TRIO
RONALD E. MCNAIR PROGRAM
RESEARCH SYMPOSUM
2022

THURSDAY, APRIL 14TH

8am - 4pm
University of North Dakota,
Memorial Union Small Ballroom

SCHOLARS

SYDNEY MENNE
BUILDING A MUON DETECTOR: HOW THESE INVISIBLE PARTICLES ARE DETECTED

Mentor: Dr. Tim Young

Sydney Menne is a junior double majoring in mathematics and physics with a focus on astrophysics. Sydney has conducted research through the McNair Program in astrophysics, specifically focusing on supernovae and progenitor star distributions. Currently, she is focused on Nuclear physics after conducting research with the Institute for Nuclear Physics at the University of Muenster last summer through a DAAD-RISE internship. Sydney is constructing a muon detector, which combines my interests in astrophysics, nuclear physics, and hands-on work. After graduating, she plans to first get a masters degree in either aerospace or nuclear engineering, and then get a PhD.

Abstract
Muons are elementary particles produced when cosmic rays (high energy particles, most often protons), strike a nucleus in the Earth's upper atmosphere and produce a shower of particles including muons, neutrons, pions, and neutrinos, among others. Muons decay after a lifetime of about 2.2 μs. Even though they travel very close to the speed of light (˜0.99c), it still takes much longer than this 2.2 μs lifetime for a muon to reach the surface of the earth from where they are produced in the upper atmosphere (˜ 15km). Because of this, we would expect all muons produced in the upper atmosphere to decay by the time they reach the Earth's surface. However, due to the time dilation effect of Einstein's Theory of Special Relativity, some muons do reach the Earth's surface, where we can detect them.

Sydney is constructing two muon detectors which she will use to gather muon count rates at different altitudes. With the help of the UND Aerospace department, she plans to take the detectors in an aircraft up to 30,000 ft to gather data. She will also gather data from both the basement and top floor of UND's Witmer hall. Muon count rates have been published for an underground mine in Soudan, MN, which she can further compare my count rates to. All of this data acquisition, comparison, and analysis will be testing Einstein's Theory of Special Relativity in support of the time dilation and length contraction effects of special relativity.

SCHOLARS

LEE QUALLEY

NATIVE POLLINATORS AND CONSERVATION EFFORTS IN THE GREENWAY OF GRAND FORKS, ND AND EAST GRAND FORKS, MN

Mentor: Dr. Rebecca Simmons

Lee Qualley is a senior working toward a bachelor's degree in Biology. Lee's area of research is within entomology and evolution, though they have an additional fascination with microbiota.

Abstract

Restored habitats need to protect native plants and pollinators. The Greenway is approximately 2,200 acres of natural open space located along the Red River in East Grand Forks, MN and Grand Forks, ND. A wildflower restoration project started in 2005 in several areas along the Red River. To aid in this restoration the City of Grand Forks implements maintenance of the natural and manicured recreational areas, using herbicides, burning, and pesticides to deter weed and mosquito populations. The outcomes of these conservation efforts are unknown. This research examines the impact of conservation efforts and global climate crisis impact on native pollinator phenology. Pollinators were collected on the Greenway before and after pesticide treatments. We dissected specimens to remove the digestive system; then extracted DNA to identify pollinator species and associated microorganisms. Using DNA we are able to determine the species in these communities using cytochrome oxidase I (COI) and 16S ribosomal DNA. Compared the sequences via BLAST to NCBI GenBank database, 98% minimum match for identification. The information collected will be used to discuss the weaknesses and strengths conservation efforts regarding synchrony of plant-pollinator systems.

SCHOLARS

ELLEI BURMEISTER

ELECTRONIC NICOTINE DELIVERY SYSTEMS PREVALENCE AND POTENTIAL TREATMENT AMONG UND STUDENTS

Mentor: Dr. RaeAnn Anderson

Ellei Burmeister is a senior in Psychology whose research is focused on the underlying causes for and treatments of various addicitions. Ellei plans to pursue a PhD in Psychology and continue working toward more effective treatments of addiction.

Abstract

This study examines rates of electronic nicotine delivery systems (ENDS) use and compares demographic characteristics, motivations for initiating use, history of mental illness, and self-reported education surrounding ENDS. This study also seeks to determine the best solution for college students wanting to quit. Participants: Respondents are >100 students attending University of North Dakota aged 18 to 24 years old. Methods: A cross-sectional survey is administered to >100 college students using UND's SONA's system. SPSS is used for the data analysis.

