1.) **Curvy Fitspiration (virtual only)--Dr. Lauren Stutts (Mentor)**

Fitspiration, or fitness inspiration, is a popular trend on the visual media platform, Instagram (Holland & Tiggemann, 2017). Fitspiration includes images of thin women in work-out attire. Exposure to fitspiration has been found to lower body satisfaction and increase negative mood in women (Rounds & Stutts, 2020). However, there is another type of fitspiration that includes bodies that are of larger size in work-out attire called “curvyfit” (Webb et al., 2019). While the impact of fitspiration has been examined (Rounds & Stutts, 2020; Sherlock & Wagstaff, 2018; Tiggemann & Zaccardo, 2015), no research to my knowledge has examined the impact of curvyfit images on individuals. Because these images contain a more diverse range of body types, it is expected that they would have less of a negative impact on women compared to fitspiration images. In addition, these images also could potentially reduce weight bias as they would provide counterstereotypic images. Previous research has found that exposure to counterstereotypic information about individuals who are obese reduces weight bias (Lin & Stutts, 2019). However, no previous study has examined the impact of fitspiration or curvyfit images on weight bias. Therefore, the aim of the present study is to examine the impact of curvyfit Instagram images and fitspiration on body satisfaction and weight bias in women. This project will be completed virtually only this summer.

2.) **Graduating During a Pandemic-- Dr. Mark Foley (Mentor)**

"There are various reasons students may take longer than expected to complete a bachelor’s degree, including unforeseen medical conditions, financial distress, and family issues, but strategically delaying graduation because of a recession or pandemic is a novel behavior. Especially in the current COVID-19 pandemic, not only is there a recession, but the “full-college-experience” is limited. Therefore, I expect some students to delay graduation, and I aim to quantify the effect this has on employment, wages, and other outcomes, recognizing the potential *benefit* of delayed graduation for students who strategically choose *not* to graduate in an economic downturn because of a financial crisis or a pandemic."

3.) **Engineering Enzymes-- Dr. Hanna Key (Mentor)**

In my research group, I study enzyme engineering, an interdisciplinary field that aims to redesign the structures of naturally occurring enzymes in order to give them new functions. Engineered enzymes have broad applicability in medicine, in the preparation of drugs and materials, and in environmental remediation, among other applications.
Dr. Hanna Key, continues…
More specifically, my research group studies the engineering of transaminases, which are key enzymes used to synthesize amines. Amines are among the most common functional groups in drugs and biologically active compounds, and by engineering transaminases to have expanded functions, we can create methods that expedite drug synthesis. To engineer transaminases, we will examine the crystal structure of the enzyme, and identify sites in the enzyme for modification. In an accelerated version of the natural process of evolution, we will then introduce mutations to the enzyme and select for enzyme variants with our targeted functions. Should we instead approach our research online, we will use computational methods to predict the changes that could confer improvements in the function of transaminases. Both laboratory methods used to engineer enzymes and computational methods used to model biological macromolecules have broad applicability. Therefore, the skills learned as part of this research program will not only contribute to my research direction, but also prepare you for further research in a multitude of areas. Previous students from my research group have gone on to medical school and graduate school in both chemistry and molecular biology.

If you are interested in this research area, you don't need any particular coursework or research experience to be eligible to join my group, though a semester of organic chemistry could be helpful. Most important is that you are excited to learn new things to facilitate your work! If you would work in my research group this summer, you would join a group of 3-5 other undergraduate students that include rising sophomores, juniors, and seniors majoring in chemistry, biology, and other majors. If you have any questions, please don't hesitate to send me an email at hakey@davidson.edu.

4.) Coming to America: Transnational Lives of Ghanaians in the US—Dr. Joseph Ewoodzie (Mentor)

The selected student will work with my collection of family letters. Recently, my father discovered about 2,000 letters, mostly correspondence between my grandfather in Ghana and his children in the U.S. between 1970 and 2000. The student’s task this summer will be to read through portions of the letter and help me code. To prepare the student for this task, I will provide the student with introductory research methods readings and teach them how to code primary data. I will also teach the student how to use NVivo, a qualitative research software. They will code for three main things, the three main objectives of the overall project: motivation for international migration, the process of migration, and the consequences of migration. The student will focus primarily on the consequences of migration especially on discussions about remittances. From the letters, we will learn about remittances from both the point of view of the sender and the receiver. We will compare what we learn to what other researchers have written about the subject.

