Abuse.

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Northwestern Economist Elected to British Academy

Economic historian Joel Mokyr has been honored by the British Academy, the United Kingdom’s national academy for the humanities and the social sciences.

The Academy elected Mokyr, the Robert H. Strotz Professor of Arts and Sciences, as a corresponding fellow — an honor reserved for those who live outside of the UK Fellows are elected for their outstanding research contributions.

Mokyr studies Europe’s economic history, specializing in the period 1750 to 1914. Among his books are The Lever of Riches, The Gifts of Athena, The Enlightened Economy, and A Culture of Growth. His research focuses on changes in technology and economic growth, as well as the impact that industrialization and economic progress have had on economic welfare.
Gambian Entrepreneur Gains Crucial Skills Thanks to Transformative Northwestern Experience

Yamundow “Yamz” Camara felt small in one of Africa's smallest nations.

Studying computer science at the University of The Gambia, she realized she was one of just two female students in her class. To change that ratio, the software engineer decided to launch a bold entrepreneurial venture.

As co-founder of the Girls ICT Association, Camara empowers and encourages female students to pursue technology careers. It’s her way of trying to end the stereotype that girls can’t handle the educational workload required to succeed in the tech world.

“The aim of the organization is to encourage girls by teaching them basic IT skills and coding, through camps, competitions, and mentorship programs,” says Camara, who visited Northwestern this summer as one of 25 Mandela Washington Fellows.

The Mandela Washington Fellows is the flagship program of President Barack Obama’s Young African Leaders Initiative (YALI). The program tries to empower professionals through academic coursework, leadership training, mentoring, networking, professional opportunities, and support for activities in their communities.

Camara applied for the extremely competitive fellowship to further her education and range of networking opportunities while visiting the United States for the first time.

“I have always had business ideas but never got down to implementing them,” she says. “Because I have a technical background, I had little knowledge of how to operate a business.”

She bolstered those skills during a six-week business and entrepreneurship institute at Northwestern. Camara and the other fellows enrolled in academic courses focusing on new venture formation taught by faculty in the Farley Center for Entrepreneurship and Innovation, visited numerous Chicago businesses, and participated in community service and Chicago cultural activities.

“It is hard to say what I’ve enjoyed the most because every experience at Northwestern is a journey,” says Camara. “It was amazing to visit the Rainbow Push Coalition and meet with young people who were coding for the first time.”

The fellows who visited Northwestern were part of a larger group of 1,000 young Africans being hosted at universities across the United States. At the end of their six-week experience, the fellows participated in a Presidential Summit, featuring a town hall meeting with President Obama, as well as networking and panel discussions with other US leaders.

New Feinberg Collaborations Sought

The Center for Molecular Innovation and Drug Discovery (CMIDD) is seeking new projects with medical school investigators interested in early stage therapeutic discovery projects. CMIDD’s Medicinal Chemistry team, led by Gary Schiltz, pharmacology, is expanding rapidly with five new synthetic/medicinal chemists joining the team in the coming months.

Investigators who are interested in discussing collaborations, research grant aims for potential projects, or project design should email CMIDD.

CLP Core Expo to Highlight Research Strengths

The Chemistry of Life Processes Institute presents its “Core Expo 2016” on August 18 on the Chicago campus.

Managers from nearly a dozen core facilities will showcase their innovative biomedical expertise, research, and services available to Chicagoland researchers. Attendees can learn how centers and cores collaborate to advance potential therapeutics and diagnostics from the early stages of discovery through pre-clinical testing.

The Expo occurs from 11 a.m. until 1 p.m. inside the Method Atrium, 310 East Superior Street, on the Chicago campus.

Register for free, here.
NIH Director Highlights Northwestern Opthamologist’s Research

For Gregory Schwartz, ophthalmology, working in total darkness has its benefits. Only in the pitch black can Schwartz isolate resting neurons from the eye’s retina and stimulate them with their natural input — light — to get them to fire electrical signals. Such signals not only provide a readout of the intrinsic properties of each neuron, but information that enables the vision researcher to deduce how it functions and forges connections with other neurons.

