Abstract

Currently about 71% of adults in the US are considered overweight or obese. Overweight and obesity are associated with higher risk of developing many chronic diseases; however, health risks associated with overweight and obesity can be reduced by as little as a 3% to 5% reduction in weight. Mobile health (mHealth) has shown promise as a way to deliver weight loss interventions, yet maintaining participant engagement over time has been a challenge.

The purpose of this study was to develop, refine, and pilot test the Social Pounds Off Digitally (POD) Android app for personalized health monitoring and interaction; revise the Social POD app based on participant feedback; and conduct a multi-site randomized clinical trial to pilot test the second iteration of the Social POD app.

Overweight and obese adults with Android smartphones (BMI 25-49.9 kg/m²; N=9) were recruited for a two-month weight loss pilot intervention and iterative usability testing of the Social POD app. The app prompted participants via notification to track daily weight, diet, and PA behaviors. Participants received the content of the behavioral weight loss intervention via podcast. In order to re-engage infrequent users, the app prompted frequent app users to select one of three messages to send to infrequent users targeting one of three behavioral theory constructs: 1) social support, 2) self-efficacy, or 3) negative outcome expectations. Body weight and dietary intake (two 24-hr recalls) were assessed at baseline and two months. All participants attended one of two focus groups to provide feedback on use of the app. Based on the usability testing, the Social POD app was refined and a point-based incentive system was incorporated into the app and used in a larger randomized controlled trial. Overweight and obese adults (N=51, mean
BMI=34.7 ± 6.0, 38% black) in Charleston and Columbia, SC who owned an Android phone or tablet were recruited to participate in a 12-week behavioral weight loss intervention delivered via mobile app and podcast. All participants received the behavioral content of the weight loss intervention via twice weekly podcasts and were randomized to download and use either a standard calorie tracking app (Fat Secret) or the Social POD app. Main outcomes included kilograms lost at 12-weeks and secondary outcomes included change in psychosocial variable scores from pre- to post-test, association between points earned and percent weight loss at 12-weeks, and re-engagement based on message-type received.

Following the usability testing participants lost a mean of -0.94 kg (±2.22 kg, p=0.24) and consumed significantly fewer kcals post-intervention (1570±508 kcal/day) as compared to baseline (2384±993 kcal/day, p=0.01). Mean number of app entries was 77.2 ± 73.8 per person with a range of 2 to 219. Messages targeting social support were selected most frequently (n=32, 46%), followed by self-efficacy (n=29, 40%), and negative outcome expectations (n=10, 14%). Themes from the focus groups included functionality issues, revisions to the messaging system, and the addition of a point system with rewards for achieving goals.

Participant attrition for the RCT was 12% (n=3 experimental and n=3 comparison). Experimental group participants lost significantly more weight (-5.3kg, CI: -7.5, -3.0) than comparison group participants (-2.23kg, CI: -3.6, -1.0; p=0.02) and had a greater reduction in BMI (p=0.02). These outcomes were significant for both intention-to-treat (using baseline observation carried forward and complete case). While there were significant differences in final positive outcome expectations scores between groups [4.56 experimental, 3.57 comparison (scale range from 1 to 7, maximum); p=0.04], other secondary outcomes (e.g., caloric intake and social
support) were not significantly different by group assignment while controlling for baseline values.

Among experimental group participants only, total points earned significantly predicted percent weight loss ($B=-0.02$, $p=0.01$). In addition, the neuroticism personality trait was significantly associated with total points earned ($B=120.2$, $p=0.03$), but other personality characteristics and demographics were not. Messages most frequently sent to infrequent users of the Social POD app were social support (n=119), followed by outcome expectations (n=99), and then messages targeting self-efficacy (n=97). There was a significant difference between the type of message received and re-engagement among infrequent users ($p=0.03$) with self-efficacy messages prompting the most engagement (n=7), followed by outcome expectation messages (n=5) and social support messages (n=1).

In conclusion, use of the Social POD app led to greater weight loss than a standard diet tracking app (Fat Secret). This mobile health intervention has the potential to be widely disseminated to reduce the risk of chronic disease associated with overweight and obesity.