SCHOLARS

KYLENE MARTELL
INTERGENERATIONAL TRAUMA IN THE NATIVE AMERICAN POPULATION

Mentor: Dr. Justin McDonald

Kylene G. Martell is a senior majoring in Psychology, graduating this May. Kylene will attend the University of North Dakota's Clinical Psychology PhD program. Her research interests include intergenerational/generational trauma, Native American/Indigenous populations, rural areas, trauma, childhood trauma, mental health in Native American/Indigenous populations, depression, anxiety, ADHD, PTSD, microbiome's/gut microbiome's relation to mental health, and mental health issues related to different types of abuse.

Abstract

Native American populations have been subject to many atrocities over the course of history. This has led to the development of various issues, many of which are still prominent issues in Native American communities today. One of the potential contributing factors to these issues is intergenerational trauma. Intergenerational trauma has been known by various names. It is most commonly referred to as intergenerational trauma, generational trauma, or historical trauma. Intergenerational trauma is trauma that is passed down through generations. This type of trauma has been spread throughout Native American communities through historically destructive events including colonization, loss of culture/language, and forced assimilation, all of which have started and maintained various cycles of abuse. The prominence of this issue and the rampant negative effects involving health disparities and mental health issues in Native American communities shows why it is important to investigate this type of trauma.

SCHOLARS

INDIA STOCKERT

INFLUENCES ON COMMUNICATION IN LONG-TERM RELATIONSHIPS

Mentor: Dr. Heather Terrell

India Stockert is a senior in Psychology and will be graduating May 2022, then attending UND for MA in Counseling Psychology. Her research interests include: gender differences and mental health.

Abstract

Communication is a large part of life that has no beginning or end; it involves listening, understanding, emotion and mutual respect between partners. In general, communication means to know how to give and to know how to receive. There are many factors that affect one's communication skills; factors such as early childhood influences, gender differences, personality traits, and education. The early childhood influences include communication between parents and children, which contributes significantly to creating fair and successful relationships later in life; the communication between a mother and father largely influence a child's communication skills. Regarding gender differences, men grow up learning that they need to be masculine without showing their sensitivity. Females are taught that their appearance is important, that they need to show sensitivity and be thoughtful. These expectations of men and women are the source of differential communication between the genders. The role of personality has been known to widely affect romantic relationships; similarities in personalities have been found to positively influence couples' communication – when a couple has similar personalities, their communication styles become similar. The role of education in terms of communication is largely influenced by whether a teacher has effective emotional skills in the classroom, which may contribute to the student's relationships outside of school as well as encouraging the student's learning process and motivation. Emotions influence teacher-student interactions and shape the classroom atmosphere. In conclusion, there are many factors that play a role in communication that will be discussed throughout this research, as well as warning signs and red flags to look out for, and how to address these issues.

SCHOLARS

HEIDI DEPLAZES

STIMULUS GENERALIZATION AND PEAK SHIFT USING STATEMENTS ABOUT COVID-19: A PILOT STUDY

Mentor: Dr. Adam Derrenne

Heidi Deplazes is a senior in Psychology, graduating May 2022. Heidi plans to get a PhD in Experimental Psychology. Heidi is from the small town of Devils Lake, North Dakota. She was working on an Associate of Arts degree at Northland Community and Technical College when she decided to take a psychology class because it sounded interesting. After the first couple weeks of that class, she knew this was her calling. Heidi intends to pursue a doctoral degree in experimental psychology. Her interests are in behavioral analysis and developmental psychology. She finds the mechanisms that are behind human behavior to be absolutely fascinating.

"*I am going to be the first person in my family to have a doctoral degree, thanks to the McNair Scholars program. I am so thankful for this opportunity.*"

Abstract

Stimulus generalization occurs when a person responds to different but similar stimuli than the stimulus they were trained to respond to. To the author's knowledge, the only stimuli that have been used in studies on stimulus generalization have been concrete, as opposed to abstract. In the current study, a series of statements about COVID-19 were presented to participants. They responded with how believable and important they believed the statements were. The items with the most consistency in ratings will be used in a future study that examines stimulus generalization with abstract stimuli.

SCHOLARS

JULIA KOCHANOWSKI
ALZHEIMER'S DISEASE

Mentor: Dr. Kevin Whaley & Nikki Huddle

Julia Kochanowski is a senior graduating in May 2022. She is majoring in Forensic science and Biology with a minor in Criminal Justice. Julia was accepted into UND's Clinical and Translational Sciences Master's Program and her focus will be in pathogenesis of human disease. Her research interest is in Alzheimer's disease and dementia. Julia plans on applying for MD/Ph.D programs to become a forensic pathologist and neuropathologist and ultimately get a Ph.D in neuroscience.

Abstract

Dementia is a group of progressive neurodegenerative brain disorders associated with signs and symptoms spanning cognitive, sensory, and psychological function. and more or less gradual erosion of mental and later physical function. The risk of dementia-related mortality significantly increases with gradual loss of one's ability to perform daily activities in addition to diminished anatomical protection of one's airway.

