

# Real-World Evaluation of a Technology-Enabled System for the Augmentation of Physical Activity Behaviour Change in Cardiac Rehabilitation.

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## INTRODUCTION

### BACKGROUND:

- Cardiac rehabilitation (CR) is effective in reducing premature death and improves physical and psychosocial health and quality of life (QoL) [1, 2].
- Much, although not all, of this benefit is thought to be due to physical activity (PA).
- However, participation is sub-optimal, with only 35-50% of eligible individuals taking up CR [3].

### AIM:

- To test the hypothesis that a technology-enabled service incorporating accurate physical activity data from a wearable, personalised online feedback and remote mentor support, in addition to CR, leads to increases in PA.

## METHODS

### POPULATION:

- Patients referred for CR between September 2020 and April 2021.
- Exclusions: patients with pacemakers or implantable cardioverter defibrillator devices, unable to access the KiActiv® Health online platform and unwillingness to participate.
- This left 17 patients who were given an activity monitor and access to the KiActiv® Health online platform and were enrolled on to the 12-week KiActiv® Health CR programme, alongside a conventional CR programme.
- Fourteen patients (82%) completed the 12-week programme (Figure 1).

### DATA COLLECTION & ANALYSIS:

- Patient characteristics, including age, sex, deprivation indices and body mass index were collected.
- 4 domains of physical activity were measured throughout the 12-week CR programme using validated physical activity monitors.
- Questionnaires were completed at first and last assessments to ascertain self-reported mental health and quality of life before and after CR.
- Area under curve (AUC) calculations were used to determine the average total PA in each dimension during the programme.
- Incremental AUC was calculated to quantify the additional PA achieved in each dimension.
- T-tests determined differences in questionnaire reported mental health and QoL before and after CR.

## RESULTS

### DEMOGRAPHIC:

- 82% of patients were male, and the mean age was 67.

### ENGAGEMENT:

- On average, patients visited their online dashboard more than once every 4 days, and there was evidence for sustained engagement with the programme in 79% of the participants (Figure 1).

### PHYSICAL ACTIVITY:

- 93% of patients improved in 1 or more dimensions of PA (Figure 2).
- There were increases in non-sedentary time, moderate activity, calorie burn and moderate bouts in patients on the programme (Figure 3).

### PATIENT REPORTED OUTCOME MEASURES:

- All patients reported an improvement in 1+ QoL domains, with statistically significant improvements in physical fitness and overall health ( $p < 0.05$ ).
- Symptom scores for questionnaire-reported depression and anxiety decreased, though not statistically significantly.

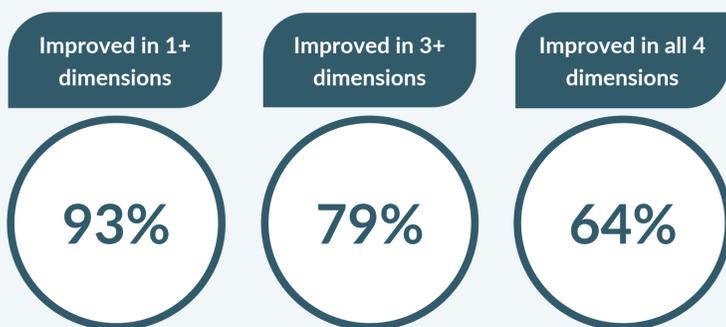


Figure 2. Percentage of participants improving in 1 or more, 3 or more, and all 4 dimensions of physical activity (PA).



Figure 1. Conversion, completion and sustained engagement rates for KiActiv® Health 12-week cardiac rehabilitation (CR) programme.

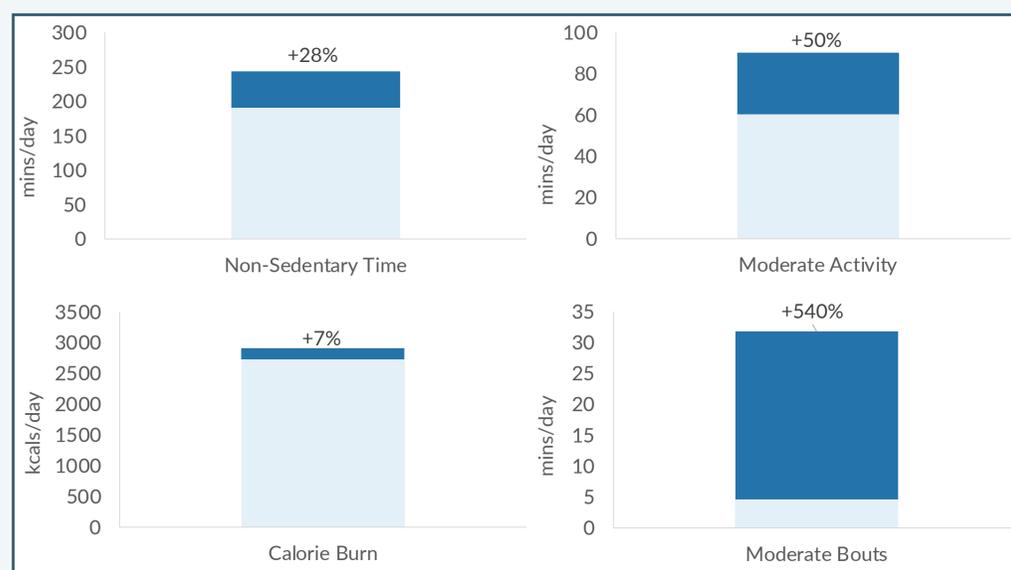


Figure 3. Group average daily physical activity (PA) in multiple dimensions at baseline stacked beneath new group average daily PA after participating in KiActiv® Health programme (n=14). Legend: Lighter stacked bar represents group average daily PA at baseline. Darker stacked bar represents new group average daily PA after participating in KiActiv® Health programme. Data labels denote % increase between group average daily PA at baseline and new group average daily PA after participating in KiActiv® Health programme.

## DISCUSSION

### KEY FINDINGS & FUTURE DIRECTION:

- Our study provides evidence that the KiActiv® Health technology-enabled system, when used in conjunction with conventional CR is acceptable to patients, and is associated with good compliance, sustained engagement, and meaningful improvements in PA and QoL.
- The change in cardiorespiratory fitness in conventional UK CR programmes has been quoted as 0.52 metabolic equivalent (MET) [4], with our study reporting increases of 1.1 to 2.9 METs, which may significantly reduce cardiovascular morbidity and mortality.
- Our study necessitates a randomised trial to compare conventional CR programmes with the KiActiv® Health in conjunction with conventional CR.

### References:

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