

# Results of the Wearables Employment in Alzheimer's Disease and Related Dementias Research Study

Development of guidelines for device selection and participant protocols

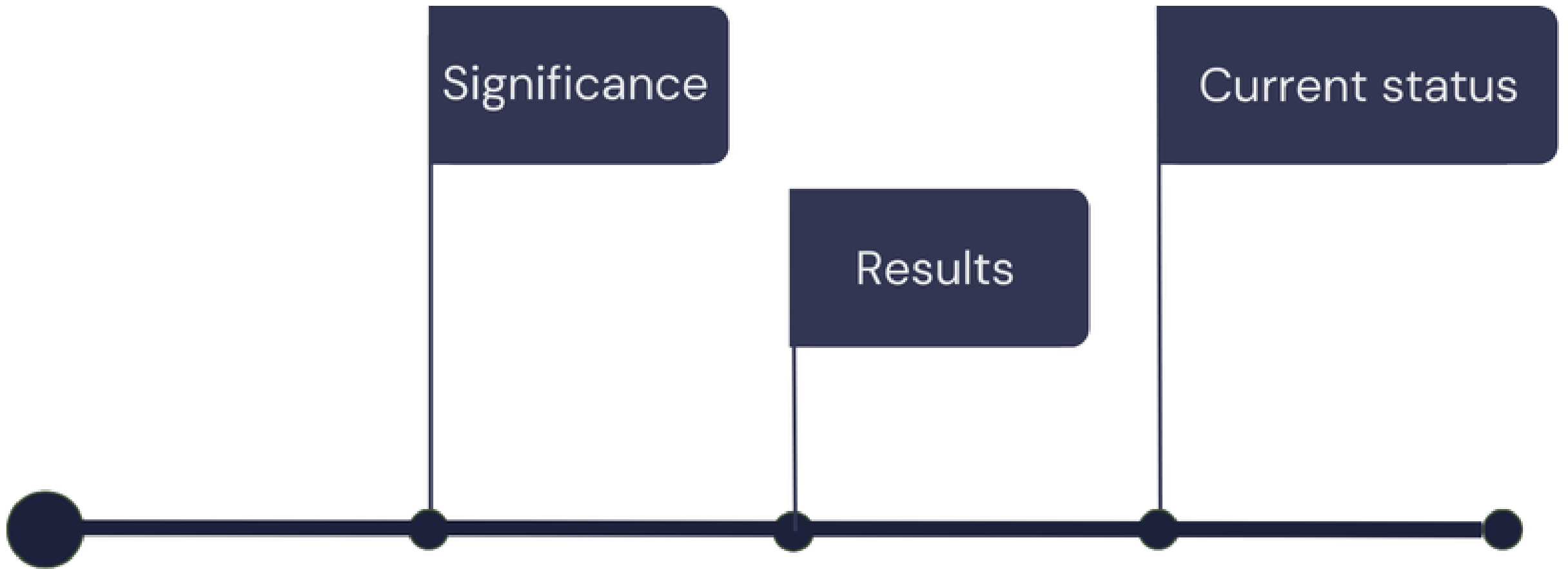
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NIMLAS

12/10/2024



# Overview





**Increased prevalence  
of dementia  
and related  
caregiver strain**



**Challenges of  
conducting research  
with this population**



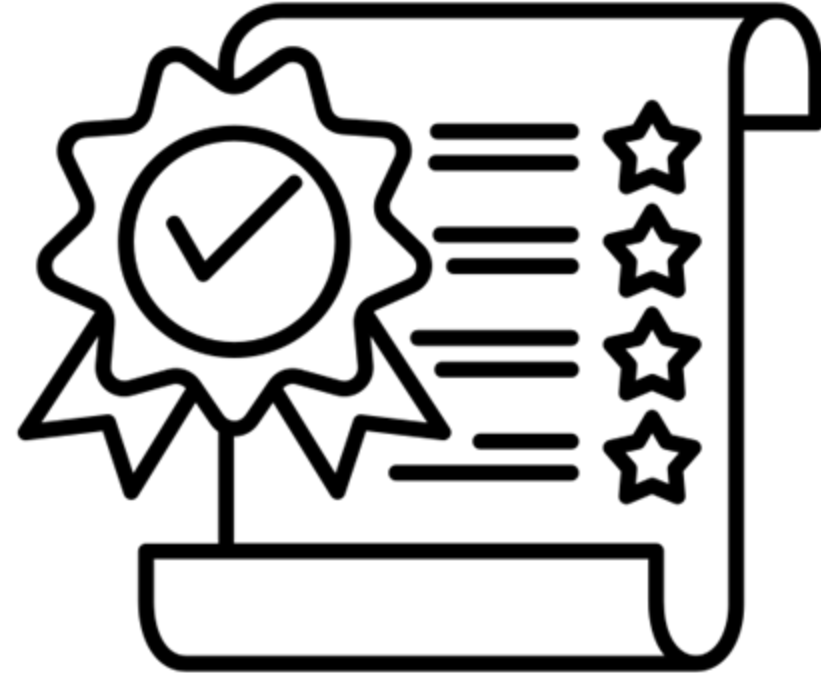
**Devices that meet  
researcher needs**