5.) Protein Family Functions-- Dr. Bryan Thurtle-Schmidt (Project Facilitator)

My lab studies how a class of proteins moves molecules into and out of cells through the plasma membrane. In humans, a protein named Band 3 is responsible for carrying bicarbonate (a derivative of carbon dioxide) across the membranes of red blood cells. Band 3 activity thus enables us to breathe. In plants and in yeast, a related protein named Bor1 transports borate, an essential plant micronutrient that is necessary to support plant growth but toxic in excess.
Dr. Bryan Thurtle-Schmidt, continues…
Students in my lab perform biochemical experiments to probe how this protein family functions to move their substrates across membranes.

6.) **Climate Change**-- Dr. Susana Wadgymar (Mentor)

*In person project:* Climate change is altering many environmental variables across the globe, including changes in temperature and precipitation. However, other environmental variables, like daylength, will remain unaffected by climate change. Many natural organisms rely on specific environmental cues, combinations of cues, or sequences of cues to signal the appropriate time to grow or develop. For example, plants often germinate from seeds or begin to flower when they experience specific temperatures or daylengths. How will plant development be affected as temperatures change and daylengths remain the same? The members of my lab will be conducting a large field experiment to explore this very question in an annual plant called *Chamaecrista fasciculata*. There are many opportunities to develop a specific project within the scope of the larger experiment, including questions about herbivory, pollination, plant growth and development, and plant associations with soil microbes. There are also many other plant-related projects available. Additionally, there will be opportunities to discuss the scientific literature related to the project in group journal club, learn how to collect, enter, manage, and analyze data, and to explore other professional development opportunities of interest.

*Remote project:* We can collect data on natural organisms now to learn about their ecology and evolutionary trajectory. But did you know we can also collect data on natural organisms that lived decades ago? And that we can use this information to learn about a species’ evolutionary ecology? Plants have been collected for centuries and stored in herbaria, which are like museums for plants. Many herbarium records have now been digitized, which allows us to search online and view specimens of interest. These specimens provide a snapshot of a species in time from a particular location. We can collect data on the morphology of the species, where it occurs, and what developmental stage it was in when collected to ask questions about its range, the kind of habitats it is found in, and whether it is evolving. This project will involve collecting data from herbarium records of an annual plant called *Chamaecrista fasciculata* and assessing whether there is any evidence that it has evolved under climate change. This project will also include current-day observations from community science websites like iNaturalist to ask questions about the species’ distribution and development. This project includes the opportunity to discuss the scientific literature related to the project, learn how to collect, enter, manage, and analyze data, and to explore other professional development opportunities of interest. *Please contact Susana Wadgymar with any questions* (suwadgymar@davidson.edu).

7.) **The Functional Significance of Cortical Plasticity**-- Dr. Julio Ramirez (Mentor)

Our primary research goal is to determine the functional significance of hippocampal sprouting after entorhinal cortex damage in rats. This model neural system exhibits a set of well-defined behavioral and morphological changes in response to differentiation.
**Dr. Julio Ramirez, continues…**

Several recent investigations have implicated sprouting by the crossed temporodentate projection to the dentate gyrus of the hippocampal formation in behavioral recovery from unilateral entorhinal cortex lesions. However, the issue of whether these proliferated connections are indeed functionally significant is far from resolved. Students involved in the DRI program will participate in on-going electrophysiological projects focusing on facilitation of the crossed temporodentate projection after its sprouting response has been induced by entorhinal cortex lesions as well as on behavioral projects exploring the use of a Y-maze (a spatial memory task) or the operant chamber as an assay for the effects of limbic system lesions on mnemonic functions. The primary pedagogical goal of our research program is to broaden students’ knowledge and training in neuroscience and to kindle an interest in and an appreciation for the issues with which neuroscientists are concerned. This experience will significantly improve the training of undergraduate students as they prepare for entry into careers in science, medicine, or public policy.

