

Bridging the Gap Between Wearable Sensors and Patient-Reported Outcomes: A Multimodal Data Collection Infrastructure for Stroke Rehabilitation

Fatemeh Sardadvar
PhD Researcher at HPI

Rok Kos
Lead Product Manager at D4L



Agenda

1. Study design & Role of D4L Collect
2. Interim results
3. Invitation for collaboration

1. Study design & Role of D4L Collect

Sensor-S Study

1. Lead: **Charité – Universitätsmedizin Berlin**,
2. Implementation sites: **Charité – Universitätsmedizin Berlin** and **Brandenburgklinik Berlin-Brandenburg**,
3. Collaborators: **Hasso Plattner Institute - Digital Health-Connected Healthcare** and **Data4Life**,
4. Recruitment concludes in Dec 2026.

Study design

Study Goal

Investigating the effect of using wearable on patient engagement in post-stroke rehabilitation

Study protocol

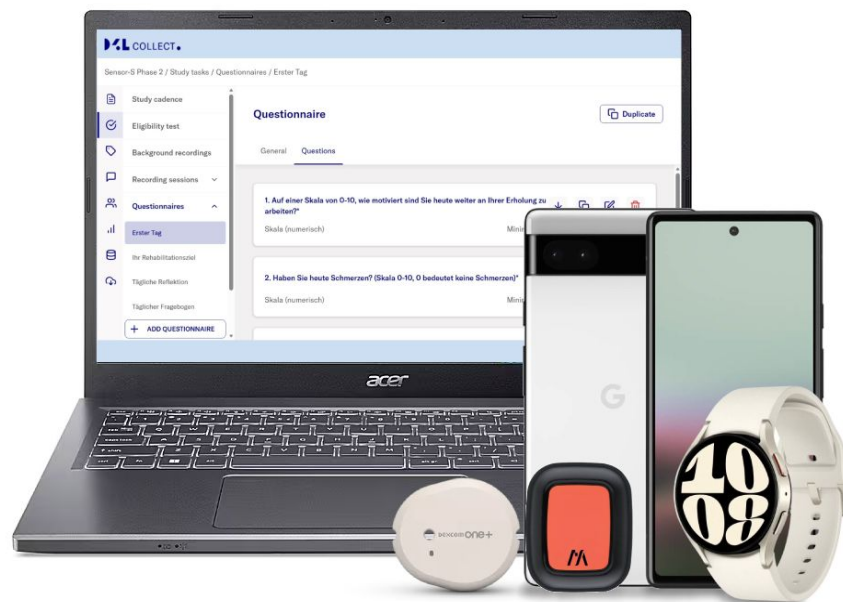
Randomized Control Trial (RCT)

Allocation into Control & Intervention groups

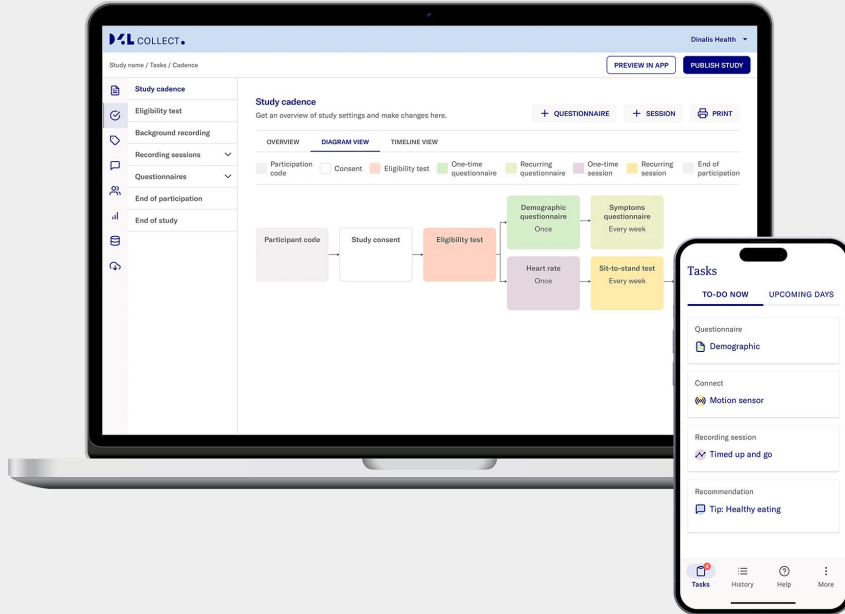
Study duration: 6 months for each participant

Target number of participants: 156

Current recruited patients: 95



Easy and efficient collection of multimodal data



➤ Digital solution for study design and execution

Web app for study management and mobile app for data collection.

