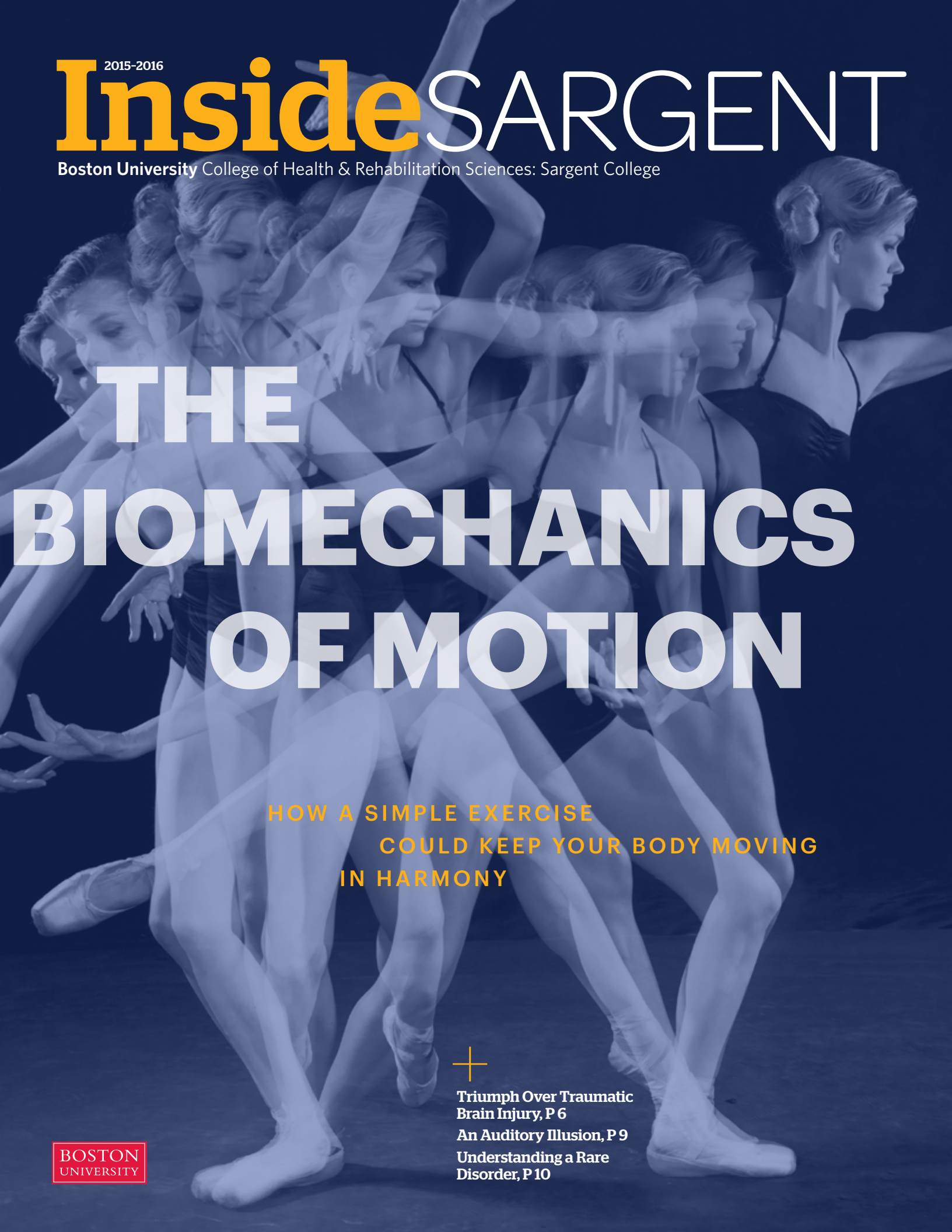
2015-2016

InsideSARGENT

Boston University College of Health & Rehabilitation Sciences: Sargent College



THE BIOMECHANICS OF MOTION

HOW A SIMPLE EXERCISE COULD KEEP YOUR BODY MOVING IN HARMONY

BOSTON UNIVERSITY

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& Rehabilitation Sciences: Sargent College

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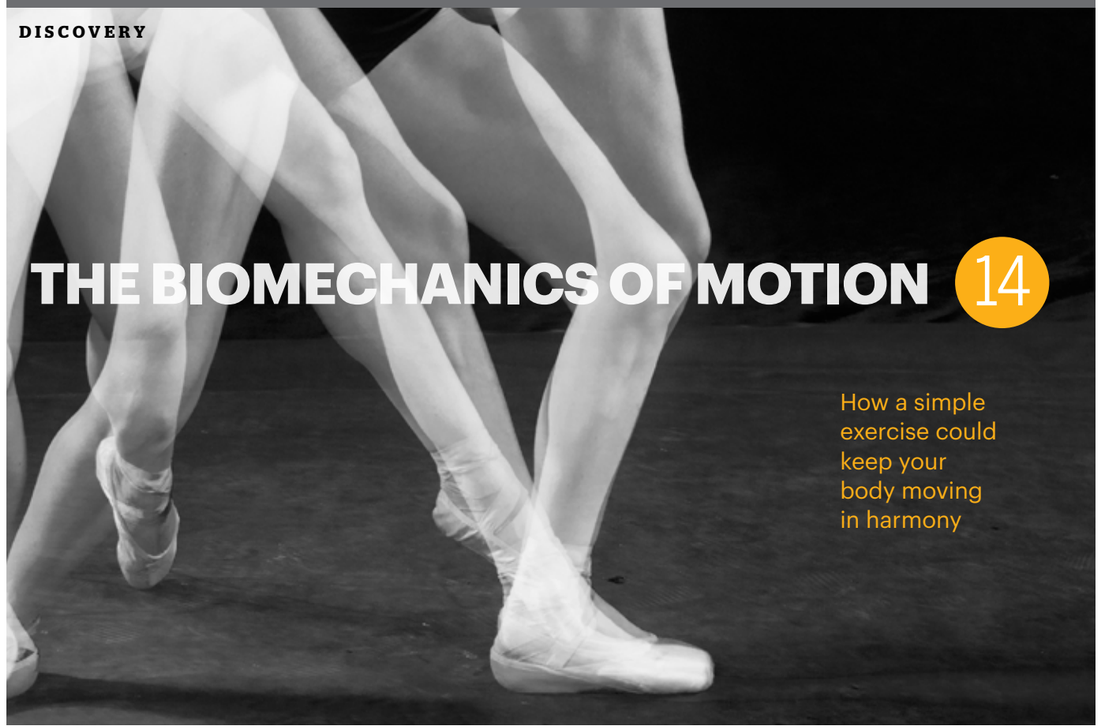

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2015–2016

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About
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"This issue of *Inside Sargent* highlights many of the current and future leaders of our profession—right here at Sargent—whose research and clinical efforts have enhanced the lives of others."

Dear Friends,

It's a pleasure to introduce another issue of *Inside Sargent*. The new academic year has gotten off to a great start with our first Sargent College virtual conference, Health Matters, in September. This event was an opportunity to share our unique expertise and engage in thoughtful discussions with our peers and experts around the world. In addition, our faculty continue to be honored with the support of some of the world's most prestigious organizations: Jennifer Gottlieb received a Fulbright Award and Cara Stepp has become the first Sargent College professor to receive the National Science Foundation's Career Award.

In keeping with the rapidly increasing expectations and responsibilities in many of the health professions, Sargent has introduced two new programs to stay ahead of imminent professional requirements: the Master of Science in Athletic Training (MSAT) and the Doctor of Occupational Therapy (OTD). Similarly, our new Fellowship in Orthopaedic Manual Physical Therapy offers licensed physical therapists the opportunity to elevate their level of clinical practice, advance their careers, and become leaders in their profession.

This issue of *Inside Sargent* highlights many of the current and future leaders of our profession—right here at Sargent—whose research and clinical efforts have enhanced the lives of others. These programs have improved access to museums for children with autism and have helped women living in public housing achieve their nutrition goals. The Center for Psychiatric Rehabilitation's Niteo program assists college students with mental illness—whose needs might otherwise be unaddressed—to remain in, or return to, university.

You'll also read in our cover story about the role of physical therapy in preventing disabling hip injury, using research findings to change our habits when we're young. And our students are developing innovative new research of their own: one of our new PhD graduates has created an assessment tool for use with youth with disabilities, while another is untangling the mysteries of language development in children with Smith-Magenis syndrome.

As always, fall is one of our most exciting times at Sargent; the year ahead is full of promise, and the accomplishments of last year are still fresh in our minds. It's the perfect time for us to be in touch! Follow Sargent's latest news and events at bu.edu/sargent, and if you missed our Health Matters conference, you can watch the presentations at bu.edu/healthmatters.

Best wishes,

Christopher A. Moore
Dean and Professor

DAN AGUIRRE

SARGENT'S COMPETITIVE NEURORESIDENCY PROGRAM GETS AN IMPRESSIVE NEW PARTNER

STEVE PRUE

WHEN IT CAME TIME to select the residents for this year's Neurological Physical Therapy Residency Program, Terry Ellis found herself in a difficult, albeit desirable, situation: she had received 33 applications for just 2 spots.

Physical therapy residency programs, which offer specialized training to develop expert clinicians, have become increasingly popular. When Sargent's Center for Neurorehabilitation (CNR)—the first in New England—enrolled its initial group of students in 2011, there were just a few other neuroresidency programs in the United States. Now there are more than 25.

"In the fast pace of health care, it's difficult to get mentoring and training in an everyday job," says Ellis (MED'05), an assistant professor of physical therapy & athletic training and director of CNR. "So, physical therapy is moving more toward the medical model, where there is specialized residency training."

Residents in Sargent's neuroresidency program perform approximately 30 hours of clinical training per week, so it's critical to have top-notch clinical partners, Ellis says. The program's collaboration with Beth Israel Deaconess Medical Center (BIDMC) provides residents with experience in an acute neurology rotation and in intensive care. And in 2015, CNR is joining with a second prestigious institution—Spaulding Rehabilitation Network's Medford Outpatient Center—"in order to add a broader, extremely high-caliber, rigorous outpatient training across numerous neurological conditions," says Ellis. "We're very excited about the partnership."

The excitement is mutual. Lisa Pezzini, the neurology program clinical supervisor and a director in Spaulding's Brace and Prosthetics Clinics, worked closely with Ellis to make the collaboration a reality. "Terry is amazing," she says, "and we're delighted to collaborate with an academic institution as wonderful as BU." In what Ellis calls a "full-circle" scenario, a graduate of Sargent's neuroresidency program, Sara Crandall ('10,'12), now works at Spaulding Medford and is a mentor to the 2015 residents.

During the yearlong program, the residents divide their time between BIDMC and Spaulding, spending six months at each institution. A partnership with California's Neurologic Physical Therapy Professional Education Consortium, which brings together neuroresidency programs from across the country, allows the residents to participate in didactic training and build their professional network. Residents also gain teaching experience by instructing in the lab component of a neurological clinical course in Sargent's Doctor of Physical Therapy program.

The residents assist Ellis in her research at CNR, which focuses on using early exercise intervention to reduce disability and improve physical function in individuals with Parkinson's. "The unique thing is, we do research, clinical

continued from previous page

care, and education all in the same space. So there's never a gap between findings and translation to clinical practice," she says. "Then we do outreach programs to disseminate our research findings to the broader scientific community."