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**8.) A Study of SAR-CoV-2-- Dr. Nicole Snyder (Mentor)**

The novel coronavirus (COVID-19) is a respiratory disease that has infected millions of individuals globally. The SARS-CoV-2 virus, which causes COVID-19, has been shown to infect host cells by engaging specialized molecules, known as glycosaminoglycans or GAGs, which are found on the surfaces of host cells. GAG engagement is believed to be one of the first steps in the viral entry pathway of SARS-CoV-2, and recent research by our collaborative research team, including the groups of Prof. Laura Hartmann (HHU, Germany) and Mario Schelhaas (WWU, Germany), and others has demonstrated that molecules that mimic these GAGs have the potential to attenuate viral engagement. We are currently focusing on expanding our efforts in this area to generate viral inhibitors that can be used in conjunction with current vaccines to combat COVID-19 and the emergence of new variants of COVID-19. Students selected to work on this project will contribute to our efforts by working to synthesize and evaluate GAG mimetics as viral inhibitors of SARS-CoV-2. This project includes a mix of synthetic (GAG mimic synthesis) and biochemistry (GAG mimic evaluation against recombinant SARS-CoV-2 spike proteins) work.

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**9.) Transgender or Fat Studies-- Dr. Melissa Gonzalez (Mentor)**

*Davidson’s Transgender Archive Project #1*

The student joining this project will be trained in using archives as well as transcribing oral interviews. Their work will consist of searching the Davidson archives, with guidance, seeking examples of non-normative gender expressions among the materials (including, for example, yearbooks, newspapers, letters, minutes of meetings, disciplinary records from throughout the history of Davidson). They may also work on digitizing materials and the transcribing of oral interviews. A student with pre-existing web development skills would take the lead on designing the website that will hold digitized versions of the digitized materials.
Dr. Melissa Gonzalez, continues…
If research can be conducted in-person, both students and faculty advisor will meet biweekly in the Davidson library and/or other spaces on campus. Otherwise, we will meet primarily via Zoom, though the plan is to also enjoy some outdoor, socially distanced meetings.

Fat Studies Project #2
The student joining this project will choose whether to assist the locating, assessing, and summarizing of scholarly work in order to contribute to a co-authored literature review and/or with the researching of solo-authored auto-ethnographic essay. The purpose of a literature review is to offer evaluative summaries and critical analysis of the scholarship on a specific topic or, as in this case, a field. An auto-ethnographic essay is a self-reflexive piece of writing that connects the writer’s own experiences to a broader, socio-cultural context, in this case experiences of fatness at the intersection of class, ethnicity, gender and/or other dimensions of social difference. Fat studies is a broad field that “critically examines societal attitudes about body weight…advocates equality for all people with respect to body size,” and, more recently, focuses on intersections of fatness and identity markers including “race, ethnicity, gender, or age” (Rothblum 2011). The larger project explores the broad contours of fat studies and new directions for future research through an evaluation of auto-ethnographic methodologies’ value for intersectional analysis. Building on scholarship showing how fatphobia has contributed to the marginalization of fat people, including poorer job outcomes and lower quality healthcare, (Averett 2019, Gonzalez 2018, Owen 2012, Schoenfielder 1988, Tomiyama et al., 2018), some fat studies scholars have taken a more intersectional approach, exploring how the origins of fatphobia are intertwined with the origins of anti-Blackness, ableism, and cis-heterosexism (Jones 2014, Longhurst 2014, Strings 2019). Intersectional fat studies scholarship demonstrates that although not all fat people experience marginalization in the same way, marginalization operates through biological notions of difference embedded within anti-Blackness, cis-heteronormativity, and ableism (Erwin 2011, Pause 2014, Prohaska 2019, Stallings 2020). In addition to a literature review, this project will contribute to the field of fat studies by producing auto-ethnography to explore the potential of this methodology as an avenue for intersectional fat studies research.

10.) Sport Analytics—Dr. Tim Chartier (Mentor)
Sports analytics has gathered tremendous momentum as a dynamic field of business, government and academia. Moreover, the field of sports analytics also prepares one for the field of data analytics where domain knowledge in such areas as finance, transportation, medicine, and retail can be significant. This work is connected to the efforts of the Davidson College sports analytics group that offers data-driven insights to the college teams and professional teams in the NBA, NFL, and NASCAR; the group also fields media questions from such outlets as ESPN and The New York Times. In particular, the group is interested in automated narratives. One project will create automated summaries of Davidson games from play-by-play and social media. Such narratives are released to the media after the game. A second project will create scouting reports for coaches using online databases and Davidson athletics’ subscription to private datasets. Students interested in learning more about these projects can request more information (or a Zoom meeting) by reaching out to Prof. Tim Chartier tchartier@davidson.edu