"Biomechanical gait profile and tissue characteristics following a real-world walking event in individuals with and without chronic ankle instability"

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PROJECT SUMMARY

Individuals with chronic ankle instability (CAI) often exhibit a laterally shifted center of pressure during gait, resulting in changes to the force distribution on the talar cartilage. While laboratory-based gait interventions have been developed to reduce these deleterious movement patterns, the long-term goal of this study is to create an intervention that can be implemented in real-world settings, maximizing the benefits of the steps individuals already take each day. The first step in developing such an intervention is to characterize the biomechanical strategies and tissue responses, specifically talar cartilage deformation, of individuals with and without CAI during everyday walking. In this case-control study, participants with and without CAI will walk a predetermined course across campus while wearing wearable inertial measurement units (RunScribes) to capture their gait patterns in a natural environment. Ultrasound imaging of the talar cartilage will be conducted before and after walking to assess tissue response. We will compare differences between groups (CAI vs. healthy), time points (pre- vs. post-walking), and course elements (e.g., stairs, hills, flat ground, changes in direction). This data will help us map the gait strategies of individuals with CAI, understand the impact of walking on talar cartilage, and explore the relationship between movement patterns and cartilage response. These insights will serve as a foundation for developing a real-world gait intervention tailored to individuals with CAI.

IMPACT ON THE ATHLETIC TRAINING PROFESSION

The goal of this study is to provide background data so that a real-world setting gait intervention can be developed utilizing wearable technology. As athletic trainers working in an increasingly tech-driven world, it is essential that we integrate current technologies into clinical practice. This study represents a first step in leveraging wearable devices, such as inertial measurement units (IMUs), to inform gait interventions in the environments our athletes encounter every day. Rather than reducing face-to-face time with athletes, wearable technology allows us to maximize our patient encounters. By capturing data during the steps athletes already take in daily life, we can better understand their movement patterns and reserve in-clinic time for hands-on, individualized interventions.

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I am Madison Swails, a fourth-year Ph.D. student majoring in biology at the University of North Carolina at Charlotte with a research focus on biomechanics with an emphasis on injury risk reduction. Originally from Evansville, Indiana and still a hoosier at heart, I completed my undergraduate studies at Butler University in Human Movement and Health Science Education. After earning my B.S. degree, I went on to earn my Master's in Athletic Training from High Point University. I have worked as a collegiate athletic trainer at the University of Louisville, working with the Women's Soccer and Tennis programs, and at OrthoCarolina Sports Medicine Center, where I worked alongside orthopedic specialists in a clinical setting. Outside of my academic work, I enjoy an active lifestyle with my husband, Travis Swails, also an athletic trainer, and our two boxers, Argo and Niner. Whether running, lifting, or heading to the park, we enjoy fitness and staying active outdoors!