

Smartphone Technology Applied to Spinal Cord Injury Research: Use and Clinical Utility

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Abstract

- Interactive smartphone technologies can inform and extend clinical care to help individuals with spinal cord injury (SCI) meet their health and rehabilitation needs.
- Advanced analysis provides customized feedback for physical and psychosocial wellbeing.
- **Aim** - Identify smartphone technologies applied to improve daily activities of those with SCI and analyze their impact.

Clinical Utility of Smartphone mHealth Technology

- **Goal Achievement**
 - Checklists, data tracking, and fact-finding tools
 - Accountability with peer, partner, or clinician
- **Health Self-Management**
 - Reminders: medication, pressure relief, physical activity, mindfulness
 - Build self-awareness: track self-report and symptoms
- **Regular collection of Active and Passive data**
 - In-situ and frequent time points
 - Objective behavioral data
- **Mechanism to provide Just-In-time Adaptive interventions (JITAI)**
 - Opportunely timed
 - Individualized and responsive

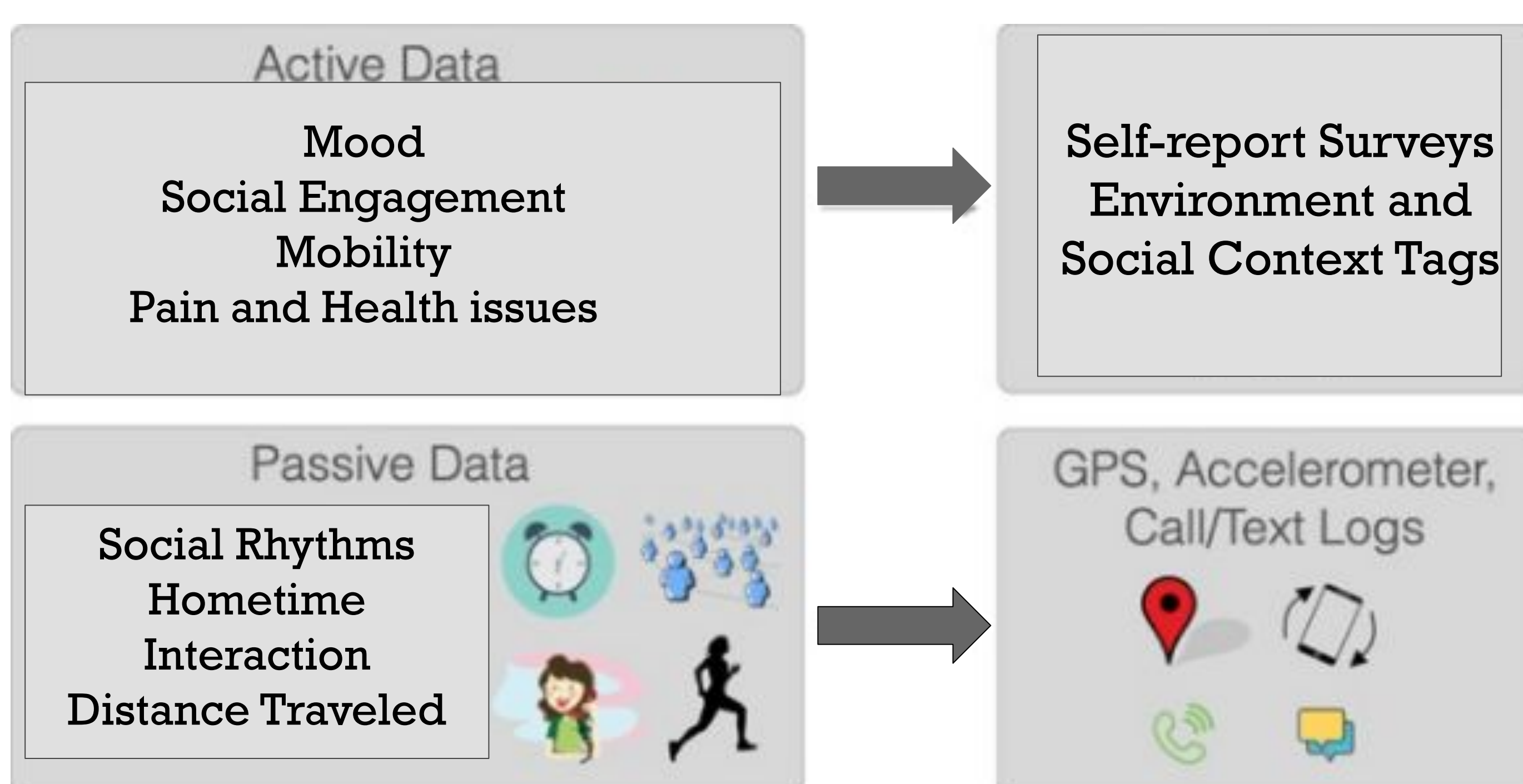
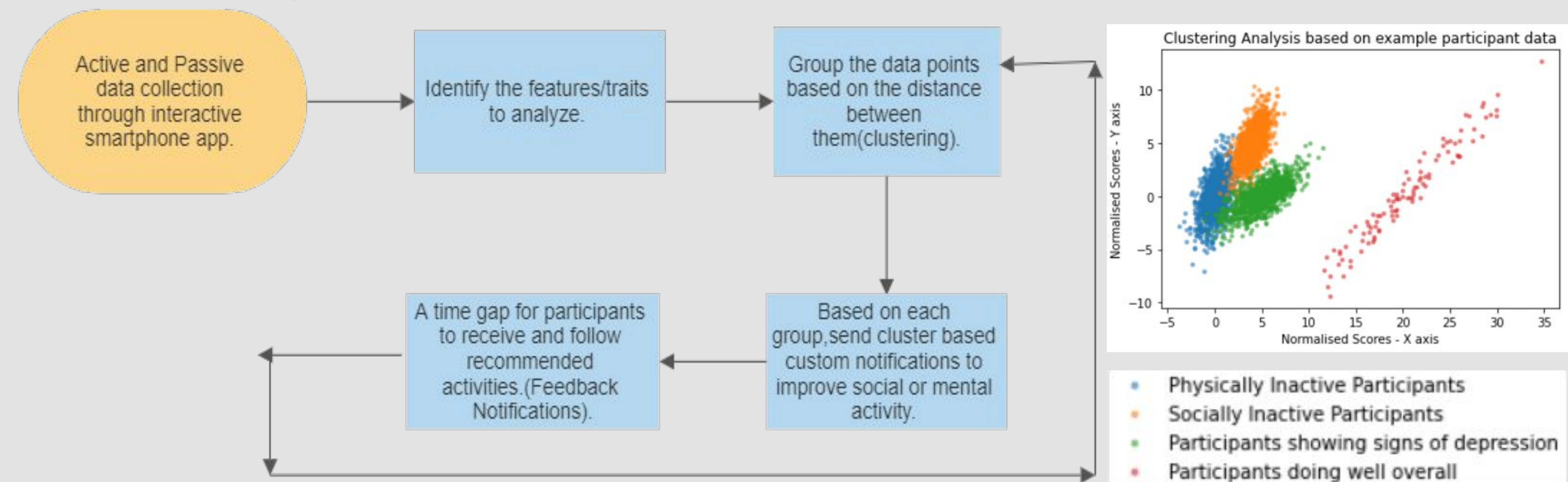


Figure 1. Collection of active and passive data taken from the mobile application.

Analyses to Inform JITAI

- **Test data:** Assessed depression symptom severity, social activity, and mobility.

Clustering Analysis



Parallel Predictive Model

- To determine how patients are doing overall, their active and passive data can be analyzed **relative to** participants doing well in all health and rehabilitation domains.
- Use this approach to **create feedback loops** for improvement of physical and psychosocial wellbeing

Scope for Future Enhancement

- Telehealth and mobile technologies can greatly help those affected by SCI, especially during the COVID-19 pandemic
 - Improved access to tools for health self-management
 - Greater geographical reach for SCI-specific care (peers and clinicians)
- Analyses require large samples, but smartphone technologies are easily scaled for larger populations.
 - The ease at which patients can be added helps in collecting more data, helping in the fine tuning of the algorithm.

Conclusion

- Smartphone technology is widely accessible and has great utility for self reporting to clinicians and for the patient's reference.
- It is readily available to participants and hence is an innovative mechanism to supplement care.
- With the help of JITAI we can provide the right kind of support at the right time by adapting to the participant's environment and contextual state.