4-6-2022

IMPACT UMaine Research, April 2022

Office of the Vice President for Research

Maine's Public Universities
UNIVERSITY OF MAINE SYSTEM

Matthew Revitt <matthew.revitt@maine.edu>

Gearing up for Maine Impact Week: Join us and celebrate University of Maine faculty, students, and community!

1 message

UMaine Research <research@maine.edu> Wed, Apr 6, 2022 at 10:06 AM
Reply-To: UMaine Research <research@maine.edu>
To: matthew.revitt@maine.edu

April 2022

Office of the Vice President for Research and Dean of the Graduate School

Spotlight

Join us for Maine Impact Week, featuring 20 virtual and in-person events!
Celebrate research and creative work by Maine's top-tier university.

In-person events:

Humanities Center Celebration
Spring Sustainability Talk
Faculty Mentor Impact Awards
Big Pitch Competition Season Finale
Older Adult Health and Wellness Fair
Maine's 1st Small Satellite Presentation
Art Meets Science Open House
Faculty Jazz Ensemble
ASCC Tour
Foster Center Innovation Awards
Jazz Ensemble Concert
UMaine Student Symposium
Opera Workshop Performance

Virtual events:

Research Impact Challenge
Ask the Graduate School
Rural Health Research Panel
Microbes & Social Equity Talk
Career Center Internship Panel
Planting for Pollinators
American Diplomacy in Turbulent Times
Maine Food Waste Solutions Summit
Imagine That! LinkedIn Talk: Factory of the Future

For a full list of events and further details visit our website!

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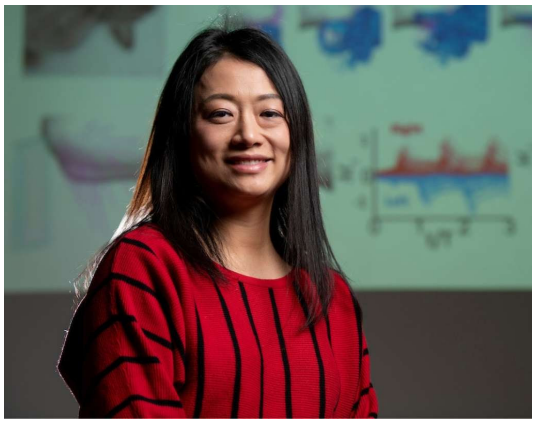
Featured Stories



Qian Xue receives NSF Early CAREER award for hydrodynamic sensing research

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Study explores diversity and equity practices in higher education faculty searches

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New research shows certain exercises can help with muscular dystrophy

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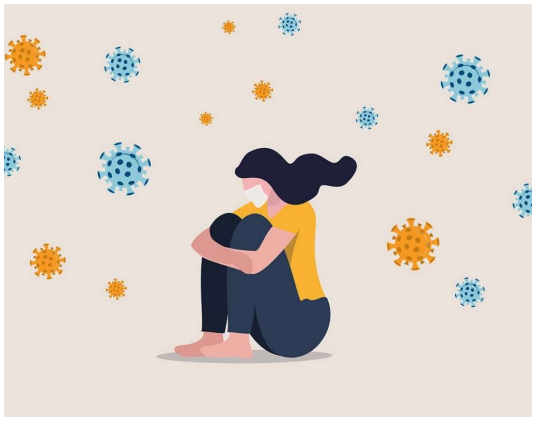

Pandemic mental health impacts on adolescents quantified in new study

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Announcements

- Explainable AI: Hope and Hypes in Healthcare, April 7
- Institute of Medicine Rural Health Webinar, April 11
- Volunteers needed for UMaine Student Symposium
- Join us for Maine Impact Week, April 10-15
- Ethics in Commercialization, April 21
- UMaine Space Day, May 4
- Call for Nominations: Pew Biomedical Scholars Program, due May 6