➤ Seamless combination of different data modalities

Integration of data from questionnaires, wearables, sensors and health apps in interoperable format.

Role of D4L Collect

D4L Collect App

Used in phase 1 by both groups

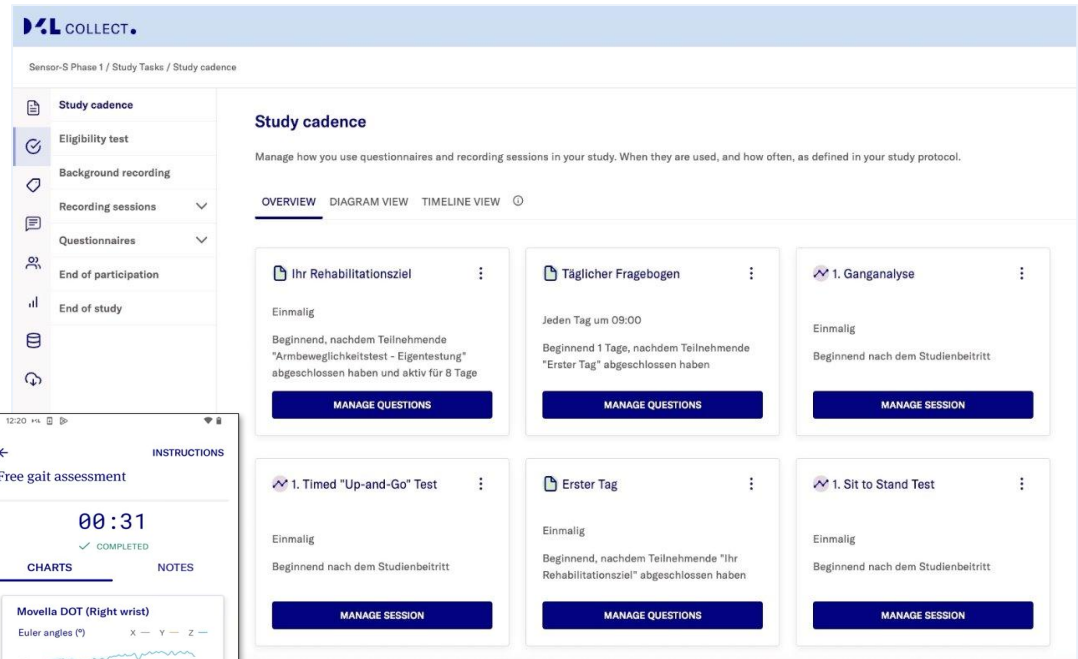
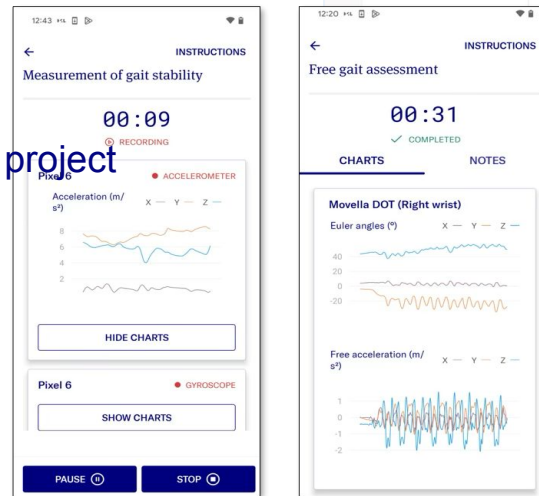
Used in phase 2 by intervention group

