



BEAP

Built Environment and Active Populations Lab

THE EXAMINATION OF COMMERCIAL WEARABLE DEVICES FOR CHILDREN AND YOUTH WHO USE MANUAL WHEELCHAIRS

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**October 17, 2025
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INTRODUCTION

Physical inactivity is the fourth leading cause of death globally.¹ Children and youth experiencing disability are less likely to be physically active compared to their peers increasing the risk of disease and mortality.² Some popular commercial wearable devices are Apple Watch, Garmin, Fitbit. These devices are being marketed more and more towards children and youth. This research looked at understanding where commercial wearable devices are at for children and youth who use manual wheelchairs. Step count is a common health metric able-bodied individuals measure. For people who use manual wheelchairs push count is the equivalent.

When searching the academic literature on commercial wearable devices,

- Step count accuracy for children and youth,
- Push count accuracy for adults, children, and youth,
- Children and youth's experiences with these devices without a mobility impairment and with,

there is not a lot of research out there. Accurate physical activity data and devices that are designed with children and youth in mind could be an important step for increasing physical activity for everyone.



METHODS & RESULTS

We first looked to see if there was any research on how accurately push count is measured on these commercial wearable devices for children and youth. We did this by going through all the articles that were initially collected for 2 systematic reviews on the accuracy of commercial wearable devices. **There was no research found on the accuracy of push count detection for children and youth.**

Next, we did 2 interviews with youth who use a manual wheelchair and 1 of their parents. During these interviews we explored their experiences with a commercial wearable device. From these interviews 5 themes emerged, youth friendly, interest, tracking health metrics, concerns, and designing devices. In general we found that:

- The devices were satisfactory and usable for both youths.
- Both youths struggled to remember their initial interest in the devices. Parent's prior device usage might influence their child's device usage.
- The youths were able to track their health metrics on the devices. As of 2025 there are only 2 brands that have a wheelchair mode on their watches. These 2 brands are Apple Watches with Watch OS 10+ and Garmin VivoActiv 5. Both parents appreciated the watches' ability to track different health metrics.
- The concerns that came up were the bands being uncomfortable, it being itchy under the watch face if worn for an extended period, teachers not wanting students to wear these devices, losing or breaking the device, the accuracy of the push count, and parent's concern with electronic usage.

The first thing both youths suggested when asked about the advice they would give to someone designing the devices was that there should be someone in a wheelchair there to test them out. Other design features that were mentioned were more brands that have a wheelchair mode, enabling users to use their hand gestures to control the devices, tracking distance while doing different activities, pencil friendly, a flip cover that would be both protective and open to increase the screen size, and parental control.



DISCUSSION

This study explored commercial wearable devices for children and youth who use manual wheelchairs. From our search we found no previous research has been done on the accuracy of push count detection for children and youth with commercial wearable devices. From the interviews we found that these commercial wearable devices tend to be youth friendly, interest in the devices varies, both the youth and their parents appreciated the device's ability to track health metrics, there were some concerns about the devices, and suggestions about future device design features.

Recruitment for the interviews was challenging. There was not a lot of interest and gaining access to potential participants for engagement was difficult. Reaching out to coaches instead of organizations was helpful.

RECOMMENDATIONS

With regards to recommendations to commercial wearable device brands:

- 1. Every device should have the option of a wheelchair mode.**
- 2. There should also be someone in a wheelchair that is there to test these devices out before they are released.**
- 3. Bands that are Velcro and long are preferred.**
- 4. Making the watches durable and easier to select the desired function is of value.**

With regards to researchers, more research needs to be done. The accuracy of these devices to detect pushes for children and youth who use manual wheelchairs needs to be researched. More research should be done on this population's experience with the devices. Finally, future research in this area can focus on innovative recruitment strategies for children and youth with disabilities so that this population does not get missed in research.



CONCLUSION

There is more research that needs to be done in this area of examining commercial wearable devices for children and youth who use manual wheelchairs. Increasing physical activity levels for children and youth who use manual wheelchairs requires accessibility in multiple domains. One of these domains is the accessibility of commercial wearable devices for tracking and motivating an increased amount of physical activity. These devices should not only be accessible for children and youth without a disability.



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