**Data usability**

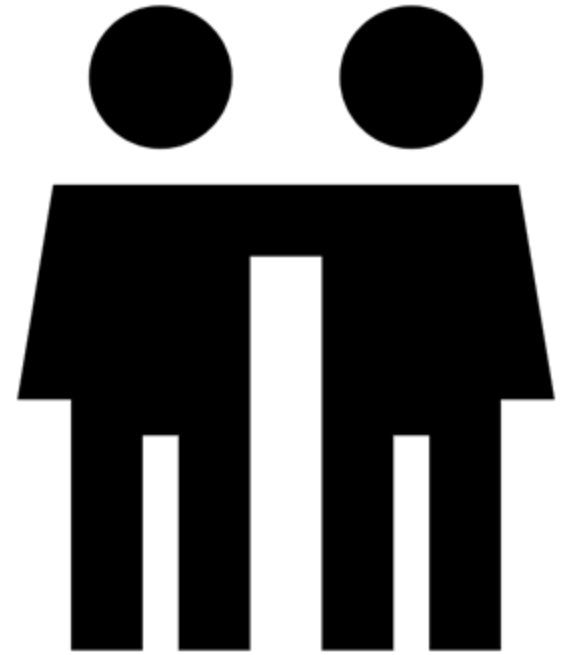
**Data accessibility**

**Limited technical problems**





**Devices that meet  
participant needs and  
preferences**



**Facilitators to buy-in**

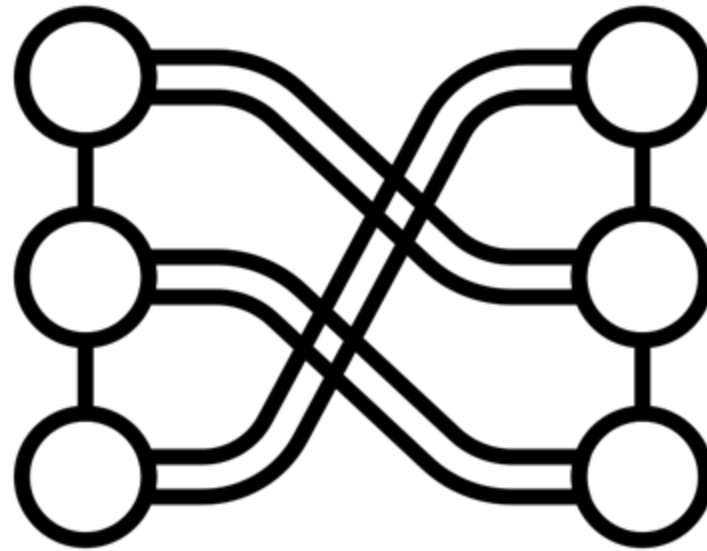
**Barriers to adherence**

**Address ethical concerns**





# Protocol support for project planning



# PROJECT OVERVIEW



**1**

## SYSTEMATIC REVIEW

Current state of usability and adherence factors

**2**

## DEVICE TESTING

In-house evaluation of available devices to meet research needs

**3**

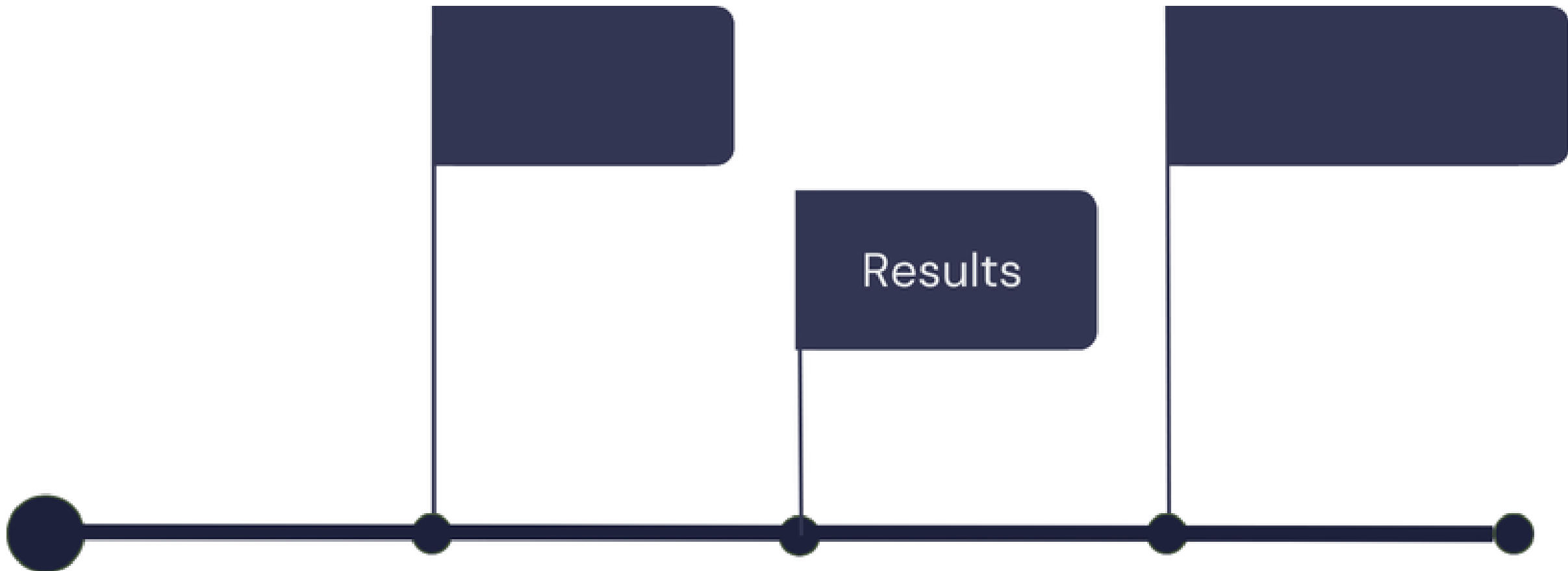
## PARTICIPANT STUDY

Trial real world data quality and support needs

**4**

## GUIDELINES

Describe device criteria and protocol methods to enhance research



# PROJECT OVERVIEW



**1**

## SYSTEMATIC REVIEW

Current state of usability and adherence factors

**2**



**3**



**4**



# 2018+ original research articles

Participants

Viewpoints and experiences



Researchers

Adherence issues and solutions



# Systematic Review Flow

PRISMA 2020 Guidance

2037

## Identification

PubMed/MEDLINE, SCOPUS, CINAHL



1210