The retina is the light-sensitive neural tissue that lines the back of the eye. Although only about the size of a postage stamp, each of our retinas contains an estimated 130 million cells and more than 100 distinct cell types. These cells are organized into multiple information-processing layers that work together to absorb light and translate it into electrical signals that stream via the optic nerve to the appropriate visual center in the brain. Like other parts of the eye, the retina can break down, and retinal diseases, including age-related macular degeneration, retinitis pigmentosa, and diabetic retinopathy, continue to be leading causes of vision loss and blindness worldwide.

In his lab at Northwestern University’s Feinberg School of Medicine, Schwartz performs basic research that is part of a much larger effort among vision researchers to assemble a parts list that accounts for all of the cell types needed to make a retina. Once Schwartz and others get closer to wrapping up this list, the next step will be to work out the details of the internal wiring of the retina to understand better how it generates visual signals. It’s the kind of information that holds the key for detecting retinal diseases earlier and more precisely, fixing miswired circuits that affect vision, and perhaps even one day creating an improved prosthetic retina.

Read more about Schwartz in the NIH blog written by Director Francis Collins, here.

Engineering Display Takes Off at O’Hare International Airport

A new exhibit at Chicago’s O’Hare International Airport is offering millions of travelers the chance to experience the future of materials science.

The Frontier Gallery — one half of a display previously on exhibit at the Museum of Science and Industry (MSI) — highlights how emerging materials, such as silicon, carbon, and magnetic products, are shaping the future of electronic technologies like computers, tablets, and smartphones. The Ubiquity Gallery remains on display at MSI until Labor Day, while the Frontier Gallery is expected to remain in O’Hare Terminals 1 (between gates B11 and B12) and 3 (near concourse K) for at least a year.

The displays feature research findings from numerous Northwestern faculty: in addition to contributions from Mark Hersam, materials science and engineering and director of Northwestern’s Materials Research Science and Engineering Center, the work of Danna Freedman, chemistry, and Lincoln Lauhon, Greg Olson, and David Seidman, all materials science and engineering, figure prominently in the exhibit.

The exhibit also provides a look at scientific instruments never before displayed at the airport, among them an atomic probe field ion microscope — donated by Seidman — the tool that first allowed researchers to see materials at an atomic level.

NUANCE Image Contest Deadline September 2

Northwestern’s Atomic and Nanoscale Characterization Experimental Center’s (NUANCE) summer image contest is accepting entries through September 2.

The contest is open to students, postdoctoral fellows, research associates, scientists, staff, and external users who rely on NUANCE instruments.

Winning images will be unveiled at the NUANCE Image Gallery Reception on October 5. They then will be displayed in the NUANCE Image Gallery located on the first floor of Cook Hall. Learn more.
Northwestern Research Portal Provides Quick-Click Administrative Overview

With the launch of Northwestern’s Research Portal, researchers and administrators have expanded access to vital operational information in a single location.

“As a leading global research university, Northwestern is committed to creating an environment that inspires and supports world-class research,” says Jay Walsh, vice president for research. “To ensure that our faculty members can pursue groundbreaking research effectively and with the greatest impact, we continue to reimagine and strengthen our knowledge ecosystem — including its day-to-day operations. The Northwestern Research Portal will certainly streamline how our academic community accesses and uses research administration information.”

Launched on August 15, the Research Portal implements feedback and guidance from research administrators, faculty, Office for Research staff, Financial Operations, and Northwestern Information Technology.

Phase one of the portal includes financial data for sponsored and non-sponsored research accounts, such as budget/award amount, direct cost balance, and end date. In addition, the platform offers the ability to drill down to expense information. Investigators can access a quick overview of current projects, obtain information and analytics to evaluate and manage financials over the lifetime of a project, and more.

The University will integrate additional features to the platform over the next two years to include tools for managing individuals paid from each project, research subject compliance information, and effort reporting.

Faculty and staff access to the portal will be granted based on their current activities and access to Cognos BI Reporting. Principal investigators will see their research portfolios upon login and administration staff will have access to an investigators sponsored projects. Sensitive information, such as salary and non-sponsored/discretionary funds, require similar access restrictions that are currently in place in Cognos.

For more details, including how-to videos and to login, visit the Research Portal website. If you need technical assistance, please contact the IT Support Center.

Odom Elected ACS Fellow, Receives Research Corporation SEED Grant

Teri Odom, a Charles E. and Emma H. Morrison Professor of Chemistry and materials science and engineering, has been named a fellow of the American Chemistry Society (ACS).

