CONFERENCE ABSTRACTS

2023

STEMNoire Research & Wellness Conference

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MEET THE SCIENTIST

MARY CHINWE ABICHI

Mary Chinwe Abichi is a 3rd Year PhD Candidate at King's College London, researching Care Pathways and Treatment Outcomes for those with Long-Term Conditions and Persistent Physical Symptoms accessing mental health services in the UK. She aims to develop models to interpret the level of Engagement and Care for those with physical and mental co-morbidities and create simulation models to improve service delivery and treatment using Statistics and Machine Learning algorithms. Mary's MSc research in Developmental Neurobiology sparked her interest in understanding how environmental stressor impacts a person's biological, psychological, and social development through a lifespan within a real-world context. She values improving care for marginalized people who need better healthcare delivery and pushes for social and economic improvement.

She believes that understanding the interaction between social deprivation, disease outcomes, and preventative care models is paramount in order to achieve this. Outside of her academic endeavors, she has also represented Great Britain at European Athletics Championships, both indoors and outdoors, ascertaining silver and bronze medals in 2017 and 2018, respectively.

PRAISE ADEKOLA

Praise Adekola is a recent Biopsychology major from Tufts University in Medford, Massachusetts. During her time at Tufts, she worked as an undergraduate Chemistry 2 learning assistant, which inspired her to explore impostor syndrome for Black STEM students at Tufts. Praise also works as a research assistant at the Nock Lab in the Psychology Department at Harvard University. There, she studies why people engage in behaviors that are harmful to themselves, including eating disorder behaviors, nonsuicidal self-injury, and suicide. She is primarily passionate about racial equity and justice in mental health, suicide, education, and learning. Praise also works as a medical assistant in Boston. Before applying to medical school, she plans on working as a research/study coordinator in one of her areas of interest. In her free time, she loves to cook, play the trumpet, and travel with friends and family.

MIRANDA ALLEN

Miranda Mullins Allen is a PhD student in STEM education at Texas Tech University in Lubbock, Texas. She is also a biology teacher at Conway High School in Conway, South Carolina where she develops and implements STEM curricula for her students. As a Black woman, Miranda has long been committed as an advocate for the edification and protection of Black girls and all groups who have been historically marginalized in the educational system. She is interested in exploring the intersectionality of race, gender, and geography and the STEM identity development of marginalized students, particularly the youth from rural and small-town communities. Miranda believes the experiences of a person shapes them to be who they are. She is motivated each day to give her students opportunities to explore, engage, and immerse themselves in culture and community within the classroom.

She created Ride the Wave of STEM, an informal after-school and summer STEM program aimed at developing the STEM identities of underserved high school students by providing a safe space to explore STEM activities. Situated in her local community, its mission is for all learners to know there is a pathway to success in STEM for them and to improve access, interest, and engagement in STEM disciplines.

SARAH BARTLEY

Sarah Bartley obtained her B.S. in Physics from Agnes Scott College and an M.S. in Physics from the University of Central Florida. She is a Ph.D. student in the Department of Nanoengineering at North Carolina A&T State University. She accepted an IBIEM (Integrative Bioinformatics for Investigating and Engineering Microbiomes) fellowship for the year 2020-2021 to focus on microbiome research. She has accepted the Chanellor Fellowship for the year of 2021-2025. She is also the host of a podcast called Funding is the Matter. For the first series, she is investigating the lack of funds to Historically Black Colleges and Universities (HBCUs).

JULIA BRISBANE

Julia Brisbane (she/her/hers) is a Ph.D. Candidate in the Engineering Education Department at Virginia Tech. She was born and raised in Charleston, South Carolina. She received her M.S. in Biomedical Engineering from the Virginia Tech-Wake Forest University School of Biomedical Engineering and Sciences and her B.S. in Bioengineering from Clemson University. Her dissertation research focuses on the lived experiences of Black engineering students participating in undergraduate research experiences. Her broader research interests lie in intersectionality in engineering, racial health disparities, and broadening participation in engineering. While at Virginia Tech, she has served as a graduate teaching assistant in undergraduate and graduate engineering courses and a graduate research assistant on engineering education research projects.

During her time at Virginia Tech, Brisbane has been involved in improving the experiences of underrepresented engineering graduate students. She currently serves as a reading and writing group leader for first-year underrepresented graduate students. Additionally, she serves as a graduate ambassador for Virginia Tech's Center for Enhancement of Engineering Diversity where she aids in recruiting minoritized students into Virginia Tech College of Engineering's graduate programs. In her free time, she enjoys baking, cooking, reading, and hanging out with her cat named Milkshake.

MADELINE BUMPUS

Madeline Bumpus is currently a sophomore computer science major and mathematics minor at Howard University from Toledo, Ohio. In high school, she attended a Catholic, all-girls, PWI (primarily white institution). As a biracial Black woman in a space of mostly white women, she had to work hard to earn the respect of her peers and teachers. However, she graduated in the top five percent of her class, and her academics and extracurriculars earned her a full ride scholarship to the illustrious Howard University. She currently works as an undergraduate research assistant at Howard through a partnership with Microsoft. Her past research experience involved computational geometry, and she made breakthrough discoveries with her coworkers on the Hilbert metric. Currently, her research interests include artificial intelligence and machine learning, and she is studying training datasets used for autonomous vehicles.

In her free time, Madeline enjoys weight lifting, and she is highly involved in her university's math club. She understands the importance of instilling STEM knowledge young, and works as an after-school math and coding tutor for elementary school students.

MARCY CAGE

Marcy Cage is a 3rd year PhD student at the University of South Alabama College of Medicine, Department of Physiology and Cell Biology, in the Center of Lung Biology. She currently studies the effects of climate modified air pollutants on the respiratory outcomes of adolescents. Through her work she also focuses on the socioeconomic factors that will influence air pollutant exposure leading to respiratory disease. Marcy has Bachelors in Sociology, Masters in Biological Sciences, and a Master's in Public Health. She has been the recipient of several awards and fellowships, Daniel Hale Williams Scholar, Okinawa Institute of Science and Technology (OIST) Science Policy Fellow, Louis Stokes Alliances for Minority Participation (LSAMP) service award. Marcy has co-authored peer-reviewed publications and presented her work at local and international conferences.

JADA CHEEK

Jada is a 3rd year PhD student in the social psychology program at the University of California, Santa Cruz. Her research interests include how Black victims of police brutality are portrayed in the media and how this has implications for the outcomes of these cases for the officers involved. She is also interested broadly in race and social justice; specifically how racial stereotypes not only apply to people but also physical spaces. Jada served on the psychology department's Diversity, Equity, and Inclusion committee and helped create a anti-racism database for their website, and collaborated with the committee to plan events aimed at creating a more inclusive and anti-racist space not only in departmental interactions with each other, but also in our teaching curriculums and pedagogy.

IRENE DUAH-KESSI

Irene Duah-Kessie is a multifaceted, first-generation Ghanaian Canadian woman, encapsulating all dimensions of a community builder, mentor, advocate, researcher, and entrepreneur. Irene received her Bachelor of Science from McMaster University and Master of Science in Sustainability Management from the University of Toronto. As a founding member of the McMaster Womanists and the University of Toronto's Black Graduate Students Association, Irene has been driven to increase support and the representation of Black students in academia through community development, research, and advocacy. Following her studies, she founded and leads Rise In STEM, a youth-led grassroots initiative that offers a variety of programs to build skills, foster mentorship, and provides leadership opportunities for Black and underserved youth in the Greater Toronto Area.

She also led the Young Black Women's Anti-Racism Insights to Action Study, which explored the experiences and centralizes young Black women's ideas in addressing employment and justice barriers. Presently, Irene is a Research Associate at Youth Research & Evaluation eXchange at York University supporting the evaluation of youth programs across Ontario. This past summer, Irene was the recipient of the City of Toronto Youth Cabinet's Black Youth Gala Award for Building Community through Research, Science, and Technology. In addition to her work with Rise In STEM and YouthREX, Irene supports J & I Beauty Supplies, her mother's beauty business, which strives to make African beauty products accessible alongside creating economic opportunities for immigrant women in the beauty industry. For leisure, Irene enjoys bird watching, hiking, and baking.

KELCEE EVERETTE

Kelcee Everette is a current fifth-year PhD candidate in the Biological and Biomedical Sciences (BBS) Program at Harvard Medical School. She conducts research in the laboratory of David R. Liu at the Broad Institute, developing and applying novel and potentially curative genome editing technologies to model rare genetic diseases like sickle cell disease. Kelcee has earned numerous awards throughout her academic career, most recently becoming a National Science Foundation Graduate Research Program (NSF GRFP) Fellow and earning a university-wide Distinction in Teaching award. She served as one of the co-founders of the BBS Diversity and Inclusion Steering Committee, a student-founded organization which institutionalized diversity and inclusion programming for all incoming science PhD students at Harvard.

Kelcee graduated with high honors from Harvard College in 2018 with a concentration in Biomedical Engineering and a secondary in African American Studies. In her free time, she enjoys serving as a research mentor for undergraduates of underrepresented communities in science, traveling, writing, and learning new languages.

TONYA GARCIA-ARNOLD

Dr. Tonya Garcia-Arnold is from Killeen, Texas and is currently Dean of Instruction in Marlin Independent School District. She has a combined 39 years of experience in education, academics, petroleum research, sales and marketing, and entrepreneurial pursuits. Tonya's academic and leadership focus has been on secondary Science, technology, engineering, and math education, educational administration, curriculum and instruction, and bridging secondary education to college and career readiness. Dr. Garcia-Arnold received her Bachelor of Science degree in Pre-Med Biology with a minor in Chemistry from Prairie View A&M University in Prairie View, Texas, a Master's of Education in Curriculum and Instruction from University of Mary Hardin-Baylor in Belton, Texas, and holds a Doctorate in Educational Administration, also from the University of Mary Hardin-Baylor. She is a fourth-generation educator, and the third-generation of Prairie View A&M University graduates in her family. Tonya has held positions as Secondary School Administrator, Postsecondary Pre-engineering adjunct, GED instructor, and Secondary Science Teacher at school districts in and around the Houston and Central Texas area for nearly 30 years.

Tonya has worked in the oil industry for over ten years with Shell Chemical Company as a laboratory research technician, where she was awarded a patent in a novel process for acrylic acid synthesis (co-authored with Dr. Sharon Beshouri), as an account services representative and supply analyst for Shell Chemical Company in Sales and Marketing; and as a gas pipeline coordinator for Dynegy energy marketing in Houston. Tonya is married to retired U. S. Army Staff Sergeant Ivan Arnold. She spent 20 years as a runway model and has owned, operated, and directed a modeling school and fashion production company in Houston; co-owns a sound engineering company and a drone services company with her husband in Killeen.

CAMONIA GRAHAM-TUTT

Dr. Camonia R. Graham-Tutt is currently an Assistant Professor at the University of Hawai'i-West Oahu. Camonia is a Certified Health Education Specialist (CHES) making her uniquely qualified to assess, design and implement sustainable community health education programs that deliver positive benefits to vulnerable communities. She received both her Bachelors and Masters degrees from Baylor University in Health Science Education and her Ph.D. from Howard University in the field of Medical Sociology. She is President-Elect and a lifetime member of the Hawai'i Public Health Association (HPHA) as well as a board member for the Hawai'i Public Health Institute (HIPHI). As a behavioral health organizer/researcher, she is dedicated to understanding and communicating health prevention efforts for all populations. She has a relentless passion for ground-breaking education strategies that assist vulnerable communities.

She also has strong academic-community research partnership experience having worked at several communities, colleges and universities throughout the nation. "Dr. C," (as she is often referred to by her students) is dedicated to many service organizations where she serves community through local, national and global efforts. She is a compassionate researcher/educator that values the notion of creative education. She is known to elicit excellence from her self and others and encourages all who come in contact with her to be the change they want to see and more.

TIFFANY HAMM

Tiffany Hamm is a Ph.D. candidate in Teaching and Leadership at Syracuse university's School of Education. Coming from the Bronx, New York, is a PRODiG Fellow at SUNY Cortland, where she is also a science teacher educator. Tiffany earned an A.S. in General Science from BMCC and a B.S. in Marine Sciences from SUNY Stony Brook. Tiffany's career then took a turn as she earned a M.S.Ed from Long Island University. Since transitioning from science to education, Tiffany spent 3 years teaching high school level Earth Science in the Bronx, New York. Tiffany's research interests include developing transformative science curricula that promotes access and equity for culturally diverse science learners.

REGINA P. MCCURDY

Regina P. McCurdy, Ph.D. is an Assistant Professor of Science Education in the Department of Middle Grades and Secondary Education in the College of Education at Georgia Southern University in Statesboro, Georgia. Regina hails from West Palm Beach, Florida. She received her BS degree in Biology, MA in Intercultural Studies from Asbury Theological Seminary in Kentucky, and her Ed. S. in K-8 Mathematics and Science Teaching and her Ph.D. in Science Education from the University of Central Florida. Her research interests include developing the science identity of K-16 learners and preparing preservice and in-service teachers to teach science in ways that are equitable and culturally responsive to ethnically marginalized learners. Dr. McCurdy is an active member of the NARST Equity and Ethics Committee and the Association for Science Teacher Education.

AZARIA CUNNINGHAM

Azaria Cunningham is a Ph.D. candidate in Curriculum and Instruction at The Pennsylvania State University. Azaria was raised in Nassau, Bahamas, and Paterson, New Jersey. Azaria earned her BA, MA, and supervisory certification at William Paterson University of New Jersey. She completed her Bachelors in Integrated Mathematics and Science with a double major in K-6 elementary & (6-8) middle school science education specialization. Azaria worked as a second-grade teacher in a charter school and later as a science teacher in the K-12 public school system for six years. As a former science educator, Azaria's research interest resides in understanding how pre-service and teacher educators learn within school contexts through teacher-driven mechanisms such as real-time coaching, mentoring, and supervision practices.

TIARA V. HINTON

Tiara V. Hinton is a Pharmaceutical Sciences Ph.D. Candidate at Wayne State University in Detroit, MI. Her research centers on the Iron-sulfur Cluster Assembly pathway in Drosophila, as it relates to Friedreich's ataxia, and iron homeostasis. Specifically, Tiara is focusing on the interaction of frataxin and the scaffold protein during iron transfer and iron-sulfur cluster assembly. At Wayne State, Tiara has served in many capacities within the Graduate School, such as being a Graduate Ambassador, a graduate student mentor, and a past Dean's Diversity Fellow. She has also served as an academic tutor in the Detroit Community. Tiara is originally from Prince George's County, MD, and earned a BS in Chemistry from Morgan State University in Baltimore, MD. Tiara is a multifaceted individual, and enjoys creative activities including painting, modeling, and photography, as well as roller skating and spending time with her family. A scientist and servant at heart, Tiara is thankful for the opportunity to continue to serve as an ambassador for STEMNoire.