## Duplicates removed and abstracts reviewed

Used EndNote20 to organize



153

## Screened text for inclusion

Noted reason for exclusion



58

## Full text data extraction

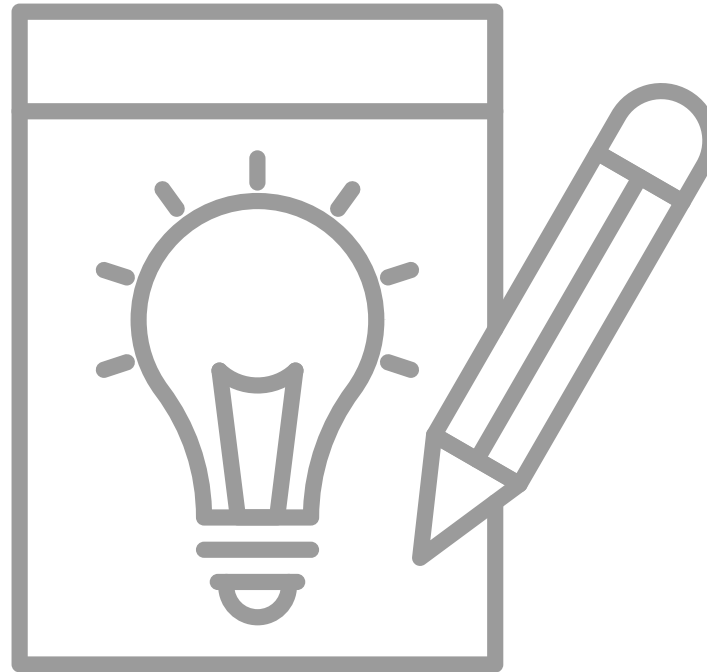
Reviewed in detail for synthesis



# Narrative synthesis to identify study themes

Device selection

Protocol considerations



Enhancing recruitment

Promoting adherence

Ethical issues

# Device selection

- Easy to use
- Smaller size and weight
- Fits into routine
- Unobtrusive
- Tailorable
- Material concerns
- Aesthetics
- Easy to wear
- Water resistant





# Enhancing recruitment

- Multifunctional devices
- Reduce stigma concerns
- Minimize burden impact
- Caregiver buy-in
- Connectivity and tech bias
- Offer remote monitoring



# Promoting adherence

- Provide health insight
- Promotes independence
- Addresses safety concerns
- Minimize self-removal
- Reminders to wear the device from staff or CG
- Technical support
- Caregiver support



# Protocol considerations

- Address privacy concerns
- Consent capacity variation
- Battery charging needs
- Adjustment period
- Reduce other task asks
- Technical anxiety