This year, the residents are helping Ellis conduct a yearlong research trial testing the benefits of a mobile app in making exercise more accessible to people with Parkinson's. With the app, patients watch videos of their CNR sessions on a mobile device, which allows them to continue their exercises at home. They rate the difficulty and painfulness of each exercise using a sliding scale on the app. "We can now remotely change people's exercise programs," Ellis says. "We've found that monitoring progress helps people keep going and allows us to optimize the benefit of exercise by increasing the challenge level over time."

Ellis is confident that the neuroresidency program's combination of research experience at CNR, diverse clinical exposure at BIDMC, and the new partnership with Spaulding will make the next generation of physical therapists even stronger.—*Mara Sassoon*

APHASIA COMMUNITY GROUP CELEBRATES 25TH ANNIVERSARY

In 1990, speech-language pathologist Jerome Kaplan launched a series of monthly meetings at Spaulding Rehabilitation Hospital to offer support to those suffering from aphasia, a language disorder that often results from stroke, traumatic brain injury, or neurological diseases.

Kaplan's Aphasia Community Group moved to BU, and expanded into Sargent's Aphasia Resource Center (ARC), which offers educational, social, and clinical resources. In addition to facilitating weekly topic-specific groups, Kaplan still leads the free monthly meetings for up to 100 people.

Thanks to the group, says Swathi Kiran, a professor of speech, language & hearing sciences and the center's research director, "the ARC is now one of the strongest community resource centers in the country, and it fulfills three important missions: providing exceptional services for patients, training the next generation of clinicians, and serving as an important test bed for clinical research in aphasia."

To date, the group has held more than 300 sessions and served approximately 12,000 people. The Community Group celebrated its 25th anniversary this June.

TOP AWARDS

Sudha Arunachalam, an assistant professor of speech, language & hearing sciences, received the 2015 Marion and Jasper Whiting Foundation Fellowship Award. **Sara Brown**, a clinical associate professor of athletic training, received the National Athletic Trainers' Association Most Distinguished Athletic Trainer Award. **Jennifer Gottlieb**, a research assistant professor of occupational therapy, received a Fulbright Scholar Award for the 2015–2016 academic year.

Julie Starr, a clinical associate professor of physical therapy & athletic training, received the American Physical Therapy Association (APTA) Linda Crane Memorial Lecture Award, which honors an APTA member who has demonstrated excellence in research, clinical, or academic practice. **Cara Stepp**, an assistant professor of speech, language & hearing sciences, was named a Hariri Institute 2014 Junior Faculty Fellow and is the first professor at Sargent to receive a Faculty Early Career Development Award from the National Science Foundation.

NEW FACULTY AND PROMOTIONS

New Faculty

Laura Driscoll, clinical assistant professor, department of physical therapy & athletic training

Bria Dunham, clinical assistant professor, department of health sciences

Anne Escher, clinical assistant professor, department of occupational therapy

Daniel Fulford, assistant professor, department of occupational therapy

Mary Beth Holmes, clinical assistant professor, department of physical therapy & athletic training

Robin Newman, clinical assistant professor, department of occupational therapy

Erin Riley, clinical assistant professor, department of physical therapy & athletic training

Basilis Zikopoulos, assistant professor, department of health sciences

Promotions

Elizabeth Hoover, clinical associate professor, department of speech, language & hearing sciences and clinical director of the Aphasia Resource Center

Eileen O'Keefe, clinical professor, department of health sciences and director of the program in health science

TO PERU, FOR A CAUSE

In summer 2015, Sargent undergraduate and graduate students embarked on a service learning trip to Peru. At an altitude of 11,000 feet, they experienced firsthand the traditional Andean way of life, from a remote farming village to the Inca capital of Cusco.

Supervised by Sargent faculty, students had the opportunity to see health care at work in a developing country; they learned about traditional medicine and visited rural community clinics, as well as public and privately funded hospitals.

ALAN WONG

Web Extra
Watch a video of the trip at **go.bu.edu/sargent/inside-sargent**.

TRIUMPH OVER TRAUMATIC BRAIN INJURY

PROJECT CAREER PREPARES STUDENTS FOR RIGORS OF SCHOOL AND WORK

BY LESLIE FRIDAY

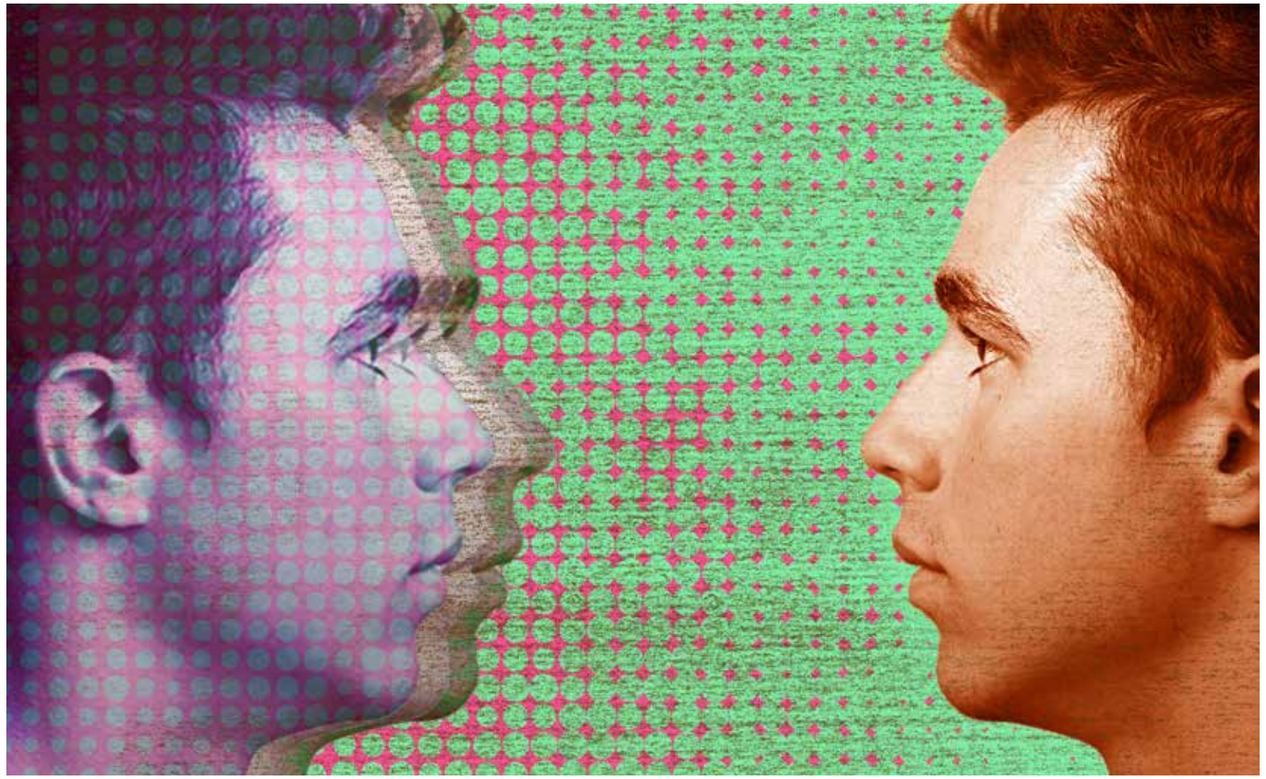


PHOTO ILLUSTRATION BY SHOLA FRIEDENSOHN

ANNA SAUCIER'S LIFE changed in an instant during her sophomore year of high school. She remembers zipping across a soccer field to head off a boy on the opposing team who was fast-breaking toward the goal. The center defender of her coed team, Saucier executed a perfect slide tackle (the first in her career) to prevent the point, but her opponent flipped and landed knee-first on her temple.

She continued to play the minute left in the game before collapsing off the field, suffering from the worst of several concussions she'd had during her career as a four-sport athlete. Saucier (CAS'18) was rushed to the hospital and in the days following, she couldn't walk, had no energy, and experienced memory issues. She was placed on morphine for three days to control her throbbing headaches.

Plagued by fatigue, an inability to concentrate, and persistent headaches, Saucier was unable to return to school full time for several months. It was enough to drive the straight-A student and class president crazy. "I got really good at coloring," she says. The walls of her house quickly filled with artwork—a daily reminder of her slow but steady progress.

Instead of giving up, Saucier says she got mad: "I forced myself to get better." She underwent neurological rehabilitation, got a tutor, and enrolled in honors and AP courses her junior year. "People get injuries and they think that's it," she says. "That was never an option for me. I know what I'm capable of, and that's what I had to get back to." She graduated among the top students in her class, applied to BU, and started her freshman year in fall 2014. While her condition has improved, she still suffers from crippling headaches and has trouble with organization, time management, and memory.

Just after she arrived on campus, Saucier visited Disability Services. Staff there recommended she enroll in Project CAREER, a program that uses assistive technology and vocational rehabilitation to improve the academic and employment success of college undergraduates with traumatic brain injury (TBI). She is now among 40 part- and full-time students enrolled in the program, which is a partnership among Kent State University, West Virginia University, and JBS International, Inc. The program is being funded by a five-year, $2.5 million grant from the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR) (formerly NIDRR).

> "THERE IS A REAL VOID IN SERVICES FOR STUDENTS WITH TBI.... EVERY ONE OF THESE STUDENTS COULD BENEFIT FROM THE INTENSE MENTORING AND ADVISING PROJECT CAREER OFFERS."
> —KAREN JACOBS

"There is a real void in services for students with TBI in helping them transition from being in a student role, graduating from school, and then obtaining a job," says Karen Jacobs, a clinical professor of occupational therapy and principal investigator for the BU subcontract. "There are limited resources helping them with that transition period. Every one of these students could benefit from the intense mentoring and advising Project CAREER offers."

Every year roughly 1.7 million Americans sustain a TBI, often from a car or sports accident or a violent assault. This group also includes soldiers who have been injured by explosive devices. Symptoms vary, but people living with TBI often experience trouble with memory, concentration, and organization; may be irritable, tired, or depressed; and may endure punishing headaches. They may find it hard to navigate and understand complex systems and initiate new tasks. And they often fail to connect with support services effectively, or have difficulty establishing and maintaining relationships. Ongoing cognitive impairments have historically made it more difficult for people suffering from TBIs to find—and keep—a job.

Students develop a number of strategies to manage their TBI. They may listen to audiobooks if reading is challenging, request note-takers or extra time for tests if their concentration lags, and post sticky notes everywhere to remind themselves of appointments, exams, or medication they could otherwise forget. These strategies might help them get into school, Jacobs says, but they'll need additional support to do well.

Students enrolled in Project CAREER receive an individualized plan designed to address their specific needs. Amanda Nardone ('13), a BU technology and employment coordinator, works with students to assess their academic difficulties, employment history, and comfort level with technology, as well as where the student would like more support. (Every Project CAREER student receives an iPad and a budget for apps.) If students have difficulty with organization or memory, Nardone uses calendar and planner apps such as iOS Calendar, PlannerPlus, Week Cal, or iStudiez. For time management, she recommends 30/30, an app that creates a list of tasks and specifies a time limit for each item. For recording lectures and note-taking that syncs with the recording, she suggests Notability or Evernote. For students experiencing anxiety, she recommends Breathe2Relax or Yoga Studio.

"I do my best to individualize this program and meet students where they are," says Nardone, who sees each student for a couple hours every other week or as needed.