CHANELLE HUNTER

Chanelle Hunter is a 4th-Year Ph.D. Candidate in the Larimer Lab. She earned her Bachelor's degree in Biomedical Sciences from the University of Central Florida, where she was a member of the McNair Scholars program. As a scholar, she began developing her skillset in molecular biology techniques and participated in research opportunities at the University of California Irvine and Vanderbilt University. Her current research is focused on the development of tools for personalized medicine, specifically engineering novel CXCR3-targeted PET imaging probes to improve predictive diagnostic imaging of cancer immunotherapy response.

In addition to her research, she is passionate about mentorship and an advocate for increasing diversity and inclusion in biomedical fields through her work with the City of Birmingham's Kids & Jobs program, giving summer research opportunities to high school and early undergraduate students.

With her degree, she hopes to continue contributing to impactful translational science and developing programs to support the high school to PhD pipeline of underrepresented students in STEM. When not in the lab, Chanelle can be found trying out new roller-skating tricks and visiting museums around Birmingham.

TAMECIA JONES

Dr. Tamecia R. Jones is an Assistant Professor at North Carolina State University in the STEM Education Department. Jones studies assessment in K12 formal and informal spaces and develops technology and research methods that expand capture of engineering knowledge. She also studies human-computer interaction, informal learning, and engineering thinking. A former middle school teacher and program developer, Jones has written curriculum and developed K12 informal STEM programs in Baltimore, San Jose, Boston, and Indianapolis. This work has resulted in two software prototypes, conference presentations, and manuscripts. She has participated in commercialization programs for her research and entrepreneurship training, completing a certificate in Women's Entrepreneurship at Cornell University.

Her interdisciplinary research partnerships have been awarded approximately 1 million dollars in funding from the National Science Foundation and Department of Education. She holds a B.S. in Biomedical Engineering from The Johns Hopkins University, M.A. in Learning, Design, and Technology from Stanford University, a M.Div. from Boston University, and a Ph.D. in Engineering Education from Purdue University. She is an ordained elder in the AME Church, amateur seamstress, and loves to travel.

JESSICA LEEKER

Fueled by her desire to deepen her knowledge and understand how she can leave a lasting impact on the world and the people around her, Dr. Rush Leeker has cultivated a rich educational background. Equipped with her undergraduate degree in Supply Chain and Information Systems from Penn University and her Ph.D. in Engineering Education and MBA in Sustainability and Operations from Purdue University, she is proud to currently share her expertise as an Engineering Professor at the University of Colorado Boulder with research focused on informal community engagement and black homeschool environments. As the founder of RL Strategies, Dr. Rush Leeker not only provides organizations with support in project areas such as goal setting and employee development but with DEI-centered workshops, training, and coaching.

Through her coaching business, Dr. Rush Leeker has worked with several successful companies, including top Fortune 500 organizations and private coaching clients looking to improve their business practices to find professional and personal growth. Dr. Rush Leeker hopes to serve as a mentor for the next generation as she encourages students of all ages to explore their creativity, always choose kindness and be brave enough to pursue their passions.

LAKEISHA LEWTER

Dr. Lakeisha Lewter was born and raised in Laurel, MD. She received her BS in Biology with a minor in Psychology from Morgan State University in Baltimore, MD. Keisha obtained her PhD in Neuroscience from The University at Buffalo where she studied the potential utility of subtype-selective GABAA receptor positive allosteric modulators for pain control. Dr. Lewter is currently a postdoc in the School of Behavioral and Brain Sciences at University of Texas at Dallas. Her work mainly focuses on the underlying mechanisms involved in the development of chronic pain-related lateralization within the amygdala. Dr. Lewter received two fellowships (NIH NRSA F32 award and Burroughs Wellcome Fund PDEP award) to help fund her research project. In addition to pain research, she also studies the feasibility of novel therapies for opioid use disorder. Outside of the lab, Keisha enjoys dancing, music/art festivals, and travel. She is also a proud member of Alpha Nu Omega Sorority, Inc.

KAELA MAKINS

Born and raised in Miami, FL, Kaela Makins graduated from Hamilton College in 2021 with her B.A in Biology, and found her way over to Los Angeles, CA where she now attends graduate school. She is currently a PhD Student at City of Hope where she studies the mechanisms of DNA double-strand break repair via end joining outcomes. When she's not in lab, Kaela enjoys spending her weekends relaxing at the beach, paddle boarding, and hiking. From the very start of her science journey, Kaela has pursued a passion for creating and fostering communities for Black and Brown scientists, hence her passion for serving as a STEMNoire ambassador.

JULIA MANDEVILLE

Julia Mandeville (MPH)- is a 2nd Year doctoral student at the George Mason University, Fairfax Virginia. She is pursuing her PhD in Public Health with a concentration in Social and Behavioral Sciences in the Department of Global and Community Health within the College of Public Health. In 2016, Julia co-founded a registered charitable organization in her home country of Barbados. With this organization- the Barbados Association of Endometriosis and PCOS, Julia actively works to provide tangible support to women in Barbados who have been diagnosed with endometriosis, polycystic ovary syndrome (PCOS) and other related conditions (including uterine fibroids and adenomyosis). She received her Master of Public Health in Global Health from the University of Manchester, United Kingdom in 2017. In 2022, she was a recipient of the George Mason University High Impact Grant and was also elected to membership in the Phi Kappa Phi Honor Society. Julia has presented her research at conferences nationally and internationally, including the 2022 STEMNoire conference.

At GMU, she works under the mentorship of Drs. Jhumka Gupta and Anna Pollack on research projects that focus on addressing disparities in women's health and reproductive health outcomes in Black, immigrant and other historically marginalized populations.

CHANNING MATHEWS

Dr. Channing J. Mathews is an assistant professor in the department of psychology (community area) at the University of Virginia. With deep roots in Florida, she claims South Georgia as her hometown. Her research considers how youth of color draw upon their ethnic-racial identity (i.e., the process and meaning associated with the role of ethnicity and race in one's life) and critical consciousness (i.e., one's awareness of social inequality and the tools, beliefs, and actions used to challenge such inequality) development as motivators for their STEM based academic engagement and activism. Her work focuses on these processes during adolescence and emerging adulthood, drawing from theoretical and methodological approaches in education, psychology, and African American studies.

Dr. Mathews' scholarship has three central foci: 1) integrating ethnic-racial identity and critical consciousness factors as dual promoters of positive Black and Latinx adolescent and emerging adult development, 2) examining how both ethnic-racial identity and critical consciousness promote STEM orientation, and 3) assessing the complexity of ethnic-racial identity and critical action behaviors (including STEM-based activism) in both Black and Latinx adolescence and adulthood. When not working as a professor, Dr. Mathews pursues her interests as an emerging food and cocktail critic (see Pass the Cornbread!) and spends quality time with her partner Ze and 3 year old goldendoodle, Jack.

RHODA MOISE

Rhoda Moise, Ph.D., CYT is an internationally trained integrative medicine specialist, multi-media artist, and creative educational facilitator with Haitian roots. Born in Philadelphia, PA, Dr. Rho learned the values of resilience, education, and community from an early age. As a child, she witnessed first-hand impacts of chronic disease on her family and community group. From these experiences, Dr. Rho was motivated to pursue advanced education and training to promote health. She graduated with honors from the Pennsylvania State University earning a Bachelor of Science in Biobehavioral Health with minors in Biology and Health Policy and Administration focusing on global chronic disease prevention and control. She earned her Ph.D. in Prevention Science and Community Health from the University of Miami Miller School of Medicine. Additionally, she also completed a 200-hour certification to teach Ancient Egyptian yoga.

Dr. Rho's goal is to eliminate inequitable distribution of disease with innovative strategies to catalyze transformation of health systems with stakeholders including patients, providers, and payers. She also serves as a community health and wellness enthusiast providing speaking, consulting, and training services in diverse settings including K-12 schools, colleges and universities, non-profits, and private workplaces in the U.S. and abroad.

CAMILLE MOSLEY

Camille (Cam) Mosley (they/she) is a fisheries ecologist from Hattiesburg, MS. They graduated from Emory University with a B.S. in environmental science in 2019. During undergrad they completed an independent research project at the Georgia Institute of Technology. Cam is currently a Ph.D. Candidate at the University of Notre Dame in the Biological Sciences Department. Cam is interested in the ecological outcomes of the interactions between fish, aquatic habitats, and the people who fish. Their dissertation research examines the strength of the feedbacks between these fisheries components through whole-lake experimentation and biostatistics. Cam hopes to continue researching fisheries ecology and management as a post-doc or in an agency in the future. In their free time Cam likes to do a variety of outdoor activities, cook, try new restaurants, and make tiktoks of their cat. Cam also greatly enjoys participating in Diversity in Stem outreach within and outside of their research institution.

TRENELL MOSLEY

Dr. Trenell J. Mosley (she/her/hers) is a highly trained human geneticist and DEI advocate with formal training in bioinformatics and molecular biology. She obtained her doctoral degree from Emory University in 2021, where she used modern techniques in genome sequencing, bioinformatics, and molecular biology to uncover the genetic and biological factors contributing to the origin of rare genetic and genomic disorders, including 3q29 deletion syndrome and a rare short stature and insulin resistance disorder. She continued similar work as a postdoctoral researcher at Emory, investigating the genetic causes of Van der Woude Syndrome, a rare orofacial clefting disorder. During her time in academia, Trenell dedicated her time to supporting diverse students and advocating for equitable and inclusive educational, training, and working environments. In pursuit of that passion, Trenell pivoted to a career in science policy, seeking avenues to advance DEI in the STEM workforce at the federal level.

Currently, Trenell works as a Health Science Analyst at the National Institutes of Health Chief Officer for Scientific Workforce Diversity (COSWD) office as part of the American Association for the Advancement of Science (AAAS) Science and Technology Policy Fellowship program. In this role, she works closely with the COSWD, Dr. Marie A. Bernard, on mission-critical programmatic, policy, and operational efforts aimed at catalyzing cultures of inclusive excellence in the scientific workforce. Ultimately, Trenell hopes to continue a career in science policy, seeking avenues to advance a diverse, equitable, and inclusive STEM workforce.

OLIVIA MURPHY

Olivia is a Ph.D. student in Mechanical Engineering interested in offshore integrated wind-wave energy systems, sustainable mineral extraction, and green hydrogen production. She is currently working on modeling and analyzing an offshore wind-powered system that extracts hydrogen and critical minerals from seawater.

Personal Interest:

Olivia is a proud plant mom who enjoys tending to her plants. She also enjoys walking trails, traveling, and spending quality time with her friends and family.

SUMMER MOTTON

Summer Motton is from Cleveland, Ohio and graduated from Barnard College with a degree in Psychology. She previously worked as an undergraduate research assistant at Teachers College, Columbia University, where she studied the influence of socioeconomic disparities on children's brain and cognitive development. She currently works as a research assistant in Dr. Margaret Sheridan's lab at UNC-Chapel Hill, where she studies how exposure to adversity increases risk for psychopathology in early childhood. She is interested in understanding how different sociocultural contexts impact child mental health, and she hopes to use psychology research to promote equity and improve outcomes for children from diverse backgrounds. She hopes to pursue a Ph.D. in Clinical Psychology to translate research findings into treatment interventions that address the needs of children and families from historically marginalized communities.

Summer is committed to participating in efforts to increase diversity, equity, and inclusion (DEI) in science. She holds discussions about anti-racism within her current lab, supports broader DEI efforts within UNC-Chapel Hill's psychology department, and conducts research with members of groups that are often excluded or understudied. She also extends these efforts beyond academia and into her local community through her involvement in outreach programs that make STEM education more accessible for young Black students.

ESTHER OSARFO-MENSAH

Esther Osarfo-Mensah is currently a PhD Student in the Advanced Characterisation of Materials CDT and is based between University College London and Imperial College London. She obtained her MChem Chemistry with Study Year Abroad from the University of Bath, where her final year project focused on the investigation of Janus gold nanoparticle structures at the DPPC phospholipid monolayer. Her Erasmus year was spent at The University of Bordeaux studying the properties of ionic particles using molecular spectroscopic techniques. After graduating, Esther spent 6 years working in science communication and education outreach at the Science Museum London and then the Francis Crick Institute. Whilst at the Crick, Esther was deputy head of the Black, Asian, and Minority Ethnic staff group PRISM, where she worked with colleagues internally and externally to promote a more inclusive and diverse scientific community.

Her current research focuses on the development of novel biosensors for improved cancer detection through the characterisation of competitive interactions and binding selectivity at bio-nano interfaces. This work primarily involves the utilization of the quartz crystal microbalance with dissipation monitoring (QCM-D), as well as extracellular vesicles which she uses as membrane models. Esther is very passionate about science communication, and so also works with the Brilliant Club, a university access charity, to tutor disadvantaged school students in science.

JULITE QUENUM

Julite Quenum comes from the Republic of Benin in West Africa. She holds a B.Sc. in biochemistry and a Master's degree in cell biology and immunology. She is currently a PhD candidate at the University of Sherbrooke in Canada. She speaks both English and French and started learning Spanish ever since she heard about the 2023 STEMNoire conference in Puerto Rico. She enjoys running, reading, meditating, and traveling. During her bachelor's program, Julite graduated with distinction and was awarded multiple scholarship funds. During her Master's research training, Julite was able to publish two first author papers as well as one co-authored paper. Last year, she attended the annual Canadian Society of Immunology (CSI) meeting in Halifax Nova Scotia after having obtained a CSI travel award. Her current work involves assessing antibody responses to the SARS-CoV-19 virus. She currently has two submitted papers in review and is excited to see what the year 2023 has in store for her.

LAERISSA REVEIL

Laerissa Reveil is a doctoral student from Orlando, FL in the Department of Pharmaceutics in the School of Pharmacy at Virginia Commonwealth University (VCU). Laerissa is a member of Dr. Matthew Halquist's lab, where she works on determining age- and sex-related differences from cannabinoid exposure. Laerissa previously received a dual Bachelors in Chemistry and Criminology from the University of Florida and a Master's in Forensic Science at VCU, where she studied the effects of drug mixtures in electronic cigarettes. She published her first, first-author publication on her Master's research and has also presented her work at numerous national and international conferences. Most recently, she presented at the Society of Forensic Toxicologists annual meeting and received the Young Scientist Meeting Award. Laerissa is a member of the Society of Forensic Toxicologists, the American Academy of Forensic Sciences, and the International Association of Forensic Toxicologists. When not working in the lab, she likes to bake, thrift shop, and work on her custom design business CreativelyStemmed with her business partner.