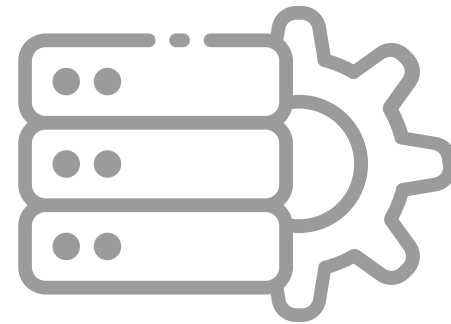
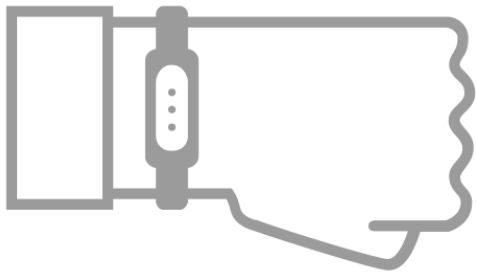
# Ethical issues

- Access to own health info outweighed privacy concerns
- Connectivity and distributive justice
- Fluctuating and diminishing understanding



# Other takeaways

- Preference for wristwatches but habits impact adherence
- Functionality and aesthetics preferences by impairment stage
- Less information re: device selection reason and data management



# PROJECT OVERVIEW



1

2

## DEVICE TESTING

In-house evaluation of available devices to meet research needs

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# Wearables candidates

## Participants

Meet preferences

Enhances buy-in/adherence



## Researchers

Variety of forms and data targets

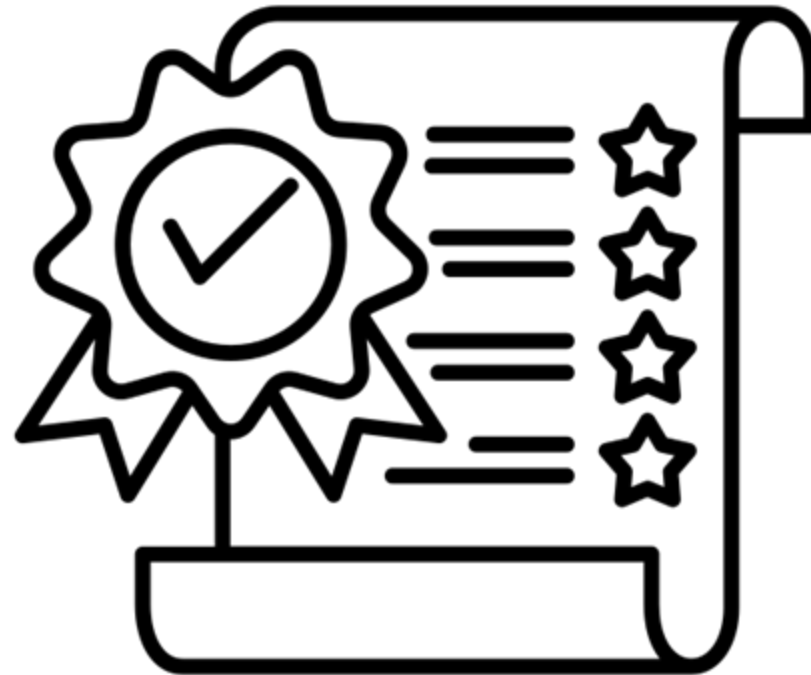


# In-house testing scenarios

Data access

Data quality

Initial usability/durability





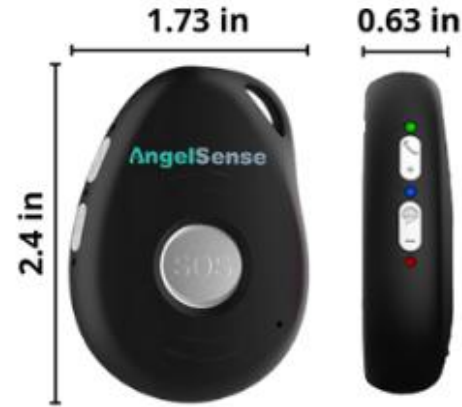
# In-house device comparison

	Product Name	Manufacturer	Form Factor	Battery Life	GPS	Interface Complexity	Health data
Full Featured Smartwatch	Apple Watch S6	Apple	Watch	Short	Yes	Complex	Yes
	ScanWatch	WiThings	Watch	Long	No	Complex (but less than others)	Yes (when activity is detected)
	Venu 2	Garmin	Watch	Short	Yes	Complex	Yes
Health Tracker Smartwatch	Charge 5	Fitbit	Watch	Long	Yes	Simple	Yes
	PulseHR	WiThings	Watch	Long	No	Simple	Yes
	Viviofit 4	Garmin	Watch	Long	No	Simple	Yes
GPS Tracker	Kid Tracker	SecuLife	Tag	Long	Yes	No interface	No
	SOS Button	AngelSense	Tag	Long	Yes	No interface	No