Research Studio

Data management

Study architecture

Used by researchers and project managers



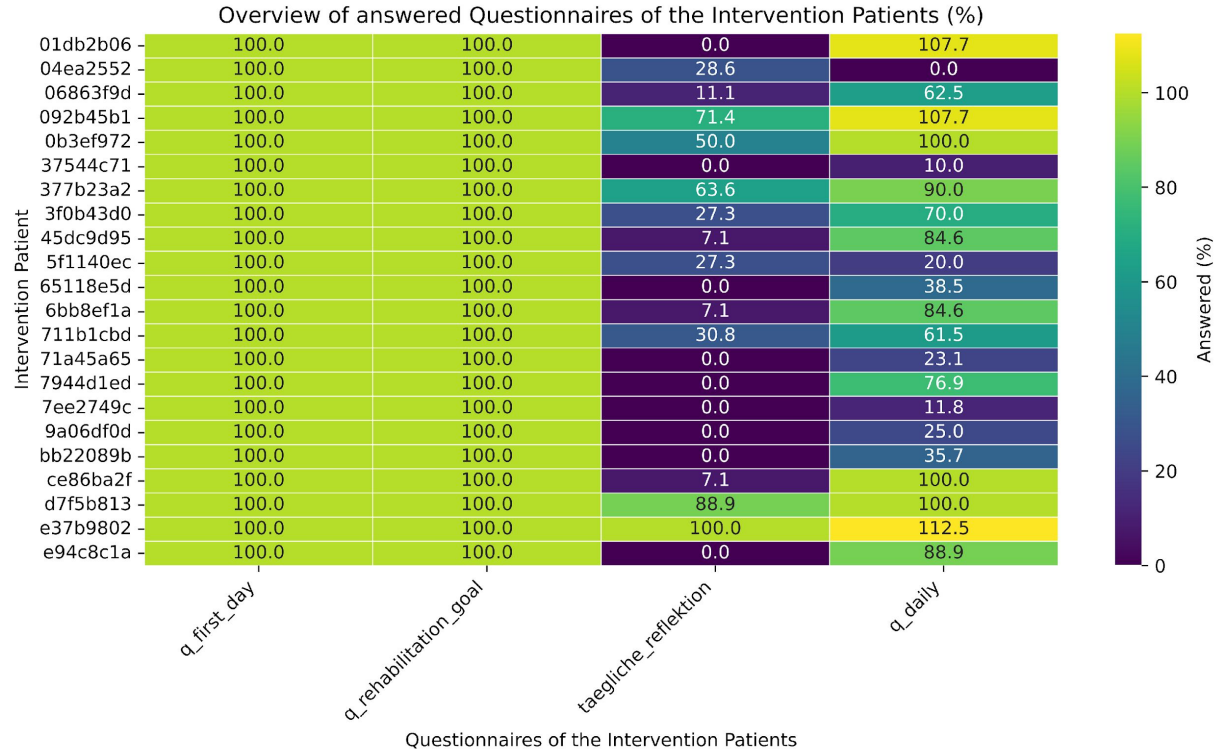
D4L Collect capabilities in use

Study set-up	Data collection	Participant tutorials	Patient engagement	Real-time monitoring	Accessing study data
Enrollment management	Raw & processed sensor data	Device pairing	Activity reports	Adherence	Harmonised & unified data
Compliance	PRO responses	Standardised study tasks	Health prompts	Task completion	FHIR, CSV
Sensor data capture				Data completeness	
PROs				Engagement	

2. Interim results

Questionnaires Quality

Overview of answered questionnaires (%) among intervention patients in Phase 1. The questionnaires include both one-time and recurring measures assessing participants' rehabilitation progress and mood.



Interim results: Data completeness (1/2)

D4L COLLECT.