For Saucier, the note-taking and organization apps have been invaluable. She says Notability has given her a "confidence boost" in lecture-style chemistry and calculus courses. And a yoga app is helping her deal with still-frequent headaches.

One of the stated goals of the project is to improve employment outcomes for students suffering from TBI. Nardone matches students with mentors in their desired field so students can better transition from academics to professional careers. Once matched, the student and mentor keep in touch

> "I DO MY BEST TO INDIVIDUALIZE THIS PROGRAM AND MEET STUDENTS WHERE THEY ARE."
> — AMANDA NARDONE ('13)

Through Project CAREER, Amanda Nardone ('13) (left) and Karen Jacobs support 40 part- and full-time students with TBI.

by email, phone, or Skype, or they meet in person to discuss questions from course selection to internship opportunities.

Nardone also helps students find internships, research and apply to graduate school programs, and polish their résumés and cover letters. She follows students for up to a year after graduation to see if they need further assistance landing a job, or to offer support for those already employed.

Jacobs recognizes that while Project CAREER helps undergraduates, graduate and certificate program students would also benefit from the services, and she hopes the next round of funding will allow her and her colleagues to address that gap.

She says that since the project launched, it has become apparent that there are few support groups in the area for individuals with TBI. She and Nardone are working on creating a support group on or near the BU campus to provide additional support for them and their families.

As for Saucier, she's embarked on an ambitious pre-med curriculum, designing a degree that combines neurology, psychology, sociology, and medical anthropology. She wants to encourage more students to enroll in Project CAREER. "The reason I'm doing so well in my classes," she says, "is because of Project CAREER." IS

CONQUERING CONCUSSIONS

In 2015, Boston University's Ryan Center for Sports Medicine will open a Concussion Management Center to meet the needs of a growing patient population. Headed by Douglas Comeau, a School of Medicine assistant professor of family medicine and director of sports medicine, the facility will provide concussion care to the public, from testing and clinical treatment to rehabilitation and prevention education.

The new center aims to make patient care more streamlined by offering all services under one roof, says Comeau, who is also the medical director of the Ryan Center and director of the BU primary care sports medicine fellowship. "It's very exciting that we are able to treat high school and college students, full-time athletes, and weekend warriors," he says, "and provide the same treatment the pros would get."—MS

300,000+
annual sports-related concussions in the US

10%–15%
of concussions result in persistent symptoms

25
is the age at which the brain's frontal lobes stop developing

34%
of college football players sustain concussions

60%
of college soccer players sustain concussions

36%
of college athletes suffer multiple concussions

70 mph
is the impact speed of a soccer ball

JACKIE RICCIARDI

A version of this article originally appeared in *BU Today*.

An Auditory Illusion

Does how we speak determine how we hear?

BY LARA EHRLICH

Researcher Elizabeth Petitti sits in a quiet lab, opens her laptop, and plays two musical notes. Some would hear the notes rise in pitch, while others would hear them fall. Why would two people hear the same notes differently? The answer may improve our understanding of how our auditory system develops, and may help speech-language pathologists who work with people who have hearing impairment.

Petitti says the answer comes down to the way our brains perceive two components that make up sound: fundamental frequency and harmonics.

A note's fundamental frequency is the primary element of sound from which our brains derive pitch—the highness or lowness of a note. Harmonics give a note its timbre, the quality that makes instruments sound distinct from one another.

Many sounds in the world are made up of these tones, whether you strike a key on a keyboard, play a note on a clarinet, or say a letter, says Petitti ('15), who graduated from Sargent with a master's in speech-language pathology. Our brains expect the fundamental and the harmonics to be present in any given note. But when some of this information drops out, "the way you perceive the note can change in surprising ways," says Petitti's mentor, Assistant Professor Tyler Perrachione, a Peter Paul Career Development Professor and director of the Communication Neuroscience Research Laboratory.

Petitti explains that when she removes the fundamental from a tone (using signal processing software), and then plays that note, the listener's brain automatically supplies the pitch. People's brains deliver this information in different ways: they either fill in the missing fundamental frequency—similar to the way the brain would compensate for a blind spot in our eye—or they determine the pitch from the harmonics.

Here's where it gets interesting: when two different tones that have been stripped of their fundamentals are played in succession, some listeners hear their pitch rising, and some hear it falling. Who's right?

In their auditory study, Tyler Perrachione and Elizabeth Petitti ('15) found that native tone language speakers and native-English speakers hear pitch differently.

MICHAEL D. SPENCER

"There's no right answer," Perrachione says. "Pitch only exists in our minds. It's a perceptual quality." So, how exactly do we determine pitch? It turns out the language we speak plays a role.

Petitti and Perrachione theorized that individuals who grew up speaking a tone language like Mandarin would perceive pitch differently than those who grew up speaking a non-tone language like English. In Mandarin, for example, a word often has several meanings, depending on how the speaker employs pitch; *mā* (with a level tone) means "mother," while *mǎ* (which drops, then rises in tone) means "horse."

To test this theory, Petitti invited 40 native-English speakers and 40 native tone language speakers to participate in a study, which she and Perrachione presented at the International Congress of Phonetic Sciences in August 2015. Each participant listened to 72 pairs of tones stripped of their fundamental frequencies, and then indicated if the tones were moving up or down.

Petitti and Perrachione found that language does change the way we hear. Individuals who grow up speaking English are more attuned to a note's harmonics, while the tone-language speakers are more attuned to its fundamental. So, when a note is stripped of that component, they're more likely to derive pitch by supplying the missing fundamental than by listening to the harmonics still present in the note.

> "We are interested in how brains change with experience and how our experiences predispose us to certain auditory skills."
> —Tyler Perrachione

These results led Petitti and Perrachione to wonder if the difference in pitch is grounded in our earliest language acquisition, or if other experiences can also affect how our brains process sound. For instance, would musicians—who also rely on pitch—perceive sound the same way as tone-language speakers?

When they put the question to the test, Petitti and Perrachione found that neither the age at which a musician began studying nor the number of years he'd practiced impacted his perception of pitch. To Petitti, this suggests the way we listen is determined by our earliest brain development. While you may begin learning an instrument as early as three, "you start language learning from birth," she says. "So your auditory system is influenced by the language you are exposed to from day one."

It's not just theoretical. "Big picture: we are interested in how brains change with experience and how our experiences predispose us to certain auditory skills," Perrachione says. This understanding could "help us better understand the opposite, when things don't work quite right," such as when a person has a disorder like amusia (tone deafness).

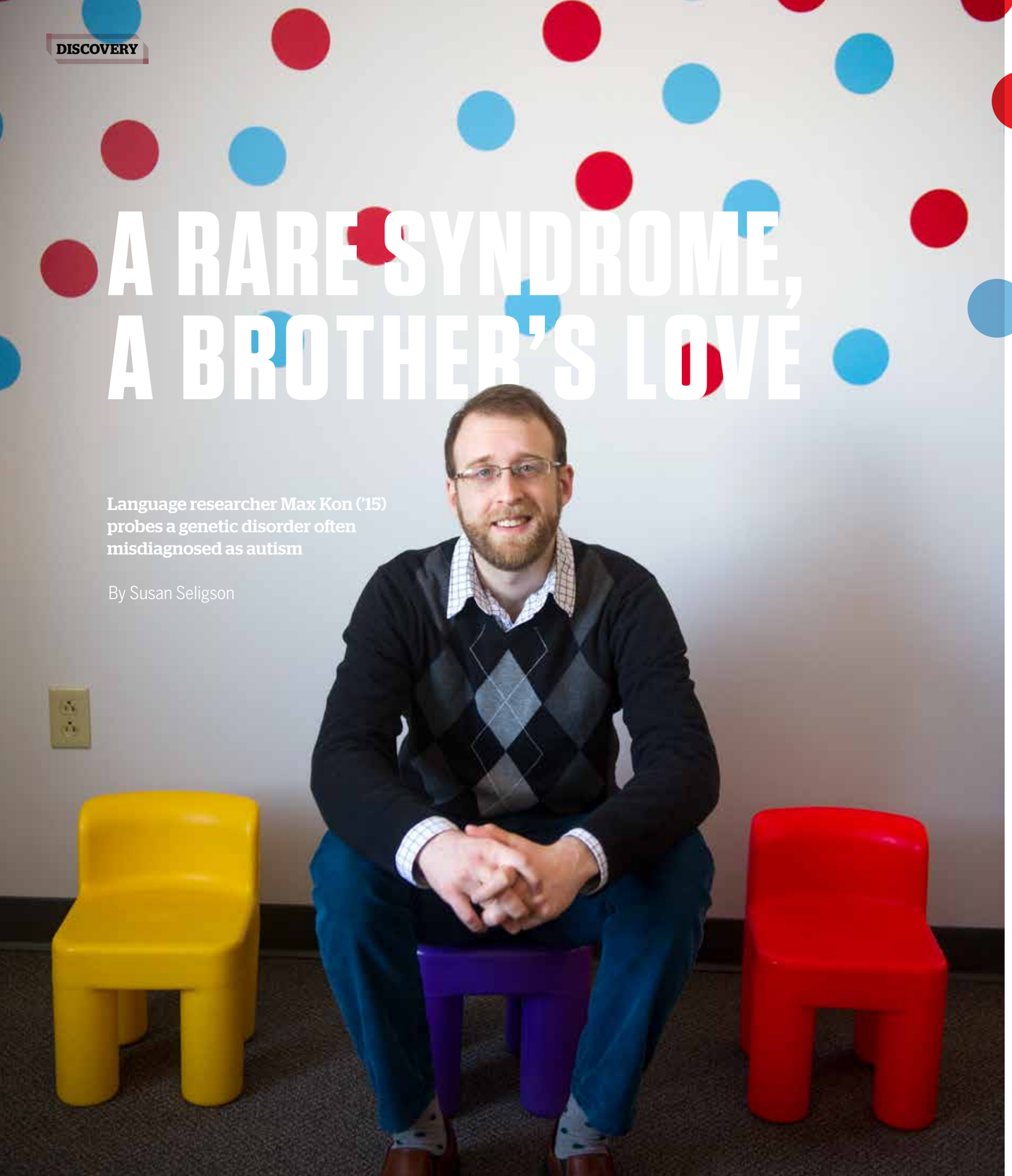
Petitti underscores the study's potential clinical impact; in her career as a speech-language pathologist, she intends to work with clients who have hearing impairments, which will involve teaching them to perceive and use pitch. This ability is "crucial when you're teaching how to ask a question, and how to use pitch to signal the difference between words," she says—all skills we typically begin to develop early and unconsciously. For a seemingly simple ability that most of us take for granted, there is much at play. IS

WebExtra
Take the auditory illusion quiz at **go.bu.edu/sargent/inside-sargent**.

A RARE SYNDROME, A BROTHER'S LOVE

Language researcher Max Kon ('15) probes a genetic disorder often misdiagnosed as autism

By Susan Seligson



CYDNEY SCOTT

WHEN ZACH KON WAS AN INFANT his mother suspected something wasn't right. He had a protruding jaw, a prominent forehead, and flattened features. As Zach grew, his speech was delayed, his facial muscle tone slackened, and when he did speak his words were slurred and often unintelligible. Despite his exuberance toward strangers, he had aggressive outbursts at home and school. And he constantly hugged himself. After years of misdiagnoses as Tourette syndrome or autism, DNA testing revealed Zach has a rare disorder called Smith-Magenis syndrome (SMS), the result of a mutation in his DNA.