The prestigious fellowship honors ACS members for their outstanding contributions to science, scholarship, and society.

Odom, associate director of Northwestern’s International Institute for Nanotechnology, is an expert in designing structured nanoscale materials that exhibit extraordinary size- and shape-dependent optical properties. The ACS recognized Odom for her innovations. These include creating multiscale nanostructured surfaces that can control energy transfer at the nanoscale and for developing gold nanostars, specialized nanoparticles that can deliver a drug directly to a cell's nucleus — an important feature for effective cancer treatment.

“I am extremely honored to be selected as a fellow of the ACS and am very proud of this recognition,” says Odom. “ACS fellows are distinct because recipients are excellent not only in their scholarship, but also in their service to the profession and society.”

The Research Corporation for Science Advancement also recently recognized Odom with a 2016 Cottrell Scholar SEED Award. SEED awards offer investigators the means to test new out-of-the-box ideas. Odom will use the $50,000 grant to explore how viral shapes can inspire the design of optical nanoprobes for investigating nanoparticle-cell interactions.

Call for Recently Published Books

We want to celebrate your scholarship in Northwestern Research Magazine!

In each magazine, we highlight some recently published books by Northwestern faculty. We invite you to share any new titles for consideration. Ideally we want to promote texts that have appeared in 2016, or else are expected to publish by December. You may also suggest texts published late in 2015.

When submitting a title, please include a high-resolution cover image for the book and any supporting publicity materials. Email content to Matt Golosinski, director of research communications.
Law School Podcast Explores Wrongful Convictions, Music Copyright, and More

Northwestern’s Pritzker School of Law has launched the Planet Lex podcast, a series of conversations with experts about law’s role in today’s dynamic, technologically complex global landscape.

Hosted by Dean Daniel B. Rodriguez and produced by the Legal Talk Network, each episode features interviews with thought leaders on a selected topic. Participants include several prominent Northwestern faculty members.

“This podcast series gives us a special opportunity to discuss key issues in law, public policy, and innovation,” says Rodriguez. “We will engage opinion leaders around exciting topics in a format that is both intense and fun.”

Podcast episodes can be found on the Northwestern Law website, and listeners can subscribe via iTunes or download the free Legal Talk Network app for iPhone or Android.

Do Stop-and-Frisk Policies Affect Trust in Police?

For police departments across the United States, stop and frisk — an investigative procedure where an officer questions a person and then searches him or her — has become a preferred strategy for deterring crime. Political scientist and Institute for Policy Research expert Wesley G. Skogan is examining the consequences of such a policy in Chicago, focusing on how such encounters affect public trust in police. Learn more.

Medill Research Collaboration Reveals Consumer Insights

A new digital consumer satisfaction index offers an innovative global tool to understand how consumers connect with a brand, providing fresh insights about decision-making related to purchasing.

This Digital Satisfaction Index (DSI) originated in the Intent Lab, a new research partnership between the Medill School of Journalism, Media, and Integrated Marketing Communications and marketing agency Performics Worldwide.

Through the partnership, Northwestern and Performics will conduct original research studies tied to major brands to help those brands better understand their consumers’ online behavior.

To construct the DSI, the partners conducted in-person consumer interviews, surveys with probabilistic and non-probabilistic samples of more than 3,000 participants in the United States and the United Kingdom throughout Spring. They identified four key factors of consumer satisfaction: trust, utility, social, and privacy.

Among the findings:
- Privacy is a significant concern for Americans, but less so for online consumers in the United Kingdom.
- Digital satisfaction is highest among Baby Boomers; lowest among youngest and oldest demographics.

“Technology empowers both consumers and brands to make digital brand connections, but consumers are flooded with messages and interactions that can be simultaneously intrusive, annoying, enabling, and empowering,” says Frank Mulhern, chair of integrated marketing communications. “Through this partnership, we aim to uncover how those connections are perceived, and the thought patterns that take place leading up to that final decision to engage with or abandon a brand.” Read more.
StarLight Completes 900 Mile Journey With Blazing Speed

The distance between Chicago and Ottawa just got shorter — digitally that is.

A recent test trial using the latest in coherent optical modulation technology successfully demonstrated 300 gigabits-per-second (Gbps) capacity between the two cities. The speed is equivocal to downloading more than 20 high-definition DVDs per second and means data-rich research can be shared with enhanced speed and security.