UMaine News: Research Stories and More

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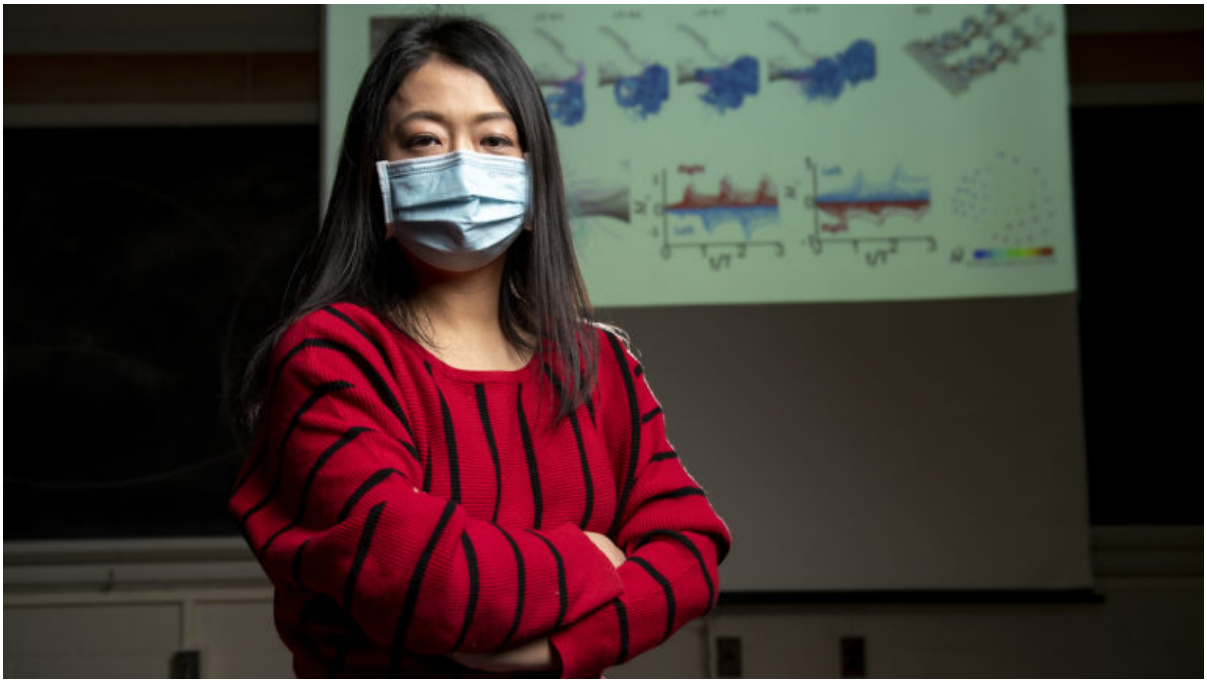
UMaine News



Qian Xue, Assistant Professor of Mechanical Engineering, NSF Award Winner 2022

Xue receives NSF Early CAREER award for hydrodynamic sensing research

March 9, 2022

Qian Xue, University of Maine assistant professor of mechanical engineering, has been awarded a National Science Foundation (NSF) Faculty Early Career Development (CAREER) Award for her research on the hydrodynamic sensing model of seal whiskers.

NSF CAREER awards are one of the organization's most prestigious awards in support of early-career faculty and include a federal grant for research and education activities for five consecutive years.

Xue researches the sensing ability of seal whiskers, which have attracted increasing research interest because of their exceptional sensitivity and accuracy. Previous studies have shown that blindfolded seals can use their whiskers to track the disturbances left behind by moving objects in the water, known as hydrodynamic trails, that were generated several minutes before, as well as discriminate the size and shape of upstream objects through their wakes.

However, relatively little is known about the mechanisms of seal whisker sensing. Xue's research looks at how the unique geometry of seal whiskers responds to different vibrations in the water, including self-induced vibrations in calm water and

wake-induced vibrations from other objects at both the single-whisker and whisker-array levels.

Xue will use a tool known as an immersed-boundary-method based fluid-structure interaction computer model to simulate the vibrations of a single whisker and multiple whiskers in a wide range of parameters. The simulation results will be validated by comparing them to the previously obtained experimental measurements in order to better understand how the whiskers respond to fluid vibrations.

“The acquired knowledge will be transformative by inspiring innovative passive hydrodynamic sensing mechanisms associated with seal whisker geometry. These sensors can be particularly useful for marine robotics to support tools for orientation, navigation, detection and tracking. The immersed boundary method is an advanced numerical method especially designed for simulating complex geometries and moving, deformable boundaries, which is ideal for simulating flow-induced vibrations of complex whisker geomeries,” says Xue.