CHASTYN SMITH

Chastyn Smith is a 4th year Ph.D. Candidate in the Integrative Life Sciences Ph.D. program at Virginia Commonwealth University (VCU). She is advised by and works in Dr. Tracey Dawson Green forensic molecular biology lab where she works on the HRM project. Her research interests are in forensic DNA analysis, assay optimization, and prediction modeling approaches. As a Richmond, VA native, she obtained her B.S. from the University of Richmond in Biology with a minor in Anthropology. She is a member of Delta Sigma Theta Sorority, Inc, a fighter for all things just, and a scientist for the people. Additionally, she is passionate about social justice and bridging the gap between science and the community (hence "scientist for the people"). During her time at VCU, Chastyn has spent her time as a Southern Regional Education Board Doctoral Scholar, an International Symposium on Human Identification (ISHI) student ambassador, and is currently a Department of Defense Science, Mathematics, and Research for Transformation (SMART) Scholar.

When not in the lab conducting research, you can find Chastyn in the VCU community organizing events for graduate students as the Black Graduate Student Association (BGSA) president, or in Richmond city engaging with the community at local primary schools arranging various events to teach students about forensic science. To learn more about Chastyn Smith view her website at https://chastynsmith.wixsite.com/cjsmith.

MARESA TATE

Maresa Tate is from Atlanta, Georgia and graduated from the College of Wooster with a Bachelor of Arts degree in Cognitive and Behavioral Neuroscience. As an undergraduate, Maresa was selected as a CDC Undergraduate Public Health scholar and worked as a clinical research intern at Johns Hopkins and Kennedy Krieger Medical Institutes' Sickle Cell Neurodevelopmental Clinic. While at Wooster, they completed an undergraduate thesis investigating the role of anti-Blackness in the processing of hair during facial identification between Black and non-Black individuals. Their study analyzed hair alterations' effects on facial recognition accuracy between own-race and other-race faces, with the use of eye-tracking technology. Currently, Maresa is a full-time research assistant in Dr. Margaret Sheridan's lab at UNC-Chapel Hill, where they study the impact of childhood adversity on behavioral and cognitive development.

Maresa is particularly interested in working with historically exploited and excluded populations to increase health and wellbeing outcomes. She is a trained health coach and doula and volunteers within her community to help individuals from under-resourced areas. Maresa plans to become a physician-scientist and pediatrician studying the impacts of intergenerational trauma on the body and brain, with a specialty in Child Abuse and Maltreatment. She hopes to continue her work with marginalized communities through community-engaged research to inform her clinical and advocacy work.

THONYA WILSON

Nathonya Wilson is a Gullah Geechee-African American non-binary person who was born in the foothills and raised in the Appalachian Mountains of Virginia. They hold a hold Bachelor' of Science in Exercise Science with a concentration in Health and Physical Education from Norfolk State University, complete with a Virginia PreK-12 Health and Physical Education teacher license, and a Master' of Education in Kinesiology with a focus in physical education for individuals with disabilities from the University of Virginia. Nathonya is currently a doctoral student studying Kinesiology with an emphasis on Adapted Physical Education and obtaining a graduate minor in public health behavior and health promotion at The Ohio State University. Their research interests include accessibility of fitness facilities for Disabled African Americans in rural communities, implementation of culturally relevant fitness programming, culturally responsive physical education pedagogy, and African American physical activity trends.

Prior to their doctoral studies, Nathonya worked as an itinerant adapted physical education teacher in the public school system and partnered with an organization such as the YMCA to provide adapted swim lessons and coaching for autistic and neurodiverse youth. Outside of work and academia, Thonya enjoys spending time with loved ones, crabbing, hiking, fishing, and engaging in cultural and historical preservation efforts for Gullah Geechee and other Black and Indigenous people of color in the United States.

ARIANA YANCEY

My name is Ariana Yancey and I am originally from the Bay Area (Richmond, Ca). I became interested in biology in high school and decided to pursue it as an undergraduate with the encouragement of my professors at San Francisco State University. During this time, I had the opportunity to participate in research upon joining the lab of Dr. Blake Riggs where I could explore concepts in cell and molecular biology more intimately. The passion I developed for research drove me to pursue a Master's degree in cell and molecular biology in 2019 where I studied interaction between the organelles known at the endoplasmic reticulum and mitochondria. Currently, I am a 2nd year PhD student in Doug Kellogg's Lab at the University of California, Santa Cruz in the department of molecular, cellular and developmental biology. For my thesis project, I study the underlying mechanisms that facilitate cell size and cell cycle entry which are often dysregulated in cancer. I look forward to finishing strong so that I can pursue a post-doctorate degree and continue a liefling career in research.

SECTION 2

POSTER PRESENTATIONS

Racial identity in introductory STEM classes: Are feelings of impostor syndrome alleviated when Black students can identify with Learning Assistants?

Praise E. Adekola[2], Vesal Dini[1,2]

[1]*Department of Physics & Astronomy,*[2]*Tufts University; 2 Institute for Research on Learning and Instruction, Tufts University*

In moving away from traditional practices, prior research suggests that active teaching environments positively impact underrepresented minority (URM) students' sense of belonging and desire to continue in STEM. However, the lack of URM leadership in STEM can leave Black students feeling that no one from their racial group belongs in that setting. This can have detrimental effects on Black students' psychological well-being and health; forcing some to adopt maladaptive behaviors to cope with the impostorism and racial stressors. The primary aim of this project is to study one feature of the reformed teaching method at Tufts University, namely the use of learning assistants. Are feelings of impostorism in introductory STEM classes mitigated when Black students can identify with their learning assistant? In addition to enhancing our understanding of the Black student experience in reformed STEM classes, we believe this study may lead to more effective ways of using learning assistants to meet the needs of Black students in these classes.

Student participants were recruited from the following courses: Biology 13, General Chemistry 11, General Chemistry 1, General Chemistry 2, Physics 1, Physics 11, and Physics 2. The study consisted of 2 parts: a self-report survey and a one-on-one, semi-structured hour-long interview. The self-report survey consisted of the validated Clance Impostor Phenomenon Scale (CIPS), which assesses the prevalence of impostorism. All interviews were conducted via Zoom with cameras on. Interviews followed a semi-structured format with questions that elicited feelings, thoughts, and behaviors of Black students in relation to their interactions with learning assistants.

A thematic analysis was used to analyze interview data from student participants. Initial codes were generated, sorted, and collated into themes and subthemes that related to our research questions. We were able to identify 3 main factors that contributed to the feelings, experiences, and thoughts of impostorism (or lack thereof) that students felt: the student-LA interaction, the student's level of agency, and the classroom ecology.

The student participants experienced impostorism that manifested as fraudulence and inferiority, whilst simultaneously experiencing an absence of impostorism as a result of high confidence in the material and assurance of belonging. However, based on our thematic analysis, the level or presence of impostorism is impacted by more than just the racial identity of their learning assistant.

Your Difference is Your Superpower: A Literature Review of Black Girls and Women in STEM

Miranda Mullins Allen

Department of Curriculum and Instruction; STEM Education; Texas Tech University

With previous studies indicating there is a low participation of women and minorities in science, technology, engineering, and mathematics (STEM), there has been a push to increase the diversification of individuals in STEM fields. Despite these diversity efforts, disparities still exist regarding gender and race in STEM. Most research focuses on these constructs in isolation and with doing so, the intersectional experiences of Black women and girls are often left out and overlooked. Black women and girls are confronted with the duality of being both Black and female. Few researchers have examined why it is difficult for Black females to establish a sense of belonging to STEM that validates their strengths, cultures, identities, and unique abilities. There are many Black girls and women who aspire to pursue STEM careers; however, they face a history of exclusion and marginalization in K-12 education which manifests in their post-secondary career decisions and persistence. Current literature reports on the injustices and inequities of Black women and girls and although this is important, there is also the obligation and necessity to report on the counter stories of these young women and the interventions that should be emphasized to ensure their success and well-being. There is a call to action for everyone, including policymakers, researchers, teachers, and schools, to realize and acknowledge that the multidimensional identities of blackness, girlhood, womanhood, and sexuality cannot be isolated. These identities will intersect in the most complex ways, and no one should force them to separate to fit their own agendas. The literature review synthesizes what is currently known about the STEM experiences of Black women and girls given their marginalized racial and gendered identities. The following research question guided the review of literature: What is the current state of the literature that addresses Black girls and women in STEM through intersectionality lenses?

This paper presents a thematic review of literature examining the multidimensional identities of Black females and their transition from girlhood to womanhood in STEM. The review is organized in four major sections. First, the researcher's positionality regarding Black girls and women. Then, the selection process and examination of books and articles using thematic analysis. Next, an introduction of the four themes (STEM experiences, the knowledge desert, STEM identity, and STEM learning environments and curricula) used to categorize literature including an in-depth exploration of each theme and their current relationship in literature. Finally, conclusions are drawn and implications for future research are explained.

Molecular Dynamics Investigations of the Binding of S-protein to DNA Aptamers

Sarah Bartley, Kristen Dellinger, Kristen Rhinehardt

Nanoengineering at NC A&T; Computational Science & Engineering at NC A&T

On December 31, 2019, a new strain of Severe acute respiratory syndrome (SARS) called SARS-CoV-2 was detected in Wuhan, China. SARS-CoV-2 is transmitted through respiratory droplets from person to person contact. Researchers have investigated the spike protein in SARS-CoV-2 for the transmission of infection. The S protein has two major binding regions S1 and S2 located in the N-terminus and C-terminal, respectively. Current detection and diagnostic methods consist but not limited by reverse transcriptase-polymerase chain reaction (RT-PCR), computed tomography, and enzyme-linked immunosorbent assay (ELISA)-based immunoassays. These platforms are limited by long detection times, low specificity, high cost, and labor-intensive training. Aptamers are generated from a library of single stranded DNA or RNA fragments, and these fragments are binded to a target analyte to make a target specific aptamer through the systematic evolution of ligands by exponential enrichment (SELEX) process. Aptamers provide a less expensive, highly specific, and highly sensitive method to detect the spike protein. While SELEX is a well-established technique, there can be complications associated with its use. For example, there are limited aptamer libraries, and the process is both time-consuming and laborious. In contrast, computational approaches can alleviate many of these limitations with the proper models and computing power. To screen aptamers, I am currently investigating the binding of 3 different aptamers specific to the spike protein.This project serves to explore the specificity and sensitivity of aptasensors with biomarkers of SARS-CoV-2. We asked whether the spike protein has the ability to bind to the domain of an aptamer. We developed 3 molecular dynamic simulations of aptamer sequences with the spike protein. Our results show consistent binding of the aptamer-protein complex. This qualitative analysis was conducted of the center of mass (COM), radius of gyration, and hydrogen bonds. We conclude that the DNA aptamers are able to recognize and bind to the S-protein of SARS-CoV2. These results may play a role in the fabrication of an aptasensors for the detection of COVID-19.

Findings in the Hilbert metric

David Mount, August Gezalyan, Sam Muñoz, Song Ye, **Madeline Bumpus**, Caesar Dai

[1]*University of Maryland College Park*

Our purpose was to research the behavior of Voronoi diagrams in the Hilbert metric and further analyze the geometric truths in the metric.

The Hilbert metric is a metric space where the distance between two points in a convex body is defined by the cross ratio of the line between the two points and the line's intersection with the convex body.
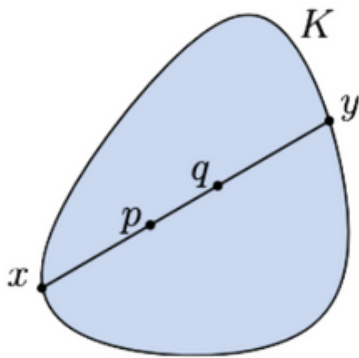
$$H_K(p,q) = \frac{1}{2}\log\left(\frac{\|p-y\| \; \|q-x\|}{\|q-y\| \; \|p-x\|}\right)$$

This makes the Hilbert metric very interesting to study because distances between points are determined by the shape of the convex polygon, and the distances from any point and the boundary is infinite. We also set out to study the behavior of Voronoi diagrams in the Hilbert metric. A Voronoi diagram of a set of sites is a partition of space around the sites into regions where all the points in that region are closer to that site than any other site.
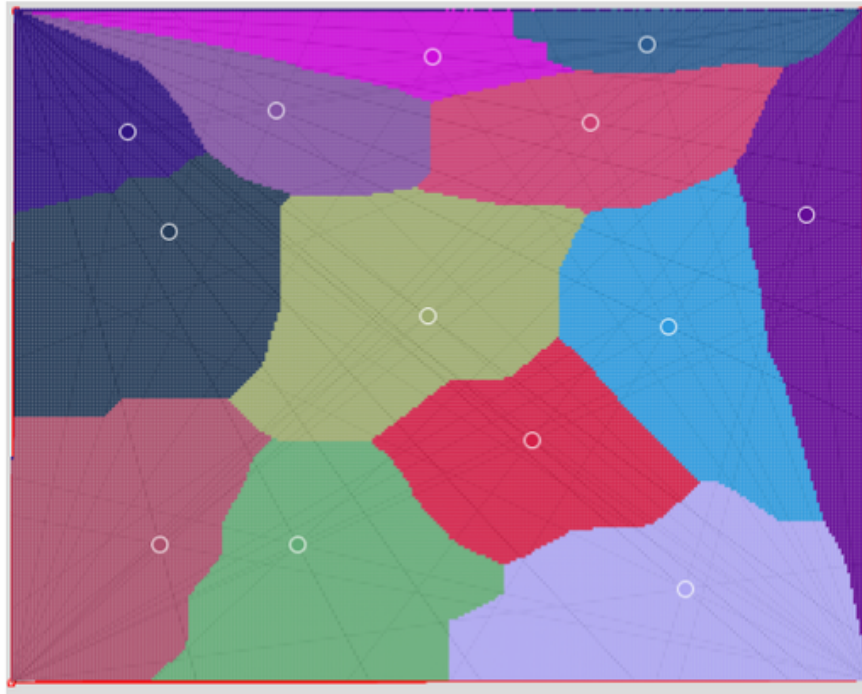
To create our algorithm, we first looked at software produced by Frank Nielson and Laëtitia Shao in their paper, <u>On Balls in a Hilbert Polygonal Geometry</u>. Their software produced balls in the Hilbert metric given a convex polygon, a center, and a radius of the ball. Our goal was to create Voronoi Diagrams in the Hilbert metric, but luckily Nielson and Shao were generous enough to share their source code with us and we were able to work off of their code. Furthermore, most of our new discoveries of geometric behavior in the Hilbert metric were made by referencing known theorems in Euclidean geometry and applying them in the Hilbert Metric.

