Comprehensive Phenotyping and Innovative Granular Assessment Key Device for Advancing Stroke Rehabilitation

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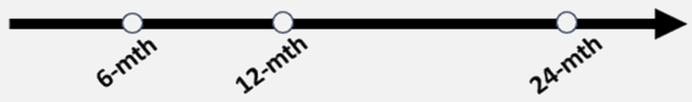
BACKGROUND

- Post-stroke functional impairments have been studied primarily focusing on motor outcomes.
- We present a more **holistic framework** to understand, track, and predict recovery better using multiple dimensions: upper limb functions, daily use, & psychological dimensions.
- Our study is part of a larger **TAILOR study** under the Future Health Technologies (FHT).
- This poster presents the results of the psychological dimensions of post-stroke recovery (**Part A**) and pilot data of a technology-based tool to measure **dynamic lateral pinch** objectively and precisely (**Part B**).

METHODS

Part A: This mixed-method, longitudinal study aims to develop a **psychosocial profile** within an upper limb sensorimotor recovery database of stroke survivors:

1. Psychosocial battery of quantitative assessments, n = 100 - 200.
2. Semi-structured qualitative interviews. n = 30 dataset.



3. The use of Fitbit wearables for 6 months

Part B: Clinical validation study for a **P**ortable **IN**strument key rig to **C**haracterize **H**and Functions after stroke **(PINCH).** Key pinch value (kg) and turning angle (deg) were sampled at 2000 Hz and filtered at 12 Hz. Key pinch was normalized against the Key rig MVC.

RESULTS

Part A

Item	Assessments	6-mth	1 year	2 years
Depression	Beck's Depression Inventory	X	X	X
Anxiety	Generalized Anxiety Disorder Scale	X	X	X
Fatigue	Modified Fatigue Impact Scale	X	X	X
Insomnia	Insomnia Severity Index	X	X	X
Social Support	MOS Social Support Survey	X	X	X
Occupational Balance	Life Balance Inventory	X	X	X
Interviews	Lived experiences	X	X	X
Smart-trackers	Health metrics	Continuously for 6 months		

Themes (6 months, n= 25)

Realization of stroke onset

- ❖"I realize, it's confirmed that I got stroke because even though I try to stand up, I fall down."
- ❖"On a scale of eighty percent, I think I have a stroke."

Acceptance is the way forward

- ❖"I told them that even though it was life-threatening and I could have kicked the bucket, but here I am."
- ❖"You just have to accept. It has happened, this is your starting point. You just have to tell yourself that you can only get better from this."

Independence is a treasure

- ❖"I was aiming for, to get myself well enough to be able to get back to work. To be able to get back to a normal life"
- ❖"That was my worst time. I felt like an infant, lying there and not able to do anything."

Emotional turbulence

- ❖"Why did this happen to me?"
- ❖"I get sad easily, and I also feel happy easily. I can't control my laughter."

Themes (12 months, n= 15)

Spirituality and faith in stroke

- ❖"When I had my stroke, the first thing I did was pray a lot, asking God for help to recover. I just put everything in his hands."
- ❖"I'm thankful to God that He's helped me on this journey and he's given me this chance."

Acceptance is the way forward

- ❖"Initially, I feel sad why this thing happened to me. But I've adjusted it and should count myself lucky because some stroke patients actually die but I managed to survive."
- ❖"I have condition myself that I may have to live with this for don't know how many years. I sort of come to terms with it."

Family & peer support as the pillar

- ❖"It's the mental support from your family members."
- ❖"My wife was with me all the way since I've got stroke. She takes care of me and makes me feel comfortable throughout this whole rehabilitation journey."

