Smartphone-Based Research for Individuals with Brain Injury

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Why you should care about smartphone-based research

- Researcher who may use this approach
- Clinical team member who wants to better understand studies done this way
- Patient or caregiver who may consider joining a study like this
Smartphone Ownership in US

Nielsen Insights 2016

iPhone 2007
Android 2008


Pew Research Center pewinternet.org/fact-sheet/mobile/
Benefits
of smartphone-based research

• Familiar interface
• Convenience & data sources
• Quantity
• Feedback to participants
Benefits of smartphone-based research

- Familiar interface
  - Software applications or “apps” extend smartphone capabilities
  - ResearchKit
ResearchKit

- Software tool released by Apple in March 2015
- Open Source, no cost
- ResearchStack (Android)
- Displays study elements & organizes data collection
Convenience & Data Sources

• Participants
  reduce travel or other interruptions to daily activities

• Researchers
  requires little to no direct interaction for enrollment and data collection

• Data Sources
  ▶ Surveys
  ▶ Smartphone sensors
  ▶ Any connected device
Quantity

• 5 iPhone apps launched with ResearchKit in March 2015
  ‣ Collectively, recruited 60,000 in first 6 months
  ‣ myHeartCounts recruited 10,000 in first 24 hours
  ‣ Targeted general population for recruitment

med.stanford.edu/myheartcounts.html
boston-technology.com/how-stanford-got-10000-participants-for-their-research-study-in-24-hours/
As of 5/17/17

Quantity

Month of Study

Reruited

Spasticity Tracker App

Prior study using Fitbit devices
Feedback to Participants

• For subjects: long delay between participation and learning results, if ever

• Smartphone-based studies allow feedback:
  ‣ During participation
  ‣ At conclusion of participation

![Completed Logs](image-url)
Considerations of smartphone-based research

- Identity verification & privacy
- Data Handling
  - Types requested (e.g., GPS)
  - Secure transmission and storage
    *Intentionally not included in ResearchKit*
Spasticity Tracker App

• Patient or caregiver perspectives on function after intervention (botulinum toxin injection)

• Participants select outcomes and provide ratings of those outcomes over time

• Available on Apple App Store at no cost

• Study developed and being conducted without financial cost

spasticitytracker.firebaseapp.com
Conclusions

• Smartphones everywhere & hold great potential for biomedical research

• Recent tools simplify the creation of research apps

• Understanding steps & pitfalls can facilitate communication with software developers

Resources:

› ResearchKit ([researchKit.org](http://researchKit.org))
  ResearchStack ([researchStack.org](http://researchStack.org))

› PT Pal ([ptPal.com](http://ptPal.com))*
  Boston Technology ([boston-technology.com/researchKit](http://boston-technology.com/researchKit))*

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