DISCOVERIES

Research at UNC

UNIVERSITY OF
NORTHERN COLORADO

DISCOVERIES

Research at UNC

UNIVERSITY OF
NORTHERN COLORADO

Office of Research and Sponsored Programs
unco.edu/research

Research at UNC

When UNC was created as Colorado's teacher's college more than 125 years ago, the life-changing nature of education was built into its character like the bricks that were cemented into the campus's buildings. And that commitment to an educated society is reflected today in UNC's purposeful fusion of innovative teaching and research.

Research, in its pursuit of new knowledge, does not stand alone here. It is part of conversations and exploration in classrooms, labs, centers and institutes. It builds connections across disciplines, between students and faculty, and between campus and community. Our professors come to UNC to teach and to share knowledge, and both their teaching and their research changes lives.

At UNC, you'll find research in the sciences, education, music, business and the humanities that doesn't sit in a journal on a shelf. It is research that impacts the educational experience and translates to the real world, improving quality of life for cancer patients, shaping K-12 education, impacting business practices, bringing century-old music to life and fostering understanding for social issues that challenge our world.

Dust Leads to Weaker Storms

University of Northern Colorado Associate Professor of Meteorology David Lerach, Ph.D., observed agitated dust from the Chihuahuan Desert and studied its potential influences on an outbreak of tornadic thunderstorms in Texas; his research was published in May 2018.

Using a high-resolution computer model, Lerach looked at a severe thunderstorm event that developed over western Texas in April 2003. Satellite imagery showed a huge amount of dust being blown into the atmosphere and interacting with the line of developing thunderstorms.

Lerach found that the dust absorbed sunlight and limited the ground's ability to heat up during the day, thus producing a weaker line of thunderstorms characterized by weaker updrafts and less precipitation. Because the dust was present before the storm formed, it was more difficult for the line of thunderstorms to grow, which resulted in weaker storms.

> ***"Turns out that the biggest influence we saw of the dust was the radiative component. When you have these dust storms, you are lofting these particles into the air that are very good at absorbing sunlight compared to the air itself."***
>
> –David Lerach, Ph.D.

UNC NEWS

BEAR-IN-MIND PODCAST

ATMOSPHERIC RESEARCH

Tackling El Niño's Influence on Diseases Through GIS Mapping

UNC Assistant Professor of Geography and GIS Jieun Lee, Ph.D., studied the connection between the torrential rainfall of Peru's El Niño and massive breakouts of infectious diseases in the country.

Working with Ivan Ramírez, Ph.D., from the University of Colorado, Denver, she carefully mapped the concentrated instances of the diseases over time in the affected areas of Northern Peru.

Tracked diseases included cholera, malaria, conjunctivitis (or pink eye), pneumonia and others. To map the disease risk, they used ArcGIS, software that easily analyzes geospatial data, and creates maps. Their goal was to develop new ways to visualize overlapping disease outbreaks.

> ***"Things that happen around us have locational elements. Because they're happening somewhere, we can use the information about the location to create a map, and GIS effectively visualizes where things happen and gives us an understanding as to why they happen in specific places and times, if the data allows."***
>
> –Jieun Lee, Ph.D.

UNC NEWS

Strengthening National Defense with Better Nutrition

University of Northern Colorado Assistant Professor of Nutrition and Dietetics Katie Kage, Ph.D., has stepped to the forefront of a project for dietary and nutrition support for the next generation of ROTC cadets.

After her first semester at UNC, Kage created a program that pairs Army ROTC cadets with senior-level students in the UNC Department of Nutrition and Dietetics to benefit both sides. The goal is to create a "ripple effect," where new ROTC graduates will immerse other soldiers under their command with learned nutritional knowledge and graduating dietetic students will have stronger nutrition counseling skills benefiting them in their future careers.

Lt. Col. Thomas Troy, head of the ROTC program both at UNC and nearby Colorado State, sees great value in this program: "Healthy young recruits are important, so we can continue to place people in the military and keep a strong defense."

> ***"From my knowledge, no other university in the country is doing something like this. The program might be something we can package and showcase to other universities saying, 'This is what we're doing, how can we get it out to you guys and adjust it for you?'"***
>
> –Katie Kage, Ph.D.

UNC NEWS

GREELEY TRIBUNE

Body Fat Percentage and Impacts in Campus Community

UNC NEWS

Studying CEO's and Corporate Social Responsibility

How do different CEO's respond to cultural, environmental and ethical issues? It's a question Monfort College of Business Associate Professor of Management Isaac Wanasika, Ph.D., asks as he researches corporate social responsibility. His research focuses on strategic decision-making and one of the dimensions of this research is trying to understand how CEOs' embedded values and morals affect their assessment of the environment and subsequent strategic decisions.

One of his case studies, "General Motors: The Ignition Switch from Hell," explored how a corporate culture of negligence led to an ignition switch failure that resulted in 124 deaths over 11 years, and resulted in a $900 million fine.

Wanasika looks at how ethical behavior, corporate environment, and a CEO's strategic actions help sustain a company's competitiveness.

His case studies have been incorporated into the Daniels Fund Ethics Initiative, as well as in the public sector. They are also used as teaching materials at UNC, CSU, and at schools in Wyoming, New Mexico and Utah to expose students to ethical dilemmas, and to allow them to work through issues with their own critical thinking skills.

> ***"I was intrigued by CEOs because, faced with the same situation, different CEOs often came up with a different understanding of the issue and how to resolve it. That led me to focus on their different individual attributes and behavioral dispositions. The next step is to identify rules and patterns that can be replicated across industries and different environments."***
>
> –Isaac Wanasika, Ph.D.