Located on Northwestern's Chicago campus, the StarLight International/National Communications Exchange Facility Consortium partnered with CANARIE, the national research and education network of Canada, and, Ciena, an optical network equipment provider, to demonstrate how innovative modulation capabilities can improve network performance and capacity over long distances.

The team conducted this trial on CANARIE's international network research testbed that uses optical fiber. CANARIE allows Canadian researchers, educators, and innovators to leverage advanced digital tools and massive data resources, especially data intensive science communities. Last year the network transmitted 172 petabytes of data, an amount expected to grow by 50 percent annually.

“This innovative trial of a next-generation, flexible optical wide-area networking is just one of many examples of the value of our ongoing research and development partnership with Ciena,” says Joe Mambretti, StarLight director. “By continuing to push the boundaries of what networks can achieve, we open up new opportunities for the global research community, especially for data-intensive science.”

StarLight is managed by Northwestern's International Center for Advanced Internet Research (iCAIR), the California Institute for Telecommunications and Information Technology at the University of California San Diego, the Electronic Visualization Laboratory at the University of Illinois at Chicago, and the Mathematics and Computer Science Division at Argonne National Laboratory, in partnership with CANARIE and SURFnet, the national research and education network of the Netherlands.

One of the ways StarLight makes data-intensive research projects possible is by supporting more than 40 individual 100 Gbps paths, including many that span the globe.

In March of this year, StarLight and KISTI, a research center in Daejeon, South Korea, established a new network (KREONET) connecting Daejeon to StarLight with a 100-Gbps lightpath implemented on optical fiber. KREONET interconnects StarLight with all major universities and research centers in South Korea. In July, an overlay network, KREONET-S, was established on KREONET, creating the world’s first international multi-domain Software-Defined wide area network connecting Daejeon, Seoul, Busan, Gwangju, and Changwon in South Korea with Chicago. The new KREONET-S network will provide multiple advanced networking services, including international science collaborations, specialized provisioning for large scale data flows, and flow isolation.

NUCATS Grants Fund Diverse New Projects

Five researchers recently received pilot grants from the Northwestern University Clinical and Translational Sciences Institute.

The awards fund small but critical gaps in clinical and translational science research not funded by other sources. Award recipients are:

Thorsten Kahnt, neurology, who will study sleep deprivation's role in the brain's responses to food odors and how this response is related to increased calorie intake.

Ruchi Gupta, pediatrics, who will develop a curriculum to empower students to understand and manage health conditions, such as asthma.

Gabriela Caraveo Piso, neurology, who will study the impact of low doses of the calcineurin specific inhibitor FK506, on a model of Parkinson's disease.

Matthew O'Brien, medicine: general medicine and geriatrics, who will implement an evidence-based diabetes program in Latino communities on Chicago’s Southwest Side.

Chad Achenbach, medicine: infectious disease, who will study changes in telomere length in people with HIV who are receiving long-term treatment with antiviral therapy.
Safety First: ORS Conducts Emergency Training Drills

Northwestern and local first responders, pictured, collaborated in a comprehensive, three-day emergency response exercise July 26-28 near Welsh-Ryan Arena.

The annual simulation’s primary goal was to enhance safety preparedness and to identify how the Evanston Fire Department’s multi-patient transportation system utilizes local hospitals. While no one was actually transported during the drills, the hospitals involved reported on their ability to accept patients with different injuries at a specific time.

“The planning for these drills begins in January and culminates with three busy days in July,” says Michael Blayney, executive director of Northwestern’s Office for Research Safety. “There are so many good people who help protect our local communities, and our ability to strengthen communication and teamwork while refining protocols is time well spent.”

Participants included more than 300 local first responders from the North Shore. This year’s training also included representatives from the FBI’s Chicago office and emergency medical instructors from the Northern Illinois Public Safety Training Academy. NIPSTA provided sophisticated training mannequins that simulate complex medical emergencies. Actors also helped make the drill as realistic as possible.

Researchers Develop Recyclable Rubber

John Torkelson, a Walter P. Murphy Professor in the Department of Chemical and Biological Engineering, has found a solution to a common problem with rubber: it can't be recycled.

Separating recyclables from the waste stream has become routine behavior. Paper, many plastics, glass, and metals are collected and converted into reusable (economically valuable) products, reducing landfill diversion and minimizing ecological footprint.

