

# Development and evaluation of a 'Smartphone-delivered Peer Physical Activity Counselling' program for manual wheelchair users with spinal cord injury.

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## Background

- Importance of physical activity (PA) is amplified for individuals with spinal cord injury (SCI) who use manual wheelchairs (MWC),<sup>1</sup> yet >50% are sufficiently active to accrue health benefits.<sup>2</sup>
- Existing community-based PA programs work, but adherence is low.<sup>3</sup>
- Smartphone-delivered Peer Physical Activity Counselling (SPPAC)** answers some theoretical gaps (i.e., **autonomy, motivation, self-efficacy**)<sup>4</sup>:
- A smartphone may promote **autonomy, motivation, self-efficacy**.<sup>5</sup>
- An individualized, goal-oriented PA program cultivates an **autonomy supportive** environment.<sup>4</sup>
- Peers can provide a source of **motivation** and **self-efficacy**.<sup>6</sup>
- Other potential benefits of SPPAC: **cultivate social support, broad geographic reach, low-cost**.

## Methods and Preliminary Results

### Medical Research Council Framework<sup>7</sup>

Theory	Modeling	Exploratory Trial	Definitive RCT	Long-term Implementation
1. Explore relevant theory to ensure important variables are considered and good hypotheses made.	1. Identify the components of the intervention.	1. Identify a replicable intervention (with evidence of theoretical relationships among variables).	1. Compare a fully defined intervention to an adequate control group using a refined protocol that is feasible and has statistical power.	1. Determine whether the intervention and results can be replicated in uncontrolled settings over the long-term.
2. Identify potential design issues.	2. Select/validate appropriate outcome measures.	2. Describe a feasible protocol for a controlled (RCT) study. <sup>9</sup>		
Pre-clinical	Phase 1	Phase 2	Phase 3	Phase 4
Design: Scoping/systematic reviews	Design: Focus groups, Delphi Survey Subjects: Experts (MWC users with SCI, community partners, clinicians)	Design: Feasibility, pre-post study Subjects: MWC users with SCI	Design: Multisite RCT Subjects: MWC users	Design: Knowledge mobilization Subjects: Experts (MWC users with SCI, community partners, clinicians)
Complete <sup>3,8</sup>	Complete	Near completion	Future study	Future study

### Modeling

#### 1. Identify the components of the intervention.

**Focus groups.** 11 Experts discussed their perceptions/opinions of the SPPAC program: delivery, frequency/duration, components, and barriers. Thematic content analyses were used to create a Delphi survey.

**Delphi surveys.** 11 experts rated their level of agreement (3-point scale) with 95 statements related to SPPAC program content, delivery and concerns. ≥70% consensus with 2 rounds.

- 10-15, 30-minute sessions (~ 1/week)
- Individualized to preferences and goals
- Provide choice and motivational strategies

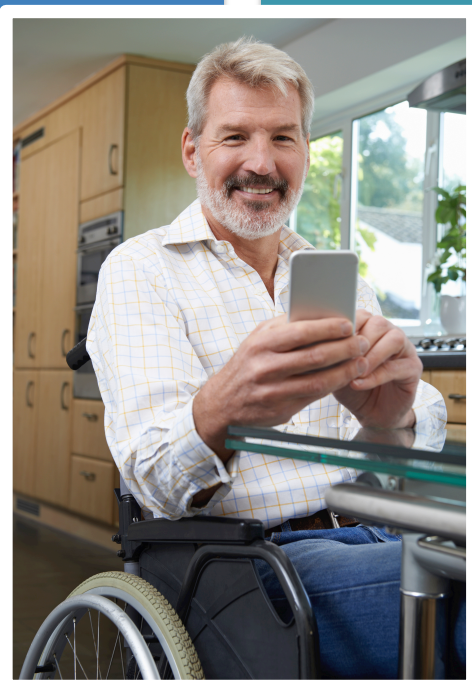
"Peers can provide extra motivation to get active."

"Goal-setting is important."

"To be active, the user first needs to trust in his/her ability to use a MWC, otherwise it's a major barrier."

"Smartphones may help establish a sense of community"

"Smartphones may have a positive affect on motivation (e.g. SMS, Facebook, voice/video calls, apps to track PA)"



"SPPAC is inclusive and has the ability to reach people of all ages and all diagnoses."

"SPPAC could improve autonomy and self-efficacy"

"May help overcome barriers to accessing PA"

"Delivery should not be limited to smartphones."

"Having a well-trained peer is important"

"Need MWC skills to participate in PA in the 'real-world'."

"Include healthcare professionals"

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#### 2. Validate appropriate outcome measures.

**Objective:** Validate an objective measure of PA (actigraphy) in MWC users

**Design:** Experimental

**Participants:** n=28 MWC user (14 SCI); 51y, 14

**Procedures:** Participants wore 2 GT3X actigraphs and completed 8 PAs:

- Low-intensity (eg. reading)
- Moderate-intensity (eg. propelling on flat surface)
- High-intensity (eg. propelling up steep ramp)

**Outcomes:** Heart rate (HR), Rating of perceived exertion (RPE), Activity counts (AC)

**Results:**

- AC:HR ( $r^2=0.76$ ,  $p=0.002$ )
- AC:RPE ( $r^2=0.48$ ,  $p=0.03$ )
- Low-intensity PA = 0 to 45 AC/s
- Medium-intensity PA = 46 to 100 AC/s, AC
- High-intensity PAs = not clear

**Conclusion:** Combining actigraphy with HR and RPE could be an easy and reliable method to measure PA intensity in the real world.

Actigraphy may discriminate various intensity PA, but further research is needed.



### Exploratory Trial

#### 1. Identify a replicable intervention with evidence of relationships among variables.

**Design:** Multi-site feasibility pre-post

**Participants:** n=12 MWC users with SCI

**Intervention:** SPPAC targets behaviour change using peers and smartphone technology to incorporate theoretical psychosocial precursors to PA (motivation, autonomy support, self-efficacy). 14x30 min individualized sessions that are tailored to PA goals. Participants can choose to join a private Facebook group.

**Feasibility indicators:**

*Process* (recruitment, perceived benefit)  
*Resources* (adherence)  
*Management* (fidelity, autonomy support)  
*Treatment* (safety, outcome response)

**1° participation outcome:** Objective PA.

**2° precursors to PA:** LTPA barriers self-efficacy, MWC use self-efficacy, satisfaction of psychological needs, motivation.

**2° participation outcomes:** Leisure Time PA, MWC skills capacity & performance, satisfaction with participation.

**Significance:** Will establish feasibility and whether theorized precursors to PA influence participation outcomes in MWC users with SCI.

## Conclusions & Future Directions

If feasible, SPPAC may offer a program that:

- was developed using a **client-centered approach**
- decreases barriers** (accessibility / transportation)
- provides **social supports**
- limits burden** on healthcare professionals
- Has potential **cost savings**
- potential for **broad geographic reach**

A definitive **RCT is the next step** in the MRC framework.

Insight into a continuum of **community-based** healthcare/**self-care** for individuals with SCI.

**References:** [1] Anderson et al. Disabil Health J 2010; [2] Rocchi et al. 2017; [3] Best et al. J Spinal Cord Med 2017; [4] Fortier et al. Appl Physiol Nutr Metab 2007; [5] Mahar et al. J Med Internet Res 2014; [6] Ginis et al. Transl Behav Med 2013; [7] Craig et al. BMJ 2008; [8] Best et al. ACRM 2016; [9] Best et al. J Med Internet Res 2017.