Calming Chemo's Side Effects

As chemotherapy and radiation wage war on cancer cells, collateral damage takes a toll on a patient's wellness and quality of life. UNC Sport and Exercise Science doctoral student Peter Smoak is working on research to help lessen the damage.

Smoak, working with advisor Laura Stewart, looks at the impact dietary interventions might have on people who have undergone chemotherapy and radiation, which can impact the gastrointestinal (GI) tract by killing beneficial gut bacteria. The loss of those bacteria can lead to systemic inflammation that can in turn cause arthritis, cancer, heart attacks, strokes and even depression.

Through his research, Smoak has focused on what might help calm inflammation and repair the GI lining, studying the impact of a probiotic source like kefir — a tart, fermented milk product — to repopulate the bacteria decimated by cancer treatments.

> ***"Initially we did a project with animals. We basically gave them a chemotherapy called doxorubicin, which is a super powerful antibiotic. (Then) we gave them kefir, milk, or a soy protein. What we found was kefir and milk both ended up improving survival rate... We thought OK, well we know that it's helping, let's start looking at it in people now."***
>
> –Peter Smoak

UNC MAGAZINE

BEAR-IN-MIND PODCAST

UNC NEWS

Evaluating Prosthetic Interfaces and Performance

Abbie Ferris, Ph.D., assistant professor in the School of Sport and Exercise Science, is focusing her research on understanding how to better serve people with lower limb prostheses and improve the limb's functionality and health. Ferris worked as a research associate at the Center for the Intrepid Military Performance Lab at Fort Sam Houston in San Antonio, Texas, before coming to UNC to pursue her doctorate in 2012. She joined UNC's faculty in 2015.

Most recently she's been looking at how prosthetic interfaces affect lower limb amputees. Prosthetics can attach to a person's limb in various ways. How the prosthesis attaches may cause pain, circulation issues, sores and difficulties with mobility. Ferris is studying how well a vacuum-attached prosthesis works biomechanically.

"In walking, while wearing a lock-and-pin system, we observe differences between the limbs where the amputated limb takes shorter steps, exerts less force on the ground, and increase their knee angle." she says. But the newer vacuum system is suggested to enable them to walk faster and take longer steps, and some patients feel that the limb is more "part of them."

Ferris is hoping to be able to add a computerized dynamic posturography machine to the lab that will measure balance and help her study the effects of the visual and vestibular systems, and proprioception (sense of body movement and position) on socket suspension system use. "You can look at all three and really understand how each effects balance in these individuals," she says.

> ***"I use many functional tools in my biomechanical analyses including an instrumented staircase, a curb, step up and over, and sitting and standing from a chair. I try to combine biomechanical and clinical outcomes to inform clinicians, prosthetists, and surgeons on outcomes that directly impact patient health and wellbeing."***
>
> –Abbie Ferris, Ph.D.

BIOMECHANICS LAB

Addressing the Complex Challenges of Custodial Grandmothers

William Merchant, Ph.D., assistant professor in Applied Statistics and Research Methods, has seen how his field — which may seem to be all about numbers and data — can impact people in the most personal ways. Applied Statistics and Research Methods is a "systematic way of looking at problems and situations so that their moving parts can be rearranged into a way that can be studied and understood," he says.

Merchant, whose affinity for numbers is equally weighted with his love for the work he's doing and the difference it can make, studies the topic of custodial grandmothers. When a child needs to be placed in care, often because of tragic or stressful circumstances, it's usually grandmothers who step in to provide care to their grandchildren. It's a difficult shift in roles, moving from grandparent to full-time caregiver and disciplinarian, and the challenges — from income to age — can weigh heavily on both child and grandmother.

The number of families with custodial grandparents in the United States is estimated at nearly 938,000 families. In their study, Merchant and his colleagues point out that only a handful of studies have looked at the parenting practices of custodial grandmothers, and yet understanding the challenges, stressors and pressures on the family and how they navigate the situation is crucial not only for the children but for their caregivers as well.

Merchant's study involved more than 340 custodial grandmothers from four states (California, Maryland, Ohio and Texas), and he looked at parenting and disciplinary practices, as well as areas — like depression and anxiety — that paint a more detailed picture of how grandmothers and grandchildren were coping. The study measured participants' responses to interventions such as counseling and support groups.

"We found that overall, their mental health outcomes were not that great. A lot of depression, anxiety and physical challenges come with taking on full-time childcare at such an old age and coupled with often stressful circumstances," Merchant says. "The most valuable result (of the study) was that all of the interventions improved some aspect of the grandmother or grandchild's well-being."