The research aims to inspire sensing mechanisms based on seal whiskers and contribute to the fundamental understanding of flow-induced vibration properties of bluff and slender bodies like whiskers, which can have applications across engineering fields.

The research will also be part of an engineering education plan for undergraduate and graduate engineering students, as well as students in grades 3–12, and the general public.

“An exciting aspect of this research is that it provides an excellent opportunity to develop activities that support engineering education at different education levels, in the classroom and in the lab. I plan to create seal whisker sensing related hands-on activities to inspire students in grades 3 through 12 to participate in STEM education, and also develop multidisciplinary educational and research projects for undergraduate and graduate students interested in bio-inspired engineering,” says Xue.

Xue’s $500,000 award will start on March 1, 2022, and is estimated to continue through February 2027. The project is jointly funded by the Fluids Dynamics Program and the Established Program to Stimulate Competitive Research (EPSCoR).

This year, UMaine’s Babak Hejrati, assistant professor of mechanical engineering, was also awarded a 2022 NSF CAREER award for his work using robots to aid mobility.

“The award is an important step for me to establish and advance leadership in the area of bio-inspired engineering, especially for flow-related problems. It’s also very exciting to see multiple NSF CAREER awards in mechanical engineering this year, which will allow us to establish strong multidisciplinary research programs in the department,” says Xue.

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THE UNIVERSITY OF MAINE

UMaine News

UMaine study explores diversity and equity practices in higher education faculty searches

March 29, 2022

Like many parts of society, higher education has grappled recently with the historic marginalization of and inequities between different groups. One way this has played out is through an increasing focus on diversity and equity in faculty hiring practices.

A recent journal article from two University of Maine researchers suggests that despite good intentions, implicit and overt bias, as well as institutional and structural barriers, may still hamper colleges' and universities' efforts to diversify their faculty ranks. The study's authors — associate professor of higher education Leah Hakkola and doctoral student in higher education Sarah Dyer — explored the role of faculty search chairs' status and social identities in search committee dynamics and decisions about hiring diverse candidates.

Through in-depth interviews with nearly 20 faculty search committee chairs at one university, Hakkola and Dyer sought to understand how chairs interpret diversity and equity, how they implement equitable hiring practices, and how faculty hierarchy influences search processes.

"A disconnect arose between how individuals discussed their understanding of diversity and how it was perceived as an institutional value in the search process," Hakkola and Dyer write.

"Specifically, participants' own understanding of diversity imbued how they talked about it in the search process," they say. "Yet, when asked how institutional actors such as administrators, [human resources] and [equal opportunity] talked about diversity related to the search, race, ethnicity and gender were most often cited as important."

The search chairs interviewed by Hakkola and Dyer rarely mentioned race when asked to reflect on how their own identities influenced their understanding of diversity. Instead, they were more likely to bring up gender, religion, nationality or field of study. Those who felt it was important to center race came from social backgrounds with a lot of racial diversity.

Overall, Hakkola and Dyer say that in interviews "faculty drew from personal narratives and institutional factors to inform the ways in which they conceptualized diversity and equity during their searches."

Most participants felt that HR and EO departments were responsible for making sure searches were equitable and inclusive. However, a common theme in interviews was the lack of information and clarity from those departments when it came to the search chair's role. Some chairs said they had no training on how to center diversity and equity, while others received very little.

"Ultimately a clear breakdown emerged in communication and expectations between institutional role senders and the search chair role," Hakkola and Dyer say.

Despite the lack of guidance, some chairs felt a need to address implicit and overt bias in their searches. However, one significant finding was that faculty rank influenced diversity and equity decisions made by search committees. Hakkola and Dyer say junior faculty members who served as chairs — those who had yet to receive tenure — felt less comfortable exercising agency or discretion than senior faculty members.

"Based on these findings, it was clear that faculty status affected equitable hiring practices," they write. "Specifically, if a senior faculty search chair valued diversity as an asset, the search was conducted with equity and diversity in mind. Alternatively, if the senior faculty search chair did not see the value in centering diversity or equity in the search, the likelihood of bias influencing decisions increased."

Although the study sheds light on roles, conduct, and responsibilities of faculty search chairs in higher education, Hakkola and Dyer say further research is needed to better understand the issues involved in centering diversity and equity in hiring decisions. That includes examining different types of institutions to see how their particular power dynamics impact search committee decisions.

