FINAL REPORT

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WEARABLES FOR WELLNESS

REPORT SUBMITTED BY

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INTRODUCTION

Purpose

The use of wearable technology to support self-directed healthcare has grown exponentially since the COVID-19 pandemic. At the same time, an increasing number of healthcare practitioners and insurance providers are incorporating wearables into patient-based management strategies to monitor health indicators, prevent chronic and acute conditions, and reduce overall healthcare costs.

As these demands expand, individuals with intellectual and developmental disabilities (IDD) are increasingly likely to be asked—or required—to use wearable technologies that may not be designed for users with disabilities. In particular, cognitive accessibility is rarely prioritized during the design, testing, and implementation of health-related wearables and other technology solutions.

To advance inclusive design and equitable user experiences, rigorous research is needed to assess and improve the approach to health wearable selection, utilization, and reporting to ensure individuals with IDD are empowered to self-direct their own health care and outcomes.

PARTNERSHIPS

The Wearables for Wellness (W4W) study was intentionally designed as a collaborative effort among partners with diverse areas of expertise, resulting in a comprehensive and holistic research initiative. This level of cross-organizational collaboration required purposeful infrastructure, strong relationship-building, and sustained communication. These coordinated efforts strengthened both the rigor of the study and the overall impact of the research.

ORGANIZATION	DISTINCTIVE CONTRIBUTIONS
OKLAHOMA Human Services	Commitment to Technology First with continuous evaluation and research of technology solutions for accessibility and enhanced care. Provided guidance and funding through American Rescue Plan Act Funds.
State of the States In Intellectual and Developmental Disabilities	Lead researchers in Technology First Systems Change. Expertise in cognitive accessibility of technology solutions, and inclusive research for people with IDD. Provided oversight of research methods and management.
OSU CENTER FOR DEVELOPMENTAL DISABILITIES	Research and training unit with expertise in IDD, Self-Determined Learning Model of Instruction, grassroots participant recruitment, and methods for applied research execution. Led project recruitment and health goal setting.
Developmental Disabilities Council of Oklahoma	Expertise in systems change, capacity building, and advocacy for people with IDD. Supportive in participant recruitment and accessible information translation.
ABLE Tech	Assistive Technology Act Program of OK with expertise in assistive technology (AT) devices and services, digital accessibility, training, and education. Provided feature matching and wearable device training.

RESEARCH METHODOLOGY

The study was designed as a randomized controlled trial, with a consumer-selected healthcare wearable serving as the intervention under investigation. The sample population included adults with intellectual and developmental disabilities (IDD), ages 18 to 60.

Participants were invited to:

- Develop individualized health-related goals;
- Receive training on how to use and wear a healthcare wearable device; and
- Complete pre- and post-surveys to assess accessibility, usability, and behavior change associated with health goal setting.

In total, 76 participants were enrolled across both the control and intervention groups.

Participants in the intervention group completed baseline assessments, established a personalized healthcare goal, and were matched with a wearable device aligned with that goal. They received training on how to use the device, utilized the wearable over a six-month period as part of their goal attainment process, and then completed post-intervention evaluations.

The control group completed the same pre- and post-assessments over an equivalent timeframe but did not receive a healthcare wearable during the study period. This design enabled the research team to assess whether access to and use of a wearable device supported attainment of healthcare goals.

To promote equity in the research process, members of the control group were offered the opportunity, following completion of their post-evaluation, to select a wearable aligned with their self-directed healthcare goal and receive training on its use.

MEASUREMENTS

Technology Utilization

The Technology Needs and Barriers Online Survey (Tanis, et. al 2012) was used pre- and post-intervention to gauge technology needs and barriers. This instrument is validated for people with IDD and is built on a cognitively accessible online platform from AbleLink Technologies.

Time samples were taken at 1 week, 1 month, and 3 months with the intervention group to evaluate wearable utilization over time and training success.

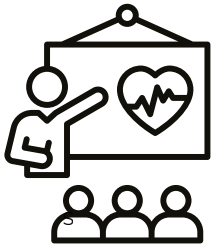
Wearable Accessibility Features

Healthcare wearable technologies were selected based on built-in accessibility features. Consumer choices aligned with healthcare goals were then analyzed to identify the most common accessibility features, informing inclusive design and guiding healthcare provider recommendations.

Health Management

Individuals used a modified version of the Self-Determined Learning Model of Instruction (Shogren & Raley, 2023) to set healthcare goals and guide wearable selection. *The Goal Attainment Scale* (Kiresuk & Lund, 1976) was used to evalute success of health goal attainment with wearable technologies.