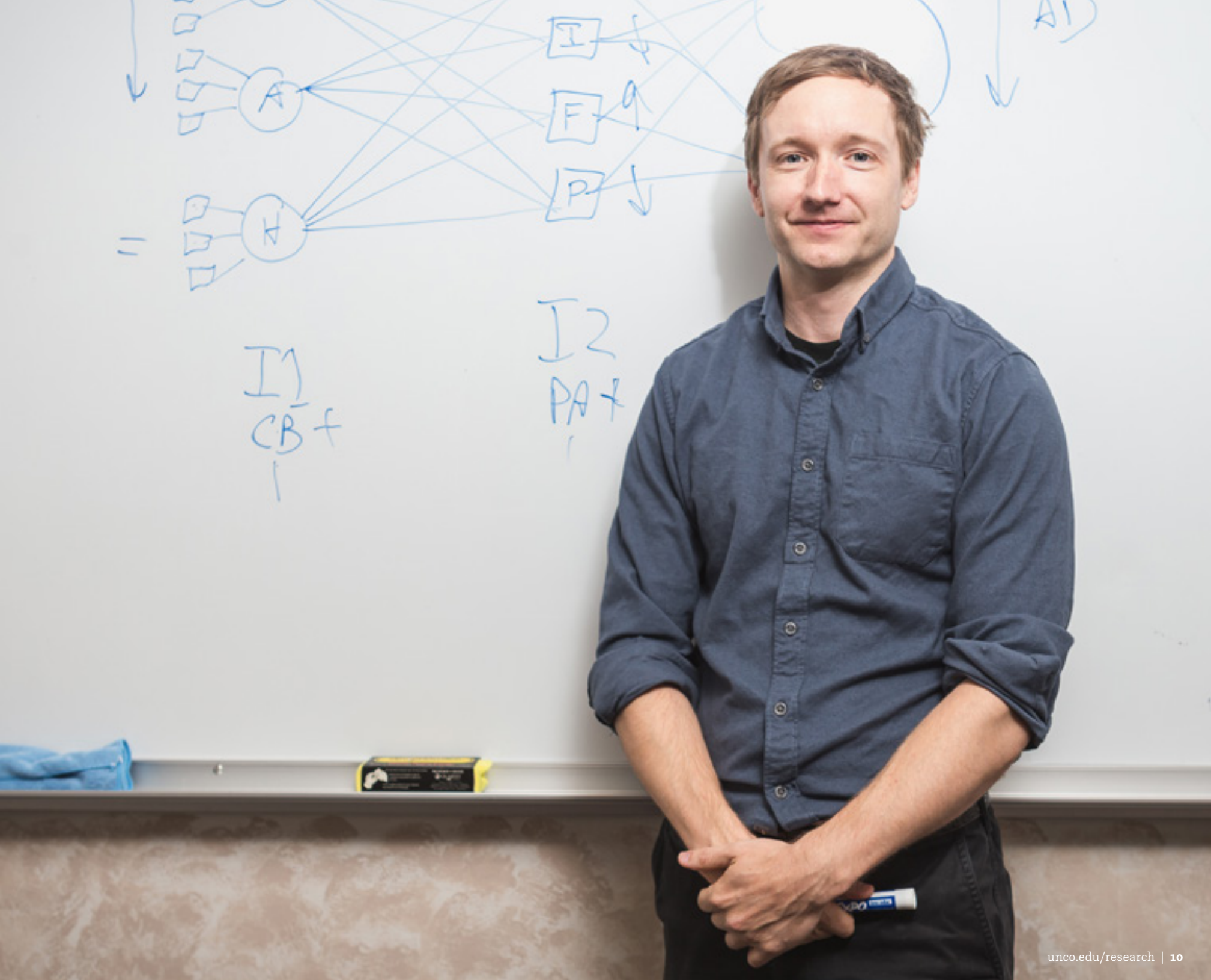
Merchant says they found that interventions aimed at improving mental health or parenting skills were helpful in both areas. Another positive? The study helped to build a support network between grandmothers, fostering friendships that have continued beyond the study.

> ***"The best take away for me as a researcher is that you can design a study that truly has a positive effect on your community while also collecting important data for the scientific/academic community."***
>
> –William Merchant, Ph.D.

His work includes deciphering patterns in information that helps show how data in various forms relate to us all on a personal level.

BEAR IN MIND PODCAST

DOC TALK


A
H
I
F
P
=
I1
CB f
I2
PA f

Setting the Mood

Assistant Professor of Theatre Studies Rand Harmon, Ph.D., MFA, researches the conceptualization and ethics of site-based and immersive theatre.

Imagine taking a ferry to Alcatraz, the site of a former military fortress and infamous prison, a cliff-edged rock in swift currents more than a mile off the bay coast of San Francisco. You step off the ferry, unsure what to expect, wearing closed-toed shoes as instructed, a "guest" entering the world of a play taking place on the island: *Hamlet*.

That production of *Hamlet*, according to director Ava Roy of We Players theatre company (as quoted in Harmon's analysis of the production), was an attempt to grapple with Americans' "threshold of forgiveness" — setting a play that revolves around revenge in a crumbling prison where forgiveness had once been more or less out of reach for its inmates.

Assistant Professor of Theatre Studies Rand Harmon, Ph.D., holds an MFA in Directing from the University of Texas, and his experience includes creating site-specific theater (where the location influences the production) and immersive theater (where audiences participate in the production).

In 2007, Harmon co-founded the group Specific Gravity Ensemble, a Louisville, Ky.-based theater company that specialized in designing plays with audience engagement determined by the site where they were held. One idea: to stage a play in an elevator. The idea quickly came to life, with a local historic building hosting the production and playwrights responding to a call for two-minute-long original scripts, written to take place in an elevator. The idea was a smashing success, selling out (Harmon dryly notes that the seats were rather limited) and returning for two more years.

In 2010, Harmon began digging deeply into the meaning of such theatre for his Ph.D. in Theatre Studies from the University of Colorado-Boulder. He calls site-specific and immersive theatre "a visceral escape," saying that ""we want to live in the same environments as our stories, in real time and real life, as our society becomes increasingly isolated and isolated by digital media and less likely to participate in entertainment publicly."

As part of his research for a guide to help other directors plan immersive and site-based experiences, Harmon spent 20 weeks in England, Scotland and Wales attending performances, interviewing creators and pondering the impact of this style of entertainment.

"We naturally bring our individual life experiences, knowledge and belief systems to interpreting what we see and experience," he wrote in an essay after experiencing a performance in the ancient South Downs of England.