The article, "Role Conflict: How Search Committee Chairs Negotiate Faculty Status, Diversity, and Equity in Faculty Searches," was published in the Journal of Diversity in Higher Education.

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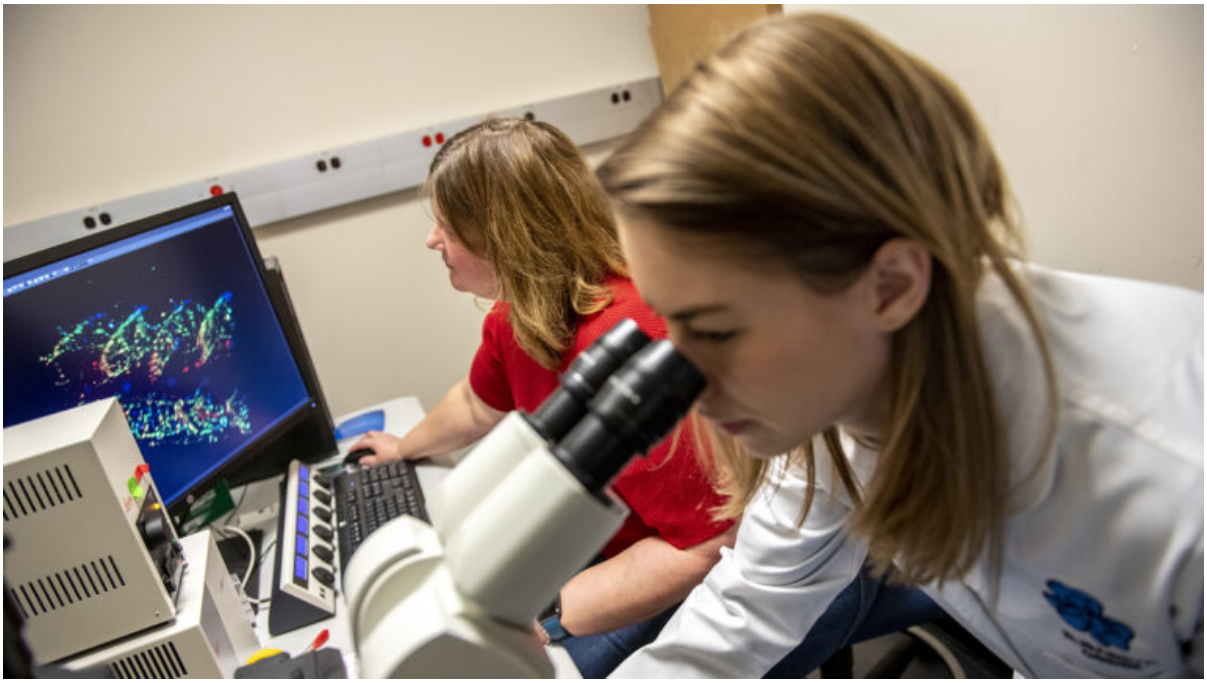

Clarrisa Henry (red shirt) and Graduate student Elisabeth Kilroy (lab coat) in the Hitchner Lab work on Biomedical Research.

New research shows certain exercises can help with muscular dystrophy

March 24, 2022

Muscular dystrophy is a debilitating disease that causes the weakness and breakdown of skeletal muscles that progressively worsens over time. According to a team of University of Maine researchers, certain activities may help strengthen muscles affected by muscular dystrophy — and they figured it out by stimulating zebrafish and watching them work out.

Zebrafish are an effective test model of muscular dystrophy because of the molecular similarities between zebrafish and human muscles. Zebrafish can also be bred with a mutation that closely models Duchenne muscular dystrophy, a severe type of muscular dystrophy that affects young boys.

Zebrafish can't lift weights, though, so UMaine researchers used a process called neuromuscular electrical stimulation (NMES), which stimulates specific nerves to elicit muscle contraction. The researchers designed four NMES regimens and named them after four common weight lifting routines: power, strength, hypertrophy and endurance. The zebrafish were

then put into an underwater 3D printed “gym” made up of tunnels and electrodes, and the researchers analyzed their skeletal muscles to see how they had changed.

