



# Undergraduate Research Symposium **May 17, 2019 Mary Gates Hall**

## Online Proceedings

---

### **POSTER SESSION 1**

**MGH 241, Easel 159**

*11:00 AM to 1:00 PM*

#### **Kids, Start Your Engines: Driving Community-Based Early Powered Mobility Tracking with a Custom Data Logger**

*Michelle E. (Michelle) Chuang, Junior, Electrical Engineering*

*Winston Lowe, Sophomore, Pre Engineering*

*Joseph Delmar St. George, Senior, Electrical Engineering*

*Mentor: Heather Feldner, Rehabilitation Medicine*

Rehabilitation research has demonstrated the benefits of early powered mobility intervention for children with disabilities, from improving developmental skills to empowering children to better participate in family and community life. However, traditional powered mobility devices are often stigmatizing, costly, and require specialized transportation due to their size and weight. One alternative early powered mobility option that has sought to address several of these concerns, The Go Baby Go Mobility and Socialization Project, provides children with disabilities a means of socially welcoming, early independent mobility experiences through custom safety and accessibility modifications to commercially available toy ride-on cars. The Go Baby Go project has resulted in promising pilot research along with community-based outreach and education in collaboration with families, clinicians, and engineers. However, a means to efficiently track car performance in real-world environments without the presence of a researcher has been lacking. Therefore, the purpose of our project was to develop a customized data logger and companion Arduino code with the ability to collect real-time data from the cars as families use them in their homes and communities. Our multidisciplinary team has created and implemented a system which gathers car performance data automatically via integrated sensors, including the number and duration of switch activations, frequency and duration of use, outdoor location, distance traveled, and driving terrain. Housed in a simple, waterproof food storage container, the data logger is integrated into the car's electronics and powered by the car battery, with data stored on a micro-SD card. Preliminary analysis of results from eight cars in local communities is ongoing and will be shared; initial feasibility of our system for real-world tracking without undue research presence or caregiver reporting burden is promising. Future

research goals include full quantitative analysis of car use patterns to improve technology design and implementation in community settings.

### **POSTER SESSION 4**

**MGH 258, Easel 190**

*4:00 PM to 6:00 PM*

#### **Social Factors and Their Association with Rehabilitation Care for Older Adults with Bothersome Pain**

*Elise Hoffman, Senior, Public Health-Global Health*

*Innovations in Pain Research Scholar*

*Mentor: Sean Rundell, Rehabilitation Medicine*

Pain is a major contributor to disability, and is more prevalent among low income groups. Rehabilitation care can be an effective treatment, although access and improvement may be associated with social factors. We examined the association of social factors (English proficiency and income) with rehabilitation use, improvement in rehabilitation, and meeting treatment goals among older adults in bothersome pain. We hypothesized: 1) participants with lower English proficiency will experience less improvement and achieve treatment goals less often than participants who are proficient in English and 2) participants with lower incomes will experience less improvement and achieve their treatment goals less often than higher income participants. This is a secondary analysis of the National Health and Aging Trends Study (NHATS), a cohort study representative of Medicare beneficiaries. Participants are interviewed yearly with a self-reported health and socioeconomic survey. We included community dwelling participants who indicated being bothered by pain in the last month. Participants reported how well they understood or spoke English. "Not well" or "not at all" was considered not proficient. Income was self-reported as total household income. Outcomes reported are rehabilitation use for pain related reasons in the next year, improvement with rehabilitation, and meeting treatment goals. Descriptive analysis suggests participants with lower English proficiency had higher rates of rehabilitation improvement. Rehabilitation users have a median income about \$6,000 higher than non-users, however there is no difference in income between improvement groups or those that do or do not meet rehabilitation goals. We found lower income is associated with lower rehabilitation use but not improvement among participants in bothersome pain. These results indicate improvement is con-

sistent among rehabilitation users however, access is limited for lower income participants. More work is required to determine how barriers can be eliminated to improve access to rehabilitation care for people in pain.