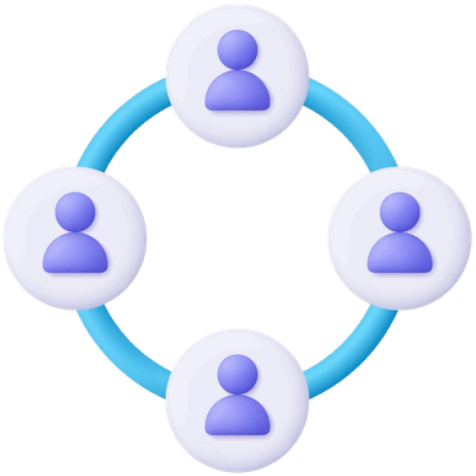
Technology Training



The Technology Resilience, Agility, and Literacy Questionnaire (Tanis, 2024) was used to evaluate the participants' technology literacy skills pre- and post-intervention. To support learning and ongoing maintenance of technology-specific training information, several training videos were made for participants using the most popular wearables selected across the study.

EMBEDDED PROMISING AND BEST-PRACTICE

From the outset, project planning was highly collaborative and intentional, engaging all organizational partners in a thoughtful review of promising and evidence-based practices to embed into the study design. This deliberate approach ensured that participant success, accessibility, and self-direction were central to implementation. Six strategies were employed throughout the study.



1. Use of best practices in consent/assent for participants with disabilities to meaningfully participate in research.
2. Utilization of online measurements built for cognitive accessibility.
3. Utilization of feature matching for healthcare technology solutions based on the participants' health goals.
4. Individualized training for technology use.
5. Healthcare wearable training videos included in the project resources to support device use and maintenance, as well as cognitive accessibility.
6. Tracking of device abandonment to enable timely training and user support.

STUDY PARTICIPANTS

Demographic information on all study participants (N=76) was gathered. Nearly half the participants were ages 18-26. Twenty-five percent were aged 27-42, and the remainder were 43 years and older.

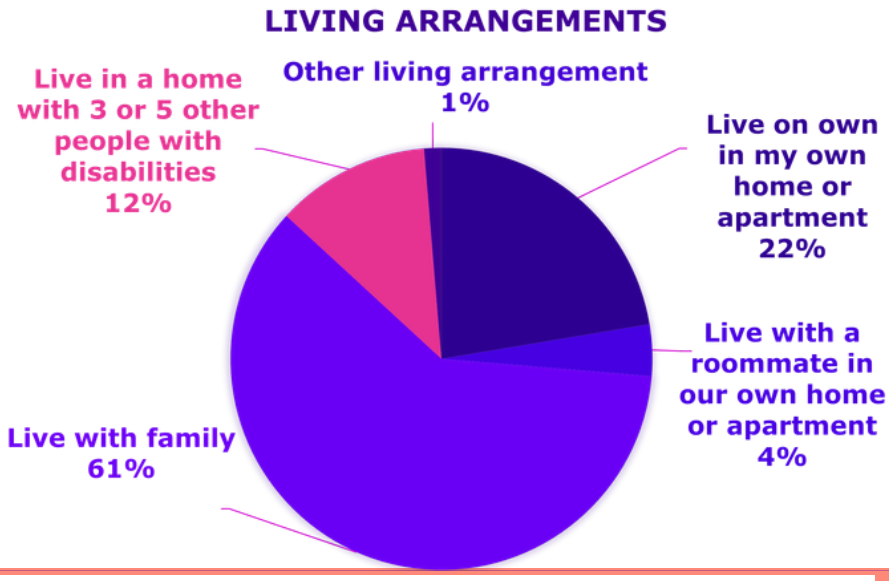
Participants were asked if they received waiver services through Oklahoma Human Services. Forty-six individuals identified as receiving services, 19 did not receive services, and 2 did not know.

The study examined race and found that the overwhelming majority of participants identified as white (76%), 11% multi-racial, 10% American Indian or Alaska Native, and the remaining participants identified as Black or African American.

When participants were asked, “What is the disabling condition preventing you from completing a task?” 18 participants identified physical support needs, 16 literacy support needs, 14 learning support needs, 9 memory support needs, and 6 speech support needs.

Chart 1 outlines the participants’ living arrangements, with the majority of people living with family caregivers.