Thousands of miles away, on Alcatraz, he also attended *Hamlet* that year, which he held up against a tour of an ancient Buddhist site to examine why both experiences inspired feelings of sacred space.

"The very act of confronting the history of a Buddhist monument or the ruins of a notorious prison constitutes a performance," Harmon wrote in *Ecumenica, a Journal of Theatre and Performance*. "As we interpret, we encode meanings on what we experience."

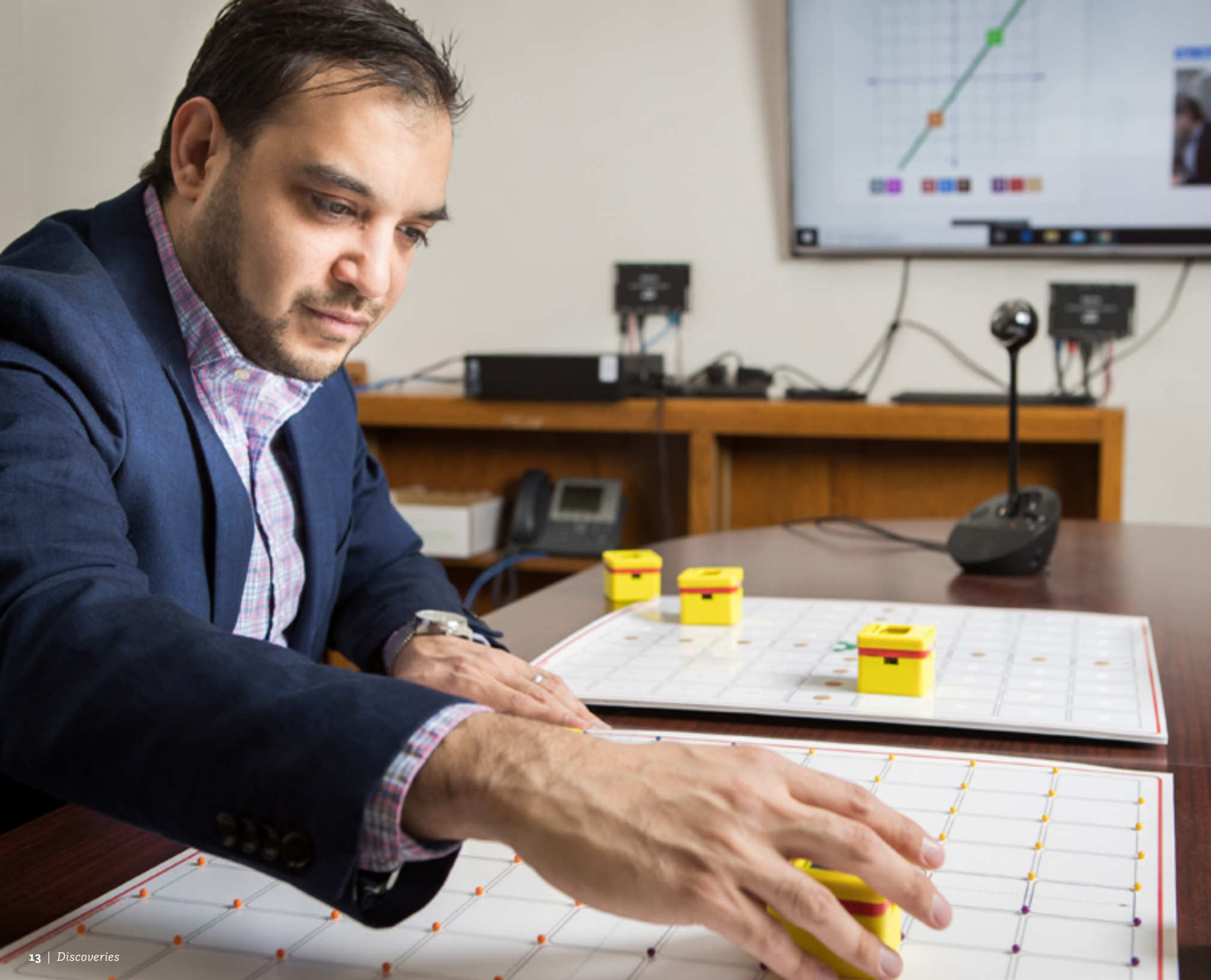
But taking an audience member outside of the expected conventions of theatre comes with ethical implications, Harmon says.

In 2017, he and coauthor Penelope Cole, Ph.D., co-directed a working group of scholars to discuss the ways creative decisions and other factors affect how audiences perceive their experiences. Afterward, while he and Cole considered and collected essays from this group, Harmon proposed bringing together a panel of four scholars to explore ethical considerations concerning resident communities, disability accommodations, consent and the personal risks that might come with attending an immersive or site-based production.

The resulting collection of essays and the curated discussion was published in *Theatre History Studies 2019 Vol. 38* in December 2019.

> ***"We want to live in the same environments as our stories.***
>
> –Rand Harmon, Ph.D.

BEAR IN MIND PODCAST



Improving Accessibility in Math and Science

When Muhanad (Moe) Manshad was in high school, his father, a mathematics professor, asked him if he could build something to provide feedback and assistance for one of his students, who was blind.

"This challenge sparked my interest in human-computer interaction and for improving the experience of all users, but especially in the area of accessibility," he says.

For blind and visually impaired (BVI) students, learning the fundamentals of science and mathematics is demanding when using traditional manipulatives (objects designed to teach BVI students a mathematical or scientific concept by touch). Each step requires the instructor's constant involvement and approval, and manipulatives must be easily distinguishable, correctly labeled in Braille and kept in one place for interaction to reduce the risk of small parts being lost.