# Final selection



Garmin  
Venu 2



AngelSense  
SOS Button



WiTHings  
Pulse HR

Product	Overall form	Battery Life	GPS	Need phone?
Venu 2	Full-featured smartwatch	Short	Yes	Yes
SOS Button	GPS tracker tag	Long	Yes	No
PulseHR	Health tracker smartwatch	Long	No	Yes

# PROJECT OVERVIEW



1

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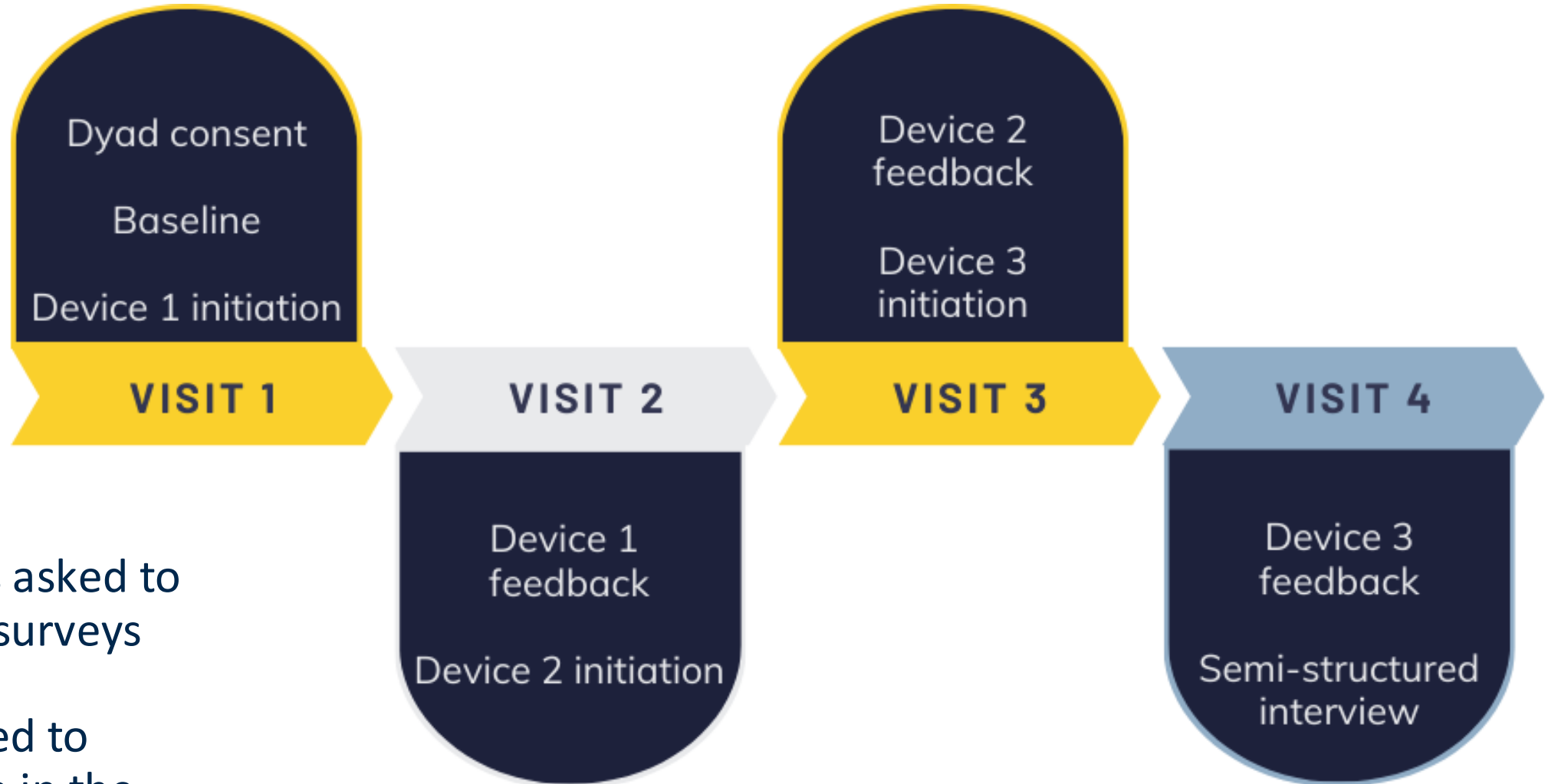
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## PARTICIPANT STUDY