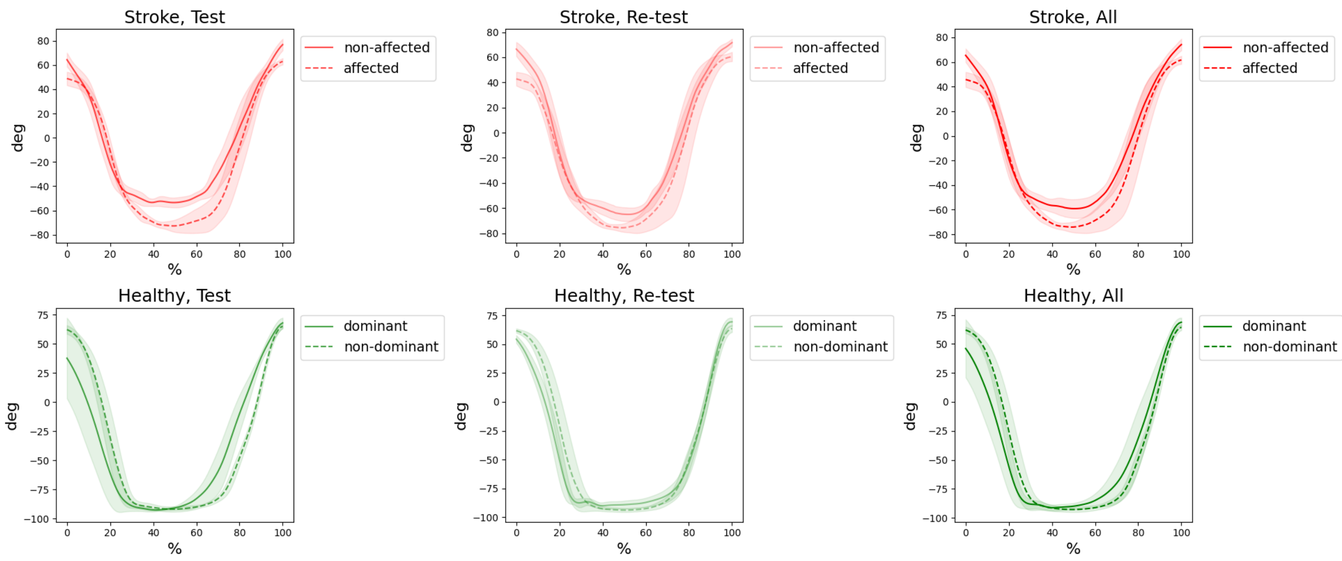
The recovery process

- ❖"One year ago I was on wheelchair and now I am not. So I can actually see progress which is one big difference already."
- ❖"I'm motivated to get better. I'm not looking for hundred percent recover but at least now I can raise my hand up, a bit more."

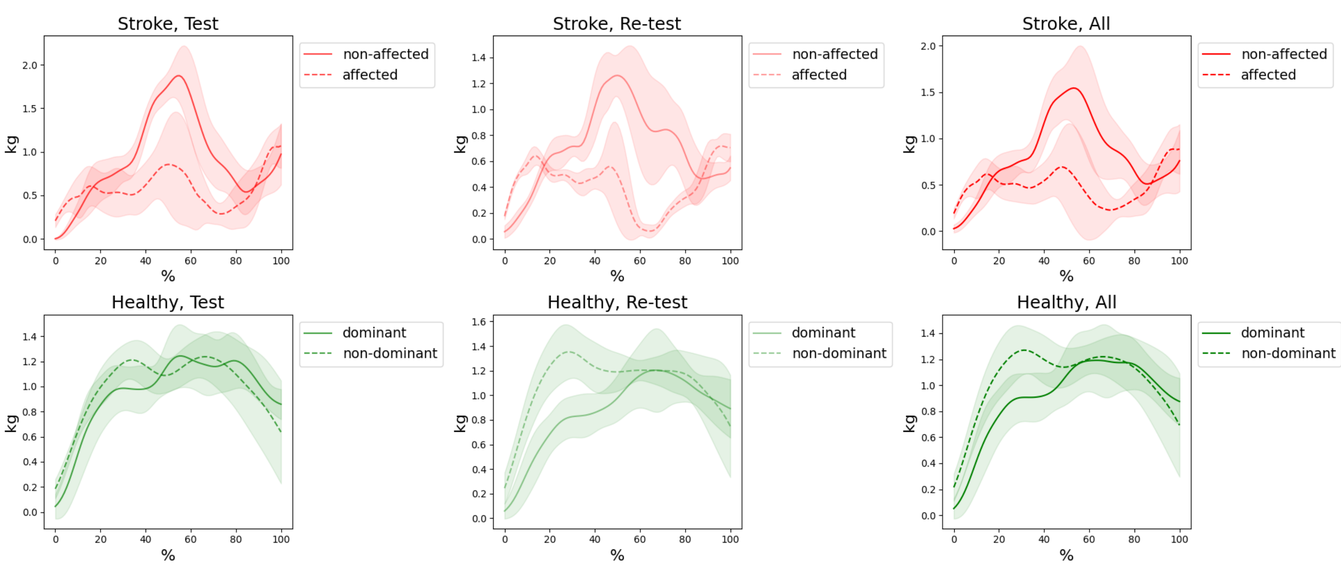




(i) Key turning angle



(ii) Pinch angle



Exemplar result of stroke patient and healthy adult comparison

KEY FINDINGS

- **Part A's** : The ongoing psychosocial profiling aims to explain recovery fluctuations across the stroke continuum. Most participants were aware of their stroke during onset, suggesting strong public awareness in Singapore. Acceptance of post-stroke identity varies individually and over time. Predictive models will be developed using combined psychosocial and sensorimotor data.
- Preliminary data for **Part B** suggests that an objective measurement is able to provide better granularity of the movement and force, potentially help inform better clinical decisions.

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Related references

TAILOR PROTOCOL

KEY RIG DEVICE