



An Evaluation of Activity Trackers for Monitoring Parkinson's Disease Patient Outcomes



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Introduction & Background:

- Parkinson's disease (PD) is the second most common neurodegenerative disease in America.
- PD results in adverse outcomes including motor impairments and non-motor impairments such as cognition and sleep.
- Medication has a limited impact on treating PD and slowing down the progression of disease
- Anecdotal reports and some research show that intensive activity has been beneficial not only to slow down the progression of PD, but also may reverse the onset of more severe PD symptoms.



Aims:

The study objectives are

- (1) Identifying the most suitable activity sensor,
- (2) devise algorithms to describe different activities, and
- (3) explorative assessment of different activities, their intensity, frequency and duration on PD patient outcomes.

Methods:

Literature review was conducted on:

- ❑ PD etiology, pathogenesis, motor and non-motor symptoms.
- ❑ Impact of exercise on motor and non-motor activity of PD patients.
- ❑ Usage of activity tracker devices to record PD patient's exercise behavior.



- Detailed device information gathered such as cost, longevity and major functionality of existing activity trackers.
- Devices were compared to identify the feasibility for use by PD patients.
- In addition, these devices were evaluated on privacy and security criteria including HIPAA compliance.

Results

- Five devices most suitable for further evaluation were identified (see table 1)
- These devices are Kinesia, Fitbit, Jawbone, Runstatic and MotionWatch.



Table 1: Device Summary

	Kinesia 360	Fitbit Charge HR	Fitbit Surge	Jawbone UP3	Runstatic Orbit	MotionWatch 8
Cost (USD)	2500	120	200	130	100	
HiPAA Compliant cloud storage	√					
Steps, Calories, Distance		√	√		√	
Clock		√	√		√	
Sleep tracking /auto sleep detection		√	√		√	√
Floors Climbed		√	√			
Active Minutes		√	√			
Multi-Sport		√	√		√	
Fat Burning		√	√			
Continuous Heart Rate		√	√	√		√
Muscle Activity & PD Symptoms	√					
Medication/Symptom diary logs	√					
GPS Tracking			√		√	
Good Sensors	√			√	√	√
Built-in Running, Cycling/swimming					√	

Future work:

- PD patients recruited from RockSteady Boxing (RSB) will test feasibility and usability of selected sensors
- Collaborate with manufacturers of to obtain raw data for additional analysis
- Develop algorithms to label type and intensity of activity from raw data
- Perform comparative study to assess the impact of intense activity on PD progression.