Trial real world data quality and  
support needs

# Participant study flow



Caregivers asked to complete surveys

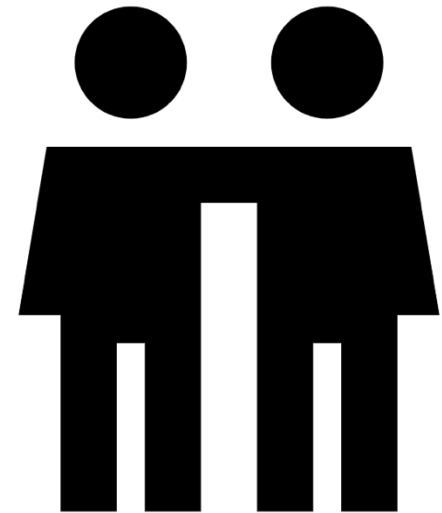
Both invited to participate in the interview

# Participants

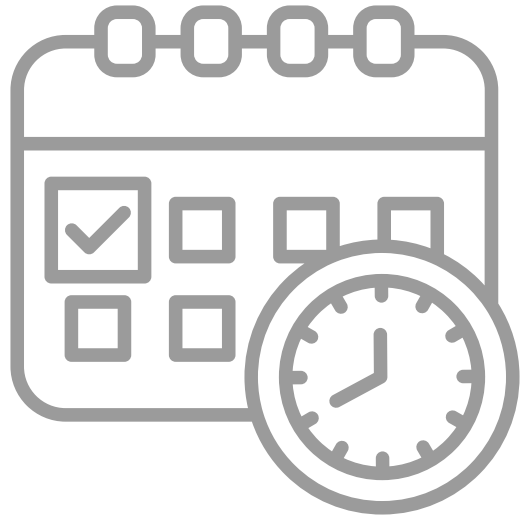
12 dyads, majority female (60%), all white, and 75% lived together

Experiencing memory concerns for about 6.5 years

Half were diagnosed with a type of dementia

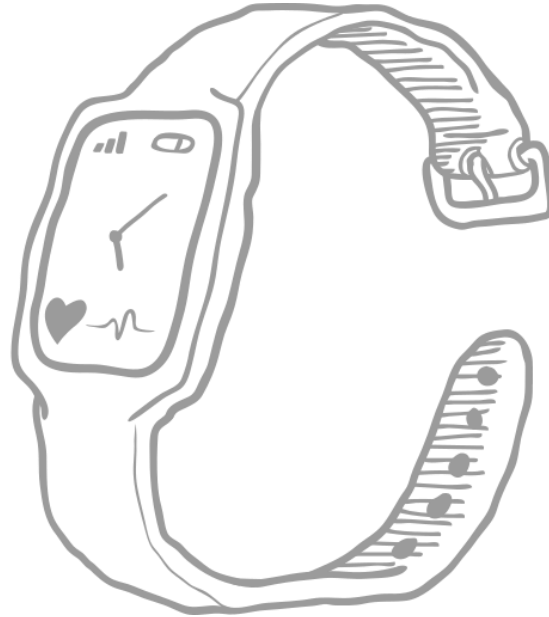


# Overall

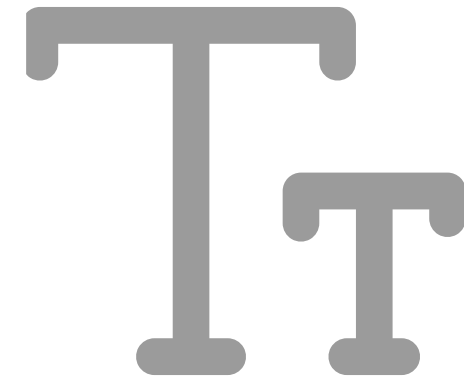


**Adherence was good**

Except for SOS Button



**Garmin was  
favorite for most**



**Informative  
and easy to use**

## Factor comparison (extract)

	Garmin Venu 2	AngelSense SOS Button	WiThings Pulse HR	p-value
Appearance	4.4 (0.8)	3.5 (0.7)	3.6 (0.8)	.009
Acceptance	4.6 (0.7)	3.6 (0.8)	3.6 (1.1)	.015
Maintenance	4.3 (0.7)	3.3 (1.4)	3.8 (1.0)	.030
Flexibility	4.1 (0.8)	3.2 (0.9)	3.3 (1.2)	.041
...	...		...	
Overall sum	92.9 (17.1)	82.8 (14.6)	82.8 (19.92)	0.182

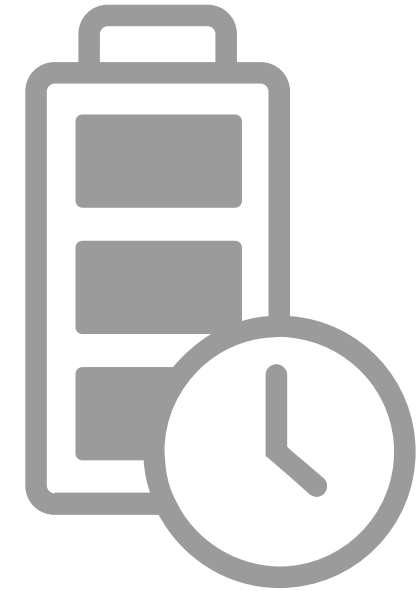
“She understood what [the Garmin] was for, and she could see what time it was and see her steps [by herself].”