Neurodegenerative disorders can only be diagnosed at autopsy. Brains are fixed in formalin and sent to a neuropathologist for further examination. The most common gross abnormalities are cortical atrophy, hippocampal atrophy, and enlarged ventricles. Dependent upon the differential diagnosis, as formulated from the patient's clinical presentation and gross brain appearance, the neuropathologist will take sections of interest for microscopic analysis. Typically, a variety of special stains are required to visualize neuronal pathologies. The most common anatomical regions of interest are the cerebral cortex, hippocampus, basal ganglia, midbrain, and cerebellum. The neuropathologist produces a report describing his/her gross and microscopic findings in addition to a broad interpretation of the findings. A forensic pathologist further interprets the neuropathological findings within the context of his/her postmortem findings and scene investigation.

SCHOLARS

NICHOLAS RAMOS
THE ABSENCE OF VETERANS IN EDUCATION

Mentor: Dr. Crystal Alberts

Nick Ramos is a Veteran and a Junior studying English & Sociology. He is interested in topics related to the field of Education. Nick plans to pursue a PhD in English.

Abstract

My research involves the lack of military veterans who are obtaining degrees in the field of education. Under the guidance of Dr. Crystal Alberts, I was able to find the necessary documents that showed the kinds of degrees that veterans obtain using their G.I. Bills. The overwhelming majority of them are getting business degrees, with the next largest group getting degrees in STEM fields. Meanwhile, veterans who get education degrees are among the smallest percentage. As important as education is, I want to know why so few veterans are pursuing degrees in education compared to other degrees, especially considering how strongly the military pushes the importance of education amongst their own soldiers.

SCHOLARS

ELIZABETH REED

CRT - WHY BANNING CRT IS DETRIMENTAL TO POC AMERICANS

Mentor: Dr.

Elizabeth Reed is in her 3rd year, but will be graduating May 2022. Her program of specialty is Public Health Education. She enjoys reading and being in nature in her free time. She looks forward to attending graduate school this fall in Alabama.

Abstract
This project is an extensive literature review on Critical Race Theory. Through this research, Elizabeth hopes to work toward devising public health approaches to the reduction of harm for POC in public institutions.

SCHOLARS

AUTUMN JOY

CELL CULTURE SEEDING DENSITY INCREASES IMPACT OF FOXL2 OVEREXPRESSION ON THREE KEY GENES IN OVARIAN DEVELOPMENT

Mentor: Dr. Turk Rhen

Autumn R. Joy is a senior and will be graduating May 2022 with a B.S. Biology, Pre-Health Emphasis. Autumn has been accepted to the University of Wisconsin Madison Endocrinology and Reproductive Physiology PhD program. Their research interests include endocrine, metabolic, and reproductive disorders; sex determination and differentiation; integrative medicine.

Abstract

RNA sequencing data has uncovered dimorphic patterns of gene expression relating to sex determination. Molecular interactions among these genes are still being described and uncovered. Here we use the common snapping turtle, a species with temperature-dependent sex determination, to explore the role of Foxl2 in regulating Amhr2, Cdkn1c, and Osr1, known cell-cycle inhibitors. In order to reduce the number of embryos used, this study also explored differences between one and two gonad cell cultures. Gene expression was higher within two-gonad versus one-gonad cultures. Foxl2 did not have any effect on expression within one-gonad cultures. However, in two gonad cultures Foxl2 increased expression of Osr1, and temperature-dependently increased expression of Amhr2 and Cdkn1c. This suggests that cell proliferation and communication interacts with environmental conditions during temperature-dependent sex determination.

SCHOLARS

LIAM YOUNG

HOW TO PROVIDE EQUITY AND EFFICACY OF SOCIAL SERVICES TO HOMELESS LGBTQA+ HIGH SCHOOL-GRAD YOUTH IN A COMMUNITY?

Mentor: Dr. Douglas Munski

Liam Young is a senior who will be graduting May 2022 with a BA in General Studies. Liam's research interests have a focus on LGBTQA+ issues, equity in public spaces, policies, and healthcare, and the geographical understanding of the above.

Abstract

There is a need for enhanced and targeted services in Grand Forks and other areas for the LGBTQA+ community. It is important for youth to feel safe and supported so they can grow to be successful adults. I want homeless youth to have knowledge of services to them when they are not sure where to turn in their time of need. Not just a safe roof over their heads but also medical, counseling, and other services they may need.

I have been researching this topic for a few semesters and have studied issues for the youth of the LGBTQA+ community like:

- safe places to go/socialize/shop
- safe bathrooms in places like schools and libraries
- Issues in moving to a new state to go to college as an LGBTQA+ individual.