Our most important result is obviously the software, but we also have several findings on the behaviors of circles and bisectors in the Hilbert metric. For example, in Euclidean geometry, any three points in a plane define a circle; however, in the Hilbert metric, there are certain regions between two points in which placing a third point will never define a circle. Also, we were able to prove that bisectors between points in the Hilbert metric are piecewise conics, and we were able to produce an equation for bisectors.

Extensions of this project could include applying the projective transformation of bisectors into the unit square in the two and three edge cases. Future work in exploring the dual of Voronoi diagrams or the Delaunay triangulations in the Hilbert metric may be beneficial as well.

Effects of Ambient PM2.5 Pollution On High School Aged Children in Mobile, Alabama

Marcy Cage1,3, Thomas Rich1,2,3, Troy Stevens1,3, Dhananjay T. Tambe2,3

1 Department of Physiology and Cell Biology, College of Medicine University of South Alabama; 2 Department of Mechanical Aerospace, and Biomedical Engineering, College of Engineering; 3 Center for Lung Biology, Department of Pharmacology

In acute exposures to ambient air pollutants PM2.5 individuals are likely to experience decrements in lung function, cough, pulmonary inflammation, increased airway hyperreactivity, and mucus secretions which may result in a decrease in airflow variability. Airflow variability is defined by a decline in peak expiratory flow (PEF) of 20-50% on at least 2 days.1 Evidence suggest that climate change is a modifier of major air pollutants such as PM2.5.2,3 Thus resulting in transient elevations of ambient PM2.5 concentrations. Currently, it is unknown how transient elevations in PM2.5 impairs the physiology of the respiratory system of those living in the Southeastern region of the US. Here, we hypothesize that transient elevations in PM2.5 increase airflow variability among high-school aged children (ages 14-18).

Forty-four (44) high school children ages 14-18 from a local school in Mobile, Alabama participated in this study. Information concerning medical history, residential history, housing characteristics, and time spent outdoors was obtained by an electronic questionnaire. Pulmonary function tests (PFTs) were performed at schools during the morning and early afternoon hours in the fall. A total of forty-three (43) children completed both a pre and post for this study period. Each subject received a peak flow meter and recorded their peak measurements twice daily in an electronic diary. We obtained PM2.5 data from the EPA's database.

PM2.5 coefficient of variation was 44% during the 5-week study period. Out of 43 subjects, we observed that 21% had morning PEF reading with coefficient of variation greater than 10%. We did not see any coefficient of variation in the PEF reading was greater than 20% in the morning. Out of 43 subjects, we observed that 35% had afternoon PEF reading with coefficient of variation greater than 10%. Approximately, 14% (n=43) of the subjects had such a variable PEF in both the mornings and afternoons. 70% of subjects who indicated a history of asthma show variability either in the morning or afternoon.

The results suggest that PM2.5 exposure contributes to increased variability in the afternoons. In future studies, we will examine the relationship of PM2.5 exposure and socioeconomic and demographic factors in Mobile, Alabama.

Young Black Women's Anti-Racism Insights to Action

Apefa Adijvon, **Irene Duah-Kessie**, Muna Aden, Nkem Ogbonna, Sumia Ali, Theresa Sinclair, Teshyla Bailey; Greater Toronto Area, Ontario, Canada

Black girls and women in Canada often deal with the joint effects of racism and sexism in their daily lives. Despite efforts to address the effects of racism, very few of these initiatives address young Black women's experiences and challenges in employment and justice. The Greater Toronto Area is home to the largest proportion (36.9%) of the country's Black population, of which more than half are women and those under 24 years make up almost one-third. Previous research has shown that Black youth make up twice the unemployment rate and Black women earn significantly lower than their counterparts. Other studies show racial differences in achievement gaps and disciplinary actions in school and ways education system criminalizes youth. In Canada, the unique perspectives of young Black women are rarely captured and therefore limits the capacity of decision makers to respond with effective and sustainable interventions.

To address this gap, this project centers the leadership and voices of young Black women aged 16 – 29 to gather evidence around the challenges and barriers experiences in hiring, workplace training and leadership development, as well as the disparities faced in the justice system. With the data gathered, we aim to develop and implement a knowledge transfer strategy to enhance policies, programs, and services serving young women.

The project was designed using a community-based approach, where six co-/peer researchers designed and implemented the research project, with support from an advisory board. The data collection consisted of both qualitative and quantitative methods. We engaged 182 young women in a survey, conducted 5 focus groups with 24 young women, and 12 semi-structured interviews with 6 young women and 6 employment and justice service providers.

Six themes, and 20 sub-themes were found including:

- Black women feeling exhausted from having to code-switch, while having their appearances and performances highly surveilled
- Microaggressions are regularly experienced, where Black Muslim women are consistently faced with anti-Blackness and islamophobia, and teachers neglect the challenges and needs of Black women.
- Leadership opportunities are not appealing due to tokenism, microaggressions, lack of compensation, whereas those who discussed positive leadership experiences focused on equity, diversity and inclusion roles.
- There is a general and great lack of training, support and community for Black women that centers holistic well-being
- Black women are harassed and hypersexualized by young boys and men in schools, workplace and community and lack the tools to navigate these instances and the justice system.
- Inadequate training, representation, education among staff across all public sectors and a need for financial aid and policies that enable increased resources and continued supports.

Key takeaways from this work are that cultural and historical narratives about Black women and their bodies is an underlying factor that perpetuates barriers and harm in public and private spaces and requires further attention. There is a need for developing leadership capacity among Black girls during childhood to ensure a strong sense of identity and self-esteem to recognize and take on such roles, as well as greater access to resources and education around wealth building to address generational socioeconomic disparities.

Creating an Environment of Engaged STEM Scholarship at the University of Hawai'i West O'ahu

Dr. Camonia R. Graham-Tutt, CHES

The purpose of this abstract submission is to demonstrate how the University of Hawaii West Oahu, Student Research and Creative Works Symposium (symposium) was developed and is being used to prepare island of O'ahu STEM students for 21st century careers. The symposium has provided and continues to provide a broad range of learning experiences that support undergraduate students in STEM in identifying and solving complex research problems, issues and challenges that affect people in Hawai'i. The symposium has been one way to both educate and immerse students in an environment of engaged scholarship that meets the need for more productive problem solvers in Hawaii's workforce. The symposium serves as an impactful setting that allows students to identify relevant public sector issues, design methods to respond to the issues, critically evaluate information collected, and disseminate the information. These higher ordered problem-solving skills are necessary to meet the needs of Hawaii's rising workforce demands.

As an on-campus event, the symposium showcases student knowledge in the art of research methodology, scientific reasoning, and giving skillful presentations. The event is the most interdisciplinary activity on campus. Faculty have redesigned their course curricula in creative ways both for in person classes as well as virtual courses to give students the agency, confidence and skills to present their research to the broader campus and the community. There was never a space for students to present their research on campus in this capacity before the symposium.

UH West O'ahu's undergraduate research symposium has grown from a single class presenting posters in Fall 2016, to now over fifteen classes presenting posters, and giving oral and roundtable presentations. Students participate in the symposium from more than seven different divisions and/or concentrations in a variety of ways, which include giving presentations in roundtable, poster or oral formats or even serving as symposium staff. The symposium's primary aim is to provide an opportunity for practice-based education through presentations on a variety of research topics, including: research methods, and STEM-related fields. Ultimately, the goal of this symposium is to increase the number of UH West O'ahu students with research presentation experience while demonstrating diversity in the field of research. Survey data specific to STEM presentations at the symposium has been collected since Fall 2016 and will be used for this poster presentation.

Undergraduate research has been increasing at UH West O'ahu with the creation of the symposium, which has also impacted UH West O'ahu students presenting their research at mainland conferences including SACNAS and the National Diversity in STEM Conference. Student conference presenters have also been selected for programs in the National Institute of Health undergraduate research program. The symposium contributes to student success in careers in the social sciences, life sciences, health sciences, technology, engineering and math. Moreover, the symposium has become a community event helping to establish a thriving culture of scholarship and research on campus and is evidence of an experience for island undergraduate students to become more prepared for STEM careers in Hawaii's 21st century workforce.

Generating Novel High-Affinity CXCR3-Binding Peptides Using Phage Display

Chanelle Hunter[1,2], Shekinah Atkins[3], Lucinda Hall[1,2], Garima Arvikar[5], Kaytlyn McNeal[4], Yujun Zhang[1,2], Rodrigo Queiroz[2], Benjamin Larimer[2]

[1]Graduate Biomedical Sciences, University of Alabama at Birmingham; [2]Department of Radiology, University of Alabama at Birmingham; [3]PREP Scholars, University of Alabama at Birmingham; [4]Multidisciplinary Biomedical Sciences, University of Alabama at Birmingham; [5]Department of Radiology, University of California San Francisco

Cancer immunotherapy has shown promise as a treatment for a variety of cancers, but not all patients respond equally well to these treatments. Identifying new strategies to improve the effectiveness of cancer immunotherapy is therefore of great importance. Phage display is a powerful technique that uses bacteriophages (viruses that infect bacteria) to display proteins on their surface. In phage display protein fragments of interest are genetically fused to a gene encoding a phage coat protein. Fragments are then expressed in a bacterial host and displayed on modified phage, generating a large number of protein variations to form a diverse target-binding peptide library. Displayed proteins with high affinity binding to a desired molecular target can be isolated and labeled with a radioactive molecule allowing for visualization and imaging with Positron Emission Tomography (PET). Chemokine receptor CXCR3, a transmembrane G-protein coupled receptor, is highly expressed on immune cells during active Th1 signaling and enriched in the tumors that respond to immunotherapy. In this study, phage display is used to screen a CXCR3-binding ligand library for high-affinity peptides that can be used to develop clinically relevant PET imaging agents to improve predictive diagnostics for cancer immunotherapy.

A CXCR3-ligand gene-fragment phage display library was generated using a modified Smith protocol. CXCL9, 10, and 11 fragment genes were fused into pUC19 plasmid vectors and transformed into TG1 Escherichia coli (E. coli) bacterial cells to produce the phage library. Peptide displaying phage were screened and selected for binding to CXCR3-expressing T cells, eluted, and re-infected into mid-log cultures of TG1 E. coli for amplification and finally next-generation sequencing.

Sequencing of selected of CXCR3-binding fragments allows for the identification of several novel peptides that exhibit high affinity binding to chemokine receptor CXCR3.

Our findings demonstrate the potential of phage display as a powerful tool for developing novel high-affinity peptides for chemokine receptor binding, and may have important implications for CXCR3 biology and the production of novel PET imaging agents for the prediction of response to immunotherapy.

Impact of Nucleases on DNA End Joining Repair Outcomes

Kaela Makins, Jeremy M. Stark

City of Hope

The focus of my dissertation research is to understand the mechanisms of DNA double-strand break repair via end joining. The specific goal of my project is to understand how different nucleases affect end joining outcomes. I am focusing on nucleases because they process the ends of double strand breaks, which causes insertion and deletion (indel) mutations. Understanding indel end joining outcomes is significant because end joining repair is important for cellular resistance to radiation, which is relevant to cancer radiotherapy. In addition, indel end joining outcomes are directly relevant to understanding how gene editing works. It is evident that, while loss of one nuclease might not influence repair outcomes, loss of two nucleases cause significant changes to repair outcomes and frequency. I am testing for a co-functional role between two nucleases, Artemis and CtIP. Artemis is an endonuclease that plays a critical role in the cleavage of hairpins formed during V(D)J recombination, as well as cleavage of various DNA structures. CtIP works in a DNA damage sensor protein complex to recognize double strand breaks and promote resection of DSB ends. However, it is not well understood how loss of Artemis and/or CtIP might impact indel end joining outcomes. I will present my plans to define how different nucleases, such as Artemis and CtIP, affect end joining outcomes, including a series of double-disruption experiments to determine whether different nucleases are partially redundant for specific end joining outcomes. A single guide RNA (sgRNA) targets a Cas9-induced double strand break in the presence of siArtemis, siCtIP, or siControl. Double strand break repair frequency is measured using flow cytometry. In testing this hypothesis, I am assessing frequency of insertions, single nucleotide variants (snv), deletions with small (0-15bp) or large (>15bp) insertions, and wild-type. This study would provide insight into understanding how loss of Artemis and/or CtIP might influence indel end joining outcomes.

A Review Of Technologies for Direct Lithium Extraction from Low Li+ Concentration Aqueous Solutions

Olivia Murphy; Maha N. Haji

Ithaca, NY

The present work reviews the advantages and challenges of various technologies for Li recovery from aqueous solutions, including precipitants, solvent extractants, Li-ion sieves, Li-ion-imprinted membranes, battery-based electrochemical systems, and electro-membrane-based electrochemical systems. The techno-economic feasibility and key performance parameters of each technology, such as the Li+ capacity, selectivity, separation efficiency, recovery, regeneration, cyclical stability, thermal stability, environmental durability, product quality, extraction time, and energy consumption are highlighted when available.

Under the Paris Agreement, established by the United Nations Framework Convention on Climate Change, many countries have agreed to transition their energy sources and technologies to reduce greenhouse gas emissions to levels concordant with the 1.5°C warming goal. Lithium (Li) is critical to this transition due to its use in nuclear fusion as well as in rechargeable lithium-ion batteries used for energy storage for electric vehicles and renewable energy harvesting systems. As a result, the global demand for Li is expected to reach 5.11 Mt by 2050. At this consumption rate, the Li land reserves are expected to deplete by 2080. In addition to spodumene and lepidolite ores, Li is present in seawater, and salt-lake brines as dissolved Li+ ions. Li recovery from aqueous solutions such as these is a potential solution to limited terrestrial reserves.

An extensive literature review was conducted to determine the techno-economic feasibility and key performance parameters for the reviewed low- Li+ aqueous extraction technologies. These parameters include the Li+ capacity, selectivity, separation efficiency, recovery, regeneration, cyclical stability, thermal stability, environmental durability, product quality, extraction time, and specific energy consumption when available. (For Context) The adsorption capacity is the maximum amount of Li+ that the technology can absorb. Selectivity is the technology's ability to exclusively select Li+ or other desired ions over competing ions present in the solution. The separation efficiency is a measure of the quality of Li+ separation from the solution achieved by the technology. It is measured by the ratio of the Li+ concentrate removed from the solution feed stream to the initial Li+ concentration in the solution. Furthermore, the recovery is the amount or percentage of pure Li product obtained after extraction and additional treatment processes, if any. Regeneration refers to the number of times the technology can be regenerated using a treatment process without significant losses in recovery. The cyclical stability indicates the number of times a technology can be reused before there are major losses in recovery. Thermal stability indicates the operating temperature(s) at which the technology achieves optimal performance. Environmental durability refers to the number of times the technology can be reused with minimal physical degradation. The product quality is the percent purity of the Li product recovered. The extraction time is the duration required to remove Li+ and recover the Li product. The pH value is the recommended solution pH for optimal Li+ extraction and recovery. Finally, the specific energy consumption is the total energy used to produce a unit weight of Li product.