A Monfort College of Business senior lecturer and doctoral candidate, Manshad aims to improve this learning strategy with research focused on tabletop tangible user interfaces (TUI), systems of digital information which can be interacted with using physical objects.

Manshad's research investigates TUIs for BVI students by designing a new set of digital manipulatives — called trackable interactive multi-modal manipulatives, (TIMMs) — with an environment that enables collaborative distance learning. In April 2020 he'll be showcasing the TIMMs to the National Federation of the Blind.

> ***"My goal is to allow blind and visually impaired students in K-12 to learn by physically moving manipulatives and providing a remote instructor with access to these blocks, which will help include students and allow them to learn independently."***
>
> –Muhanad (Moe) Manshad

Looking at Lava to Understand Volcanoes

Professor of Earth and Atmospheric Sciences Steve Anderson, Ph.D., has been surveying volcanoes for decades and is especially familiar with the Kilauea eruption in Hawaii, which he has been studying since the early 1990's. His work involves watching and learning from active lava flows to understand the volcano's behavior.

He and his team studied two areas at Kilauea: an area of expansive lava flows near the coast and an active lava lake prone to explosions near the summit. The lavas studied by Anderson and his team had a chemistry that remained relatively unchanged until the middle of 2018 when lavas erupted with a very different chemistry. Volcanologists are currently attempting to understand why this is happening and what it means for future eruptions of Kilauea.

> ***"As a scientist, it is always fun when sudden, unexpected events occur because those surprises challenge you to think differently about what you're studying,"***
>
> –Steve Anderson, Ph.D.,
> as told to Discovery Channel's *Daily Planet* magazine

UNC NEWS

DISCOVERY CHANNEL

BEAR-IN-MIND PODCAST

Anderson, with former graduate student Davitia James, who graduated from UNC with a master's degree in 2019 and is pursuing her Ph.D. at the University of the West Indies.

UNC Researchers Discover Novel Toxins in Venom of Snake

University of Northern Colorado Professor of Biology Steve Mackessy, Ph.D., studies snake venom — from its protein structures to the effects of the venom on other animals. He's also interested in its potential in the therapeutic world to fight against human diseases such as cancer.

He and his colleagues, including a graduate research assistant, identified two toxins in the venom of a species of snake that affect prey differently.

The toxins, named sulditoxin and sulmotoxin 1 by the UNC researchers, were discovered in the Amazon Puffing Snake. Sulditoxin is "highly toxic" toward lizard prey but harmless to mammals such as rodents. Sulmotoxin 1, on the other hand, is the opposite. Mackessy is intrigued by the prey-specific toxicities that this venom possesses.

> ***"Looking at animal venoms and understanding the mechanisms of how some of these toxins work actually provides us insights into how our own systems work, and also are a possible source of new therapeutic drugs."***
>
> –Steve Mackessy, as told to Newsweek

UNC NEWS | NEWSWEEK | MACKESSY LAB

How snake venom could fight cancer

NEWS PODCAST

Forensics and Snake Venom: Professor Helps Close Case by Analyzing Slithery Evidence

NEWS PODCAST

Witnessing Climate Change

In January 2019, Cindy Shellito, Ph.D., found herself trekking up a steep hillside in slushy snow. But she wasn't on a trail in the Colorado Rockies. She was on Danco Island on the Antarctic Peninsula, witnessing the impacts of climate change with a group of fellow scientists — 80 women from 18 countries selected to participate in Homeward Bound's third expedition to Antarctica.

A UNC Professor of Meteorology, in the Department of Earth and Atmospheric Sciences, Shellito explains that the expedition was the culminating adventure of a year-long international professional development program for women in STEMM (Science, Technology, Engineering, Math and Medicine).

"The aim of Homeward Bound is to raise the status of women in science and empower them to step into leadership roles related to making decisions that lead to a more sustainable future for our planet." There are seven more expeditions planned with the aim of building a global network of 1,000 women supporting each other in science and in leadership roles.

"I've spent more than 20 years studying climate and teaching my students how Earth's climate system works," she says. "Climate change is one of the biggest, most complex problems we've ever faced as a species, and its effects can be catastrophic. It's easy to feel overwhelmed and depressed by an issue of this magnitude. But I want to find a way to walk into my classroom and present climate change as an opportunity, not the disaster it is. I want to fuel my students with the hope that they can be part of the solution. That's why I applied to Homeward Bound. I wanted to be part of a professional network of women scientists working across disciplinary and national boundaries to find solutions."

> ***"Ultimately, it's about collaboration on a scale that we've never seen. And it starts by listening to ourselves. This is what I want to share with my students."***
>
> –Cindy Shellito, Ph.D.

UNC NEWS

UNC MAGAZINE


UNIVERSITY OF
NORTHERN COLORADO

Dressing for the Occasion

UNC Professor Anne Toewe, Ph.D., studies Victorian mourning mores, and steampunk, and puts her extensive clothing history research to use in costume design for UNC mainstage productions and in the classroom.

You have onyx buttons on your dress: cover them with cloth.

You see a widow you know at the market, shopping in her black dress; don't approach her for a chat unless she approaches you.

You're a woman in mourning: make sure every item of clothing is black for at least three years.

Your wife dies. Prove your love by wrapping your hat band with black crepe. Oh, another widower wraps a taller hat? Buy a hat the height of a train car to prove you loved your wife more.

These are a few of the rules and anecdotes of mourning in the Victorian era, and no one knows them like UNC Theatre Professor Anne Toewe, Ph.D., costume designer and head of the Theatre Design and Technology program at UNC.