CHART 1. PARTICIPANT LIVING ARRANGEMENTS



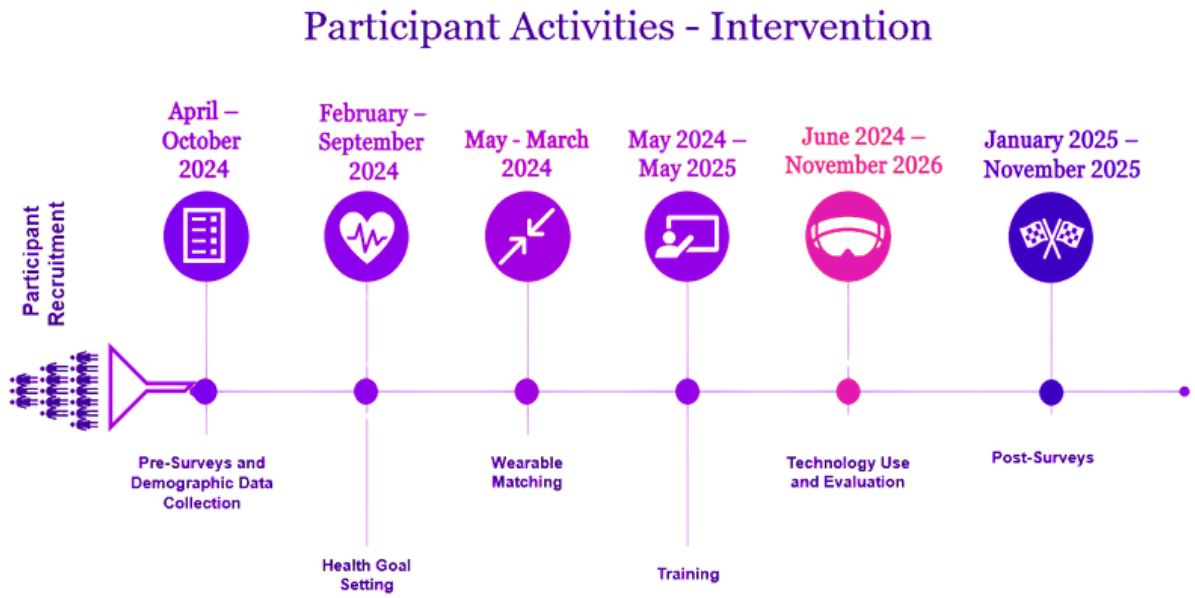
STUDY DESIGN

The study was designed to have six phases: 1)participant recruitment with pre-survey demographics and data collected, 2) health goal setting using the modified self-determine learning model for setting health goals, 3) wearable matching to align the health goal with wearable features, 4)individualized healthcare wearable training completed by experts at AbleTech, 5) technology utilization and monitoring, and 6) post-survey data collection.

The original project timeline began in January 2024, with completion for both the intervention and control groups projected for May 2025. However, challenges with participant recruitment resulted in a five-month delay. As a result, the project team adjusted the implementation schedule, staggering wearable device training over nearly a year instead of the originally planned six months and adjusted measurement deployment.

These delays extended the overall project timeline beyond the initial end date of May 2025. Final data collection occurred in November 2025, and the final report delivered in 2026. Chart 2 below outlines the revised project timeline.

CHART 2. REVISED PROJECT TIMELINE



HEALTH GOAL SETTING

As part of the self-directed model for identifying technology solutions through goal setting, the project team outlined procedural questions to support individuals with IDD in identifying a health goal.

What can I do to be healthy?
What do I know can help me be healthy?
What can I change in my environment to live a healthy life?
What can I do to live a healthier life?
What are my strengths and supports?
What may keep me from achieving my health goal?

IN ONE SENTENCE, WHAT IS YOUR HEALTH GOAL?

Participants identified a wide range of healthcare goals, offering valuable insight into the types of health outcomes that are most meaningful to individuals with IDD. Examples include:

"I want to ride my bike 20 min. 3 days a week."
"My goal is to limit the times I go to the gas station and buy junk food to one time per week."
"I want to do 20 arm reps and 20 leg reps of my strength exercises every Mon., Wed., and Fri. so I can be stronger."
"I want to follow a 1,500 calorie a day diet 7 days a week for 4 months."
"I want to get faster (build stamina) at walking to work by getting there in 30 min. rather than 40 min."

General Areas of Health Wearable Monitoring Based on Health Goals			
General Exercise	Navigation Safety	Specific Exercise (Bike, Zoomba, Swimming, etc.)_	Nutrition
Walk/Run	Medication	Hydration	Sleep Cycles

INTERVENTION STATISTICAL SIGNIFICANCE

The final sample included 34 participants in the control group and 35 participants in the intervention group. Because of the small sample size and the large number of variables examined, there is a considerable risk of false-positive findings. As such, they might not replicate in future research.

We failed to reject the null hypothesis of no difference between the intervention and control groups on the *Technology Needs and Barriers Survey*. Although we failed to reject the null hypothesis, it is important to note that it would be premature to 'accept' it, as many other hypotheses are also consistent with these data. In other words, absence of evidence is not evidence of absence.

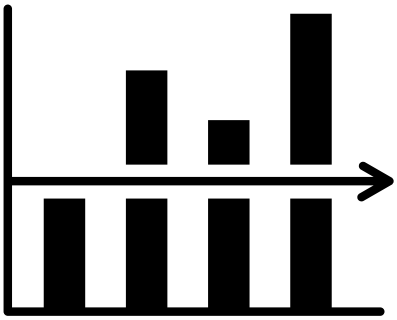
In examining the *Technology, Resilience, Agility, and Literacy Questionnaire (Tech-RAL Q)*, we found significant pre- and post-test effects on technology agility and technology literacy after controlling for pre-test scores.

Tech-RAL Q: N = 64 (with both pretest and posttest)

Tech_Agility: The intervention group had 0.111 (SE = 0.051) higher posttest scores than the control group, after controlling for the pretest scores (p = 0.030).

Tech_Literacy: The intervention group had 0.103 (SE = 0.045) higher posttest scores than the control group, after controlling for the pretest scores (p = 0.022).

Tech_Resilience: The group difference was not statistically significant.



