23-24 Impact Award Recipients

Student awardee: Aaliyah Butts
Faculty name: Nicolas Knuth
Project abstract: Near-Infared spectroscopy (NIRS) is a relatively novel device that allows for a non-invasive measurement of oxy- and deoxyhemoglobin content in skeletal muscle (SM). This technology can be applied to the specific measurement of skeletal muscle metabolism and oxygen consumption rate, which is important given that muscle defects that may hinder skeletal muscle metabolism in various disease states may be undetected at the whole-body level. However, few studies have confirmed the ability of NIRS to capture SM oxygen consumption (mVO2) rates compared to whole-body (wbVO2) oxygen consumption rates in individuals free of disease. The purpose of our study was to investigate the relationship between wbVO2 and NIRS-derived mVO2 while at rest and while performing low-intensity physical activity (i.e., walking). Measurements for mVO2 will be obtained by placing NIRS on the gastrocnemius muscle (MG)of 15 healthy young, healthy adult participants. Measurements for wbVO2 will be obtained with the COSMED metabolic analyzer. Data will be collected at rest for 15 minutes, during over-the-ground walking (OTG) for 5 minutes, and during treadmill walking at 8 increasing speeds (1.1 mph-3.5 mph, 4 minutes each stage). By demonstrating valid methods of measuring SM metabolism using the NIRS device compared to current invasive and costly alternatives, my project will allow for further research on SM metabolism and disease.

Student awardee: Eber Guzman Cruz
Faculty name: John Weldon
Project abstract: Hemophilia A (HA) is a bleeding disorder that is characterized by a deficiency of factor VIII protein (FVIII), which is essential for blood clotting (Chavin S. I., 1984). Individuals affected by this disorder experience internal/external bleeding episodes that are of increased duration and intensity than healthy individuals (Chavin S. I., 1984). HA patients receive blood infusions of recombinant FVIII to treat the condition, but around 20%-30% will develop an immune response to the infused protein that renders it ineffective. This response is characterized by the formation of antibodies (termed “inhibitors”) that bind to FVIII and neutralize its function (Meeks, S. L., & Batsuli, G., 2016). Patients who develop inhibitors are refractory, or resistant to treatment. Many efforts have been made to address inhibitor formation, but corrective efforts have been limited in scope and carry risk, even causing death in some patients (Aledort LM, 2019). Most of the existing treatment options do not make individuals tolerant to FVIII, which is a large reason why new treatments are needed to prevent or remediate inhibitor formation (Aledort LM, 2019). This project proposes an approach that directly targets FVIII-specific immune cells to eliminate them. We have designed a recombinant fusion protein that links an anti-CD8 single-chain variable fragment (scFv; derived from the OKT8 antibody) to an immunogenic region of FVIII (the C2 domain) to specifically direct the patients immune system to eliminate cells responsive to FVIII. We hypothesize that the proposed protein, similar in design to a class of therapeutic proteins known as

BiTEs (Bispecific T cell Engagers), will be able to engage and eliminate FVIII specific B cells in the presence of CD8-positive cytotoxic T cells, leading to tolerance.

Student awardee: Jordan McConville
Faculty name: Alison McCartney
Project abstract: Since its creation in 2014, the Islamic State of Iraq and Syria (ISIS) has been proven to participate in the human trafficking of women. This study expands on the research related to ISIS's use of human trafficking to uncover the extended strategic use of human trafficking by the terrorist group. ISIS traffics women for sexual slavery, traffics prisoners to be sold for profit, and traffics children for forced criminality. Additionally, the recruitment practices of ISIS are considered human trafficking because the recruits are exploited after joining and are persuaded to join through deception or coercion. As part of an Honors Senior Thesis, this research examines what, in the face of the demonstrated human trafficking violations, prevents states from taking counterterrorism actions to defeat ISIS. Provisionally, my findings show that the lack of political will is limited by states' national interest. To support this claim, I will analyze multilateral treaties and domestic law of Iraq and Syria as well as reports published by relevant non-governmental organizations and intergovernmental organizations. Also, I will review secondary source literature on the political will of humanitarian interventions. When states are not intervening on issues with overwhelming evidence of human rights violations, the international order is at risk.