Excluding precipitation and solvent extraction, these technologies demonstrate a high potential for sustainable Li+ extraction from low Li+ concentration aqueous solutions or seawater.

Further research and development will be required to scale these technologies from benchtop experiments to industrial applications. The development of optimized materials and synthesis methods that improve the Li+ selectivity, separation efficiency, chemical stability, lifetime, and Li+ recovery should be prioritized. Additionally, techno-economic and life cycle analyses are needed for a more critical evaluation of these extraction technologies for large-scale Li production. Such assessments will further elucidate the climate impact, energy demand, capital costs, operational costs, productivity, potential return on investment, and other key feasibility factors. It is anticipated that this review will provide a solid foundation for future research commercialization efforts to sustainably meet the growing demand for Li as the world transitions to clean energy.

Optimisation of cell membrane models via supported lipid bilayer formation from extracellular vesicles

Esther Osarfo-Mensah1, Jugal Suthar1, Alberto Alvarez-Fernandez2, Stefan Guldin1

1 Department of Chemical Engineering, University College London; 2 CRANN Institute/School of Chemistry, Trinity College Dublin

Extracellular vesicles (EVs) share the same membrane composition as their parent cells, which not only makes them useful biomarkers in disease detection, but also offers excellent potential for cell membrane models in the form of supported lipid bilayers (SLBs). Such model interfaces can serve in fundamental studies of nanoscale interactions at the cell membrane and also feed into the design of effective biosensors for use in the detection of analytes such as cancerous cells. In this work, the optimal conditions for the formation of extracellular vesicle derived supported lipid bilayers (EVSLBs) are studied, including temperature and ionic strength.

The EVs were isolated from Human Umbilical Mesenchymal Stem Cell Culture Media (HUMSCCM). The media underwent centrifugal ultrafiltration using a 10kDa NMWCO filter, followed by size exclusion chromatography using a 35 nm pore size column with agarose resin and 500μL sample loading. The resulting supernatant underwent further centrifugal ultrafiltration using a 3kDa NMWCO filter. The EVs were characterized using nanoparticle tracking analysis (NTA) and Western Blot. SLB formation was monitored and characterized via Quartz Crystal Microbalance with Dissipation Monitoring (QCM-D) and liquid atomic force microscopy (AFM). An acoustic based, label free instrument, the QCM-D allows for nanoscale events to be monitored in real time, whilst liquid AFM provides valuable topographic data.

QCM-D data indicates that the presence of divalent cations and higher temperatures lead to higher adsorption of EVs to the sensor surface, and comparably lower material loss in vesicle rupture and rinse stages. When the conditions were repeated in liquid AFM studies, the data shows confirmed QCM-D results, showing improved EVSLB coverage.

Higher temperatures and divalent cation presence are important in promoting the critical vesicle concentrations required for EV adsorption, vesicle rupture and thus EVSLB formation. This is a promising work, as supported lipid bilayers made from EVs are particularly useful in the field of biomimetic membranes, where EVSLBs are an excellent bridge to study nanoscale interactions at cell membranes without the complexity of working with an entire cell.

Sample Analysis using Prediction Modeling for Early Mixture Detection and Expansion of a Reference Training Set

Chastyn Smith, B.S.1,2, Dayanara Torres, B.S.2, Andrea L. Williams, M.S.3, Sarah J. Seashols Williams, Ph.D.2, Edward L. Boone, Ph.D.4, and Tracey Dawson Green, Ph.D.2

1Virginia Commonwealth University, Integrative Life Sciences, 1000 Cary Street. Richmond, VA 23284
2Virginia Commonwealth University, Department of Forensic Science, 1015 Floyd Avenue, Richmond, VA 23284
3Bode Cellmark Forensics, 10430 Furnace Rd, Lorton, VA 22079
4Virginia Commonwealth University, Department of Statistical Sciences & Operations Research, 1015 Floyd Avenue, Richmond, VA 23284

Analysis of evidentiary samples containing DNA from multiple contributors ("mixtures") is a time intensive process for a forensic analyst and one where the contributor nature of a sample is not revealed until the end of the traditional forensic workflow. Often, at this stage, retesting or additional testing of mixture samples may not be possible, particularly if only trace amounts of a contributor's DNA is present. Thus, a new method that would allow for the quick and accurate identification of single source (versus mixture) samples, prior to the end-point of STR analysis would be beneficial.

We propose a high resolution melt curve (HRM) mixture screening assay, which uses support vector machine (SVM) modeling of melt curves from two STR targets integrated into two existing commercial qPCR-based human DNA quantitation kits, the Investigator Quantiplex® kit and Quantifiler™ Trio kit, in order to determine if a sample is a mixture at an early stage of the DNA workflow (quantification). In the current study, ~170 single source samples and 32 two-person mixture samples were tested using both the integrated Quantiplex®-HRM assay and Quantifiler™ Trio-HRM assay on the QuantStudio™ 6 qPCR platform.

When samples were tested in the Quantiplex®-HRM assay, an overall accuracy of 87.88% was exhibited, correctly classifying 87.5% of single source samples as such and 90% of mixture samples. Similarly, when samples were tested in the Quantifiler™ Trio-HRM assay an overall accuracy of 79.2% was exhibited, with 89.2% of single source samples accurately classifying and 43.8% of mixtures accurately classifying. Additionally, quantification values obtained from the integrated assays as well as the quality metrics such as the slope, R^2, and y-intercept, were not significantly different than those obtained in the standard assays.

Overall, the integration of the HRM components into both of the human DNA quantification chemistries resulted in two assays that are as effective in producing reliable quantification data as their respective standard assays. Additionally, our primary goal has been met – this assay is accurately determining if a sample has more than one contributor >70% of the time. This low-cost, low effort assay will thus contribute to saving time and resources, which are often limiting factors in forensic labs. However, these proof-of-concept studies included only a limited number of genotypes in the modeled data. For implementation of this assay into forensic labs, the dataset used for modeling must be expanded to encompass HRM data from all common genotypes for both STR loci. For this, synthetic melt curve data will be generated for each common genotype not currently represented. Additionally, future work will seek to identify the limitations of this assay.

Experiences Accessing Physical Activity Facilities: Exploring
The Intersections of Blackness, Rurality, & Disability

Thonya Wilson, Jr.

The Ohio State University

The primary purpose of the study is to describe Disabled African American adults' experiences accessing and navigating physical activity spaces in rural communities. The secondary purpose is to identify and describe the alternative physical activity spaces of those who do not utilize physical activity facilities.

Lack of access to Americans with Disabilities Act (ADA)-compliant fitness facilities is a health equity issue. Achieving the expert-recommended amount of moderate to vigorous physical activity is known to decrease the risk of diseases and health conditions associated with inactivity such as hypertension, type-2 diabetes, heart disease, and various cancers (Booth et al., 2012). Healthy People 2030 has six physical activity (PA) objectives aimed at increasing adults' physical activity levels. Some of the referenced objectives include: (a) increase the proportion of adults who do enough aerobic physical activity for substantial health benefits-PA-02, (b) increase the proportion of adults who do enough muscle-strengthening activity-PA-04, and (c) increase the proportion of adults who do enough aerobic and muscle strengthening activity-PA-05 (Healthy People 2030). Some populations have an increased risk for physical inactivity due to social determinants of health. Social determinants of health include social identities (e.g., race, gender, disability) and environmental factors (e.g., urban, rural, suburban, community safety and infrastructure), which increase an individual's or population's likelihood of developing a particular disease or health condition (Braveman & Gottlieb, 2014). The intersection of race, disability, and rurality place Disabled African American populations who reside in rural communities at higher risk for diseases associated with inactivity such as hypertension and type 2 diabetes than their white counterparts regardless of geographic residency or disabled status (Diaz et al., 2017; Kegler et al., 2022; Whitson et al., 2011). In 2016-2017 only 17% of rural Disabled African American adults met expert-recommended PA guidelines (Whitfield et al., 2019). Thus, it is important to consider barriers to PA. Some access barriers to PA include attitudinal, communication, physical, policy, programmatic, social, and transportation (CDC 2018). In this presentation, the following will be discussed: (a) the importance of PA to kinesthetic disease prevention, (b) the need to frame PA accessibility as a health equity issue, (c) social determinants of health, (d) Healthy People 2030 objectives, (e) current PA trends of Disabled African American populations in rural communities, and (f) how accessibility to PA facilities is a barrier which must be eliminated to provide equitable healthcare to all.

The researcher will utilize a descriptive qualitative research design. Descriptive qualitative designs use an array of data collection and analysis which includes but is not limited to interviews and visual artifacts (videos and photographs) to make meaning of and interpret a given phenomenon (Sandelowski, 2000). Five to seven participants from rural communities will be recruited using purposive sampling. Participants will complete two to three rounds of 60-90 minute semi-structured interviews. Participants will also submit pictures of their physical activity spaces discussed during the interviews. The interviews will then be transcribed and a line-by-line thematic analysis conducted to identify which reoccurring themes emerge from the collected data.

Elucidating the Role of Cln3 in Cell Cycle Entry

Ariana Yancey, Doug Kellogg

University of California, Santa Cruz

Eukaryotic cells must carefully regulate the decision to enter the cell cycle as it is an irreversible step. Entry cannot occur unless cells undergo adequate growth. A canonical model in budding yeast has long dominated the field of cell cycle entry. In this model, the early G1 phase cyclin Cln3 binds and activates cyclin dependent kinase 1 (Cdk1). This complex then inactivates the transcriptional repressor Whi5 to initiate transcription of late G1 phase cyclins essential for driving cell cycle entry. Both the overexpression and loss of Cln3 and Whi5 influence cell size and the timing of cell cycle entry, suggesting that entry is intimately linked to cell growth and size. Yet, there are several aspects of the model that are poorly supported. The tight stoichiometric binding that is typical of cyclin and CDK interactions has not been observed for Cln3 and Cdk1 and Cln3 shows only weak homology to other cyclins. In addition, recent work has shown that Cln3 can influence cell size and cell cycle entry via post-transcriptional mechanisms that are independent of Whi5 activity. I hypothesize that Cln3 carries out Cdk1- and Whi5- independent functions that control cell cycle entry. The goal of my project is to elucidate the role of Cln3 in mechanisms that facilitate cell cycle entry during the G1 phase.

My first Aim will investigate whether Cln3 carries out functions independently of Cdk1. I will test whether a mutant version of Cln3 that lacks amino acids thought to be involved in Cdk1 binding can drive changes in cell size and cell cycle progression. If it can, that would provide conclusive evidence for Cdk-independent functions. My second Aim will further investigate the functions of Cln3. To do this, I will purify TAP-tagged versions of Cln3 from yeast. Upon purification, mass spectrometry will be utilized to identify proteins that bind to Cln3, which could identify new targets that help control cell cycle entry. Data collected from this project will improve our understanding of conserved mechanisms that drive cell cycle entry. Furthermore, this project may give insight into mechanisms that are dysregulated in cancer, which affects millions of people worldwide.

SECTION 3
ORAL PRESENTATIONS

Care Pathways and Treatment Outcomes for those with Long Term Conditions Accessing Improved Access to Psychological Therapies (IAPT)

Mary Chinwe Abichi (KCL), Sam Norton (KCL), Joanna Hudson (KCL), Alice Davis (Mayden), Rona Moss-Morris (KCL)

Fifteen million people in England live with one or more long-term medical conditions (LTCs), with 30% presenting co-morbid mental health conditions. It is known that LTC status accounts for and is associated with post-treatment distress, lower medical adherence and, or physical symptoms exacerbation. Healthcare services prioritized the integration of mental and physical health services called LTC-tailored Improved Access to Psychological Therapy (LTC-IAPT) in response to a 2018 UK policy document.

This report aims to evaluate mental health treatment outcomes for people with Long-Term Conditions, pre-integrative policy.

We will report the outcomes of 115,779 patients referred to 7 healthcare services using iaptus management system. A Mixed-effects Regression analysis compared treatment engagement and categorical binary outcomes measures: Reliable recovery, Reliable improvement, and Reliable deterioration between those with LTC and those without. Controlled covariates include Index Multiple Deprivation, Ethnicity and Gender, and LTC-IAPT services were imputed as a random effect.

Baseline Findings indicate that self-reported LTC (85%) engaged at the same level as those without LTC (83.3%) (OR = 1.20, p-value =<0.001). LTC status decreased the likelihood of Reliable recovery (OR = 0.80, p =< 0.001) and Reliable improvement (OR = 0.87, p= <0.001) compared to those without. LTC status increased the likelihood of Reliable deterioration (OR = 1.16, p = 0.000284). Findings suggest that people with LTC accessing LTC-IAPT had higher post-treatment distress scores compared to those with LTC accessing normal IAPT (p=<0.001).

Mixed Effect model clarifies the influences covariates have on treatment engagement and outcomes within IAPT. LTC status remains a significant predictor for post-treatment distress, despite accessing LTC-IAPT or normal IAPT before the introduction of integration guidelines. This study will be followed up by comparing care pathways and treatment outcomes for those with LTC; 2 years after the integration guidelines. Outcomes from our studies based on real-world data will provide insight into developing simulation models to improve healthcare delivery and predict physical and mental pathology outcomes based on deprivation levels in England using machine learning models.

Exploring Forms of Capital Embodied by Black Women Pursuing Graduate Engineering Education: An Extension of Community Cultural Wealth

Julia Brisbane1, Jeremi London1, Nicole Jefferson1

1 Department of Engineering Education, Virginia Polytechnic Institute and State University

While there has been an increase in broadening participation efforts focused on Black engineers, Black women graduate students remain vastly underrepresented in engineering. However, Black women graduate students are often understudied in engineering education literature although studying their experiences may help us understand how we should support them. Using Community Cultural Wealth as a theoretical lens framework, we know that students of color come into institutions with cultural knowledge and skills that help them navigate education spaces; but there is very little literature applying this lens to Black women pursuing engineering degrees. There is a need to investigate the forms of capital that Black women engineering graduate students leverage to persist and fuel their academic success.