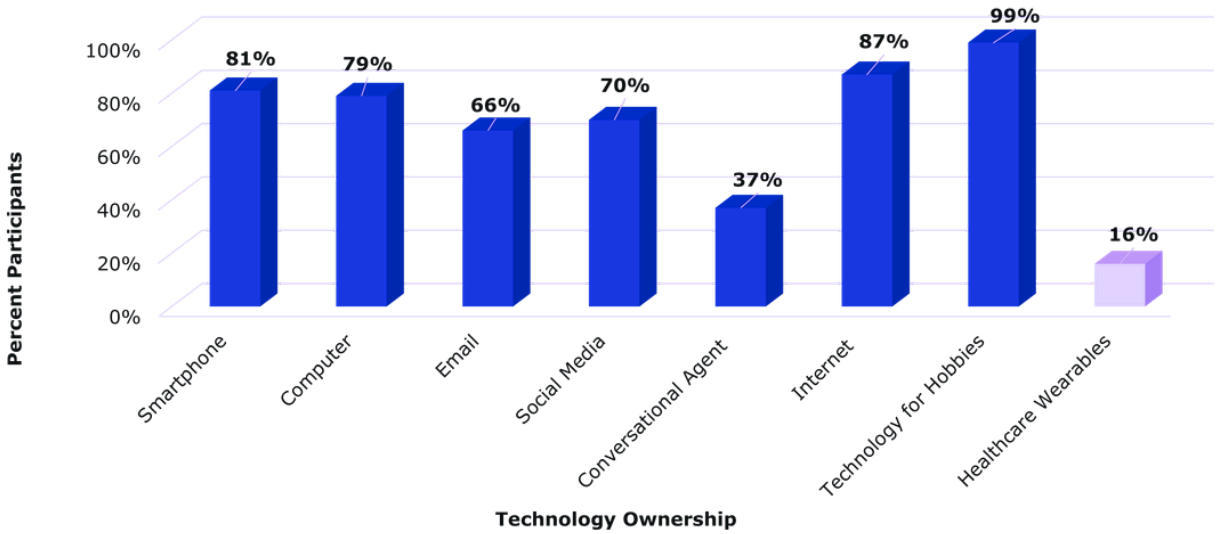
SECURING CRITICAL BASELINES

Although no large statistically significant differences were detected between the control and intervention groups through the pre- and post-test, the data collected through the *Technology Needs and Barriers Survey* and the *Tech-RAL Q* provide the state with critical baseline information to identify trends, advance future research, and inform strategic planning.

Descriptive statistics that combine pretest data from both the intervention and control groups offer valuable insight into the technology needs of people with IDD in Oklahoma. The following charts identify key takeaways.

1. PEOPLE WITH IDD HAVE ACCESS TO TECHNOLOGIES, BUT DO NOT OWN HEALTHCARE WEARABLES (N=70)

Response to the question of what types of technologies do you own?



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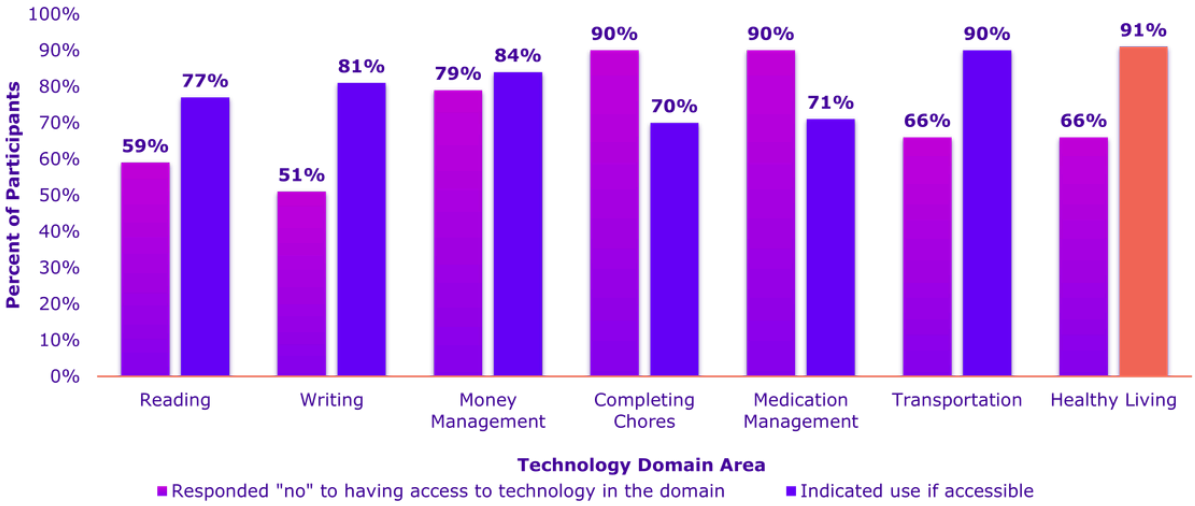
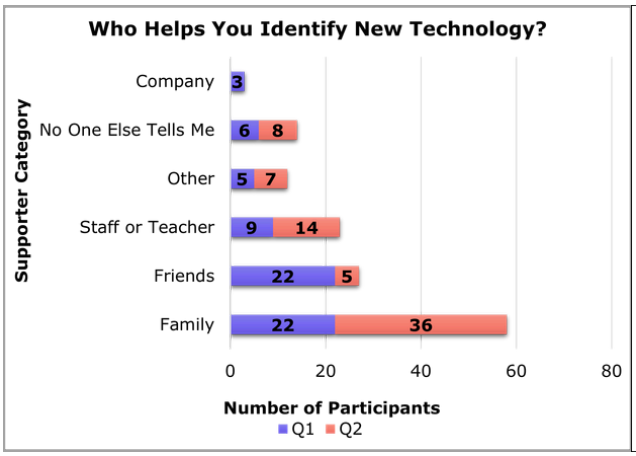
2. PEOPLE WITH IDD DO NOT HAVE ACCESS TO TECHNOLOGIES FOR KEY SUPPORT AREAS, BUT IF AVAILABLE, WOULD USE THEM.