**Watch form easy  
and familiar**



**Personal  
health access**



**Battery life  
tradeoffs**



“The Pulse you could flush  
down the toilet.  
You couldn’t give me one.”



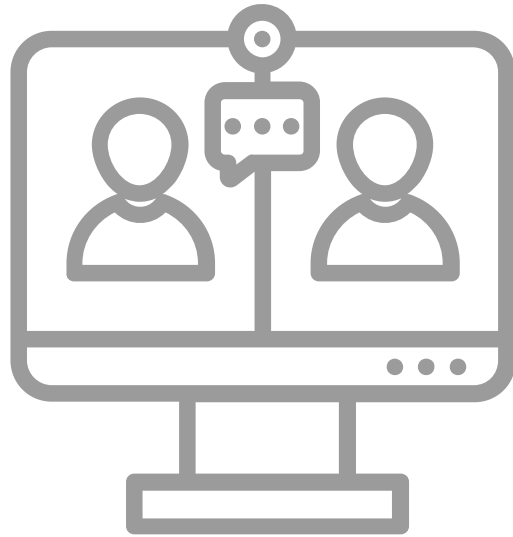
**Accuracy is  
paramount**

“The Angel fob thing was  
[my favorite] 'cause it really  
told me where he was.”

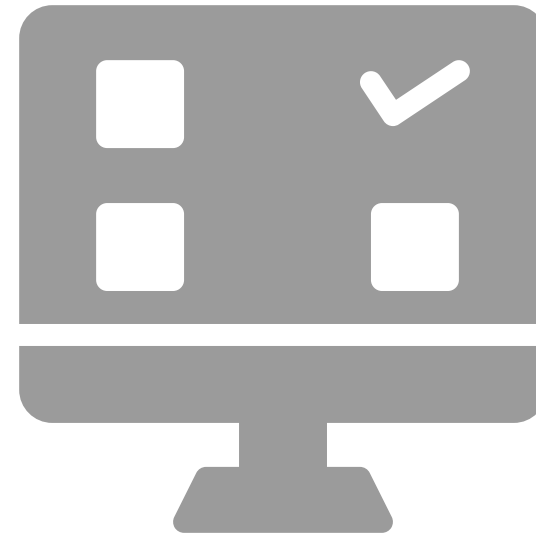


**Location gave  
peace of mind**

“We're very much attuned to doing offsite stuff.”



**Virtual support  
worked well**



**Simplify surveys**

# Conclusions

Watch forms were still preferred, but liked larger

Prioritized detailed and accurate over charging issues

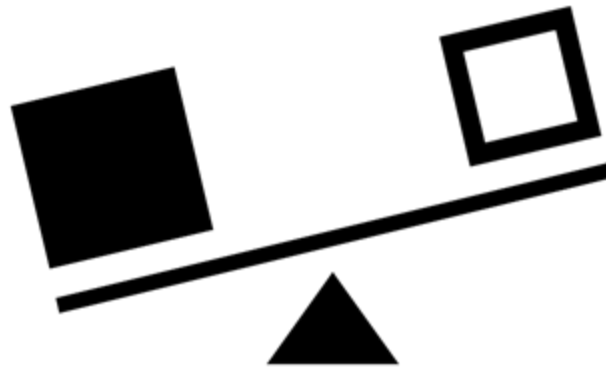
Comfortable with remote, more passive tech support