The family's struggle to identify and treat Zach's disorder inspired his older brother, Max Kon ('15), to become a linguist and speech pathologist and devote his research to better understanding the disorder his family once called "Tourette's Plus."

Because SMS is not widely understood, there is no specific treatment for it, says Kon. He hopes that studying how children with SMS learn to speak and why they interpret written and spoken words differently than typically developing learners will lead to a targeted approach to treatment.

A MYSTERIOUS DISORDER

From the delayed speech and language skills to the irrepressible attraction to strangers—"He has way more friends than I do," his brother says—Zach fits the textbook profile of SMS, a condition that affects an estimated 1 in 25,000 people worldwide. The disorder is not typically inherited and is caused by a mutation, or permanent alteration in a DNA sequence during the formation of reproductive cells in the early development of the fetus. The mutation's cause is unknown, and the precise genetics of SMS are for scientists in another field to decipher, says Kon.

As of now, the disorder, identified in 1986 by a pair of geneticists, remains poorly understood, says Kon's mentor, Sudha Arunachalam, an assistant professor of speech, language & hearing sciences, and director of the BU Child Language Lab. Study sample sizes have been small because the disorder is not only rare, it often goes undiagnosed.

> "WHILE AUTISM IS A MORE COMMON DISORDER AND WE OFTEN RECRUIT PARTICIPANTS TO THE LAB, SMS IS FAR LESS COMMON, SO I NEED TO GO TO THEM." —MAX KON ('15)

Individuals who have been diagnosed with SMS are often treated with applied behavior analysis (ABA), which targets skills related to attention span, language comprehension, reading, and math. (Other practitioners also address sleep disturbances and behavior issues.) Designed for children and teens, the tasks used in ABA involve clear instructions, positive reinforcement, and repeated trials. For Zach, who wasn't diagnosed with SMS until his teens, intervention with ABA had mixed results, Kon says. Zach's treatment involved modifying inappropriate behavior by

focusing on the "antecedent"—the conditions leading up to the behavior—rather than on the outcome. For children with SMS, "this tilts the balance toward maintaining a positive, helpful environment rather than setting expectations," Kon says. This treatment is frequently used to treat children with autism, but tends to be less reliable for those with SMS, who require more individualized intervention, Kon says.

SIMPLE QUESTIONS, REVEALING ANSWERS

Kon, a master's student, has been working with Arunachalam to establish the first comprehensive picture of what the SMS population looks like in terms of language expression and understanding: their strengths and weaknesses, how their abilities grow over time, and whether this growth is dependent on the kinds of intervention they experience.

Arunachalam advised Kon as he prepared the study, helping him to "formulate questions and look at the disorder from a broader research perspective," Kon says. Since Kon's graduate education has been largely focused on clinical practice as a speech-language pathologist, Arunachalam helped him integrate the more clinical aspects, such as language testing and behavior management, with the rigorous standards of research. She helped Kon ensure his documentation and testing met the standards of the University's Institutional Review Board (IRB), which must approve all research involving human subjects.

> "WHEN I'M GOING THROUGH A ROUGH PATCH, [MAX] SAYS THINGS LIKE, 'ZACH, CALM DOWN, TAKE A DEEP BREATH.'" —ZACH KON

In June 2014, Kon attended a conference in St. Louis, Missouri, where those with SMS and their families gathered to share experiences and learn about research and treatment updates. In advance of the event, Kon emailed families on the conference participant list and recruited eight children to his study. "While autism is a more common disorder and we often recruit participants to the lab, SMS is far less common, so I need to go to them," he explains. At the four-day conference, he conducted one-on-one testing with the children whose parents had agreed to participate.

The children, who ranged in age from 5 to 10, took part in a series of tests to probe their levels of language ability and comprehension. In one test, Kon held up a board depicting four pictures and asked his young participants to point to the objects—shovel, tree, hat—as he named them. While some were very capable of following directions, others responded to something close, for example, pointing to "cat" instead of "hat," which indicates difficulty listening, hearing, or comprehending the command, says Kon. One child pointed to a dog when asked to point to a cat, indicating difficulty with associating meanings and sounds. "And some children, while social and happy enough to spend time with me, did not respond at all, indicating poor comprehension or an inability to recognize my intent."

In another, slightly more difficult test, Kon presented two pictures, one of a boy kicking a ball, and one of a boy hugging a girl, and asked the participants to identify the picture in which the boy is hugging the girl. This test examines a child's understanding of syntax, Kon explains. "Think of how complicated English can be," he says. Sentences as similar as "The boy hugged the girl" and "The boy was hugged by the girl" require what speech-language pathologists call "syntactic comprehension." "Testing this comprehension can reflect whether children show patterns in their syntax—passive versus active sentences, for example—or whether they understand relatively complicated sentences but can't respond verbally with the same level of complexity. Tests like these also measure verbal memory," Kon adds.

Kon hopes his work will eventually help improve detection of SMS. He plans to apply to a PhD program to continue his research and attain a better sense of the range of abilities among those who have the disorder. As Kon continues his study, he also aims to show the key differences between autism spectrum disorder and SMS, and find ways in which treatment that has been effective for autism might be tailored to children with SMS. Ultimately, he hopes his research will enable doctors to diagnose the disorder more quickly and it will lead to a targeted treatment that can be applied as consistently at home as it is at school.

A LONG-TERM PROJECT

"I'm still in the preliminary phase of analysis," says Kon, who is in the process of renewing his IRB certification, which will enable him to continue collecting data to increase the sample size as well as track the same participants over time. In the meantime, the more kids with SMS Kon meets, the more he understands the challenges his brother, Zach, has faced.

Now 22, Zach is a high-functioning extrovert living in a group home. A fan of the *Guinness Book of World Records* who's emphatic about people spelling his name correctly, he is on medications that have largely calmed his aggression.

At the Parents and Researchers Interested in Smith-Magenis Syndrome, or PRISMS, Building Bridges of Hope Conference in 2014, Zach gave a speech to children with SMS and their families, in which he said, "My family is the rock of my life and I love them dearly. My older brother is really helpful," and has been "right there from the start. When I'm going through a rough patch, he says things like, 'Zach, calm down, take a deep breath,' and these words will never leave my brain." IS

Kids in Context

A new survey helps youth with intellectual disabilities engage with their community

BY STEPHANIE ROTONDO

At a local burger establishment, 17-year-old Lisa* orders a drink and fills her cup at the soda machine. It's a routine act for many teenagers, but performing this task without assistance is a milestone for Lisa, whose ultimate goal is to participate more fully in community living. Lisa and five other Boston-area youth with intellectual disabilities are taking part in field research for a survey development project conducted by Kendra Liljenquist ('15), who recently graduated with a PhD from Sargent's program in Rehabilitation Sciences.

RON WURZER, LEFT; MIKE SPENCER, RIGHT

Throughout the summer, Liljenquist takes the youth on trips to a restaurant, a bowling alley, a pottery class, and the Museum of Science, Boston, where they engage in activities that are new to them. Liljenquist documents these outings with photographs, and after each trip, interviews the youth about their experiences. The tool she has developed to record their impressions—the Participatory Experience Survey—features 20 questions, such as, "Did you do something by yourself today?" and "Was anything too hard today?" When Liljenquist asks Lisa to choose the photo that depicts her favorite activity of the day, the teen beams with pride as she selects the image of herself at the soda machine.

"When kids participate in activities like clubs or sports, they're given the opportunity to develop skills that lead to successful transition into adulthood," says Liljenquist, who intends for the Participatory Experience Survey to help minority youth with intellectual disabilities—particularly those in disadvantaged circumstances—become more involved in school and other social activities.

Developed for those in the "transition ages" of 12 to 22, the tool will assist service providers—occupational therapists, special education teachers, and recreational therapists—to determine whether the young people have participated in various aspects of an activity, including being independent, working with their peers, and engaging in key developmental activities such as collaboration and planning. The survey will also help researchers and service providers better understand how different environments promote growth and will assist schools and community organizations in becoming more inclusive.

Liljenquist's survey is the first tool to provide youth with intellectual disabilities the opportunity to self-report their impressions and experiences. Current self-report measures are often not accessible to individuals who may have difficulty with abstract thinking. "You're asking people with cognitive challenges to report on how they're thinking, so you have to conduct testing in a different way," says Liljenquist's mentor, Professor Wendy Coster, chair of the occupational therapy department and director of the Kids in Context Lab. Liljenquist's survey is intended to be conducted in interview format—no reading required—"to be as accessible as possible to young people with a wide range of abilities," says Liljenquist. "You can't ask for a survey of people who can't understand the questions." Her tool forgoes the rating scales common in many instruments and features straightforward questions, asking participants to respond with either "yes" or "no."

Liljenquist's fieldwork was invaluable to designing the survey. "She's not developing something in the lab and taking it to the community," says Coster. "Instead, she went to the community and developed something that from the beginning is there to meet their needs." Liljenquist conducted field research and observation, gathered feedback from parents and practitioners, and asked the survey-takers for input. She conducted in-depth interviewing to check the participants' understanding of each question, and she was mindful to include youth of varying ages, backgrounds, and disabilities. "It's important to ensure we're not disenfranchising people," Coster says.

With support from her mentor Wendy Coster (above), Kendra Liljenquist ('15) (left) developed the first tool to help youth with developmental disabilities self-report their experiences.

Liljenquist is now implementing the tool with organizations like Seattle Parks and Recreation, which has asked her to evaluate their youth sport and teen activity programs and expand the measure to adult populations. And the Special Olympics Washington has expressed interest in working with Liljenquist to assess its unified sports program. She plans to broaden the public's access to the survey by making it available for free download through Canada's CanChild Centre for Childhood Disability Research, an organization with which Coster and her lab regularly collaborate. Coster credits Liljenquist's skill in cultivating relationships and developing trust among service providers and the youth they serve as a key reason for the tool's success. IS

*Name changed for privacy

Development of the Participatory Experience Survey was supported by Boston University's Department of Occupational Therapy and School of Education, Harvard Graduate School of Education, Boston Children's Hospital, and the Center on Human Development and Disability at the University of Washington. It is aided by a grant from the Dudley Allen Sargent Research Fund.

THE BIOMECHANICS OF MOTION

HOW A SIMPLE EXERCISE COULD KEEP YOUR BODY MOVING IN HARMONY

BY ANDREW THURSTON

AT HISTORIC FENWAY PARK, RED SOX FANS DON'T SIT COMFORTABLY. THE SEATS, CRAMMED IN DURING THE EARLY 20TH CENTURY, OFFER VERY LITTLE WIGGLE OR LEGROOM. WHEN STRAGGLERS IDLE BACK MID-INNING WITH DRINKS AND DOGS, THE WHOLE ROW HAS TO RISE AS THE LATECOMERS SQUEEZE AND SIDESTEP PAST.

In summer 2010, Cara L. Lewis and a fellow physical therapist watched the regular up and down of row after row as the Sox took on the Arizona Diamondbacks. As the pitches flew, they started talking about the muscle activity involved in the Fenway side step. The hip abductors were getting a workout, from the posterior gluteus medius, which wraps from the rear to the outside of the thigh, to the tensor fascia lata, a small muscle on the outer hip.