This study relied on phenomenological semi-structured interviews in order to understand each participant's life experience and how they successfully navigated engineering environments. Participants were enrolled in an engineering graduate program at the time of study and identified as Black or African American, with some identifying with a specific ethnicity such as Nigerian and Cameroonian. Thematic analysis was used to analyze the data. The goal of the data analysis was to uncover the forms of capital that Black engineering graduate students utilize to persist and fuel their success.

There are four social systems that Black women navigate while leveraging various forms of capital: intrapersonal, interpersonal, organizational, and institutional. Intrapersonal capital includes assets that stem directly from the individual, such as knowledge, attitudes, behaviors, skills, self-concepts, and developmental history. Interpersonal capital includes resources in the form of formal and informal relationships and support systems, such as family, work, group and friends. Organizational capital includes elements of interpersonal capital and institutional factors. It manifests as knowledge and skills that result from students participating in an identity-focused organization, such as the National Society of Black Engineers and Black Greek-letter Organizations. Institutional capital counts when social institutions and organizational characteristics are leveraged to benefit the individual.

Black women engineering students embody a wide range of assets to persist and succeed in engineering. The results also provide insight on what is needed for Black women to thrive in engineering and have implications for discussions on what is needed from the wider STEM community to partner in propelling their success.

Moral Disengagement in News Coverage of the George Floyd Case: Exploring Media Depictions of Police Brutality toward Black Americans

Jada Cheek 1, Courtney M. Bonam 1

University of California, Santa Cruz

The 2020 killing of George Floyd, a Black man, by officer Derek Chauvin sparked one of the largest protest movements in the history of the United States (Armed Conflict Location & Event Data Project, 2020). Chauvin was convicted of murder—a rare verdict but necessary start to holding officers accountable. The media play an important role in framing the public's attitudes surrounding high-profile cases involving police killings of unarmed civilians. The current study investigates media narratives surrounding the Floyd case for evidence of cultural violence, which occurs when physical violence becomes institutionalized, accepted as normative, and legitimized within society (Galtung, 1990). Normative acceptance of police violence toward Black people is one example of cultural violence, which is especially problematic because the justification and legitimization of police violence toward Black people could in turn increase its occurrence.

My research team and I looked for evidence of this normative acceptance across 300 articles from three U.S. newspapers (i.e., New York Times, Wall Street Journal, and The Star Tribune). We coded for cultural violence themes, which we operationalized as the seven dimensions of moral disengagement (i.e. the process of convincing oneself that ethical standards do not apply; (Bandura, 1999): moral justification, euphemistic labeling, advantageous comparison, displacement of responsibility, distortion of consequences, attribution of blame, and dehumanization of the victim.

Overall, moral disengagement was prevalent across all news outlets (i.e., they occurred in 87.6% of articles from each outlet).

These findings have implications for how media framing influences attitudes surrounding high-profile police brutality cases involving Black victims. Future work here that goes beyond this study would be to experimentally manipulate the language used to describe George Floyd's murder.

Genome Editing for Sickle Cell Disease

Kelcee A. Everette1,2,3, Gregory A. Newby1,2,3, Rachel M. Levine4, Kalin Mayberry4, Yoonjeong Jang4, Thiyagaraj Mayuranathan4, Nikitha Nimmagadda4, Erin Dempsey4, Yichao Li4, Senthil V. Bhoopalan4, Xiong Liu5, Jessie Davis1,2,3, Peter J. Chen1,2,3, Alexander Sousa1,2,3, Yong Cheng4, John F. Tisdale5, Mitchell J. Weiss4, Jonathan S. Yen4*, David R. Liu1,2,3*

1Merkin Institute of Transformative Technologies in Healthcare, Broad Institute of Harvard and MIT, Cambridge, Massachusetts, USA; 2Department of Chemistry and Chemical Biology, Harvard University, Cambridge, Massachusetts, USA; 3Howard Hughes Medical Institute, Harvard University, Cambridge, Massachusetts, USA; 4Department of Hematology, St. Jude Children's Research Hospital, Memphis, Tennessee, USA; 5Molecular and Clinical Hematology Branch, National Heart, Lung, and Blood Institute/National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health, Bethesda, Maryland, USA.

Sickle cell disease (SCD), a deadly monogenic disorder affecting millions of patients, is caused by an A·T-to-T·A transversion mutation in the β-globin gene (HBB). We optimized a gene editing system to directly revert the SCD allele (HBBS) to the wild-type allele (HBBA) with high ratios of the desired edit to indel byproducts without requiring DNA double-strand breaks, donor DNA templates, viral vectors, or drug selection. Edited sickle-cell patient hematopoietic stem and progenitor cells (HSPCs) yielded conversion of HBBS to HBBA at levels that are thought to be therapeutic. Transplantation of edited HSPCs into immunodeficient mice showed that high-level correction of HBBS was maintained in all donor-derived cells, rescuing blood abnormalities of SCD, with no deleterious alterations detected in edited cells compared to unedited healthy donor HSPCs. An extensive analysis of over 100 candidate off-target sites detected minimal off-target editing. Our findings represent a promising therapeutic strategy for HSCs, suggesting the potential of a one-time treatment for sickle-cell disease that directly corrects pathogenic HBBS to wild-type HBBA, does not require delivery of any viral or non-viral DNA template, and minimizes undesired consequences associated with DNA double-strand breaks.

Texas STEM Standards and Occupational Descriptors

Tonya L. Garcia-Arnold

University of Mary Hardin-Baylor, College of Education, Belton, Texas; Marlin Independent School District, Marlin, Texas

This study aims to quantify the alignment between STEM academic standards and entry-level STEM occupations to evaluate STEM curriculum for STEM job readiness.

America's secondary students are taking more math and science courses than ever. Standardized tests in math and science have become more rigorous—legislators at every level call for even more rigor in both the curriculum and standardized assessments. Over the past few decades, science, technology, engineering, and math (STEM) initiatives have increased. Despite America's best efforts to increase American students' motivation, entrance, and retention in science and technology, there is still a critical and persistent shortage of qualified STEM American workers. While there is no single reason or resolution to this problem, there may be some iota of an explanation in the alignment or lack thereof to the STEM curriculum concerning STEM work requirements. This study involves the application of Porter's Alignment Index to Texas STEM Career and Technical Education courses concerning alignment with STEM entry-level work requirements.

This quantitative content analysis study included analysis of a matrix that encompassed identifying and coding the components of CTE STEM TEKS and O*NET job descriptors for entry-level STEM occupations. The content used for analysis was pre-existing data found in STEM CTE TEKS and entry-level job requirements for STEM occupations identified in O*NET online descriptors. When applying Porter's Index of Alignment to the data, 1 indicates perfect alignment, and 0.5 indicates weak alignment.

A matrix contained Texas' CTE STEM standards, STEM entry-level occupation requirements, and the content and cognitive demands required by both the state standards and entry-level occupational descriptors. First, each of the standards (TEKS) and the job descriptors (O*NET) was coded to identify levels of cognition using Bloom's taxonomy as a guide. Next, the tasks, knowledge, and detailed work activities listed in the O*NET database of job descriptors were matched, respectively, with the appropriate CTE standard and marked in the intersecting cell with an asterisk (*).

The results indicated a weak to very weak alignment in all of the courses involved in the study. (Figure 1).
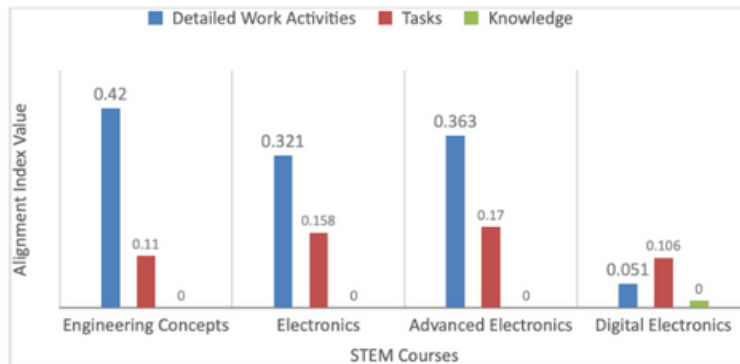
Figure 1.

This study and the subsequent results have far-reaching ramifications. The methodology has the potential to give educators and leaders a tool to evaluate STEM curricula to ensure that it delivers on their promise of career readiness, especially in CTE industry certification programs. Additionally, a method to quantify curriculum gives curriculum writers a stronger foundation to develop a framework for STEM job training. While the results are not generalizable across all content areas, it provides greater insight into the nuts and bolts of both STEM academic curriculum and STEM job readiness.

Science sistering: Becoming science teachers
through our science her-stories

Tiffany Hamm1, Regina McCurdy2, Azaria Cunningham3

1Teaching and Leadership, Syracuse University; 2Middle Grades and Secondary Science Education, Georgia Southern University in Statesboro; 3Curriculum and Instruction, The Pennsylvania State University

Our research focuses on the narratives of three Black science teacher educators who recount their lived experiences surrounding science inquiry. Through the (re)storying of our experiences, we are able to highlight some of the possible ways to engage students of color through nurturing their science interests and supportive science inquiry. Science identities are not shaped by classroom examinations, grades, or standardized exams. While these evaluations have their purpose, they have been utilized to deny access to equitable scientific activities (Kim et al., 2018; Vincent-Ruz & Schunn, 2018; Archer et al., 2010). We know that there are low percentages of black women and girls in science (Miles et al., 2022; Kang et al., 2019). In this study, we aim to address oppressive practices and dispel harmful beliefs in education that places Black girls and women within the margins of science.

Our methodology, collaborative autoethnography (Chang et al., 2016; Chang, 2013), speaks to the critical wellness of Black women in science education and how this work came about. We stayed in touch virtually for several years, sharing our lives and discussing our experiences as doctoral students, Black women, and science teacher educators. This collaboration and sister-friendship provided a safe space for us to engage in this collective memory work (Onyx & Small, 2001) from our unique and individual lived experiences. We wrote narratives based on our science experiences from elementary school all the way up to our doctoral degree. Across these years of collaboration, we have each progressed in our academic journeys. In this paper, we highlight three major themes including: (1) formal science learning experiences, (2) academic influences, and (3) informal science learning experiences that cultivated our science identity.

We highlight our re-storying process to counter inequitable educational practices that perpetuate the prevalent erroneous narratives of Black girls and women in science. We put the focus on each of our individual stories by making them about formal and informal science learning experiences, as well as cultural experiences and events that had a big impact on our science-focused professions. Specifically, we wrote narratives centering on science inquiry over time. After weeks of open-coding cycles (Saldana, 2021), we found similar connections across stories. During that time, we began to group and label particular sections of each narrative. After, we created a document of codes and then organized the coded information. We negotiated our interpretations of each of our individual stories and then assigned agreed-upon themes (Braun and Clarke, 2006).

As young black girls growing up, we had a natural interest and curiosity in science, however, black girls and women are frequently marginalized in science education (Miles et al., 2022; Kang et al., 2019). Interest in science is important, but so is the nurturing of said interest. We all had meaningful classroom learning experiences through mentorship, family, and other cultural tools that shaped our science identities. To promote inclusivity and equitable learning opportunities in science, it is imperative that science classroom experiences provide support for and nurture the science interests of black girls and women in science. Further research into inclusive teaching methodologies that promote equitable learning opportunities for young black girls in science is needed. This includes incorporating curricula and pedagogy that move beyond traditional Euro-centric methods of science instruction.

Drosophila melanogaster frataxin: protein crystal and predicted solution structure with identification of the iron-binding regions

Tiara V. Hinton(a)*, Andria V. Rodrigues(a), Sharon Batelu(b), John Rotondo(a), Lindsey Thompson(b), Joseph S. Brunzelle(c), Timothy L. Stemmler(a, b)

a Department of Biochemistry and Molecular Biology, Wayne State University, Detroit, MI, USA
b Department of Pharmaceutical Sciences, Wayne State University, Detroit, MI, USA
cNorthwestern Synchrotron Research Centers, Life Science Collaborative Access Team, Northwestern University, Evanston, IL, USA

The goal of this report is to provide structural details of the Drosophila melanogaster frataxin ortholog (Dfh), using both X-ray crystallography and nuclear magnetic resonance (NMR) spectroscopy, in order to provide the foundational insight needed to understand the structure–function correlation of the protein. Additionally, NMR iron(II) titrations were used to provide metal contacts on the protein to better understand how it binds iron and aids its delivery to the ISC scaffold protein.

Friedreich's ataxia (FRDA) is a hereditary cardiodegenerative and neuro-degenerative disease that affects 1 in 50,000 Americans. FRDA arises from either a cellular inability to produce sufficient quantities or the production of a nonfunctional form of the protein frataxin, a key molecule associated with mitochondrial iron–sulfur cluster biosynthesis. Within the mitochondrial iron–sulfur cluster (ISC) assembly pathway, frataxin serves as an allosteric regulator for cysteine desulfurase, the enzyme that provides sulfur for [2Fe–2S] cluster assembly. Frataxin is a known iron-binding protein and is also linked to the delivery of ferrous ions to the scaffold protein, the ISC molecule responsible for the direct assembly of [2Fe–2S] clusters.

To elucidate and further understand the structure of frataxin from Drosophila melanogaster, we implemented NMR and X-Ray crystallography. The protein was first purified and isolated using fast protein liquid chromatography. Protein used in NMR backbone assignment studies were isotopically labeled with 15N and overexpressed in minimal media. Crystal trays of Dfh were utilized during the protein crystallization process and crystals were obtained by sitting drop vapor diffusion. NMR backbone assignments and the identification of iron-binding residues in Dfh were identified by NMR spectroscopy.

Structural data show that bacterial, yeast, human and Drosophila frataxins are structurally similar, apart from a structured C-terminus in Dfh that is likely to aid in protein stability. Crystallographic results indicate that Dfh is well folded at 1.4 Å, in an α-β structural motif with a 310 helix on the C-terminus. Compared to the predicted solution structure via NMR and Chemical Shift Index analysis, minor differences are present such as the lengths of β-sheets, the length of the N-terminal α-helix and the presence of the structured C-terminus. Eight iron-binding residues were identified. The iron-binding location on helix-1 and strand-1 of Dfh is also conserved across orthologs.

The structure of Dfh is very similar to that of frataxin orthologs, however Dfh is more stable. Though these proteins have high sequence similarities, key differences arise regarding their biophysical characteristics and potential for degradation and aggregation. Our comparison of the crystal structure and predicted solution structure of Dfh provides insight into the structure/function relationship of the protein. The identified iron-binding residues on Dfh are located on the helix-1 and sheet-1, which is conserved across orthologs. Further, the residues are all acidic, providing a negatively charged region for an iron(II) molecule to bind.