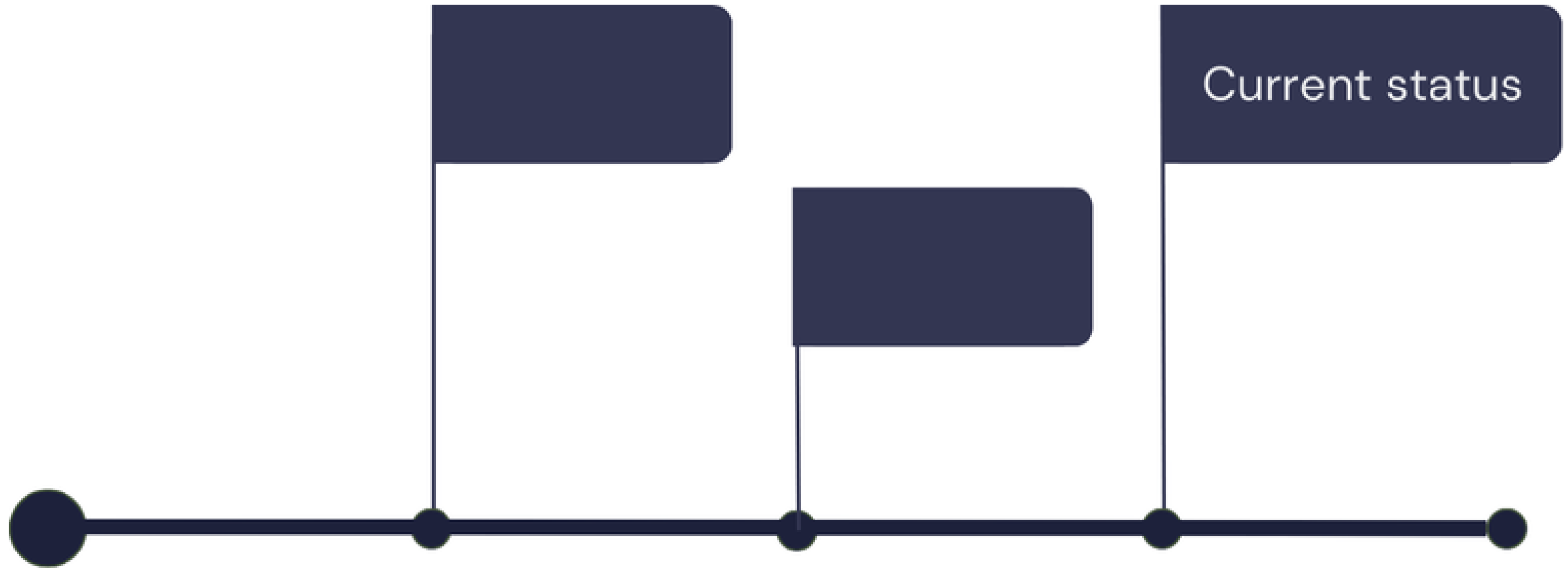
Potential bias due to more tech savvy participants



# Conclusions

“It really depends on the problem that you're trying to solve as to which one is better.”





# PROJECT OVERVIEW



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## GUIDELINES

Describe device criteria and protocol methods to enhance research

# Dissemination

Systematic review is under review  
at *JMIR Aging*

Presented study results  
at GSA 2023 and 2024

Observational study writeup in progress

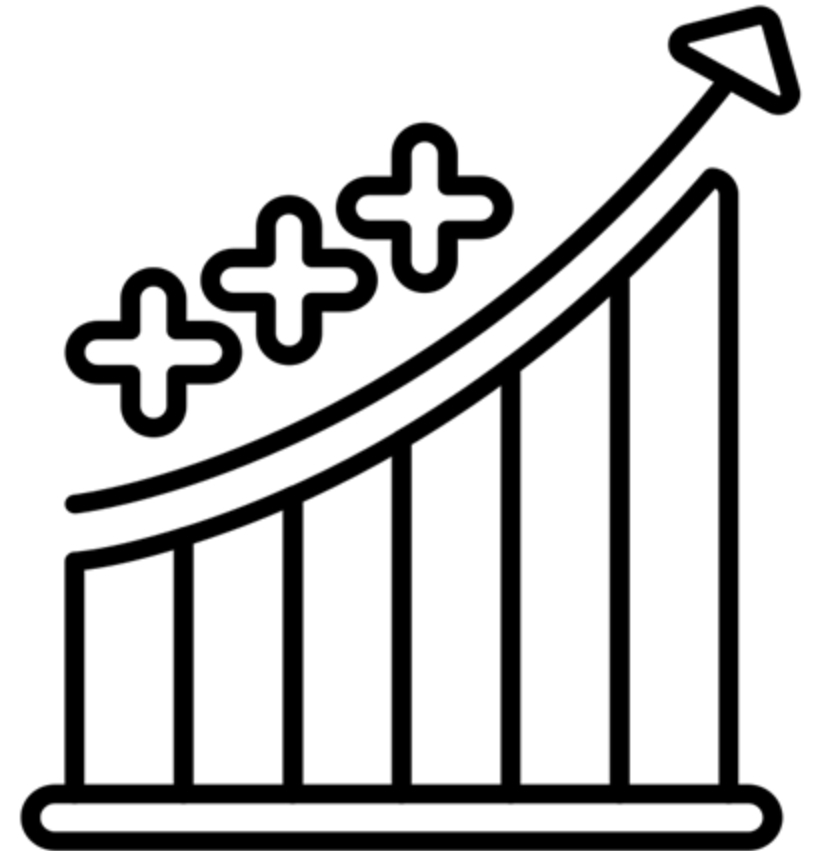


# Some takeaways

Be thoughtful about device choice to meet both researcher and participant needs

Empathetic, engaging staff support participants and enhance buy-in

Additional wearables specific resources available for researchers! (Apple, UMich)





**Thank you!**

**Questions?  
Comments?**



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**Updates at [cmpeterson.com](http://cmpeterson.com)**