They're the same muscles that can cause, among other things, iliotibial band problems (leg pain common in runners and cyclists) and patellofemoral pain syndrome (that dull ache in the knee you might feel when jogging or descending stairs). In many clinics, the exercise of choice for such conditions is a resisted side step. Physical therapists loop a TheraBand, an elastic resistance band, around a patient's legs and ask them to step from side to side. As they step, they have to stretch the sophisticated rubber bands, available in a rainbow of colors and resistance levels, forcing the leg's muscles to work harder—an effect that's also made them popular at-home exercise tools.

But as they sat watching Fenway Park's side steppers, Lewis and her colleague began to wonder which hip muscles the bands were actually working and whether they were being used in the most effective way.

"When I treated patients in the clinic, I usually put the band around their ankles, but why?" says Lewis, an assistant professor of physical therapy & athletic training who started her career in professional practice. Almost every clinic and gym has bags full of the bands, but no common guidance on their usage.

In a National Institutes of Health–funded study, Lewis tested the bands every which way: around toes, ankles, and knees; while standing and squatting. "You have to stop and think about what you're doing and where it's actually working—put a little biomechanics back in the picture," she says of her research aims. "What are the forces, what's each side of the body having to do?"

In a series of lab-based exercises, she determined the best way to rehab hip abductors, from where to place the band to how to move each leg. She also discovered that the leg doing the moving might not be getting a great workout after all. By using biomechanics to test conventional treatments and exercises, Lewis consistently uncovers new ways of helping patients. And her work isn't limited to just intervening after a knee gives out or a hip locks up—she's pioneering rehabilitation as prevention to ensure fewer people get injured in the first place.

JANICE CHECCHIO

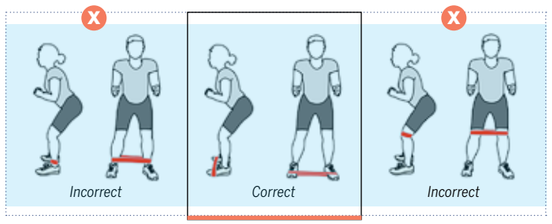
THE HUMAN MACHINE

Fixing things runs in Lewis' family. When she was growing up, Lewis used to watch her grandfather coax car engines back to life. He was an auto mechanic—and occasional racetrack pit crewmember—and Lewis was captivated by the combustion engine's ballet of valves and pistons.

"I always thought being a mechanic was so cool because I loved looking at how things moved, how they interacted," she says.

The gadgets assembled in Lewis' Human Adaptation Lab at Sargent College—digital motion capture cameras, an electromyography system, signal conditioning amplifiers—shed light on how components in the human machine work together. And they help Lewis figure out ways to prevent our bodies from breaking down.

In the side step study, Lewis and her team of researchers placed electromyography pickups on subjects to record "the electrical activity in the muscle, which then tells you how active the muscle is." Participants also wore small reflective markers. Ten cameras nestled close to the lab's ceiling followed the reflective markers, recording the images and tracking movements



In a study using electromyography technology, Cara Lewis determined that the most effective use of the TheraBand is to step while squatting with the band around the toe, as opposed to positioned around the ankle or knee.

using a 3D motion capture system so Lewis could determine the subject's position and how they moved.

She asked the subjects—all healthy, so results weren't skewed by existing neuromuscular conditions—to sidestep across the lab and then make their way back with a resistance band looped around their knees, ankles, or toes. This test allowed researchers to see each leg stand and move in both directions. They'd then do it all again (and again) with the band in a different position. They repeated the whole scenario one more time, too: if a subject went through the routine standing up, Lewis would ask them to squat and repeat. Lewis says the standing and band positions were randomized in case one position affected the next.

The step distance was not randomized. As the subjects moved through the room, they were told to step one floor tile at a time. "Some studies will do it on leg length and all these other parameters," says Lewis. "We just used the floor tiles to be practical. In the clinic, you're not going to sit there and put all these different side step lengths down on the floor when you have floor tiles and you can say, 'OK, step this far.'"

She expected to see the hip muscles working harder as the band moved lower down the leg, but wasn't sure if moving it from ankle to toe would make a significant difference.

"From a biomechanical standpoint, when you get farther from the joint, you would assume you've increased your lever arm—that is, the distance from your joint—and that's going to increase the torque created by the band," says Lewis. She explains that's why most doorknobs are opposite the hinge and not in the middle. "But when you go from ankle to toe, we weren't really sure what was going to happen because the increase in lever arm isn't a lot."

THE POWER NEEDED TO STAND

After collating the results, Lewis found that for most conditions it's better to step while squatting rather than standing and that the toe is the best place to put the band.

"When you go out to the toe," she says, "the band pulls your toes in, creating this internal rotation of your legs." When that happens, the external rotators—the gluteus medius on the outer pelvis and the gluteus maximus, the most powerful hip muscle—activate to stop the toes from turning. But, importantly, the tensor fascia lata doesn't have to work as hard.

"As you go from knee to ankle to toe, the gluteals all increase," says Lewis. "The tensor fascia lata increases from knee to ankle but not from ankle to toe. A lot of these musculoskeletal conditions that we try to rehab, we're trying to get more gluteal activity and not more tensor fascia lata activity. By putting the TheraBand around the toe, you're getting that." Most home exercisers using resistance bands to strengthen leg muscles should put the band around their toes for the same reason.

For some, the most surprising conclusion from the study could be Lewis' finding on which leg is getting the biggest workout during the side step: the one standing still. "As a biomechanist it makes perfect sense to me," says Lewis. "The leg you're standing on has to stabilize your trunk; all you're having to do is move the other one. You're really strengthening the leg you're standing on more than the leg you're moving." The result is one she hopes reminds clinicians—and fitness fanatics—to think more often about the body's mechanics as it goes through common exercises.

It's not unusual for Lewis' research to bring such practice-changing conclusions. In a concurrent study, she tested the mechanism of another popular drill, the single leg squat—one leg off the floor, the other bending at the knee and pushing back up again. What nobody seemed to have thought about before, says Lewis, is the nonstanding leg's position. And yet it has a big impact on how the exercise works.

"If I stand on my right leg and hold my left leg out in front of me, just to hold my leg out there, I'm going to tip my trunk back a little bit, so I squat differently," she says. "The second I put it behind me, I lean forward more as I squat and I also drop my hip a little bit more."

For example, if a clinician were treating someone with femoroacetabular impingement, a common cause of hip osteoarthritis, they would want to avoid holding the air-bound

Cara Lewis' grandfather made car engine components work in unison. She does the same with the human machine.

DAN AGUIRRE

> "I REALLY THINK PHYSICAL THERAPISTS SHOULD BE PLAYING A BIGGER ROLE IN PREVENTION."
> —CARA LEWIS

leg back: it would force the hip into an injurious position. "A single leg squat with your leg behind you seems to work the quadriceps muscle more," says Lewis. "A single leg squat with your leg in the middle or out in front works your gluteals and hamstrings more."

MORE THAN TREATMENT

At Sargent, Lewis has the opportunity—albeit between teaching courses (she also holds an assistant professor position on BU's Medical Campus) and directing a lab—to study the efficacy of exercises and treatments many take for granted. Clinicians in the field aren't always so blessed, says Lewis. To give her students the best start and "encourage a spirit of inquiry," she urges them to play an active role in her research.

"It gives you a better appreciation for interpreting evidence," says Lewis of involving students. "If we're all going to be evidence-based practitioners, we've got to understand the process and we've got to be willing to take part in that."

Two Sargent students, Hanna Foley ('15) and Theresa Lee ('15), did much of the work on the side step study and were listed as coauthors when it was published in the *Journal of Orthopaedic & Sports Physical Therapy*. After being involved in the project, Foley changed her plans and now hopes to work toward a career as a researcher. The study results have already shaped her clinical work.

"My clinical experience is in the outpatient orthopaedic setting," says Foley. "I implement our findings with patients who need gluteus medius strengthening. It is very rewarding to have been a part of the research that supports the exercises I'm prescribing for real patients."

Lewis also hopes her students take away another important lesson: physical therapy is about diagnostics as well as treatment. When she was first studying the subject, Lewis remembers, "we were talking about how people walk and I was one of the ones put up onstage to walk in front of everyone. Not because I did it correctly, but because I didn't know how to push off with my feet."

In a study with her postdoctoral mentor, Lewis discovered that pushing off harder from the feet when walking reduced stress on the hip joints. She changed the way she walked, lessening her chances of future hip and back pain.

"I really think physical therapists should be playing a bigger role in prevention. If you think about it, you go to the dentist twice a year, you brush your teeth every day; why don't we take better care of our musculoskeletal system in a similar way? Why don't we go to physical therapists at least once a year to find out what we could be doing better?"

When it comes to hip pain, most think about seniors creaking along until they need a joint replacement; Lewis aims to ward off the problems before they begin. Other projects in her lab include a study of how male and female hip structure changes in adolescence and a five-year investigation of young athletic adults with hip pain. She's also planning to collaborate with a mechanical engineer to model bone growth to better understand the forces that may cause bone to develop abnormally.

"It's exciting to think we don't have to injure ourselves to see a rehabilitation specialist," says Dean Christopher A. Moore of Lewis' impact on the wider field. "This approach broadens the appeal of Dr. Lewis' work to many more people—young and old, injured and not injured." Moore adds that the analytical and mechanical approach taken by Lewis "requires the skills of a counselor, a therapist, an engineer, a physiologist, and a good bit of Dr. Emmett Brown," *Back to the Future*'s resourceful inventor. "She's one of the rare scientists who has all of those capabilities." IS

CHANGE OF PLANS

WHY DO WE BREAK OUR HEALTH RESOLUTIONS? WHAT MICHELE DEBIASSE KNOWS CAN HELP WOMEN OF LOW SOCIOECONOMIC STATUS—AND ALL OF US—FOLLOW THROUGH ON OUR INTENTIONS.—BY JULIE BUTTERS

We all do it. We intend to ease up on the carbs or the junk food and eat more leafy greens. But somehow, between setting a goal and getting in gear, we slip up.

To help people make the leap between their intentions and adopting healthy habits—specifically, eating more fruits and vegetables—Michele DeBiasse is studying a practice called implementation intentions, in which an individual plans to perform a particular action at a specific time and place. Her research was partially funded with a five-year Centers for Disease Control and Prevention grant for the Partnership in Health & Housing (PHH), a collaboration among Boston Housing Authority (BHA), Boston Public Health Commission, the PHH Community Committee, and Boston University School of Public Health (SPH) that promotes the health of BHA residents.

DeBiasse, a Sargent clinical assistant professor of nutrition, is working with women of low socioeconomic status (SES) who face high hurdles in improving their diets. In a study she conducted with the assistance of SPH, DeBiasse found that mothers and daughters who live in public housing in greater Boston aren't eating many fruits and vegetables, even though they know these foods are good for them. She believes one reason is economics. Showing people how to buy fruits and vegetables at lower costs—choosing canned or frozen foods, for example, and using government assistance coupons at farmers markets—can make a difference, says DeBiasse. But even addressing a host of barriers, including economics, won't necessarily get someone to stick with a health plan.

DeBiasse invited some of the women living in public housing to join her intervention study, which she says is the first to test implementation intentions exclusively with women of low SES. In a phone conversation, she helped them create a plan to eat one additional daily serving of fruits or vegetables over the course of a month, which involved noting specific places and times when they could do so. She then asked them to write the plan in an "if-then" format, such as: "If it's between 3 and 4 p.m., and I am on the living room couch watching TV while waiting to pick up my child from school, then I will eat half a grapefruit." One month later, they completed a short survey through which DeBiasse could assess their progress.