The ability of a non-paper material to be recycled — heated at high temperatures and recast for reuse — depends largely on the way in which its polymers are linked.

Polymers, or chains of molecules arranged to give structure to larger molecules, are usually configured in either linear or cross-linked chains. Polymers that we typically recycle, namely thermoplastics, are made of linear chains, which can be heated to high temperatures, remolded in their melted state, and effectively reform when cooled without losing their original properties.

When rubber — which is made of permanent cross-linked chains — is heated, it strengthens and can’t be remolded or reheated into a usable product that retains its original durability and elasticity.

Torkelson and PhD students Kailong Jin and Lingqiao Li have developed a simple, one-step strategy to solve this problem by modifying the way in which the polymers in rubber are linked. Read more.

Seven Minutes of Science Timed for September 13 and 14

How much science can be learned in the time it takes to make a pot of coffee?

Find out at summer’s final Seven Minutes of Science event.

Presented by Northwestern’s Ready Set Go (RSG) program, Seven Minutes of Science showcases graduate students and postdoctoral fellows as they present current research in a manner meant to be understandable by a non-expert audience. Founded in 2012, RSG is tasked with helping young researchers improve their presentation skills in effort to create more communicative scientists.

On September 13, Seven Minutes of Science will take place from 3 to 5 p.m. at Hughes Auditorium on the Chicago campus. The following day, presentations will take place from 3 to 5 p.m. at Tech M345 in Evanston. Register to attend.
Northwestern Materials Science Experiments Blasting Off to Space

Objects orbiting the Earth include the moon, more than 2,000 satellites, the International Space Station, an abundance of space debris, and soon, two Northwestern experiments.

A team of undergraduate students advised by David Dunand, materials science and engineering, recently received a NASA award to send a freeze-casting experiment into low Earth orbit, between 100 and 1,200 miles from Earth’s surface. The project will be contained within a CubeSat, a miniaturized satellite built of compartments about 4-inches square in size.

CubeSats play a valuable role in NASA's science, technology, and educational missions. The miniature satellites provide a low-cost platform for planetary exploration, Earth observation, and fundamental Earth and space science.

To date, NASA has selected 119 CubeSat missions — 46 of which have already been launched — as part of its CubeSat Launch Initiative, which started in 2010. Approved CubeSats are auxiliary payloads on launches to the International Space Station (ISS).

“We are very proud that Northwestern is launching its first CubeSat,” says Dunand, the James and Margie Krebs Professor of Materials Science and Engineering. “It is particularly rewarding that this project is led and driven by undergraduate students from five departments and three schools.”

The Northwestern team is collaborating with students at the University of Illinois at Urbana-Champaign, who will build the CubeSat infrastructure. The experimental component, led by Northwestern, involves freeze casting a mixture of titanium oxide and water to develop a new material for solar cells.

Low Earth orbit will benefit the experiment because structures created in space enjoy the benefits of zero gravity.

“Gravity confuses everything tremendously,” says Kristen Scotti, who is studying biology in the School of Professional Studies. “By turning it off, we can prevent convective mixing and particle settling in the suspension being frozen.”

Two Cube Sats are released from the International Space Station.

Voorhees Receives NASA Funding

A research proposal by Peter Voorhees, materials science and engineering, is among 16 recently approved experiments by NASA's Physical Sciences Research Program.

“This is a tremendously exciting opportunity,” says Voorhees, the Frank C. Engelhart Professor of Materials Science and Engineering and co-director of the Northwestern University-Argonne National Laboratory Institute of Science and Engineering. “The unique environment provided by the International Space Station will enable us to acquire data that cannot be obtained on Earth.”

Voorhees' experiment on dendrite fragmentation will take place aboard the ISS as part of NASA's MaterialsLab program.

Dendrites are snowflake-like structures that form during the solidification of a metal. The arms of these dendrites frequently become detached, a process known as fragmentation. These fragments form one of the major defects in castings, which can greatly reduce mechanical properties. Examples of such a defect, says Voorhees, may occur in jet turbine blades and in turbines used to generate electricity.

By performing experiments in space, these fragments will not move due to the reduced gravity environment of the ISS.

“The ISS makes it possible to measure the location and rate at which these fragments form,” Voorhees says. “This will help us understand the fragmentation process, and build models to predict when these fragments may form during solidification on Earth.”