The study found that while each of the NMES weight lifting “routines” affected the zebrafish neuromuscular junction morphology, swimming and survival differently, only one — the endurance neuromuscular stimulation (eNMES) — improved all three, as long as it was accompanied by a certain antioxidant, heme oxygenase, and a receptor called integrin alpha7.

“eNMES is defined by high-frequency, low-voltage pulses, which is similar to a high-repetition, low-weight workout that we would do in the gym. The longstanding consensus in the muscular dystrophy field is that minimizing resistance training preserves muscle strength and mass because it lowers the risk for muscle damage. However, our data suggest that a certain level of NMES-induced activity is actually beneficial for overall muscle health,” says Elisabeth Kilroy, first author of the study who conducted the research for her Ph.D. at UMaine. Kilroy is now the director of the neuroMuscular ObserVational Research (MOVR) at the Muscular Dystrophy Association.

The study was published March 24, 2022, in the journal ELife.

The research suggests that the right type of resistance training might be beneficial to human patients with muscular dystrophy. There is also potential for NMES to improve mobility and strength in patients with muscular dystrophy, though not much is known about applying the technology this way.

“I think the most exciting aspect is that we established a model for neuromuscular plasticity in healthy versus diseased muscle, and this model will allow us to elucidate mechanisms that could be the basis for potential therapeutics in the future,” says Clarissa Henry, professor of biological sciences, director of Graduate School of Biomedical Science and Engineering, and principal director of the Henry Lab.

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UMaine News

Pandemic mental health impacts on adolescents quantified in new UMaine study

March 11, 2022

The COVID-19 pandemic has been an isolating and lonely time for almost everyone. For adolescents especially, the loneliness accompanied by pandemic-related school closures and the like has led to an increase in mental health issues like depression and self-destructive behavior, according to a University of Maine-led study.

The study, published in the Journal of Clinical Child & Adolescent Psychology, looked at 362 middle and high school adolescents in rural Maine during the first several months of the pandemic in the United States. The participants reported about their mental health before the pandemic and again in June 2020, after months of lockdowns and isolation. Adoelscents specifically reported on their depressive symptoms; frequency of non-suicidal self-injury (NSSI) like cutting, pulling hair or hitting; and suicide risk.

The study also assessed adolescents' feelings of loneliness and health anxiety due to COVID in March 2020, during the first week of school shutdowns in Maine. To gather this information, smartphone-based ecological momentary assessment (EMA) was used. Three times a day for seven days, students responded to questions on a smartphone app called LifeData about their COVID-19 loneliness and health anxiety to track fluctuations in COVID-related distress.

The results showed that all adolescents in the study, regardless of whether they were feeling depressed before the pandemic, experienced increased depressive symptoms as a function of increased COVID-related loneliness. Loneliness also exacerbated suicide risk for adolescents already experiencing some level of suicidality before the pandemic. Surprisingly, elevated loneliness also predicated more frequent self-injury for adolescents who hadn't been self-injuring prior to the pandemic.

"These findings were concerning because they suggest that perhaps these kids turned to self-injury as a new way to cope with feelings of isolation and loneliness," says Rebecca Schwartz-Mette, director of the Peer Relations Lab at the University of Maine and principal investigator of the study.

Teens who self-injured prior to the pandemic and who experienced intense health anxiety experienced more frequent self-injury. However, a decrease in self-injury was observed for self-injuring teens who reported very high levels of loneliness.

"Additional research is needed to replicate this finding, but it may suggest that some adolescents benefited from being at home with increased monitoring and family support, and perhaps less school-based, peer stress," says Schwartz-Mette.

The study shows that the effects of COVID-19 and pandemic-related closures were largely negative for most adolescents. The results also suggest that how adolescents felt in the first days of isolation is essential to understanding their adjustment months later. Youth already experiencing mental health challenges and risks may have fared especially poorly during the pandemic, but other groups not previously identified as being at risk may be facing new mental health challenges.

The researchers emphasize the necessity to meet youths' mental health care needs now and develop effective treatment options for youth suffering from the psychological impacts of the pandemic.

"Our results punctuate what we already knew. Adolescents need mental health support. Now more than ever. The good news is that schools are aware, we have widely available telehealth options to reach youth who have previously been underserved, and, because the pandemic has affected all of us, perhaps the stigma around seeking support is shrinking," says Schwartz-Mette.

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