There are two primary reasons this method should work. First, it means they've got a plan, which is more likely to help them reach a goal than a vague intention. DeBiasse says study participants told her, "Nobody's ever asked me [about eating more fruits and vegetables] or actually planned with me how I was going to do it." Second, a specific if-then plan helps make the behavior automatic. Take walking for exercise, says DeBiasse. When the opportunity arises, you debate, "Should I do this now or wait until after dinner? Where am I going to walk and for how long?"

"Having to think through all these questions makes it easier for you to just say, 'Oh, forget it!'" says DeBiasse. But if you make a plan—"If I'm home from work by six o'clock, then I will go to the track"—you don't have to make any decisions: you just do it. You can also make contingency plans to account for unexpected circumstances, such as, "If I have to work late, I will get up an hour early the next day to walk at the track instead."

Implementation intentions is a method proven to help people reach their goals. Michele DeBiasse thinks it could help us eat healthier.

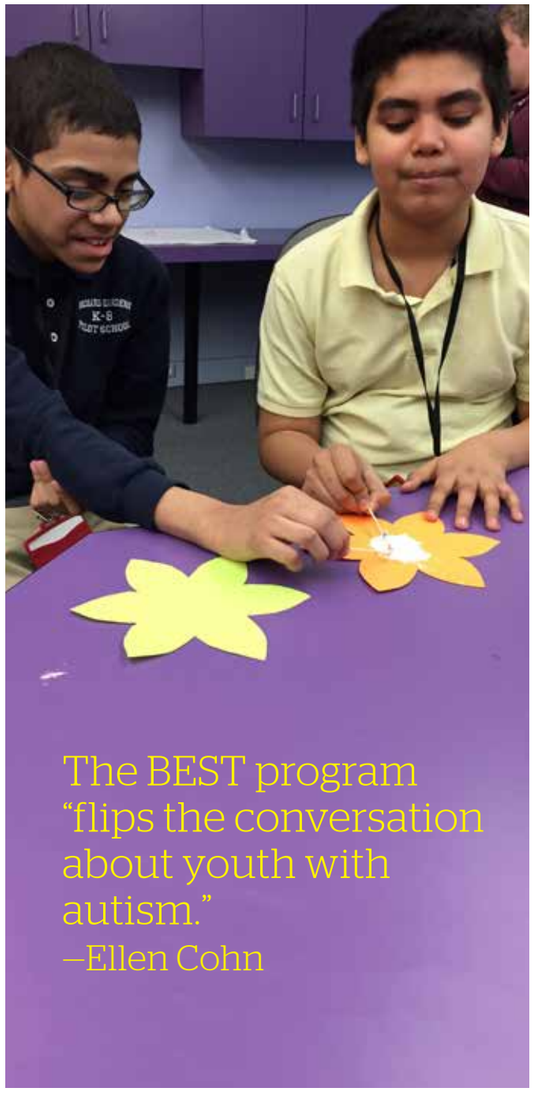
While DeBiasse needs to finish analyzing the data to see if the intervention shows promise, existing research indicates she's on the right track: implementation intentions has been shown to significantly increase people's success in reaching their goals. One frequently cited study in the *British Journal of Health Psychology*, for example, showed that 91 percent of participants who wrote a plan specifying when and where they would exercise followed through once or more a week, compared to just 38 percent of the control group.

If the intervention works, says DeBiasse, public health professionals nationwide would have a simple, low-cost tool to help individuals or groups of low SES to improve their overall health. And all of us might learn a thing or two about keeping our New Year's resolutions. IS

DAN AGUIRRE

On Their BEST Behavior

A TRIP TO THE SCIENCE MUSEUM HELPS YOUTH WITH AUTISM PRACTICE THEIR SOCIAL SKILLS | BY LARA EHRLICH



The BEST program "flips the conversation about youth with autism."
—Ellen Cohn

EVERY SUMMER, the Museum of Science, Boston, offers children's programs on subjects like rockets, dinosaurs, and electricity. The programs are popular with children on the autism spectrum, who may have an aptitude for science, technology, engineering, and math (STEM), and develop focused interests in these areas. These children also have difficulty with social interaction; at the start of a program, they would be more likely to pull out a book during lunchtime, rather than eat with the other kids, says Annette Sawyer, director of the museum's education and enrichment programs. As the program progressed, however, Sawyer noticed that the children and their peers connected through their shared interest in science. Sawyer set out to see if there was more the staff could do to create a supportive learning environment for the children with autism. In 2009, she called Sargent for help.

Ellen Cohn, a clinical professor of occupational therapy at Sargent, and her colleagues began working with Sawyer and her staff to make the museum more inclusive. In 2011, this collaboration expanded into the Buddies Exploring Science Together (BEST) program, a partnership of Sargent, the museum, and Boston Public Schools (BPS) that serves children with autism. Each spring semester, the OT students from Cohn's Group Leadership Experience course co-lead a group of 15 BPS students ages 9 to 16 on weekly field trips to the museum. Now in its fourth year, the BEST program "flips the conversation about youth with autism" says Cohn, who is also the director of Sargent's Entry-Level Doctorate in Occupational Therapy (OTD) Program.

Ellen Cohn's OT students co-lead BPS students on weekly field trips to the museum.

Typical interventions for people with autism focus on addressing an individual's social deficits and on teaching social skills, such as making eye contact and conducting a reciprocal conversation. These lessons often take place in a classroom or clinic and are not easily transferable to other environments and situations, says Cohn. "We know it is helpful to teach in context, and the Museum of Science is a highly engaging, interactive, and motivating environment," she says. "Because the content of the exhibits is so compelling to youth, they have a great desire to be at the museum, and because they have an interest in the exhibits," they're more likely to share that interest with others. They're learning new things, and they are interacting socially—and spontaneously—with support from Sargent's OT students.

For the first two weeks of Cohn's class in January, the OT students get to know the children in the BPS classroom setting. Together, they develop social stories, booklets that outline the activities the children will participate in at the museum and identify the behavior expected of them. For example, "When we get to the museum we will walk together to meet Museum Teachers. Museum Teachers wear red coats and they will help us learn about science." They also set learning and social participation goals for their visit, such as "I will ask my friends questions about themselves and their interests" and "I will share things with my partner." This goal-setting process is vital, says Cohn, because the children "are more intentional when they set specific goals, and we see better outcomes when the goals are co-constructed or negotiated" between the OT students and the children.

The children's enthusiasm underscores the success of the program. They have expressed excitement with comments like "awesome" and "cool," asked questions, and participated in presentations. During the time provided for independent exploration, they often lingered at exhibits that interested them. One child asked a friend to "come over here and look at the armadillo," and another asked his teacher to join him in looking at a shell. "That's the kind of spontaneous interaction that happens at the museum that we don't think would happen in the classroom," Cohn says.

At the end of each visit, the OT students reinforce the children's goal-setting by pointing to specific examples of their successful behavior. It's important for the youth to assess for themselves whether they met their goals because "we're trying to promote their perceived sense of competence in their ability to be successful science learners and social participants," Cohn says.

At the end of the program, the OT students and museum staff also interview the teachers about how the visits benefit their students, and how BEST reinforces their learning goals. According to teacher assessments before and after the 2014 program, 9 of the 15 children demonstrated improvement in skills such as participating in group activities, sharing with others, and demonstrating flexibility in unplanned situations. The children, too, reported improvement in their social skills and behaviors.

The OT students benefit as much as the youth. "It's all about the community," Cohn says. Through the BEST program, the OT students "learn that some of our partners don't necessarily have to be medical practitioners in a hospital or rehabilitation hospital. Our partners can be educators and exhibit designers and docents in museums." IS

Children impacted by autism spectrum disorder may have an aptitude for the STEM fields, but find social interaction challenging. At the Museum of Science, Boston, they learn new things and interact socially, with support from Sargent's OT students. In 2014, 9 of the 15 participants demonstrated improvement in their social skills.

MUSEUM OF SCIENCE, BOSTON, LEFT; VERNON DOUCETTE, RIGHT

TMP IMAGES; MUSEUM OF SCIENCE, BOSTON (2); TMP IMAGES

FIGHTING FOR A FUTURE

NITEO PROGRAM GETS COLLEGE STUDENTS WITH MENTAL HEALTH CONDITIONS BACK IN CLASS

BY JOEL BROWN

Since Dori Hutchinson established Niteo in 2014, the majority of participants have completed the program, enrolled in college courses, and secured at least part-time jobs.

IMPACT: NITEO PROGRAM

10 out of 12 students completed the first semester.

Of these, 7 returned to school, and

3 found employment and plan to return to school after a second semester.

Abe* began hearing voices as a boy. When he started drinking and smoking pot as a teenager, the voices got stronger, and he was briefly hospitalized for psychiatric treatment. Despite ongoing therapy and medication, things fell apart in college. "I was so far off track," says Abe (who is not a BU student). "I was miserable. I was drinking a lot and having lapses in reality and bad symptoms." He was eventually suspended by an administration he says failed him, and moved back in with his parents.

Most students who leave college as a result of mental health problems do not return, says Dori Hutchinson, a clinical associate professor in the occupational therapy department specializing in psychiatric rehabilitation. Many become socially isolated or marginalized, and a job, career, and fulfillment may seem out of reach. Many end up on disability. To help students before they slip that far, Hutchinson and her colleagues at the BU Center for Psychiatric Rehabilitation (CPR) started the Niteo program. (Niteo is Latin for "to thrive.") Established in 2014 and funded by a $175,000 grant from the Sidney R. Baer, Jr. Foundation, the program provides recovery services and support to help students with serious psychiatric challenges return to school. The program is open to college students who live in the Boston area or attend school here, including BU.

College and mental illness can be a combustible mix. "There are kids who come to school with attention deficit problems, psychiatric and mental health problems like bipolar disorder, or a depressive disorder," says Larry Kohn, the center's director of development. These problems often worsen in college because of substance abuse and other risky behaviors and the stress that comes with having more independence and responsibility. Students who manage their illnesses with the help of doctors, therapists, and medication may still have difficulty meeting the demands of higher education on their own. When Hutchinson spoke at a 2013 meeting of the National Alliance on Mental Illness in Boston, "about 80 parents lined up to tell me the story of their kids, saying, 'My kid didn't get any support to stay in school.'"

This is where Niteo comes in. The program "uses education to nurture the idea that people can heal from their experiences with mental health challenges and move forward to live the kind of life they want," says Hutchinson, director of services at the center. "Education gives people a valued role. They're not patients, consumers, or clients—they're students. And there's a foundation of optimism and hopefulness to that."

The 30-week program is divided into two semesters. During the first, students come to the center on Commonwealth Avenue three times a week for classes in coping skills like mindfulness and stress tolerance, as well as academic skills like writing and test preparation. The second semester focuses on individual coaching to help the students over their personal hurdles, whether it's a practical task like organizing a schedule or getting to class on time, or more complex, such as overcoming the feeling of stigma. The program can be adjusted to address each student's needs, says Niteo program coordinator Courtney Joly-Lowdermilk.

Students in the first two cohorts, who started in fall 2014 and spring 2015, had nearly identical results. A dozen students enrolled each time; 10 in each group completed the classes and 7 have already taken at least one college course. About half also secured at least part-time jobs. The program starts a third cohort in September 2015. Hutchinson and colleagues hope to secure funding to keep the program going and to share their practices with campuses around the country.