Read more.
Honors

Guillermo Ameer, biomedical engineering and surgery, has received a 2016 Minority Affairs Committee Eminent Chemical Engineers Award from the American Institute of Chemical Engineers for his exceptional achievements within the Institute.

Navdeep Chandel, medicine: pulmonary and critical care, has received the National Cancer Institute’s Outstanding Investigator Award for his research examining the mechanisms of mitochondrial metabolism in cancer.

D. Mark Courtney, emergency medicine and medical social sciences, was named president-elect of the Society for Academic Emergency Medicine. He will accede to serve as president at the 2017 annual meeting.

Paul Greenberger, medicine: allergy and immunology, received the 2016 American Academy of Allergy Asthma and Immunology Distinguished Clinician Award for outstanding contributions toward clinical care for allergic disease. The Academy selects recipients based on the candidate’s commitment to patient care and clinical investigation focused on diagnosis, treatment, and prevention of asthma and allergic disease.

Northwestern undergraduate students Linnea Hodge, art history, Naomi Johnson, history, and Jaclyn Zhou, Asian languages and cultures, have been named 2016-2017 Franke Undergraduate Fellows. As a Fellow, these seniors will receive mentorship for their research projects through the Alice Kaplan Institute for the Humanities and will present their findings at the Kaplan Institute’s annual Future Directions Forum.

Katrin Katz, a doctoral student in political science, received a grant from the Horowitz Foundation for Social Policy for her research on Northeast Asia’s territorial conflicts.

Bruce Lindvall, assistant dean for graduate studies at the McCormick School of Engineering, received the DuPoint Minorities in Engineering Award from the American Society for Engineering Education. The award is bestowed upon engineering educators who formally or informally help motivate underrepresented students studying engineering at the university level.

Hani Mahmassani, civil and environmental engineering, was named a National Associate by the National Academies of Sciences, Engineering, and Medicine’s National Research Council.

Rukhsana Mirza, ophthalmology, received the 2016 American Academy of Ophthalmology/Association of University Professors of Ophthalmology Award for Excellence in Medical Student Education. This national honor is given to one academic ophthalmologist who demonstrates the greatest impact on medical student education in ophthalmology.

Brian Mustanski, medical social sciences and psychology, was awarded the 2016 Advances in Culture and Diversity in Prevention Science Award by the Society for Prevention Research. Mustanski, also the director of the Institute for Sexual and Gender Minority Health and Wellbeing, was selected based on his contributions to prevention science through research on the relationships between mental, behavioral, and physical health, particularly as they relate to HIV/AIDS in vulnerable populations.

Margarita Rayzberg, a doctoral student in sociology, received a grant from the Horowitz Foundation for Social Policy for her research on social experimentation in international development.

Ali Shilatifard, biochemistry and molecular genetics, was named the 15th recipient of the Martin E. and Gertrude G. Walder Award for Research Excellence for his pioneering research of the intricate molecular mechanisms that regulate gene expression, specifically as it occurs in cancer biology. Established in 2002, this award recognizes research excellence at Northwestern.

James Surmeier, physiology, has been awarded the 2016 C. David Marsden Presidential Lecture Award by the International Parkinson and Movement Disorder Society for his pioneering research to advance understanding of Parkinson’s disease.

Kirsten Viola, neurobiology, received the 2016 de Leon Prize in Neuroimaging, which recognizes a senior scientist who has published the best paper in a peer-reviewed journal related to in-vivo neuroimaging of a neurodegenerative process.

Nicholas Volpe, ophthalmology, was recently accepted into the American Ophthalmological Society for his achievements in ophthalmic science and clinical practice.

The Harold E. Eisenberg Foundation presented its inaugural Harold E. Eisenberg Research Scholar Award to Guang-Yu Yang, pathology, to support his innovative research on gastrointestinal cancers.

Northwestern was ranked number one among top institutions for most highly-cited scholars in materials science and engineering, according to data from the Elsevier Scopus database.
**Spotlight: Research in the News**

Your genes may determine how coffee affects you, but more research is needed to make predictions about individual health consequences, reports a study conducted by Marilyn Cornelis, preventive medicine. Cornelis’ research, featured in the New York Times and Fox News, cautioned that numerous genetic and environmental factors contribute to the physical impact of caffeine consumption, suggesting the need for further research before personalized recommendations can be made.