Her research on Victorian mourning recently took her to London to present at the International Conference of Dress Historians, where she presented her research on Victorian mourning rules, especially for men. She found they are not any less codified than rules for women, but the mourning periods are typically shorter, as men were more likely to need to remarry to keep their households functioning. (Her presentation, "Men's Victorian Mourning Practices in America" is being published as a chapter in the upcoming book from the Association of Dress Historians devoted to Victorian history.)

Toewe's work as a clothing historian and fashion designer melds on stage and in the classroom, where she immerses her students in clothing history — a set of binders from each historical era spans half of her office — and then sets them to work using research to design costumes.

Toewe herself designs five to 10 mainstage UNC productions each year. In 2014, when UNC staged *Sweeney Todd: The Demon Barber of Fleet Street*, director David Grapes came to Toewe with a request: to outfit the actors in steampunk garb, playing off the 1980s subculture born from sci-fi and alternate history literature.

Then, when Grapes directed George Bernard Shaw's *Major Barbara* in 2017, he asked for steampunk again. This time, Toewe dug into the scholarly roots of the genre and found something surprising about steampunk subculture adherents.

"There are a lot of them out there that are incredibly studied in Victorian social practices. They've just found a way to bring that to life," she says. "Say, you're not allowed to wear black. 'Oh, well then, I'm going to make my costume black.' 'My corset goes on the outside.' Which would be completely inappropriate for Victorians. 'I'm going to have three quarter sleeves.' What? Your arms are showing in the daytime?"

The design for Major Barbara, Toewe says, used research to bridge the gap between Shaw's

Toewe studied Biology as an undergraduate and went into costume design after an "easy A" costume construction class, which she took to boost her GPA for medical school, turned into another costume class. And another. She went on to earn a Master of Fine Arts — a terminal degree in the field — and became a professional costume designer, working around the country.

She entered the University of Colorado's Ph.D. program (to prove to a boyfriend that Ph.D. programs weren't that hard to get into), but found it filled the gaps left by her nontraditional academic route (as well as getting "Dr." into her name — she's from a long line of medical doctors). She came to UNC for three years and has stayed 16, having found a love for research and teaching. She attributes her passion to her mentor in those undergraduate classes, and she that's partly why she's a teacher now. On that note, she says research is a way to develop as a professional while still being available to her undergraduates, rather than leaving campus for weeks at a time to go design other shows.

"I truly believe in the teacher-scholar model. I think that I am only as good as being current."

Costume history is a great way to learn history, Toewe says. An understanding of culture gives context to clothing, and clothing trends are a way to remember dates. She pushes her students to have extensive information on file in their brains for when a director makes a spur-of-the-moment request or comment in a meeting.

"Rumor has it that my Costume History class is a second hardest class on the college campus. Second only to Physics," she says. "Well, I mean, 20,000 years of fashion in 16 weeks is a lot."

In addition to helping make her tough, her Biology degree has not gone to waste.

"Everything I learned as a biologist, looking down the tube of a microscope, in terms of layers of observation, scholarly study, detail, is what I do now," she says. She jokes that she can't be an impartial juror because she would notice and judge every detail of a defendant and prosecutor. "I am a scientist. I'm just a scientist of clothing, of fashion, of historical time periods, of mores and social cultures."

"I am a scientist. I'm just a scientist of clothing, of fashion, of historical time periods, of mores and social cultures."

–Anne Toewe, Ph.D.

Mapping Vulnerability in Nepal

In Nepal, in April 2015, nearly 9,000 people died as a result of the Gorkha earthquake. With entire villages levelled and hundreds of thousands of Nepalese made homeless, the nation is still recovering.

In December 2018, invited by the Institute of Crisis Management Studies (ICMS) in Kathmandu, Professor of Geography Karen Barton, Ph.D., and 10 UNC undergraduate and graduate students, accompanied by Professor of Geography Jim Doerner, conducted fieldwork in Nepal.

"ICMS needed assistance in grant writing and field research on a social vulnerability mapping project in the wake of the earthquake," Barton says. Put simply, Barton says the team "hiked up and down the hills of Nepal to interview people about their resilience in the wake of the biggest natural disaster in recent history. Then we mapped those results."

The project was part of Barton's larger Fulbright grant, with funding also provided by a grant Barton proposed with the Swiss Red Cross. It will help map vulnerability for future hazards, with the hope that the project will also be disseminated to the rural communities most affected by natural disasters. The long-term project will involve more than 20,000 households.

"Students will be presenting their work at local area high schools as part of the funding requirement associated with our William E. Hewit Institute for History and Social Sciences grant award, which underwrote part of the expedition. It's a great opportunity for our students to give back to the community and to highlight some of the parallels between natural hazards and disaster recovery in Colorado and Kathmandu."

–Karen Barton, Ph.D.

BEAR-IN-MIND PODCAST

Investing in Watersheds for Growing Urban Populations

By 2060, around two-thirds of the world's population will live in cities and will need sustainable drinking water. UNC Assistant Professor in the Geography, GIS, and Sustainability program Chelsie Romulo, Ph.D., published her research on investments for watershed services in the journal Nature Communications.

Investments in watershed services programs connect rural areas to cities to help support healthy ecosystems and provide clean drinking water. Romulo and her team developed a computer model with The Nature Conservancy to better understand where investments for watershed services programs are placed. They created maps and diagrams to communicate the locations of the investments and compare characteristics of existing programs to help The Nature Conservancy identify cities where new programs could be developed.

"One of the things that we found is that these programs are much more common when a large portion of the watershed is being used for agriculture," Romulo says.