Sensor-S Phase 1 / Metrics / Data completeness / Recording sessions

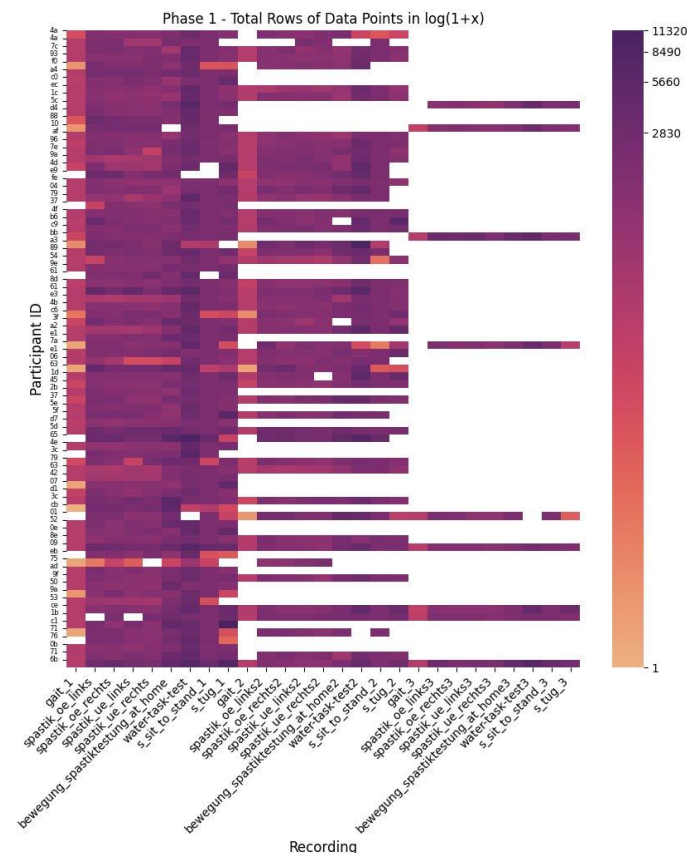
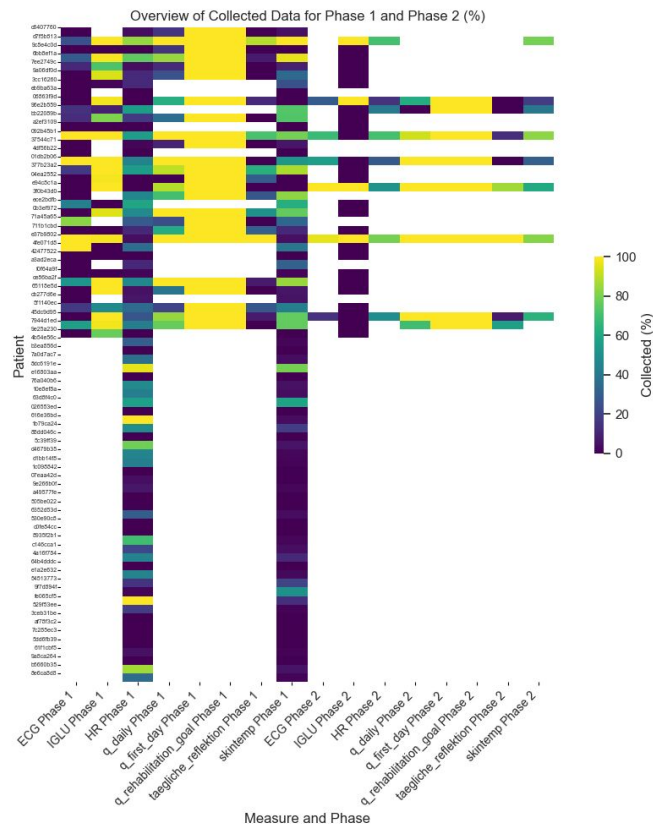
- Study statistics
- Engagement
- Data completeness
- Background recordings
- Recording sessions
- Questionnaire responses

Recording sessions



Overview of the data completeness in Research Studio from the first phase. Red indicates missing data.

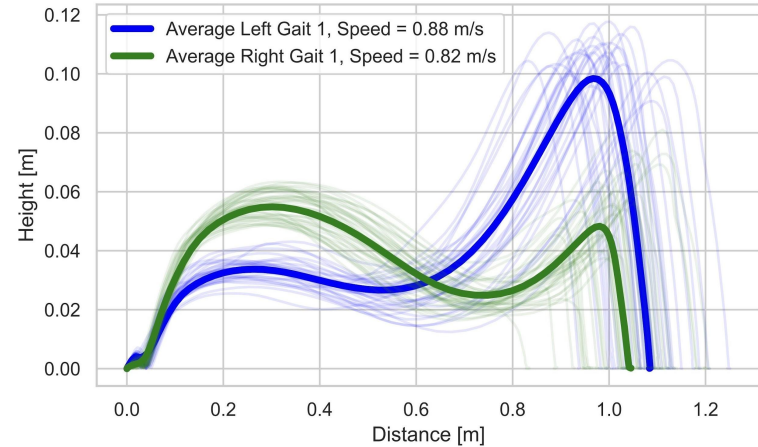
Interim results: Data completeness (2/2)



Interim results: Gait analysis



Stance Features Healthy Control
vs. Post-Stroke Patient



Foot Trajectory Analysis
PatID9

3. Invitation for collaboration



data4life

Mission-driven.

We digitalize health research to advance public health & precision medicine.

Non-profit.

We are 100% nonprofit, always putting impact first.

Open source.

We contribute back to the open source community with key solutions.

*If you are interested
to learn more and in collaborating,
please contact us via*





Thank you.

Fatemeh Sardadvar

PhD researcher at HPI

fatemeh.sardadvar@hpi.de

Rok Kos

Lead Product Manager at D4L

rok.kos@data4life.care

data
4life