Student awardee: Julian Maycock
Faculty name: John Sivey
Project abstract: The direct cost of metallic corrosion in the United States in 2001 was estimated to be $276 million annual, an amount that represented approximately 3.1% of the national GDP. Development and use of new corrosion inhibitors (CIs) is vital to maintaining a resilient infrastructure. This research is focused on the evaluation and testing of newly synthesized CIs and their ability to prevent corrosion on copper. The applications of these new CIs are extraordinarily impactful in applications like industrial cooling water systems and natural gas hydraulic fracking. If these CIs are proven as effective as anticipated, it would be the next step at creating a more effective strategy toward maintaining industrial infrastructure potentially saving billions of dollars in maintenance and replacement costs each year. Towson received a new inductively coupled plasma-optical emission spectrometer (ICP-OES) last year which is exceptionally effective at analyzing metals. This research project is the first application of the ICP-OES at Towson and this research has been important in evaluating the instrument, developing methods and training students and faculty. This project is now in the later stages of its life as data collection proceeds and is heading toward publication to share exceptional results.

Student awardee: Madisyn Howard
Faculty name: Melissa Groves
Project abstract: There is a lack of research on women's sports and especially field hockey, for example EconLit a database of economics article contains only one article on field hockey, and it is at the high school, while hundreds of economics studies are in the data base on football and basketball. TU spent over $100,000 on the field hockey team last year, while programs with a longer winning history, like University of North Carolina, spend close to three times that. My research will focus on NCAA Division I women's field hockey and its funding. The goal of this research is to understand the impact a college field hockey's team's record has on its funding. I have gathered data on fifteen years of NCAA field hockey revenue, spending and winning for roughly 100 schools. I will use data analysis techniques such as multivariate regression to estimate the relationship between winning and future spending, while controlling for past spending and other factors such as conference. As a women's TU Division I field hockey player, I was intrigued by understanding more about how these specific sports get their money and I hope use my research to promote equity in sports funding and research.

Student awardee: Maya Scher
Faculty name: Erik Ropers
Project abstract: During the Cold War era, the United States became increasingly concerned with the geopolitics of Asia. Under the U.S. occupation of Japan and the U.S. involvement in the Korean War and Vietnam War, American military bases were established throughout Asia and the prevalence of relations between Asian women and American servicemen were used by Japan and South Korea's governments to promote the nation-building of anti-Communist Asian countries. These interactions occurred through prostitution, military base employment of local peoples, the commerce surrounding military bases, and by a variety of other circumstances. Around these military bases, a distinct subculture and industry began to grow. As Japan and South Korea gained political and economic stability, the trafficking of women from Southeast Asia to work in these military sex industries began to take place. This paper examines how Orientalist concepts were imposed upon the Japanese, Korean, and Vietnamese and how they were reinforced by prostitution and relationships between local women and GIs. I also aim to show that the gendered dynamic of military prostitution was transposed upon the American racial imaginary of Asia through analyzing U.S. immigration laws, monographs, images in popular culture, and wartime archives. In establishing this transnational connection, I utilize frameworks of race, gender, sexuality, and nationality to create a more intricate grasp of these narratives.

Student awardee: Morgan Hawkins
Faculty name: Harald Beck
Project abstract: Color perception and discrimination play crucial roles in various aspects of animal behavior, including foraging, mate selection, predator avoidance, and communication. While extensive research has been

conducted on color vision in primates, birds, and bees, there is limited knowledge about color perception in other species, particularly those with more than three types of color photoreceptors. This study aims to investigate color perception, and non-spectral color, as a UV light + purple, etc., discrimination in sugar gliders (Petaurus breviceps); since small arboreal marsupials known for their gliding abilities, and their possession of three-color cone types and one rod opsin, similar but not the same compared to birds (Stoddard et al. 2020).(Stoddard MC, Eyster HN, Hogan BG, Morris DH, Soucy ER, Inouye DW. Wild hummingbirds discriminate nonspectral colors. Proc Natl Acad Sci U S A. 2020 Jun 30;117(26):15112-15122. doi: 10.1073/pnas.1919377117. Epub 2020 Jun 15. PMID: 32541035; PMCID: PMC7334476.)