Developing Assessments that Empower Black Women in STEM

Tamecia R. Jones, PhD

North Carolina State University, Raleigh, NC

This research presents an innovative assessment model that empowers young women of color in STEM spaces. Epistemic frames have the potential to empower Black women in STEM rather than oppress or isolate them. Initially designed for K12 and piloted in an informal space, this presentation introduces epistemic frames as a strategy for assessing undergraduate and graduate women in STEM more equitably. This presentation will show how epistemic frames have been used in K12 spaces and describe how it can be evolved to undergraduate and graduate education. This presentation could be particularly useful for faculty, outreach programming focused on girls, and those in professional development.

Epistemic frames describe the skills, knowledge, values, identity, and epistemologies within respective disciplines. They capture more than standardized tests or capstone projects as they analyze process and practice within a career discipline. They can be used in professions such as law, medicine, architecture, and engineering.

First, an engineering epistemic frame was developed after a synthesis of local K12 educational standards, policy objectives, higher education outcomes, and engineering and design literature. The goal of the epistemic frame was to increase continuity from K12 assessment into higher education assessment in engineering. Forty-seven codes were generated. Second, the engineering epistemic frame was piloted on video clips from an engineering science course during one summer session of a college preparatory program. Finally, the codes were used to conduct epistemic network analysis, a method for quantifying qualitative data and showing relationships between constructs.

Application of the epistemic frame showed that more than half of the students displayed elements of the epistemic frame. Even when young women did not perform well on traditional tests or quizzes, the epistemic frame presented a more comprehensive view of their abilities. The network analysis showed how live interactions in class captured even more powerful depictions of female student skills and abilities. As the data was analyzed on the individual and group levels, we were able to see student-level strengths and growth areas and how students' cumulative strengths benefit the group's success. We can also use the networks to inform future group formation.

Using the engineering epistemic frame for assessment presented female students as non-passive group members, often leaders and innovators, and having engineering skills and values that do not typically get assessed. This kind of assessment has the potential to challenge long-held views about women in STEM and their abilities in groups or on teams. This kind of assessment also takes into consideration the values of discipline and identity development. Future work involves continuing to validate the epistemic frame for engineering, expanding to include computational thinking, and revising the epistemic frame to single-gender contexts.

Lessons from Building a Legacy in Engineering: Developing Projects WITH Community Members

Jessica Rush Leeker, Lyndsay Ruane, Robertha Richardson

Tuskegee, Alabama

Our central hypothesis is that an inter-institution approach to educational transformation, centered on democratizing innovation across institutional boundaries, will effectively prepare next-generation innovators and engineers to address systemic and institutional racism and whiteness within STEM by challenging educational norms in higher education. This project is focused on co-facilitation and co-learning across Tuskegee University and the University of Colorado Boulder through an informal (outside of the classroom) undergraduate project, with land provided by Harvest Dreams. Undergraduate students from both institutions are a part of a collaborative cohort facilitated by faculty from both institutions to tackle each year's mission based on the faculty's expertise. This first year's cohort is focused on Creation as the inter-institutional group is creating the blueprint for the next four years with students and faculty heavily engaged with Harvest Dreams. Harvest Dreams has continued the legacy of teaching based on lessons from ancestors and has maintained land ownership since 1922. As a place pivotal to Black history in the United States, Harvest Dreams has played a pivotal part in forming such a project.

While community engagement is not novel, it is rarely explained as anything other than "helping" a (usually) disenfranchised population. Community Engagement projects with institutions, especially PWIs, often ignore the colonial power structure, achieve something for a community, and leave without following up on progress (Grande, 2018). To counter this, it is crucial to answer and be responsible to the communities with which we form a partnership (Sasson, 2019). In addition, it is imperative for students first to explore and think critically about the intersections of what is Western, modern, or Indigenous and establish a sense of self-awareness and understanding of their own implicit biases. From there, students will be supported to engage community stakeholders and evaluate the community's needs.

Data sources include observations, stakeholder interviews, focus group discussions, and documents (reflective journals). The research team used this qualitative data to understand better the enablers and obstacles facing the collaborating institutions to develop the joint undergraduate educational model for community benefit.

After analyzing the data from the first cohort of students, faculty, and community members, the following themes emerged:

- There is significant importance associated with understanding the 'culture' of Tuskegee for all participants
- Sincere and authentic communication is key to success with students and community members
- Design thinking and situational practice are valuable educational tools to prepare students

The work rooted in this project will produce critical insights and purposeful next steps that other inter-institution partnerships can take to develop, implement, and assess new ways to expand knowledge across institutions while addressing institutional barriers to bring authentic learning to the broader community. In addition, inter-institutional collaboration projects can increase pipelines to all academic institutions by exposing undergraduate students to faculty from other programs, influencing them to pursue higher education.

The influence of amygdala calcitonin gene-related peptide receptors (CGRP-Rs) on the development of chronic bladder pain

Lakeisha Lewter1 and Benedict Kolber1

1School of Behavioral and Brain Sciences and Center for Advanced Pain Studies, The University of Texas at Dallas, Richardson, TX 75080, USA.

Chronic pain affects hundreds of millions of people worldwide. Most research focuses on somatic pain. However, pain from internal organs is also a serious health issue and is understudied. Visceral pain (e.g., bladder pain) is difficult to localize, therefore difficult to treat.

Within the brain, the amygdala is a region that has received increasing attention as a significant contributor to the pathology of chronic pain. Findings from both human and rodent studies have revealed left versus right brain differences in the amygdala in pain modulation. The amygdala in the right hemisphere of the brain has been shown to increase pain outside of the body and in internal organs, including the bladder. In contrast, the left amygdala has been shown to reduce bladder pain. Recent evidence has shown that amygdala activity is not only asymmetric, but also changes with time once pain is induced. However, it is unknown whether time-dependent activation of the amygdala contributes to the development of chronic bladder pain. We seek to study the hemispherical and temporal changes of the amygdala in the context of bladder pain and identify cell-types that might be responsible for contributing to these changes. One interesting target that has been shown to produce asymmetric functions within the brain is the neuropeptide, calcitonin gene-related peptide (CGRP).

In this study, we used a CGRP antagonist – CGRP8-37, to study the role of amygdala CGRP receptors (CGRP-Rs) on bladder pain-related changes over time. The effects of CGRP8-37 were examined using a mouse model of bladder pain (100 mg/kg cyclophosphamide, 3 days). Abdominal von Frey was conducted 2-21 days post-injury (DPI) in mice that received direct amygdala injections in the left or right amygdala of CGRP8-37 (1 uL of 100uM) or vehicle. Additionally, we used in vivo calcium imaging to measure the neural activity of CGRP-R positive cells in the left or right amygdala 2-21 DPI.

Data indicate that animals that received vehicle in both the right and left amygdala, displayed an increase in bladder pain in the abdominal von Frey assay once treated with cyclophosphamide. Animals that received an injection of CGRP8-37 into the right amygdala displayed less bladder pain-like behavior than animals that received CGRP8-37 into the left amygdala. For the in vivo calcium imaging experiments, an increase in spontaneous neural activity of CGRP-R cells was observed in the right amygdala, compared to the left, as bladder pain progressed.

Collectively, these data support the study of cell-specific manipulation of the right amygdala to produce pain relief. Focusing on the contributions of CGRP receptors in visceral pain modulation will provide insight into the underlying mechanisms contributing to bladder pain. These data, in turn, will lead to the development and advancement of effective central nervous system targeted therapies for chronic bladder pain.

Risk Perception and Use of Personal Care Products
by Race and Ethnicity among Young Adults

Julia Mandeville, Judy Nanawa,Charlotte Joannidisa, Michelle Ryana, Devon Nelsona, Lesliam Quiros-Alcalab, Matthew Gribblec, Anna Z. Pollacka

aDepartment of Global and Community Health, College of Public Health, George Mason University, Fairfax, VA
bDepartment of Environmental Health and Engineering, Johns Hopkins University, Baltimore, MD
cDepartment of Environmental Health, University of Alabama, Birmingham, AL

Personal care products (PCPs) like hair and skincare products can contain phthalates, parabens, and other endocrine disrupting chemicals (EDCs). However, information on consumer perception of risks from PCP use and how use varies by race and ethnicity, is limited. Our objective was to evaluate differences in PCP use and risk perception in a diverse sample of participants.

A self-administered questionnaire captured information on demographics, PCP use trends, and perception of risk associated with PCPs. Participants were recruited from George Mason University, Fairfax, Virginia, campus and online. Pearson's Chi-square and Fisher's exact tests were used to determine differences in both PCP use and risk perception.

Participant (n=770) mean age was 22.82 years (SD= ± 6.03 years). Highest daily use frequency of make-up (eye = 29.3%; other=38.0%; all=33.7%) and skincare products (55%) was in Middle Eastern and North African (MENA) (n=50) participants. non-Hispanic Black participants (n=109) reported highest daily use of hairstyling products (52%) and lotion (78%). Multiracial participants (n=35) reported highest daily use of fragranced products (55.1%), particularly fragranced facial soap or cleanser (59%). Daily sunscreen use was highest in MENA (36%) and lowest in non-Hispanic Black participants (15%). Fewer non-Hispanic White participants (54%) agreed that there are health risks associated with PCP use compared to other participants (≥65%). Non-Hispanic White participants (85%) indicated they would trust scientists to provide reliable safety information compared to non-Hispanic Black participants (68%). Non-Hispanic White participants (79%) believed PCPs were safe compared to MENA participants (51%). Levels of agreement were similar across racial and ethnic groups, that PCP manufacturers should be required to list all ingredients present (≥87%).

There were differences in daily use frequency, levels of trust, perception of safety and health risks associated with PCPs by race and ethnicity, underscoring that there may be different sources of exposure to PCPs by race and ethnicity.

Patterns of Ethnic-Racial Identity and Critical Reflection and Associations with Perceived Barriers: A Latent Class Analysis

Channing J. Mathews, Jacqueline Cerda-Smith, Angelina Joy, Jerica L. Knox, Josefina Bañales, Michael Medina, Kelly Lynn Mulvey

The disparity in the members of racially minoritized groups in the STEM workforce (National Science Board, 2018) may be exacerbated by youth having fewer opportunities to build STEM skills given that they are less likely than their White peers to enroll in foundational STEM courses (Chang et al., 2014; Tyson et al., 2007). Further, these youth are more likely to perceive and experience both educational and career barriers (Carey, 2019). Minimal research explores what roles critical reflection (awareness of social inequity) and ethnic-racial identity (the meaning and process of understanding one's racial self-concept) play in helping youth overcome barriers and engage in STEM. Thus, the current study examines cultural assets that may foster STEM engagement to overcome perceived educational and career barriers for racially/ethnically minoritized individuals.

The sample included 265 adolescents (49% female; Range$_{age}$=13-17) from racially/ethnically minoritized backgrounds (Black (46.8%), Latinx (31.3%), Multiracial (14.7%), Asian-American (3.4%), Arab-American (0.4%), Native American/Pacific Islander (0.8%) and American Indian (3%)). Participants completed measures of ethnic-racial identity (Scottham et al., 2008) and critical reflection (perceived inequality and egalitarianism; (Rapa et al., 2020), STEM Engagement (Mulvey et al., 2022) and measures of educational and career barriers (Luzzo & McWhirter, 2001).

Using latent class analysis (see Figure 1) to assess patterns of ethnic-racial identity and critical reflection, we determined that a four-cluster solution best fit the data. The first class, disillusioned (44.2%), was characterized by low to average scores across critical reflection and ethnic-racial identity variables. The second class, naïve affirmed advocates (22.6%), showed slightly below average levels of egalitarianism, low perceived inequality, and high levels of private and public regard. The third class, affirmed advocates (20.4%), showed high scores across all ethnic-racial identity and critical reflection variables. The fourth class, affirmed and critical (12.8%), showed high private regard, low public regard, and high support for egalitarianism and high perceived inequality. STEM engagement differed by class ($F_{(3, 231)}$=4.935 $p<.001$, $\eta 2 = .06$). The disillusioned group had the lowest STEM engagement across classes, see Table 1. Perceptions of educational barriers differed by class ($F_{(3, 242)} = 5.83$ $p<.001$, $\eta 2 = .07$), see Table 1. The disillusioned class had the highest perceptions of educational barriers whereas the naïve affirmed advocates perceived the least educational barriers. The naïve affirmed advocates group perceived significantly less educational barriers than all other classes. The disillusioned group perceived significantly higher educational barriers than the naïve affirmed advocates group. Perceived career barriers also differed by class ($F_{(3, 255)}$=12.06 $p<.001$ $\eta 2 = .15$). The disillusioned class perceived more career barriers than the naïve affirmed advocates, but fewer career barriers than both the affirmed advocates and the affirmed and critical groups. The affirmed and critical class perceived the highest barriers across all groups.

The current study suggests that racially/ethnically minoritized adolescents who feel most affirmed in their ERI and maintain low perceptions of inequality have the highest STEM engagement and lowest perceived barriers to their future educational and career pursuits. Implications for research and practice will be discussed.

Sleep Duration Associated with Hospital Utilization in the United States: Revisiting Andersen's Behavioral Model of Health Service Use

Rhoda Moise, University of Miami Miller School of Medicine
Marie-Rachelle Narcisse, University of Arkansas for Medical Sciences
Clarence Locklear, University of Miami Miller School of Medicine
Arlener Turner, University of Miami Miller School of Medicine
Azizi Seixas, University of Miami Miller School of Medicine
Girardin Jean-Louis, University of Miami Miller School of Medicine

One in three Americans is sleep deprived, and sleep disturbances are associated with greater health service utilization and costs. Therefore, this study examined factors associated with Emergency Department visits (ED) and overnight admission hospitalization (OA) in a large representative sample of adults aged ≥18 in the US.

Guided by Andersen's Behavioral Model of Health Service Use, zero-inflated negative binomial and multivariable logistic regressions were used to examine associations between predisposing, enabling, and health needs factors and health service utilization ($\alpha=0.05$).

Of the predisposing factors examined, ED visits significantly increased with age, female sex, Black race, and less than high school education (15%, 36%, and 85%, respectively). Enabling factors analysis found that those who were unemployed, had problems paying medical bills, lived under the federal poverty line, and did not have private insurance were more likely to have ED visits. ED visits also increased by health needs including adults reporting poor/fair health, increased number of chronic conditions, and very short or long sleep. Regarding OA, significant risk predisposing factors included female sex and foreign-born nativity. Enabling factors for OA found adults who were unemployed and had problems paying bills were more likely to be hospitalized. Additionally, adults with Medicaid, Medicare, and other insurance were more likely (70%, 34%, 44%, respectively) to be hospitalized. Further, of the health needs factors examined, OA odds increased for those with less than excellent health status, without a usual source of care, and an increased number of chronic conditions. Adults with very short or short sleep were also more likely to be hospitalized (48% and 22%, respectively).

