**Cover page**

**Official Title: Mobile Motivational Physical Activity Targeted Intervention**

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## Study Design

This was a prospective one group pre-posttest study to test the feasibility and efficacy of a multidimensional intervention, the components of which were wearable activity tracking devices, personalized texts, and motivational interviews. Participants received a Fitbit Charge 2 device [Fitbit, San Francisco, CA]) and were given access to the Fitbit mobile app to facilitate their self-monitoring. The study occurred over 19-weeks.

## Participants

Study participants were recruited through direct mailings, presentations, and flyers in retirement communities and other places frequented by older adults in Seattle, WA. Eligibility criteria included: a) being age 65 years and older, b) having a diagnosis of osteoarthritis, c) having a smartphone, d) having physical activity levels below the U.S. Department of Health and Human Services recommended guidelines evaluated using the Rapid Assessment of Physical Activity scale, and e) having Insomnia Severity Index score $\geq$12. Exclusion criteria included: a) having an acute injury associated with hip or knee pain, b) inability to stand up without assistance, c) having a Memory Impairment Screen for Telephone score of <4, d) having severe hearing or visual impairment, and e) an acute episode or change in the treatment of psychiatric problems within the past 3 months.

## Intervention Components

*Wearable Activity Tracking Devices*

The Fitbit Charge 2 is a heart rate and fitness wristband used to deliver the intervention and measure daily step counts. This device was selected because 1) it can accurately sense step count in older adults; 2) it has an optical heart rate sensor that monitors and

documents heart rate over time, thus allowing for collection of objective wear time; and 3) its technology permitted the retrieval of near real time information exchange between the Fitbit app and the iCardia research platform.

*Personalized Texts*

The adaptive personalized intervention was informed by Control Theory framework. Following a formative process that included an expert panel, end users, and literature review, the study team developed targeted behavioral change text messages that provided information and motivational reinforcement with regard to participant's past and concurrent physical activity progress. Participants received weekly targeted and personalized text messages that provided motivational feedback according to their adaptive step count attainment.

*Motivational interviews*

In addition to text messages, three phone calls at weeks 1, 5, and 9 that were informed by motivational interviewing principles were scheduled with participants to discuss their goals and debrief strategies for facilitating behavioral change**.**

*Remote and self-monitoring*

The iCardia research platform was used to retrieve data from the Fitbit cloud server, present these data on a user-friendly dashboard, and send personalized text messages to the end user smartphones. In addition to motivational messages, reminders to sync the Fitbit and charge its battery were sent when participants failed to sync for more than 3 days and/or tracker battery was low.

**Data Collection Procedures**

A study coordinator (SC) collected data during one-on-one interviews and remotely using standardized procedures at three-time points. At the baseline in-person assessment, the SC administered clinical and demographic questionnaires and provided actigraphs. The second and third assessments at weeks 14 and 19 occurred either in-person or remotely by using Research Electronic Data Capture (REDCap) online survey feature. During the second and third data collection points, participants were also provided with actigraphs, which they were instructed to wear for one week and mail back to the research office.

**Statistical Analyses**

De-identified data from RedCap and iCardia were exported and analyzed using Stata 15.0 in two phases. First, univariate analyses were conducted to summarize participants' baseline characteristics and follow-up measures. Mixed effect models were utilized next because of the time repeated structure of the data. Data collection occasions were also entered in the models to account for change over time. The adjusted main effects for time for each of the variables were tested for significance and reported as estimates and 95% confidence intervals (CI).