At 23, Abe is a Niteo success story. An inpatient treatment program finally provided a diagnosis to explain his challenges: schizo-affective disorder. His psychiatrist steered him to the center, where he's known as an enthusiastic participant, working with both a college coach and a writing coach, speaking up in discussions, and even organizing social events for the group. He attends Alcoholics Anonymous meetings, has two jobs, and has been admitted to a new college. "I'm taking a course online there, and I have a 95 average," he says. "Niteo made it possible, because the last time I went back to college I was like a deer in the headlights."

This progress, he says, has convinced him "that if I stay sober and treat my symptoms and work hard at this, I can make a difference in my life. I sort of lost hope at one point, and Niteo is one of the things that brought it back." IS

*Name changed for privacy

"Education gives people a valued role. They're not patients, consumers, or clients—they're students. And there's a foundation of optimism and hopefulness to that."
—Dori Hutchinson

DAN AGUIRRE

THE SOCIAL IMPACT OF PARKINSON'S

> Clinicians should emphasize the importance of getting out and staying socially connected for health and well-being.—Sue Berger

SHE USED TO PRIDE HERSELF on being Ms. Fix It. Today, because of her tremors, her spouse has to wield the drill. He used to crush opponents on the court—now he's too tired to finish a game. Friends once knew her as the life of the party, but her increasingly stiff expressions have made communicating a chore. When Parkinson's—an incurable brain disease affecting an estimated 7 to 10 million people worldwide—affects physical movement, it also exacts a social toll. Sufferers drop activities, relinquish long-held roles to their spouses, and can suffer from depression.

And yet much of the intervention for Parkinson's is focused on the physical symptoms, says Sue Berger, a clinical associate professor of occupational therapy who is studying people with Parkinson's and their spouses to learn how the disease affects social participation and relationships, and how couples cope. "One of my hopes is that by gathering all of the strategies that people at different stages of Parkinson's use to maintain their social activities, we can develop a toolbox for clinicians, to help clients brainstorm what is going to work best for them," she says.

This research, which Berger is conducting with colleagues at Tufts University, is part of a five-year project run by former Sargent faculty member Linda Tickle-Degnen on the impact of Parkinson's. The project is funded by a grant of more than $2 million from the National Institute of Nursing Research.

Berger is analyzing data from interviews with people with Parkinson's and their care partners (often spouses), mostly from greater Boston; the study will later evaluate how Parkinson's impacts social participation over time. Her analysis of early data has reinforced the idea that clinicians should emphasize "the importance of getting out and staying socially connected for health and well-being." People who can no longer engage in their favorite pursuits are at risk of becoming isolated, says Berger. Clinicians can assess the activities that people with Parkinson's engage in with the help of a tool used in the Tufts study—a set of cards depicting a range of pastimes, from cooking to swimming, that patients sort into categories, such as "I do it now" and "I do it less than I did six months ago." Clinicians can then offer advice—replacing activities that are too demanding with easier ones that still offer social interaction, for example—and help patients plan activities for times when they are most energetic.

Berger hopes the study will reveal whether Parkinson's social impact varies with age, gender, and the stage of the disease. With that information, she says, clinicians will be better equipped to tell patients and their care partners, "This is what's been working for people. It might work for you." —JB IS

THE VALUE OF A CLINICAL EDUCATION

FIELDWORK

SARGENT'S OCCUPATIONAL THERAPY STUDENTS complete Level I Fieldwork at sites ranging from inpatient rehabilitation to day habilitation to community-based settings. One such program, Photovoice, uses photography, digital storytelling, and self-advocacy projects for socially excluded groups.

> **"I had the opportunity to develop relationships with participants, to learn about what community integration after their brain injury meant to them."**
>
> —Intern Angela Viani ('17)

INTENSIVE TREATMENT PROGRAM

IN 2011, SARGENT'S APHASIA RESOURCE CENTER launched a rigorous four-week interprofessional Intensive Treatment Program to serve people suffering from aphasia. Led by BU faculty and clinical specialists, the program provides each participant with an iPad loaded with apps to help improve cognitive and language skills. Since 2011:

25
people with aphasia participated in the program

100%
of participants demonstrated significant language improvement

50
Sargent students received interprofessional training

INTERPROFESSIONAL EDUCATION (IPE) COMMITTEE

THE INTERDISCIPLINARY CULTURE OF SARGENT COLLEGE makes interprofessional education (IPE) and interprofessional practice (IPP) natural parts of our programs. Both IPE and IPP are increasingly important in the emerging health care landscape, and more formalized educational and clinical structures are bringing these innovative patient-centered approaches to our students and our patients.

> **"Throughout the course of the program, I learned the importance of reaching out to others, which sometimes felt a bit out of my comfort zone as a student, but in the end was the most beneficial to my client."**
>
> —Athina Kalemos ('15)

PRESCHOOL INTENSIVE LANGUAGE PROGRAM

IN 2015, SARGENT LAUNCHED the Preschool Intensive Language Program, a monthlong intensive intervention program offering daily individual and group therapy to four- and five-year-olds with language disorders. Through this work, speech-language pathology students develop expertise in cutting-edge approaches to language intervention. The program is hosted by the Boston University Academic Speech, Language & Hearing Center.

> **"The program is unique because of the intensive nature of the intervention and the specific combination of intervention approaches and parent training sessions."**
>
> —Michelle Mentis, clinical professor of speech, language & hearing sciences

Grant Awards

BU SARGENT COLLEGE'S FACULTY RECEIVED **$13,052,538** IN RESEARCH FUNDING IN 2014–2015. HERE IS A LIST OF OUR PROJECTS AND THE AGENCIES AND FOUNDATIONS SUPPORTING THEM.

PRINCIPAL INVESTIGATOR	TITLE OF PROJECT	AGENCY/FOUNDATION	FUNDS AWARDED 2014–2015	YEAR OF AWARD	TOTAL AWARD
Sudha Arunachalam, assistant professor of speech, language & hearing sciences	A Non-Interactive Method for Teaching Noun and Verb Meanings to Young Children with ASD	Autism Speaks	$58,900	2 of 2	$118,886
	Toddlers' Representations of Verbs: Effects of Delay and Sleep on Verb Meaning	Northwestern University	$57,706	2 of 2	$119,847
	Mechanisms Underlying Word Learning in Children with ASD: Non-Social Learning and Memory Consolidation	NIH/NIDCD	$172,195	2 of 4	$688,018
	Individual Differences in Toddlers' Abilities to Learn New Verbs From Their Linguistic Context	Language Learning	$10,000	1 of 1	$10,000
Helen Barbas, professor of health sciences	Organization of Prefrontal Feedback Circuits	NIMH	$438,124	5 of 5	$2,260,464
	Prefrontal Anatomic Pathways in Executive Control	NINDS	$567,217	1 of 1	$567,217
	Prefrontal Anatomic Pathways in Executive Control	NINDS	$374,799	5 of 5	$1,990,887
Helen Barbas and Claire Timbie, predoctoral student	Circuitry of Emotion: Integration in Orbitofrontal Cortex	NIH	$41,340	5 of 5	$182,112
Shelley Brown, clinical assistant professor of health sciences	Boston University Health Science Program: Developing Global Citizens through Civic Engagement in Public Health	Association of American Colleges and Universities	$10,000	2 of 2	$10,000
Terry Ellis, assistant professor of physical therapy & athletic training	Telemedicine Intervention to Improve Physical Function in Persons with Parkinson Disease	Department of Veterans Affairs (VA)	$81,835	1 of 1	$81,835
	Mobile Health Technology to Promote Physical Activity in Persons with PD	American Parkinson Disease Association, Inc.	$50,000	2 of 2	$100,000
	CPS: TTP Option: Synergy: Human Machine Interaction with Mobility Enhancing Soft Exosuits	Wyss Institute for Biologically Inspired Engineering—NSF Subcontract	$74,039	1 of 3	$328,803*
	Maintaining Physical Independence in Older Adults	Spaulding Rehabilitation Hospital Rx Foundation Subcontract	$60,013	1 of 3	$170,807*
Marianne Farkas, clinical professor of occupational therapy and director of training & international services, BU Center for Psychiatric Rehabilitation, and E. Sally Rogers, research professor of occupational therapy and director of research, BU Center for Psychiatric Rehabilitation	Bringing Recovery Supports to Scale Technical Assistance Center Strategy	SAMHSA	$35,000	4 of 5	$708,521
Marianne Farkas	Toolkit of Recovery Promoting Competencies for Mental Health Rehabilitation Providers	NIDILRR**	$199,869	3 of 3	$599,504
Marianne Farkas and E. Sally Rogers	Improved Employment Outcomes for Individuals with Psychiatric Disabilities	US Department of Education	$848,218	5 of 5	$4,245,042
Miguel García-Cabezas, research associate	Circuits and Molecular Features of Anterior Cingulate Areas and Depression	Brain & Behavior Research Foundation	$30,000	1 of 2	$65,000
Simone Gill, assistant professor of occupational therapy	Multicenter Career Development Program for Physical and Occupational Therapy	NIH/NICHHD	$135,000	2 of 2	$270,000
	Massive Weight Loss and Its Effects on Postural Stability and Fall Risks	NIH/NIAMS	$83,561	1 of 3	$270,438
Mahasweta Girgenrath, assistant professor of health sciences	Modulation of Inflammation and Fibrosis in the Context of Regeneration in MDC1A	MDA	$119,149	3 of 3	$357,465
	Inhibition of Angiotensin II Signaling in Congenital Muscular Dystrophy Type 1A (MDC1A)	Cure CMD	$50,000	2 of 2	$100,000
	Evaluating Efficacy of ANG(1-7) in Improving Survivability in FYW Mice	Tarix Orphan, LLC	$25,000	1 of 1	$25,000
Jennifer Gottlieb, research assistant professor, BU Center for Psychiatric Rehabilitation	Internet-Based CBT for Schizophrenia: A Pilot RCT Computer-Based Program for Auditory Hallucinations	NARSAD	$0	1 of 1	$21,891
	Improving Quality and Reducing Cost in Schizophrenia Care and New Technologies and New Personnel	CMMI	$81,326	3 of 3	$409,022
Frank Guenther, professor of speech, language & hearing sciences	Neural Modeling and Imaging of Speech	NIH/NIDCD	$353,515	4 of 5	$1,862,227
	Sequencing and Initiation in Speech Production	NIH/NIDCD	$344,384	4 of 5	$1,834,729
	Minimally Verbal ASD: From Basic Mechanisms to Innovative Interventions	NIH/NIDCD	$347,133	2 of 4	$1,982,833
Kenneth G. Holt, associate professor of physical therapy & athletic training	Smart Exoskeleton Suit—Biomechanically Synergistic Body Support and Protection System	Wyss Institute for Biologically Inspired Engineering—Subcontract	$116,140	2 of 2	$116,140
	Smart Exoskeleton Suit—Biomechanically Synergistic Body Support and Protection System	Wyss Institute for Biologically Inspired Engineering—Subcontract	$54,856	1 of 1	$54,856
	Biologically Inspired Soft Smart Exosuit for Injury Prevention and Performance Augmentation	Wyss Institute for Biologically Inspired Engineering—Subcontract	$67,800	1 of 1	$175,888*
Norman Hursh, research associate professor of occupational therapy	The City Connects Model of Student Support: Building a K–12 Student Support Practice and Process	Boston College	$22,871	4 of 4	$162,051
Karen Jacobs, clinical professor of occupational therapy	Project CAREER: Development of a Multidisciplinary Demonstration to Support the Transition of Students with Traumatic Brain Injuries from Postsecondary Education to Employment	Kent State University/ NIDILRR**	$82,885	2 of 5	$407,210*
Susan Kandarian, professor of health sciences	The Molecular Basis of Muscle Wasting in Cancer Cachexia	NIH/NIAMS	$360,958	4 of 5	$1,815,430
Julie Keysor, associate professor of physical therapy & athletic training	ENACT	HHS/DOE	$799,991	4 of 5	$3,999,923
	New Investigator Workshop on Advancing Arthritis Research	NIH/NIAMS	$15,000	1 of 1	$15,000
	Osteoarthritis Action Alliance	University of North Carolina/Arthritis Foundation	$43,786	1 of 1	$43,786