> ***"These types of programs are very important for managing watersheds that are not currently protected as public lands by providing support to people in rural areas. Our research helps make sure we are setting up the programs in places where they are most likely to be successful — which is critical when we have limited funding for conservation."***
>
> –Chelsie Romulo, Ph.D.

UNC NEWS

BEAR IN MIND PODCAST

Contributing to New Knowledge in Early Childhood Special Education

When Sara Movahedazarhouligh came to UNC to pursue her doctorate in Early Childhood Special Education in 2016 (Sara – I wasn't sure when?) she arrived from Iran in the wake of a presidential election, with a travel ban in the headlines. But she would find that she wasn't without support.

"I came to UNC and I got integrated in a very accepting, welcoming, inclusive community. I was receiving so much support socially and emotionally from my professors, from my friends, from my bigger context which is UNC," she says. "I never forget that when the travel ban happened, two of my American friends just walked up to a Colorado senator's office near their hometown just to talk about me, about what the problem we will incur if such a thing happens. That's a big piece that I never forget, and one example of the kind of social, emotional, spiritual support that I received."

Since then, Movahedazarhouligh's contributions to scholarly work and understanding in the area of Early Childhood Special Education has been significant. Her research interests include professional development in quality leadership practices and leadership development in early intervention and sustainability early childhood special education. She has also worked a number of projects related to family systems and approaches and play-based learning in early intervention and early childhood special education and evidence-based practices and interventions for children with disabilities.

"This semester we started thinking of a project to look for successful people with Down Syndrome — people who are out of a school, are above 25 years of age, and who are in this society living their normal life," she says. And, though adults aged 25 and older may seem beyond her scope as an early childhood education scholar, their success is very applicable to her work.

"It gives me ideas that, what can I do as an early childhood special education researcher to pave the ground for such a success at the age of 25?" she says.

Movahedazarhouligh has also had the opportunity to work with UNC's G.O.A.L project (an acronym for "Go On And Learn") that offers postsecondary inclusive education for students with intellectual and developmental disabilities.

Students enrolled in the program at UNC receive specific instruction and are included in typical classes with students across campus. She was able to help with the program's development, evaluation and planning.

She continues to contribute to her field's body of knowledge through research across a wide spectrum of topics. Recently, she completed and published "Parent-Implemented Interventions and Family-centered Service Delivery Approaches in Early Childhood Special Education" in the Journal of Early Child Development and Care.

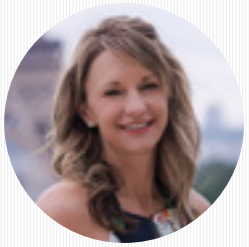
"I think it's my ethical responsibility and other international students who come here and get such quality education and support, and grow as an individual and as a professional scholar, to represent our organization. I've done research that got published in top tier journals and that's a good representation of UNC."

–Sara Movahedazarhouligh

BEAR-IN-MIND PODCAST PT.1

BEAR-IN-MIND PODCAST PT.2

Young Minds Tackle Complex Problems



When Professor of Sociology Angie Henderson Ph.D., and 14 of her students left for Costa Rica to study social inequality, they had research partners back in Greeley — 12 middle schoolers from Fred Tjardes School of Innovation in Greeley — who would be waiting to hear about the study's results.

The middle schoolers came to UNC and worked with UNC students to develop research questions. Then, in March 2018, Henderson and her students conducted qualitative research throughout Costa Rica.

Through 27 interviews, UNC students compiled data before returning home to share data with the middle schoolers, who analyzed the information. The collaborative project, says Henderson, helped both groups of students develop professional skills and the ability to think beyond their borders.

> ***"I have no doubt they will remember all the interesting things we learned about Costa Rica because of the nature of our work together — their eyes were opened to things they'd never before considered, and hopefully that continues to inspire them to never stop asking questions and seeking out new information to solve problems."***
>
> –Angie Henderson, Ph.D.

Henderson has also researched sex-trafficking and was featured in a Bear-in-Mind podcast.

BEAR IN MIND PODCAST

Where Fashion and Activism Intersect

In fall, 2017, Africana Studies Associate Professor Travis Boyce, Ph.D., presented a paper at Drexel University at a conference called "Fashion and Media," which focused on fashion's portrayal in the media.

For Boyce, a scholar who looks at popular culture and contemporary issues, the conference was an opportunity to talk about the impact of social media on fashion in the Black Lives Matter movement. His presentation has led to a new book project, (in contract with Universitas Press) tentatively titled *#MoreThanAnAthlete: Fashion, social justice and the counternarratives of the activist Black athlete on social and print media*, as he explores how black athletes — like Colin Kaepernick, LeBron James, Chris Paul among others — use fashion as a form of social protest.

Boyce's most recent publications have appeared in edited collections *Campus Uprisings: Understanding Injustice and the Resistance Movement on College Campuses* (2020 – Teacher's College Press) and *Racism and Discrimination in the Sporting World* (2019 – Universitas Press). He served as a guest editor for a special issue (Whiteness and Race in Popular Culture) for the *Journal of Asia-Pacific Popular Culture* published in 2019. He has also served as a guest editor for a special issue for the *Fashion Style and Popular Culture Journal*, called "Fashion, Style, Aesthetics and Black Lives Matter." The issue is set to be published early 2021. Additionally, Boyce co-edited a book, *Historicizing Fear: Ignorance, Vilification and Othering*, published in February 2020 by the University Press of Colorado.

> ***"I look at how athletes such as Kaepernick, James, and Paul — among others — have effectively used social and print media as their virtual runways to address social issue through fashion. The book will also investigate hashtags, memes, and images on social media related to activist athletes and place it both in historical and contemporary context."***
>
> –Travis Boyce, Ph.D.