This is the first-time sleep duration is examined as a health needs component of Andersen's Behavioral Model of Health Service Use. When determining predictors associated with hospital utilization, sleep duration should be considered a key factor as it significantly increases the odds of ED visits and overnight hospital admissions. Future studies should investigate the influence of other dimensions of sleep health and sleep disorders in examining health services use in the US.

Angler effort influences on fish behavior: Hook memory impacts on recapture probability in a recreational fishery

Camille Mosley1, Colin Dassow2, Chris Solomon3, Stuart Jones1

University of Notre Dame Department of Biological Sciences1 Wisconsin Department of Natural Resources2 Cary Institute of Ecosystem Studies3

Recreational fisheries provide a multitude of ecosystem services and economic benefit globally. One measurement of quantifying the health of a fishery is catch rates. Many recreational fisheries involve catch and release practices. Unintended consequences of catch release ethics may lead to fish population dynamics undesired by anglers. When catch rates and abundance are non-linear anglers may have an inaccurate perception of population size resulting in changes in angler effort density within a fishery. Behavioral plasticity in fish causes captured fish to become invulnerable to recapture for a certain amount of time after release, we refer to this as the refractory period. Fish hook avoidance through catch and release fishing has been observed in marine and freshwater systems. There have been few studies of this dynamic in Largemouth Bass, a common catch and release sport fish species of high importance across North America and in our study region of the Northern Highlands Lake District in Wisconsin. Lab experiments have observed significant behavioral changes in response to predator interactions. Relative to studies of hyperstability, little empirical work has investigated the possibility of hyperdepletion of angler catch rates in a recreational fishery. To determine if hyperdepletion of catch rates occur at increased angling effort levels in a recreational fishery and estimate variability in refractory periods amongst individuals we performed a whole lake experiment. After calculating catch rates over time in our experiment we then used a mark-recapture model to determine individual probability of recapture across the population. We observed no significant effect of angling effort shifts among average catch rates between lakes but observed variability in individual recapture histories. Variance in the probability of recapture was predicted by days since last capture in our model comparisons. Hook memory should be further studied to determine other drivers of variability of recapture histories within a population such as biological characteristics of genetics, body size, and angler selection pressures.

The NIH UNITE Initiative: A Framework for Addressing Structural Racism Within the Biomedical and Behavioral Science Enterprise

Trenell J. Mosley[1]

1Chief Officer for Scientific Workforce Diversity Office, Office of the Director, The National Institutes of Health, Bethesda, MD, USA

Recent events in our nation's history have illuminated the inequalities that people of color face in the United States. In parallel, racial, and ethnic inequities in biomedical and behavioral science (BBS) have resulted in a loss of talent, creativity, and innovation. In response to the need for change, the National Institutes of Health (NIH) publicly unveiled the UNITE initiative on February 26, 2021. UNITE is a NIH-wide effort that works to address structural racism (SR) in BBS. It comprises five committees with distinct but coordinated objectives to tackle the problem of racial and ethnic equity in science while developing data-driven methods to promote diversity, equity, and inclusion (DEI). Here we describe the unique features of UNITE's structure, governance, and functioning. We present these as potential key features within a larger framework for institution-wide initiatives seeking to address issues of equity and promote DEI. Finally, we highlight key actions taken since UNITE's establishment as illustrative strategies to spur internal and external systematic change.

To thoroughly address SR within the BBS enterprise, UNITE works across three intersecting domains—health disparities and minority health (HD/MH) research, internal NIH workforce, and external workforce. UNITE's five committees total more than 80 members across all staff levels and each of NIH's 27 Institutes and Centers and the Office of the Director.

UNITE is integrated into the governing fabric of NIH. Regular and staggered cycling of UNITE leadership and members creates capacity to continuously engage new ideas and diverse perspectives. UNITE charges and goals are aligned with tenets of several NIH strategic plans, to ensure collaboration and minimize redundancies.

The five UNITE committees collaboratively develop data-driven strategies to enhance equity. The recommendations are vetted by NIH-wide leadership and implemented by existing NIH entities, and, in all efforts, UNITE collaborates with and operates in tandem with existing DEIA-related entities within and outside of NIH. This approach allows for the collective support of recommended strategies, builds sustainability, and hinders the "siloing" of key efforts within a single NIH entity.

UNITE's unique structure has facilitated the implementation of several initiatives including, but not limited to:

- Launching funding opportunities to expand the capacity of HD/MH research at research institutions.
- Approving concepts to encourage extramural institutional cultural change, support extramural DEIA efforts, and enhance MSI capacity.
- Establishing internal plans and committees to identify areas that may lead to inequities and guide NIH-wide efforts to promote equity.
- Gathering data and input from collaborators to inform priorities and activities and developing strategies to improve transparency and accountability.

UNITE is an NIH-wide effort to promote equity, generate bold ideas, and catalyze new actions to achieve structural change across BBS. The initiative utilizes a top-down, bottom-up approach to achieve widely supported and sustained systemic change. Through its collaborative, diverse, and synergistic structure, governance, and functioning, UNITE has initialized several efforts within its first two years of operation. These efforts are expected to have global impact and create systemic change throughout the BBS enterprise.

Examining hair artifact in MRI: A case study on coarse hair texture and increasing inclusivity in neuroimaging

Maresa Taté1, Summer Motton1, Lucy Lurie1, Emily Hammer2, Amber Leinwand2, Meredith Gruhn1, Margaret Sheridan1

Universities invloved1University of North Carolina at Chapel Hill; 2Biomedical Research Imaging Center - University of North Carolina Chapel Hill

Neuroimaging techniques, such as magnetic resonance imaging (MRI), have contributed to the fields of developmental psychology and neuroscience. These methods not only aid in clinical diagnoses but also in further understanding of complex systems of the body, such as the nervous system, thus being highly relied on in academic and medical settings. Presently, the majority of psychology study samples are comprised of participants from Western, educated, industrialized, rich and democratic (WEIRD) populations (80%), despite the fact that that demographic is in the minority globally (12%) (Henrich et al., 2010). This oversampling results in a distortion of the current data that informs current developmental and behavioral research and is not representative of the greater global population. In turn, there is room to question the validity of current research practices and findings (Nielsen et al., 2017). In order to produce knowledge about brain development that is universal and generalizable, psychology and neuroscience fields should move towards more diverse and inclusive samples. As we continue to improve our diversity in samples to create more reliable and representative data, there is a need to be cognizant of potential barriers that would affect data integrity. Imaging artifacts interfere with the quality of data, consequently affecting the interpretation of results, resulting in misdiagnoses and exclusion of data. In turn, professionals inform participants of ways to reduce the artifacts for better data quality; however, the current practices to improve these techniques do not consider imaging related artifacts that disproportionately affect systematically and historically excluded populations.

We observed MRI artifacts in 7- and 9-year-old sisters that were previously identified as unknown. Initial review using the fMRIPrep, a tool used to prepare human fMRI data for analysis, failed to remove distortion with fMRIPrep's susceptibility distortion correction (SDC) feature with field maps applied for offline distortion correction of the BOLD images. The images showed no improvement, thus they were then run without fieldmaps; however, both images structural and functional runs still presented significant artifacts declared "unexplained," possibly explained by "technical difficulties".

With further investigation, the artifacts are now believed to be attributed to the sister's shared hairstyle, locs (Figures 1 & 2). Specifically, with Black participants, coarse hair textures, common hair products and hairstyles may produce hair-related imaging artifacts that result in lower quality data.

With this case study, we aim to call attention to how hair-related artifacts may disproportionately affect those of Afro-descent whose hair texture, styling and maintenance have not been historically accounted for in psychophysiological and neuroimaging technology. In an effort to aid scientists in being more cognizant of this systemic issue during data collection, with this case study and review, we aim to identify and formalize presentations of hair-related artifacts that perpetuate the exclusion of Black participants in neuroscience research. Further discourse should occur to identify methods needed to eliminate current exclusionary practices for higher quality data for all individuals involved, regardless of demographic makeup.
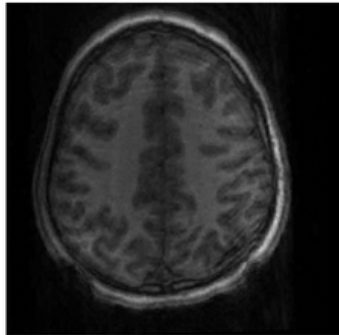
Observation 1: Sibling A

Fig. 1 Axial anatomical T1 images with depiction of artifacts located in the right and left posterior cranial fossa/occipital bone
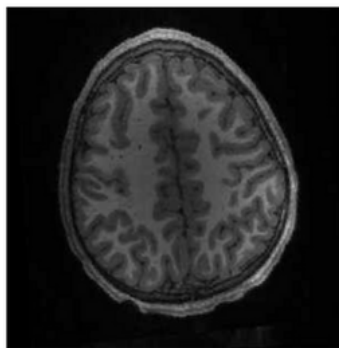
Observation 2: Sibling B

Fig. 2 Axial anatomical T1 images with depiction of artifacts located in the right and left posterior cranial fossa/occipital bone.

Molecular mechanisms of cytokine-mediated increase in antigen responsiveness in CD8+ T lymphocytes

Akouavi Julite Irmine Quenum, Sheela Ramanathan and Subburaj Ilangumaran

Department of Immunology and Cell Biology, Faculty of Medicine and Health Sciences, Université de Sherbrooke, Sherbrooke, Canada

CD8+ T cells can be activated in an antigen-independent manner following stimulation with synergistic combination of homeostatic (IL-7, IL-15) and inflammatory (IL-6, IL-21) cytokines. Such cytokine-primed cells display increased responsiveness to low concentrations of antigen or low affinity antigenic peptides that are insufficient to activate naïve cells. In this study, we aim to gain insight into the molecular mechanisms of 'cytokine priming´ that increases the antigen responsiveness of naïve CD8+ T lymphocytes.

Pmel-1 TCR transgenic T cells were stimulated with IL-15 and IL-21 and chromatin accessibility was analyzed by ATAC sequencing (ATACseq). The expression of candidate genes implicated in T cell activation found close to loci with altered accessibility were verified by RT-qPCR in cytokine-primed (CytP), antigen-stimulated (AgS) and cytokine-primed followed by antigen-stimulated (CytP_AgS) cells.

Antigen stimulation resulted in thousands of opening and closing peaks (accessible and non-accessible chromatin regions), whereas cytokine priming modulated chromatin accessibility only in a few hundred loci. Nonetheless, a significant fraction of the opening (33%) and closing (63%) peaks of CytP cells overlapped with those observed in AgS cells. Many of these peaks lie adjacent to genes implicated in T cell signaling, activation, effector cell functions and regulation. Our RT-qPCR results on a select set of these genes in CytP, AgS and CytP_AgS cells suggest that cytokine primed-induced changes in gene accessibility can boost T cell activation, effector functions and prevent exhaustion without completely compromising the regulatory controls.

Our findings indicate that 'cytokine priming´ of naïve CD8+ T cells induces significant changes in gene expression programs, which are also modulated in a similar manner in antigen-stimulated cells, thereby eliciting a 'poised state´ that can boost antigen responsiveness.

Determination of the Age-Related Differences in the Pharmacokinetic Profile of Cannabinoids in a Mouse Model

Laerissa Reveil[1], Justin L. Poklis[2], Mohammed Mustafa[2], Aron H. Lichtman[2], Matthew S. Halquist[1]

1Department of Pharmaceutics, 2Department of Pharmacology & Toxicology, Virginia Commonwealth University, Richmond, VA

The purpose of this study is to determine age-related differences in cannabinoid exposure by determining the pharmacokinetic profile of delta-9-tetrahydrocannabinol in a mouse model.

Cannabis use among individuals of 50 years of age or older has steadily increased following the legalization of cannabis in the United States (21 recreational, 37 medicinal). Cannabis has become a popular remedy among older adults for its potential medicinal properties as an antiemetic, pain reliever, anti-inflammatory, and appetite stimulant, among other purposes. Cannabis contains the psychoactive ingredient delta-9-tetrahydrocannabinol (THC), which is mainly responsible for these effects. However, acute or chronic THC use can negatively impact memory, judgment, cognitive function, and psychomotor skills and can cause confusion, dizziness, tachycardia, and psychosis. Cannabis use in older adults is of increased concern as aging can play a significant role in drug pharmacokinetics, altering the drug absorption and incidence of negative effects associated with THC exposure. With limited information on the safety and efficacy of cannabis in older adults, an understanding of the pharmacokinetic profile of THC is imperative.

Animal studies were performed under the Institutional Animal Care and Use Committee (IACUC) protocol AD10000369. Three C57BL/6J young (two months) mice (1 M, 2 F) and three C57BL/6J old (28 months) mice (1 M, 2 F) were administered 100 mg/kg THC in 1:1:18 vehicle (5% EtOH, 5% emulphor, 90% saline) orally (n=6). Blood samples (12 µL) were collected at 0-, 0.5-, 1-, 2-, and 4-hour time points. After the 4-hour time point, whole brain tissue samples were collected for analysis.

Blood samples were extracted using a protein precipitation method with cold acetonitrile. Following vortexing and centrifugation, the supernatant was transferred and 2 µL was injected onto the Sciex 6500+ liquid chromatography tandem mass spectrometer (LC-MS/MS). Chromatographic separation was performed using an Agilent Zorbax Eclipse XDB C18 column with an isocratic method using 90:10 methanol:0.1 mM ammonium formate at a flow rate of 0.5 mL/min. THC, 11-OH-THC and THC-COOH were prepared in a linear range of 10-1000 ng/mL.

The THC blood level in the young mice (n=3) increased from 1 to 4 hours while the blood level in the old mice (n=3) increased from 0.5 to 2 hours. The THC blood level in the old mice compared to the young mice was higher 1 and 2 hours after THC administration. The blood level of the metabolite 11-OH-THC was higher 2 hours after administration for the old mice compared to the young mice. In the analysis of the whole brain, there was no difference in parent drug or metabolite levels in the young mice compared to the old mice.

Age-related differences are present in blood concentration-time profiles of the young mice compared to the old mice. This mouse model may translate to showing that older adults taking cannabis may experience greater intended or unintended effects or an altered onset of effects compared to younger adults.

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