The Monroe Doctrine did more than establish a foundation for US policy toward Latin America – it also influenced how North Americans saw themselves in relation to the rest of the world, according to new research by Caitlin Fitz, history. As reported in the Wall Street Journal, Fitz's research reveals how North Americans initially applauded revolutions to the South, heralding a universal ideal of liberty, but quickly assumed a different tone when this vision came at odds with the institution of slavery at home.

As older technologies are replaced with newer, improved gadgets, people lament the transition much like a personal loss of a loved one, reported Elizabeth Gerber, communication studies, to the Washington Post. Gerber, who pioneered a research model called “Tech Break Up” to examine this phenomenon, suggests that taking conscious steps to severe ties with a technology can allow people to accept innovation changes more easily.

Irregular sleeping schedules imposed on night shift workers can detrimentally impact their health, according to a study co-authored by Daniela Grimaldi, neurology. Although more research is needed to corroborate the findings outside of a controlled environment, the study suggested that odd sleeping patterns can quickly lead to heart damage. The Huffington Post reported on the research.

Contrary to Milton Friedman’s prominent “permanent income hypothesis,” Lorenz Kueng, finance, revealed that many people are more likely to spend a sudden windfall rather than save it for a rainy day, as Friedman’s theory contends. The research, published in Bloomberg, found that Alaskans who received a payout from the state’s wealth fund were quick to spend it, suggesting it may be important to reexamine popular predictions about consumption.

Amanda Logan, anthropology, has uncovered the forgotten, prosperous past of Banda, Ghana, a district 10 miles from the country’s capital Accra. Logan’s research, showcased on NPR, revealed that contrary to present-day scarcity in the region, those living in Banda 500 years ago had enough to eat even when plagued by drought. Logan is one of the first researchers to use archeological evidence to help explain colonial policy’s impact on food security.

For many students, bullying decreases over time, but for LGBT youth harassment and discrimination often continue or increase, leading to lasting mental health conditions such as post-traumatic stress disorder and major depression, according to research led by Brian Mustanski, medical social sciences. The findings, featured in the Huffington Post, point out that incidents of physical and sexual assault endured by LGBT students are often dismissed as typical adolescent behavior, rather than viewed as criminal offenses.

New cases of metastatic prostate cancer have skyrocketed 72 percent in the United States from 2004 to 2013, according to a new Northwestern Medicine study. The study’s lead author, Edward Schaeffer, urology, hypothesized that the disease may have become more aggressive or that the decrease in routine screenings precipitated the sharp increase in advanced cases. News outlets across the country promoted the story, including CBS News, FOX News, and the Financial Times, among other publications.

Northwestern research conducted by Phyllis Zee, neurology, indicated that office lighting might improve productivity, health, and sleep. The study revealed that employees who received more exposure to light – particularly natural light – enjoyed better mood, improved metabolic function, and longer sleep. The research findings were widely publicized, including in the Huffington Post, Bloomberg, and Chicago Tribune.

More than 160,000 fish and freshwater mussels were killed in July 2012 when toxic pig waste contaminated more than 20 miles of Beaver Creek in Illinois. Student research from Northwestern’s Medill School of Journalism helped the Chicago Tribune investigate the story of willful environmental destruction by agribusiness and bring the problem to the attention of state authorities and the public.
Discoveries

J. Edward Colgate, mechanical engineering, and his research team have discovered why ultrasonic vibrations applied to a flat glass plate make it slippery to the touch. Their research confirmed that the vibrations cause the fingertip to bounce on pockets of trapped air, which, in turn, nearly eliminates the friction, emulating a feeling of slipperiness. Understanding the underlying mechanism that causes this phenomenon could lead to significant advances in touchscreen technology. Learn more.

It may be possible to treat depression by manipulating novel targets in the brain using gene therapy, according to new Northwestern Medicine research. By decreasing proteins called HCN channels, investigators were able to “turn off” depression-like behavior in mice. The study’s senior author Dane Chetkovich, neurology and physiology, is hopeful this research can be replicated in humans and will lead to a therapeutic alternative for people unresponsive to existing treatments. Learn more.