I am working on this research to get a better understanding of what issues there are & what public policies need to be set to address them. I am approaching these issues through Public Policy, Public Health, and Geographical lenses.

SCHOLARS

LINNYA SANDERS

SEXUAL VIOLENCE PREVENTION: EXPANDINGTHE DATA ON VICTIMS & PERPETRATORS OFSEXUAL VIOLENCE TO IMPROVE PREVENTION

Mentor: Dr. RaeAnn Anderson

Linnya Sanders is a senior at the University of North Dakota. Her major is Psychology with a double minor in Sociology and Criminal Justice. Some of Linnya's research interests have been in sexual violence and prevention, specifically the difference between male and female perpetrators. After she graduate, Linnya plans on pursuing a PhD in Psychology.

Abstract

The purpose of the current study is to see if questionnaires are measuring adequate data reports from sexual assault victims and perpetrators. The need for this study is highlighted by research that is reporting males to keep the data set valid for perpetration. Through this current study there is a first questionnaire the participant is answering, after the first survey is completed then the participant is interviewed on the questionnaire responses and asked to verbally tell the situation. After the interview, the participant is then asked again to answer a second set of questionnaires. How the research results are showing is that adding in women and transgender to the data set, the data is remaining consistent. There are no significant differences between the survey responses between men, woman and transgendered. Overall, the information being gathered for research is beneficial to include men, woman, and transgender to evaluate effective prevention plans.

SCHOLARS

VIOLET INGEBORG
MAPPING BIRGITTA OF SWEDEN AND OTHER FEMALE MYSTICS OF THE 13TH-15TH CENTURIES

Mentor: Dr. Michelle M. Sauer

Violet A. Ingeborg is a senior majoring in English and minoring in linguistics, German studies, and Women and Gender Studies. Violet's research primarily focuses on female saints in the Middle Ages, as well as medieval religious literature written for and by women. Violet is graduating May 2022, and will be attending the M.A. program in English at UND.

Abstract

Over the course of my time with McNair, much of my research has focused on female saints of the Middle Ages, as well as medieval religious literature written for and by women. This semester I decided that I wanted to explore the ways in which female mystics of twelfth through fifteenth centuries are interconnected. For example, Dorothea von Montau's hagiography and The Book of Margery Kempe reference Birgitta of Sweden. As such, Birgitta is the focal point of my project. In order to demonstrate this interconnectedness, I used ArcGIS, a digital mapping software, to create an interactive map of lives these women including Catherine of Siena, Elizabeth of Hungary, and Catherine of Vadstena. This map visually demonstrates trends that these women took part in such as chaste marriages, pilgrimages, and participation in ascetic practices. Additionally, this interactive map provides links to sites that have more information on the process of canonization, religious orders, and the Avignon Papacy.

SCHOLARS

SHEALYNN WELLS

P53, CDKN1A, STEAP3, CASP10 GENE EXPRESSIONS AT BASAL LEVEL IN CD133+/CD24+ AND CD133-/CD24+ FROM THE RPTEC/TERT1 CELL LINE

Mentor: Dr. Seema Somji & Dr. Aaron Mehus

Shealynn Wells is a senior majoring in Nursing. Shealynn will be graduating in May 2022 and attending UCLA for a Nursing Ph.D. Shelynn's research interests are focused on Native American Health disparities/Epigenetics/Genetics.

Abstract

The proximal tubules, located in the kidneys, are one of the main sites of injury to kidneys. This is due to large surface area, increased blood filtrate, and high amounts of mitochondria (R.L., 2016)There are stem/progenitor cells that are involved in the regeneration of the renal tubules but the mechanisms by which the stem cells repair the tubules is not fully understood. To grasp a fuller understanding of how this process works we are looking at the gene expression of the following genes: P53, CDKN1A, STEAP3, and CASP10 using RT-qPCR. This group of genes are mainly involved in the apoptosis, necrosis, and senesces process of the cells of the human proximal tubules. The cells being used for this study are the RPTEC/TERT1, CD133+/CD24+ and CD133-/CD+ cells. CD133+/CD24+ considered as stem/progenitor cells and CD133-/CD+ considered as differentiated cells are the cell populations isolated from the RPTEC/TERT1 (Shrestha S, 2019). The mRNA levels for these genes showed minimal to no expression for the CD133+/CD24+ cells while the significant increase in CD133-CD24+ cells compared to the RPTEC/TERT1 parental line. This suggests that the CD133-CD24+ cells which possess less stem/progenitor characteristics and predicted to be differentiated cell type may have acquired senescence characteristics, therefore increased expression of these relevant markers involved in senescence and cell death process.

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Thank you!

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