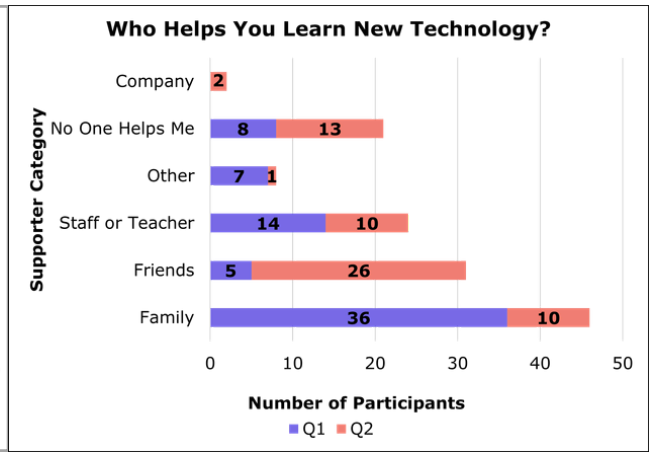
Participants who indicated “no” to currently using a particular technology domain were subsequently asked whether they would consider using technology in that domain if it were available to them.



3. FAMILY MEMBERS ARE THE PRIMARY SOURCE FOR IDENTIFYING AND LEARNING NEW TECHNOLOGIES

Responses to the question, “Who helps you identify and learn about new technologies?” Q1 represents the first group of supporters selected, while Q2 represents the second group of supporters selected.





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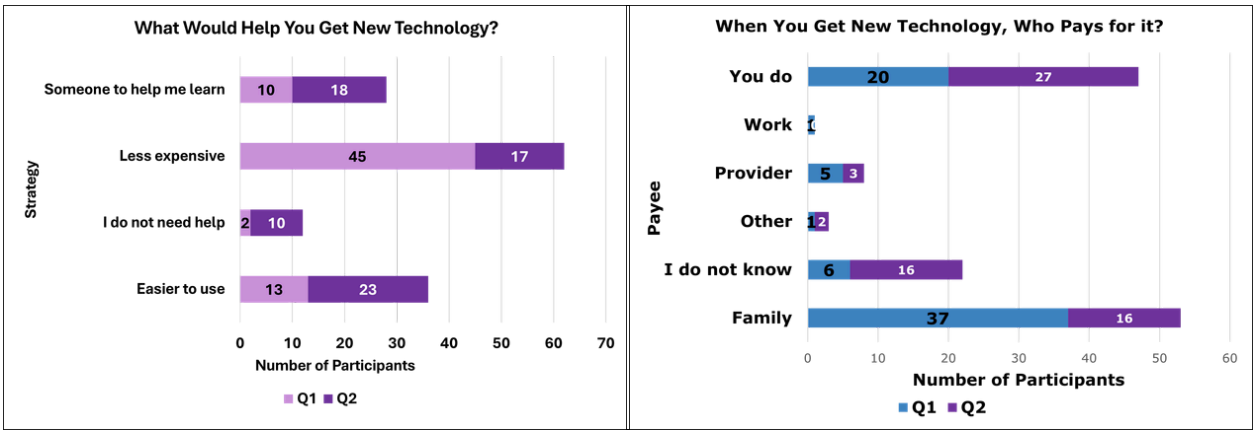
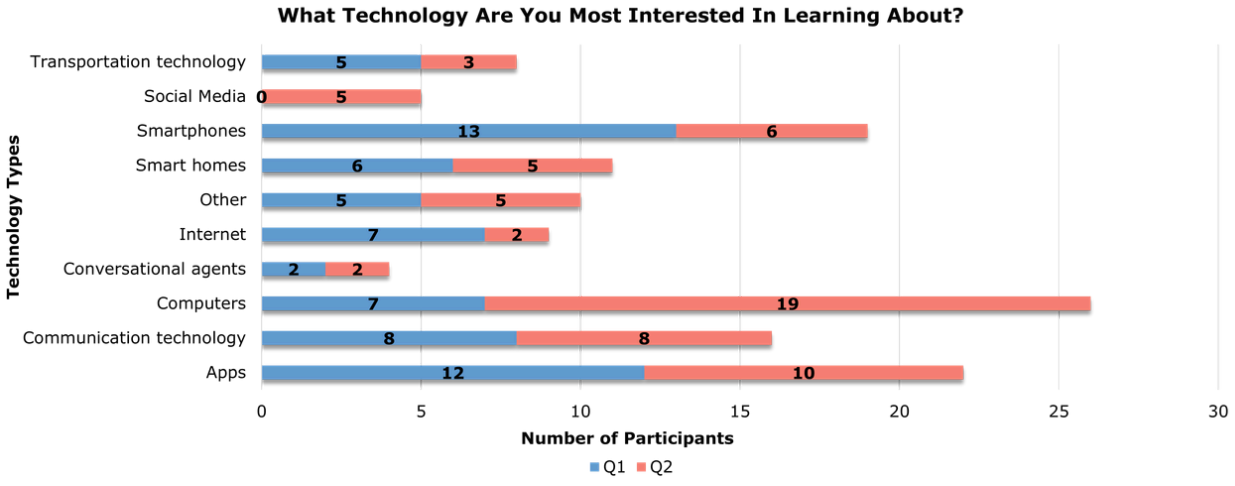
4. EXPENSE IS THE GREATEST BARRIER TO ACCESS, BUT FAMILY MEMBERS AND INDIVIDUALS ARE MAKING THE INVESTMENTS IN TECHNOLOGY.