Student awardee: Nicole Golemboski
Faculty name: Alison McCartney
Project abstract: Migration has emerged one of the largest issues currently facing international politics within our increasingly globalized society because it has exposed a wide array of political, legal, economic, cultural, and political barriers to safe movement. As migration increases, so too does the scope of the actors tasked with managing such barriers and upholding the human rights and safety of migrants. The United States exemplifies the tensions raised by such barriers, as the country has been the main destination for international migrants since the 1970s and continues to have the single highest global migrant stock at 50.6 million migrants (15.3% of the population) in 2020 (International Organization for Migration [IOM] 2022). Local struggles with protecting and integrating migrants directly mirror national trends, as data from the U.S. Census Bureau's 2017-2021 American Community Surveys found that foreign-born individuals constituted 8.1% of Baltimore city's population and 12.3% of the county (U.S. Census Bureau 2023). These individuals often have fled war-torn or insecure areas and arrive with few to no resources, straining local capacity in a city already suffering from high poverty rates. This research will examine the nature of migration issues as they manifest in the greater Baltimore community to identify areas in which local organizations succeed in navigating challenges to human mobility, as well as expose those areas in which protection gaps persist. Revealing trends in the efficacy of local migration management will then allow for the proposition of short-term and long-term solutions that would best guarantee the human security of the Maryland community and its immigrants.

Student awardee: Parker Cross
Faculty name: Bethany Willis
Project abstract: What impacts a person's decision to adopt or not to adopt? This research focuses on testing the theoretical model described by Willis-Hepp (2019) (Figure 1), to see how prospective parents come to an informed, unified decision on whether to adopt. Thousands of children go through the foster care and adoption process each year and their lives depend on the family who adopts them. Therefore, the influences behind each family's decision to adopt has a significant real-world impact. Years ago, George Mead created Symbolic Interactionism (SI), which explains that the idea of 'self' develops via constant, recursive negotiation between 'I'

and ‘me’, where the ‘I’ is the present component of self that responds in the moment and in context, and the ‘me’ reflects other people’s responses to one’s behaviors, once internalized. He introduces the idea of generalized other, which is the ability to understand and interpret social norms and social cues from environments. The question arises: could symbolic interactionism influence the decision-making process to adopt in young adults? While adoption may seem like a relatively individual choice, the ‘generalized other’ can significantly change a person’s decision.

Student awardee: Sumra Chaudhry
Faculty name: Erin Harberts
Project abstract: Ultraviolet (UV) radiation induces DNA damage resulting in skin cell mutations and immunosuppression which can contribute to the formation of nonmelanoma skin cancer. UV-induced cellular damage is commonly associated with apoptosis characterized by a non-inflammatory cell death. Toll-like receptor 4 (TLR4) is a cell receptor and has been shown to contribute to UV-induced carcinogenesis. UV-induced apoptosis requires TLR4 signaling to activate the apoptotic signaling pathway, if TLR4 is absent then UV exposure causes cells to die by a more inflammatory process called necroptosis. We hypothesize that skewing cell death from apoptosis to necroptosis using lipid A mimetics, pieces of bacteria, that bind to TLR4 to reduce TLR4 expression can reduce apoptosis and lead to inflammatory cell death. This skewing of cell death mechanism will ultimately lead to lower incidences of nonmelanoma skin cancer.

Student awardee: Victoria Akingbehin
Faculty name: Michelle Snyder
Project abstract: An estimated 1.2 million individuals lose their lives each year due to antibiotic-resistant bacterial infections, surpassing the mortality caused by HIV/AIDS or malaria. Characterization of novel bacterial virulence factors is critical for identifying targets for new therapeutics that can be used in place of traditional antibiotics to treat bacterial infections. Uropathogenic Escherichia coli (UPEC) is among the most common causative agents of urinary tract infections (UTIs). UPECs survive in hosts using various mechanisms, including by secreting a protein known as TcpC. TcpC is a Toll-like receptor/interleukin-1 receptor (TIR) domain containing protein that modifies mammalian innate immunity by inhibiting the host Toll-like receptors (TLRs). We hypothesize that TcpC also affects the survival of UPECs in model systems, including the social amoeba Dictyostelium discoideum and planaria flatworms.

Student awardee: William Ensminger
Faculty name: Chris Boyd Leon
Project abstract: Air pollution has been shown to be a significant factor in children’s health. Prior research has shown that children exposed to significant amounts of air pollution are vulnerable to certain respiratory and

other health related illnesses. The consequences of these negative health outcomes for children have not been widely explored. This paper analyzes how a child's education can be impacted by air pollution and would estimate the casual effect of air pollution on school attendance in Peru. This topic has not been researched heavily, especially in Latin America, and will look at the country of Peru from the years 2010-2019. The impact air pollution has on short term educational measures such as attendance and long-term measures including educational attainment will be examined. Data for air pollution measures are from NASA while the education variables are from the Demographic and Health Surveys (DHS).