How UNC Researchers Study Cannabis

Researchers at UNC are studying cannabis in a variety of ways, ranging from tax laws to biometrics.

Leisure and Recreation Choices for Cannabis Consumers

What do consumers enjoy doing the most when they are under the psychoactive effects of cannabis? UNC Associate Professor James Gould is researching this question to gain a better understanding of the cannabis preferences of consumers and their leisure and recreation choices.

The next phase of this research involves exploring cannabis consumers' food and beverage preferences.

> ***"The majority of consumers prefer to be social with their friends, followed by being in the outdoors and involving themselves in music. We also found that video gaming and artistic activity to be highly ranked."***
>
> –James Gould

WATCH VIDEO

Heavy Marijuana Use in College Students: Academic, Social and Alcohol Co-Use

UNC Professors Kristina Phillips, Ph.D., Michael Phillips, Ph.D., and Trent Lalonde, Ph.D., are researching marijuana use in college students by surveying participants through a smartphone app. The research focuses on how marijuana use affects academic performance, various environments where marijuana is used and how marijuana and alcohol may be used together.

A recent area they're expanding in is how marijuana and alcohol are used together as well as real-time intervention.

> ***"We're interested in academic issues and how those relate to heavy marijuana use, and we're also interested in the context of participants' marijuana use, so if you use in a social environment versus using by yourself."***
>
> –Kristina Phillips

WATCH VIDEO

Kristina Phillips, Ph.D

Michael Phillips, Ph.D

Trent Lalonde, Ph.D

Treating Cancer Cells and Immune Issues with Cannabis Chemicals

UNC Assistant Professor Nick Pullen researches when immune systems don't respond correctly, known as immunosuppression. Pullen uses isolates from cannabis chemicals to treat cancer cells and immune-related problems, such as allergies and asthma.

> ***"We take these chemicals from the cannabis plant, isolate them and treat different types of cells to see what those cellular responses are. We look at different proteins circuits that tell us, is the cell in the case of cancer dying or living? In the case of cells involved in allergy or asthma, are those cells activated to cause what would look like allergy or asthma, or are we actually tamping down that response?"***
>
> –Nick Pullen

WATCH VIDEO

PULLEN LAB RESEARCH

Cannabis and Your Health

UNC Professor of Sport and Exercise Science Laura Stewart is researching how cannabis alters health. She and her team explored the cardiorespiratory fitness, lung function and other areas of individuals who either use cannabis regularly or do not. The results showed little differences between these two groups with the exception that some regular cannabis users had a higher risk for cardiovascular disease.

Their future work will explore how regular cannabis use affects a person's immune system and how that may affect recovery from exercise.

> ***"We brought chronic users into the lab and did multiple tests" Steward said. "How well someone could run on the treadmill, how well someone's lungs are functioning, we took blood samples and looked for biomarkers."***
>
> –Laura Stewart

WATCH VIDEO

BEAR-IN-MIND PODCAST

Genetic Inconsistencies in Cannabis Strains

UNC student Anna Schwabe, Ph.D., uses genetic tools to research the consistency of cannabis products from a consumer point of view. She found genetic inconsistencies within strains from different dispensaries.

Her results showed that "what's inside the package doesn't always match what's on the outside," which is an issue for those using medical marijuana for a health issue.

> ***"We know as consumers that when we go to the store and purchase a Snickers bar, that no matter where we go, that Snickers bar will be the same. Looking at cannabis, we should expect the same thing where if you're buying a certain kind, you should be able to get that certain kind no matter where you get it."***
>
> –Anna Schwabe

WATCH VIDEO

Helping Tax Practitioners with Cannabis Tax Laws

UNC Associate Professor of Accounting Janel Greiman is interested in cannabis tax laws and assisting tax practitioners. By creating and maintaining a database with state and federal tax laws regarding cannabis, she's made it easier for tax practitioners to better serve the needs of their clients.

> ***"They have one set of laws for federal regulations and different sets of laws for each state, and within each state there are different laws for recreational, medicinal, research and textile cannabis. It's very difficult for any practitioner to keep up and advise their clients."***
>
> –Janel Greiman

WATCH VIDEO

How Police in States Bordering Colorado View Legalized Cannabis

UNC Assistant Professor of Criminology Kyle Ward surveyed police in states bordering Colorado (Wyoming, Kansas and Nebraska) to understand their viewpoints on legalized cannabis in Colorado. He found that police in counties closer to the Colorado border had more negative viewpoints; however, the negativity decreased farther away from the border.

> ***"They believed that there was an influx of marijuana coming into their states, trafficking concerns, the marijuana had higher potency than in the past, and a perception that more juveniles were using than before."***
>
> –Kyle Ward

WATCH VIDEO

Issues Dispensary Owners Face Post-Legalization

UNC Assistant Professor of Criminology Kyle Ward along with his colleagues UNC Associate Professors Brian Iannacchione, Ph.D., and Mary Evans, Ph.D., surveyed Colorado marijuana dispensary owners to understand the issues they face post-legalization. Surveyed dispensary owners deal with issues in banking, taxes and real estate, as well as concerns over federal government intervention.

> ***"We wanted to understand the issues they face when trying to run their businesses. These dispensary owners aren't able to write off constant business expenses like any other small businesses can."***
>
> –Kyle Ward

WATCH VIDEO

DISCOVERIES

Research, scholarship and creative works at the University of Northern Colorado

UNIVERSITY OF
NORTHERN COLORADO

Office of Research and Sponsored Programs
unco.edu/research