Respondents identified cost as the greatest barrier to access, with self and family as the primary payers.



5. 93% OF PEOPLE WITH IDD WANT TO LEARN MORE ABOUT TECHNOLOGY THEY COULD USE

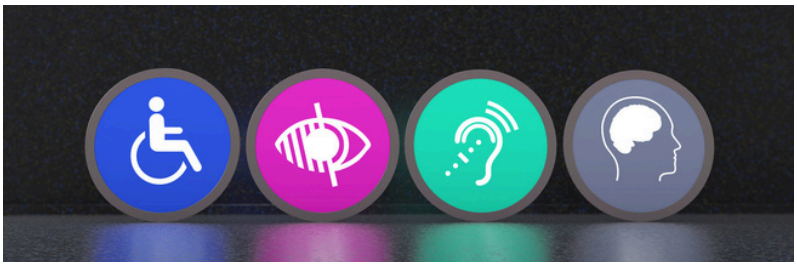
The following categories were identified as future areas of demand for technology solutions. Q1 represents the category selected first by participants, while Q2 represents the category selected second.



WEARABLES FOR WELLNESS

HEALTHCARE WEARABLE DEVICE ACCESSIBILITY

A secondary objective of the study was to determine which wearable devices offer the most cognitively accessible options for monitoring health metrics, as identified by consumers with IDD. The research team aimed to inform healthcare professionals about accessible design features that could guide product recommendations and support patients in self-directed health monitoring and ongoing health management. Additionally, the team tracked the devices most frequently selected across broad health goal categories to better understand consumer preferences and trends.



Notable accessibility design features that were valued by participants included:

- Voice over
- Display and Text size
- Zoom/magnify
- ECG monitoring
- Sleep score
- Wheelchair mode
- SOS option
- Haptic feedback
- GPS

KEY HEALTH GOAL ACTIVITIES	MOST POPULAR DEVICE FOR ACTIVITY
EXERCISE TRACKING	FITBIT INSPIRE 3
NUTRITION TRACKING	FITBIT VERSA 4
WATER INTAKE	GARMIN VIVOACTIVE 5
SLEEP TRACKING	ANY OFFERED FITBIT DEVICE

TIME SAMPLING OF TECHNOLOGY USE AND TECHNOLOGY ABANDONMENT

Time sampling was completed at 1 week, 1 month, and 3 months. The following questions were asked at each interval:

Have you used your wearable today?
What does your wearable tell you?
Do you need any help using your wearable technology?
Has anyone supported you in using your wearable technology?

KEY TIME SAMPLING RESULTS (N=32)