PRINCIPAL INVESTIGATOR	TITLE OF PROJECT	AGENCY/FOUNDATION	FUNDS AWARDED 2014–2015	YEAR OF AWARD	TOTAL AWARD
Gerald Kidd, professor of speech, language & hearing sciences	Spatial Hearing, Attention, and Informational Masking in Speech Identification	US Air Force	$233,739	3 of 3	$685,945
	Central Factors in Auditory Masking	NIDCD	$533,202	4 of 5	$2,694,821
	Top Down Control of Selective Amplification	NIH/NIDCD	$535,871	2 of 5	$2,750,773
Gerald Kidd and H. Steven Colburn, professor of biomedical engineering	Core Center Grant—Sound Field Laboratory (Core 1)	NIDCD	$212,929	5 of 5	$1,208,700
Swathi Kiran, professor of speech, language & hearing sciences	Theoretically Based Treatment for Sentence Comprehension Deficits in Aphasia	NIH/NIDCD	$0	5 of 5	$2,369,071
	The Neurobiology of Recovery in Aphasia: Natural History and Treatment-Induced Recovery	Subaward—Northwestern University	$398,289	3 of 5	$1,299,549*
Jessica Kramer, assistant professor of occupational therapy	Multicenter Career Development Program for Physical and Occupational Therapy	NIH/NICHHD	$135,000	2 of 2	$270,000
	Evaluation of Project TEAM (Teens Making Environmental and Activity Modifications)—Effectiveness Social Validity and Feasibility	NIDILRR**	$199,657	3 of 3	$597,509
Susan Langmore, clinical professor of speech, language & hearing sciences	Non-Invasive Brain Stimulation for Swallowing Recovery After Dysphagic Stroke	Beth Israel Deaconess Medical Center	$115,990	2 of 5	$476,591*
Cara L. Lewis, assistant professor of physical therapy & athletic training	Effect of Femoroacetabular Impingement (FAI) on Hip Motion in Young Adults	NIH/NIAMS	$130,680	2 of 5	$653,400
	Sex-Specific Movement Pattern Differences in Young Adults With and Without Hip Pain	NIH/NIAMS	$209,945	2 of 2	$405,158
	SBIR Phase II: Compliant Nonlinear Quasi-Passive Orthotic Joint	Adicep Technologies	$42,768	2 of 2	$70,000
Susan McGurk, associate professor of occupational therapy and senior researcher, BU Center for Psychiatric Rehabilitation	Neuroscience-Guided Remediation of Cognitive Deficits in Schizophrenia	NIH	$0	2 of 2	$47,733
	A Dismantling Study of Cognitive Remediation for Supported Employment	NIMH	$522,538	4 of 5	$2,771,031
Kim Mueser, executive director, BU Center for Psychiatric Rehabilitation, and professor of occupational therapy	Treating Co-Occurring Substance Use and Mental Disorders Among Jail Inmates	NIH	$18,827	1 of 3	$56,481
	Recovery After an Initial Schizophrenia Episode (RAISE)	NIMH	$57,536	5 of 5	$143,267
	Enhancing Assertive Community Treatment with CBT and SST for Schizophrenia	NIH/NIMH	$42,532	4 of 5	$192,913
	Effectiveness of Psychosocial Treatment for Inpatients with Psychosis	NIH	$18,827	2 of 3	$56,481
	Development and Randomized Controlled Trial of a Mobile System for Self Management of Schizophrenia	NIDILRR**	$14,814	2 of 3	$37,035
E. Sally Rogers, research professor of occupational therapy, and Marianne Farkas, clinical professor of occupational therapy	Improved Employment Outcomes for Individuals with Psychiatric Disabilities	NIDILRR**	$874,965	1 of 5	$4,374,848

PRINCIPAL INVESTIGATOR	TITLE OF PROJECT	AGENCY/FOUNDATION	FUNDS AWARDED 2014–2015	YEAR OF AWARD	TOTAL AWARD
Zlatka Russinova, research associate professor of occupational therapy and senior research specialist, BU Center for Psychiatric Rehabilitation	Patient Navigation and Financial Incentives to Promote Smoking Cessation	ACS	$9,782	1 of 1	$9,782
	Enhancing Community Living and Participation of Individuals with Psychiatric Disabilities	NIDILRR**	$499,907	1 of 1	$2,499,724
	Recovery 4 Us—Development of a Photovoice-Based Social Media Intervention to Enhance Recovery	NIDILRR**	$199,895	1 of 1	$599,855
	Peer-Led Photovoice for Overcoming Prejudice and Enhancing Community Integration	NIH	$569,776	1 of 1	$2,158,965
	Advanced Research Training Program in Employment and Vocational Rehab	ED	$149,968	2 of 5	$749,806
Elliot Lee Saltzman, associate professor of physical therapy & athletic training	RI: Medium: Collaborative Research: Multilingual Gestural Models for Robust Language-Independent Speech Recognition	NSF	$52,627	2 of 4	$52,627
	Modeling the Behavioral Dynamics of Social Coordination and Joint Action	NIH/NIGMS—Subaward, University of Cincinnati	$24,900	3 of 5	$124,500*
Joshua Stefanik, research assistant professor of physical therapy & athletic training	Effect of Massive Weight Loss on Patellofemoral Joint Structure and Pain	Arthritis Foundation	$50,000	3 of 3	$150,000
	Identifying Cases of PFJ OA & Their Hip Impairments	RRF/ACR	$124,998	1 of 3	$374,998
Cara E. Stepp, assistant professor of speech, language & hearing sciences	Career: Enabling Enhanced Communication through Human-Machine-Interfaces	NSF	$110,143	1 of 5	$537,538
	Automation of Relative Fundamental Frequency Estimation	NIH/NIDCD	$163,700	2 of 3	$480,927
	Development of an Electromyographically Controlled Electrolarynx (EMG-EL) Voice Prosthesis	Griffin Laboratories, Inc. (NIH/NIDCD)	$26,110	2 of 2	$49,615
	Videogame-Based Speech Rehabilitation for Children with Hearing Loss	Deborah Munroe Noonan Memorial Fund	$80,000	1 of 1	$80,000
Gloria S. Waters, professor of speech, language & hearing sciences	Assessment of Comprehension Skills in Older Struggling Readers	ED	$0	5 of 5	$1,597,065
Gloria S. Waters and William Evans, doctoral student	Attention and Executive Control During Lexical Processing in Aphasia (NRSA)	NIH/NIDCD	$33,986	2 of 2	$70,476
Stacey Zawacki, director, BU Sargent Choice Nutrition Center	Statewide Intervention to Reduce Early Mortality in Persons with Mental Illness	NIH/NIMH	$18,133	1 of 1	$18,133
Basilis Zikopoulos, research assistant professor of health sciences	Organization of Excitatory and Inhibitory Prefrontal Circuits in Children with Autism	NIH/NIMH	$395,236	2 of 5	$2,018,222
Total			**$13,052,538**		**$58,521,470**

*Total anticipated subcontract

**Formerly NIDRR

Faculty in Print

OUR FACULTY'S RESEARCH REACHES AUDIENCES ACROSS THE GLOBE. HERE'S A SELECTION OF PUBLICATIONS AND ARTICLES WRITTEN BY BU SARGENT COLLEGE FACULTY DURING 2014-2015.

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We've been doing the research.
Now, we're hosting the discussion.

Sargent College is a leader in research, scholarship, education, and clinical practice in health and rehabilitation. In September 2015, we hosted a free, informative conference dealing with today's health issues. Topics included communication neuroscience, obesity, concussion management, traumatic brain injury, and child development. The full conference is archived online. **Check out the presentations and panel discussions at healthmatters.bu.edu.**

OCCUPATIONAL THERAPY | PHYSICAL THERAPY
SPEECH, LANGUAGE & HEARING SCIENCES
NUTRITION | HUMAN PHYSIOLOGY | HEALTH SCIENCE
ATHLETIC TRAINING | REHABILITATION SCIENCES

Health Matters A VIRTUAL CONFERENCE

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Boston University College of Health & Rehabilitation Sciences: Sargent College

BU Sargent College

WHO WE ARE		
STUDENTS	**UNDERGRADUATE**	**GRADUATE**
Number of full-time students	1,228	394
Average SAT	1943	n/a
Average GRE	n/a	312
FACULTY		
Full-time	69	
Part-time	87	
ALUMNI	**16,550** in **60** countries	
CLINICAL SITES	More than 1,300 in all 50 states and 3 countries	

KALMAN ZABARSKY

Programs of Study

Athletic Training
Behavior & Health
Health Science
Human Physiology (Pre-Med)
Nutrition
Occupational Therapy
Physical Therapy
Rehabilitation Sciences
Speech, Language & Hearing Sciences
Speech-Language Pathology

Special Programs

- Combined BS and MPH in Public Health
- Combined BS in Health Studies and Doctor of Physical Therapy
- Combined BS and MS in Human Physiology

New Programs

- Master of Science in Athletic Training (new in 2016)
- Entry-Level Doctor of Occupational Therapy (new in 2016)
- Fellowship in Orthopaedic Manual Physical Therapy (new in 2015)

U.S. News & World Report Best Graduate School Rankings

Our graduate programs are officially among the nation's best—Sargent programs tracked by *U.S. News & World Report* all rank in the top 8 percent in their respective fields:

- **Occupational Therapy Program** ranked number 2 out of 156 programs
- **Physical Therapy Program** ranked number 16 out of 201 programs
- **Speech-Language Pathology Program** ranked number 21 out of 250 programs

National Certification Board Exam Passing Rates

Percentage of BU Sargent College students in entry-level graduate programs who passed the exam the first time (data averaged over the past three years):

Nutrition	100%
Occupational Therapy	100%
Physical Therapy	99%
Speech-Language Pathology	100%

ABOUT US

Boston University College of Health & Rehabilitation Sciences: Sargent College has been defining health care leadership for more than 130 years. As knowledge about health and rehabilitation increases and society's health care needs become more complex, BU Sargent College continuously improves its degree programs to meet the needs of future health professionals. Our learning environment fosters the values, effective communication, and clinical skills that distinguish outstanding health professionals. Our curriculum also includes an important fieldwork component, providing students in every degree program with substantive clinical experience. Clinical internships are available at more than 1,300 health care facilities across the country. The College also operates outpatient rehabilitation centers that offer a wide range of services to greater Boston.

Boston University College of Health
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