Identifying mutations in the estrogen receptor gene can help clinicians determine effective treatment for patients with metastatic breast cancer, according to new research co-authored by Massimo Cristofanilli, medicine: hematology and oncology. The study’s findings revealed that patients with mutations had higher survival rates when taking the drug fulvestrant than when treated with the drug exemestane, whereas patients without this gene mutation responded similarly to both regimes. Learn more.

A study that sent twice-weekly text messages to a million people in India advising them to exercise, eat less fat, and eat more fruits and vegetables increased these health behaviors known to prevent diabetes, reports new research from lead author Angela Fidler Pfammatter, preventive medicine, and Arogya World, a global health non-profit organization. The research is the first to use the power and reach of mobile phones to change diabetes risk behaviors in a large number of people from different parts of a vast country like India. It has implications for diabetes prevention in low and middle-income countries. Learn more.

A study led by Robert Lamb, microbiology and immunology, has revealed how fusion proteins, found on the surface of viruses like mumps or measles, undergo a refolding process that allows the virus to enter the cell. Better understanding of the structural change in fusion proteins could lead to the development of new, targeted antiviral therapies. Learn more.

Those with genetically inherited high cholesterol – or familial hypercholesterolemia – have a significantly greater risk of developing coronary heart disease, according to a study led by Donald Lloyd-Jones, preventive medicine. The findings will assist clinicians in communicating the risks of this health condition and discussing treatment options with patients. Learn more.

A study conducted by Matthew O’Brien, medicine: general medicine, has revealed that the latest diabetes screening guidelines fail to identify 55 percent of high-risk individuals with prediabetes or diabetes. Many people who fall outside the guideline’s age and weight ranges, but who still develop diabetes, miss out on early intervention because they may not be identified until it’s too late. Learn more.

Northwestern scientists may have devised a way to deliver faster, cheaper internet. A research group led by Manijeh Razeghi, electrical engineering and computer science, developed a highly sensitive mid-wavelength infrared photodetector that could offer a favorable alternative to using cables or even the existing problematic near-infrared photodetector to wirelessly transmit data. Learn more.

Irrespective of particular medical treatments, many breast cancer survivors experience memory problems seemingly linked to high stress. A study led by Siobhan Phillips, preventive medicine, has revealed that moderate-to-vigorous physical activity can effectively combat subjective memory loss in this population by alleviating stress and offering other psychological benefits that improve memory function. Learn more.

Northwestern scientists have revolutionized a technique for super-resolution optical imaging that can reveal nanoscopic structures as well as the physical and chemical processes occurring at the nanoscale level. The research team, led by Hao Zhang, biomedical engineering, developed a novel platform based on spectroscopy that leverages photon localization microscopy to detect molecules with subnanometer resolution in a faster, simpler way than existing imaging methods. Learn more.

The virtual classroom’s appeal may obscure a hidden cost. New research from Jennifer Heissel, School of Education and Social Policy, has shown that high-achieving North Carolina eighth-graders performed significantly worse when taking Algebra 1 online compared with similar students who completed the course in a traditional classroom. The findings highlight the need for further research on the impact of virtual learning on student achievement. Learn more.
Proposal and Award Report: Through June 2016

Northwestern has received a total of $409.5 million in award funding this fiscal year, through June. This figure reflects a 4 percent increase ($17 million) compared with June 2015. The number of awards to date (2,119) is slightly higher than this time last year.

The dollar volume of awards from federal agencies increased 12 percent ($32.6 million). Awards from industrial sponsors declined about 1 percent ($1 million). Foundation funding is down 39 percent ($9.2 million), while voluntary health organization funding decreased 21 percent ($2.8 million).

The dollar volume of proposals submitted through June is $2.2 billion, which is about the same as last year. The number of proposals submitted (2,902) is also about the same.

The dollar volume of proposals submitted to federal agencies increased 1 percent ($24.8 million), while proposals to industrial sponsors was down 16 percent ($14 million). Proposal activity to voluntary health organizations is down 2 percent ($1 million) and foundation proposals declined by 10 percent ($5 million).

Click here to access the full report.

ORS Unveils Vision for Better Eye Safety

The Office for Research Safety has a new way for Northwestern’s research community to order prescription safety eyewear electronically. Thanks to a kiosk in Tech NG71, individuals who are eligible for a new University benefit will pay just 10 percent of the cost of selected frames and prescription lenses. Learn more.