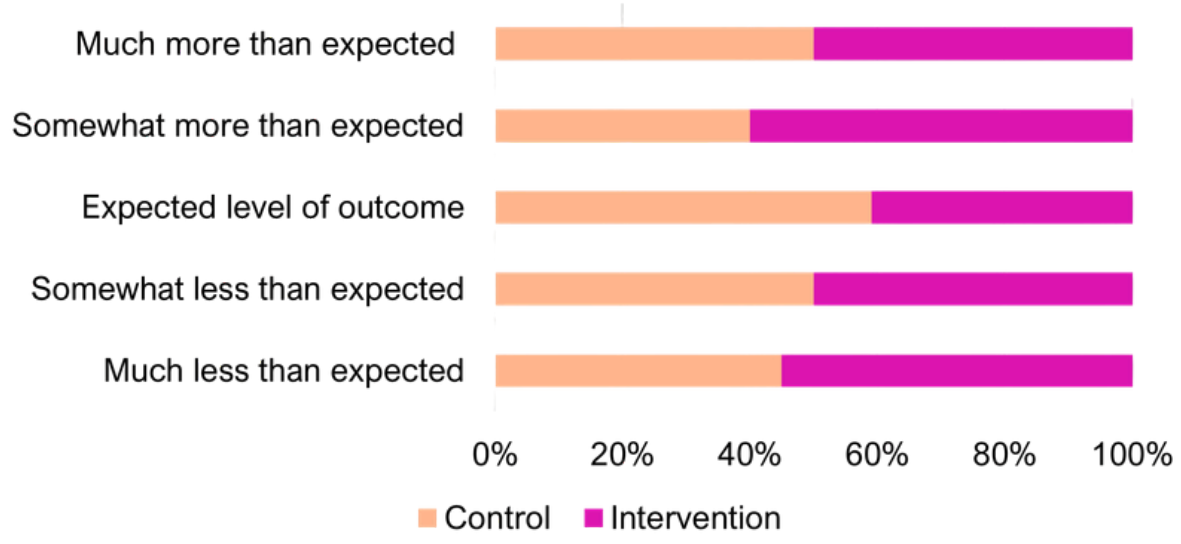
- **Device utilization,** measured through randomized time sampling, ranged from 87% at the beginning of the study to 71% over time.
- **Support needs decreased over time**. In the first week, 25% of participants required assistance using their wearable device. By three months, this decreased to 15%.
- **One-quarter of participants needed assistance during the first week** of device use.
- **Eighty-seven percent** of participants identified a support person they could rely upon to help with their technology if needed.
- **Only two participants** experienced difficulty reading their wearable data. Both received targeted remediation and were able to successfully use their devices over time.
- **Participants used their wearables beyond their stated health goals**, tracking additional information such as weather, time, and heart rate.
- **Two instances of device abandonment** were identified. Review suggested that both cases may have been preventable with early remediation during the first week of use.

HEALTH GOAL ATTAINMENT

The study aimed to explore whether the use of healthcare wearables could support individuals with intellectual and developmental disabilities in achieving their personal healthcare goals. To measure goal attainment, the project employed the *Goal Attainment Scale (GAS)*, a tool that enables participants to define their own goals and specify what progress would look like on a five-point scale, ranging from "much more than expected" to "much less than expected." Notably, even outcomes rated as "much less than expected" often reflected meaningful progress toward the individual's goal. In further examination, only four individuals rated no progress as the value, estimating "much less than expected" outcomes.

While comparisons between the control and intervention groups did not reach statistical significance, the findings provide valuable insights into goal-setting processes and the ways participants engaged with their healthcare goals. Chart 3 illustrates that both groups made progress, suggesting that wearable technology may support self-directed health management, even though measurable differences between groups were not observed in this study.

CHART 3. GOAL ATTAINMENT SCALE OUTCOMES FOR CONTROL AND INTERVENTION GROUPS



STUDY LIMITATIONS

No reliable study could be reported without due attention to study limitations and parameters. Accurately addressing study limitations lead to improvements and accurate applications of data interpretations and generalizability. The Wearables for Wellness study limitations fall into three categories: sample size, wearable selections, and measurement fidelity.

SAMPLE SIZE

The overall sample size for the study was 76 individuals; however, due to the study timeline, participant attrition and reduced consumer engagement were observed. Despite attempts to oversample and address these natural research challenges, limited recruitment resulted in few participants in both the intervention and control groups. Because the final number of participants who accurately completed pre- and post-study assessments was fewer than 35, the researchers could not use more robust statistical approaches to determine the intervention's impact. Thus, further studies should attempt to excessively oversample when completing research with engaged participants over one year.

WEARABLE SELECTION

To complete a randomized controlled study, the research team had to restrict as many confounding and influencing variables as possible that could disrupt the proper observation of the wearable's impact on health goals. As a result, one of the parameters included in the study was to limit the selection of wearable devices to those that provided a fully-inclusive product, meaning all wearable functions were embedded within the product and did not requrie internet or secondary device interactions. This limited the types and availability of devices for selection. Additionally, to understand the impact of technology training, the devices could not already be owned, but were new to the study participant. This ensured that previous wearable experience didn’t influence outcomes.

FURTHER STUDY LIMITATIONS AND RECOMMENDATIONS

MEASUREMENT FIDELITY

Measurement fidelity reflects the consistency and accuracy with which an instrument is applied and genuinely reports what it is expected to report. In the Wearables for Wellness study, several instruments were used to capture a broad range of impacts of the wearable intervention. One such measurement was the use of ecological inventories to capture changes in behavior over time related to health goals. Throughout the study implementation, responsibility for the ecological inventory completion shifted to remote partners at the University of Kansas to support project completion. Without a local connection to reliably instruct participants on completing ecological inventories, the collected data were insufficient to detect behavior changes across a participant's daily routine. This lack of instrument fidelity limited the availability of accurate data to assess the wearable device's impact. Further research should ensure local supports are available for instrument implementation, particularly when study participants are required to independently report study data.

FUTURE RESEARCH RECOMMENDATIONS

The Wearables for Wellness study had the opportunity to implement, at a small scale, the potential impacts of wearable technologies on health goal attainment for people with IDD. The study has scratched the surface and provided foundational information from which to launch further investigations. Based on the study outcomes and impacts, further investigation into wearable technology follow-along services would be valuable to accurately identify where targeted investments could be made to maximize impact. Additionally, the research can be used to influence and track healthcare providers' use of healthcare wearables for health surveillance and to investigate the impact of accessible vs. inaccessible device selection on patient-directed care.

CONCLUSIONS

> "My device is telling me I have 4,127 steps. Right now it shows my heartbeat is 74 beats per minute. I don't wear it to bed, so I don't know what my sleep score is. It counts my steps, the laps I do, my pace I go at and is helping me train for the marathon. - Study Participant

The cross-organizational Wearables for Wellness study generated critical insights to advance healthcare and technology utilization for Oklahomans with IDD, identifying promising practices, key interventions, and areas for sustained investment.

LEVERAGING EXPERTISE AND PARTNERSHIPS

Intentional, ongoing communication among partner organizations was central to ensuring study participants had access to high-quality research methods and effective interventions. Although transitions between partners occasionally presented challenges, this structure reflected the real-world system navigation commonly experienced by individuals with IDD when accessing services and supports. Unlike traditional models, however, the project team implemented a highly responsive support framework to promote smooth transitions, clear procedures, and compassionate communication.

Strategies such as participant communication logs, weekly cross-team meetings, continuous progress monitoring, and individualized assessments of communication preferences were used to support participant engagement and success. Future research may benefit from incorporating more frequent participant touchpoints throughout long-term studies to further strengthen motivation and intervention adherence. However, researcher bias and participant acquiescence are important to consider in research design.

HEALTH CARE WEARABLE SELECTION AND USE BY PEOPLE WITH IDD

The investigation uncovered real insights into the selection and use of healthcare wearables to empower people with IDD to self-direct health care, maintenance, and outcomes.

The study examined a self-directed goal-setting approach to technology selection developed by the University of Kansas. This model begins with the individual identifying a personally meaningful goal and culminates in selecting a technology solution specifically aligned to support that goal. The approach further incorporated elements of problem-solving and decision-making, asking participants, prior to intervention, to articulate their vision of successful goal attainment across a 5-point scale.

This approach contrasts with alternate models in which a device is selected first—often based on availability or technology trends—and later introduced into the individual's life. Such approaches can result in misalignment with personal priorities and contribute to device abandonment.

Study outcomes demonstrated high rates of wearable utilization and active participant engagement with personal health data. Participants were able to interpret and apply their data to their stated health goals and associated interventions. These findings support the feasibility of a goal-driven, self-directed technology selection process as a strategy to enhance adherence to health interventions and promote consumer engagement in health care.

"I want to replace junk food with fruits or veggies 1 meal 4 times per week." - Study Participant Health Goal

Goal Attainment Much Less Than Expected
Replace junk food 1 meal 2 times per week.

Goal Attainment Much More Than Expected
Replace junk food 1 meal 7 times a week.

INCLUSIVE DESIGN, ACCESSIBILITY, AND HEALTH PROVIDER GUIDANCE ON WEARABLE SELECTION

Principles of inclusive design emphasize creating technology solutions that are accessible to all, addressing the full spectrum of human diversity to promote opportunity and belonging. However, individuals with cognitive disabilities are often the last to be considered in the design and application of accessibility features. Understanding user needs and aligning wearable technology features with those needs is, therefore, critical to supporting long-term adoption and effective use of healthcare wearables.

The Wearables for Wellness study not only assisted individuals with IDD in identifying and achieving self-directed healthcare goals, but also provided valuable insights into consumer preferences for accessible wearable design. These insights can guide healthcare providers in selecting wearables for health prevention, management, or monitoring, ensuring that device recommendations are sensitive to accessibility needs and maximize the likelihood of patient-directed care and success.

The study culminated in a set of guidelines for accessible healthcare wearable selection and feature matching, grounded in participant health goals, to inform future investments by healthcare providers and technology engineers.

DATA-DRIVEN DECISION-MAKING FOR FUTURE TECHNOLOGY SOLUTION INVESTMENTS IN OKLAHOMA

Investments by Oklahoma Human Services in the Wearables for Wellness study provided a strategic advantage not only by informing technology-driven healthcare services, but also by informing the use of technology solutions across domains of living. Results from the *Technology Needs and Barriers Online Survey*, and the *Tech-RAL Q*, have a broader application to statewide investments in technology selection, training, and innovation.

The *Technology Needs and Barriers Online Survey* demonstrated the need and desire among Oklahomans with IDD for access to technology solutions to address functional challenges. The survey results also indicated common barriers to cost, training, and technology investments that could be addressed in program development and policy modernizations. An example is investing in family members to build capacity in technology solution training and to provide cost reimbursements based on the data gathered about the supports utilized in technology identification, learning, and funding.

Finally, the results establish the baseline data for future statewide investments. Further expansion of the sample pool examining technology needs and barriers could be used to gauge investment impacts and establish new public/private partnerships in technology development, education, and innovation.

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