

## Introduction:

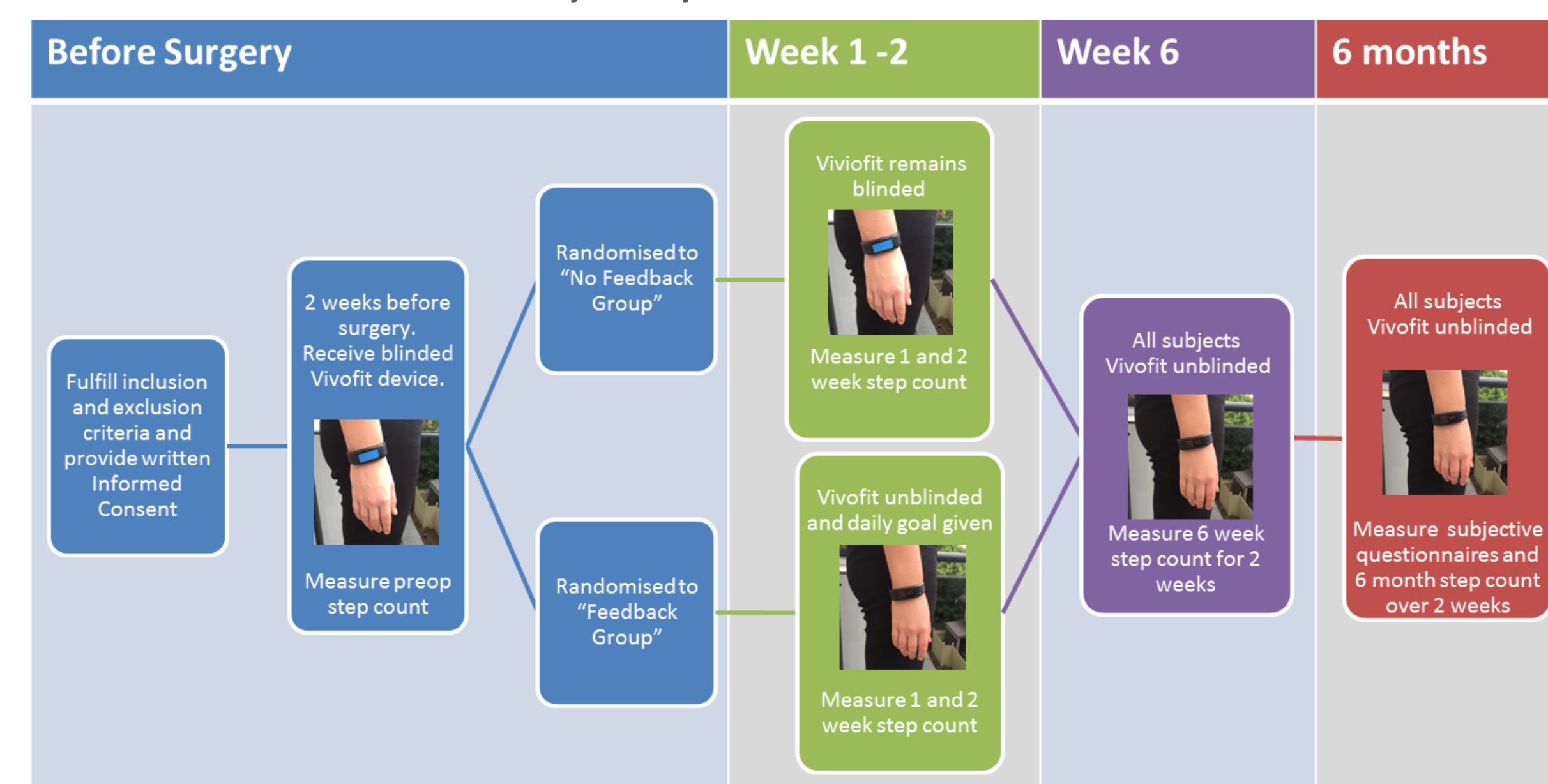
Mobility and physical activity are imperative to healthy aging. Joint replacement surgery aims to improve pain and function, but may also lead to higher activity levels. Commercial wrist-worn activity monitors have a great potential to accurately assess activity levels, and are being increasingly adopted in the general population.



In this study, we used commercial activity trackers to monitor and encourage higher activity levels in a series of participants before and after Total knee arthroplasty (TKA) or Total hip arthroplasty (THA). We assessed whether feedback of step count in the first 2 weeks after surgery improved 6 week and 6 month activity levels after TKA or THA, and if this impacted participant satisfaction or participant reported outcome measures.

## Methods:

- This was a single center parallel group randomized controlled study with an equal allocation ratio.
- Eligible patients were all adults undergoing primary elective hip or knee arthroplasty under the care of one of the investigating surgeons between May and December 2016.
- 163 consecutive subjects were included and received a Garmin Vivofit device 2 weeks before surgery but were blinded to their daily step count.



On day 1 after surgery participants were randomized to either the "Feedback Group" (FB) or the "Non Feedback Group" (NFB).

The **FB group** were able to view their daily step count via the activity monitor or using the app on a mobile device, and were given a daily step goal.

Post op Day	Daily Step Goal
Day 1	No goal
Day 2	500
Day 3	1000
Day 4	1500
Day 5 to 7	2000
Week 2	3000
Week 3	4000
Week 4	5000
Week 5	6000
Week 6	7000

The **NFB group** wore the device with the display obscured for 2 weeks after surgery, after which time they were also able to see their daily step count, but did not receive a formal step goal.

All subjects wore the device for 2 weeks before and 6 weeks after surgery. The mean daily steps at 1, 2, 6 weeks, and 6 months were expressed as a percentage of the subject's preoperative steps and compared between the FB and NFB groups. At 6 months after surgery subjects repeated PROMS and daily step count collection.

## Results:

Of the 163 joints, 95 underwent THA and 68 underwent TKA. There was no significant difference between the 2 groups for any baseline measures.

- FB subjects had a significantly higher ( $p < 0.03$ ) mean daily step count by 43% in week 1, 33% in week 2, 21% in week 6, and 17% at 6 months, compared to NFB subjects (Figure 2).

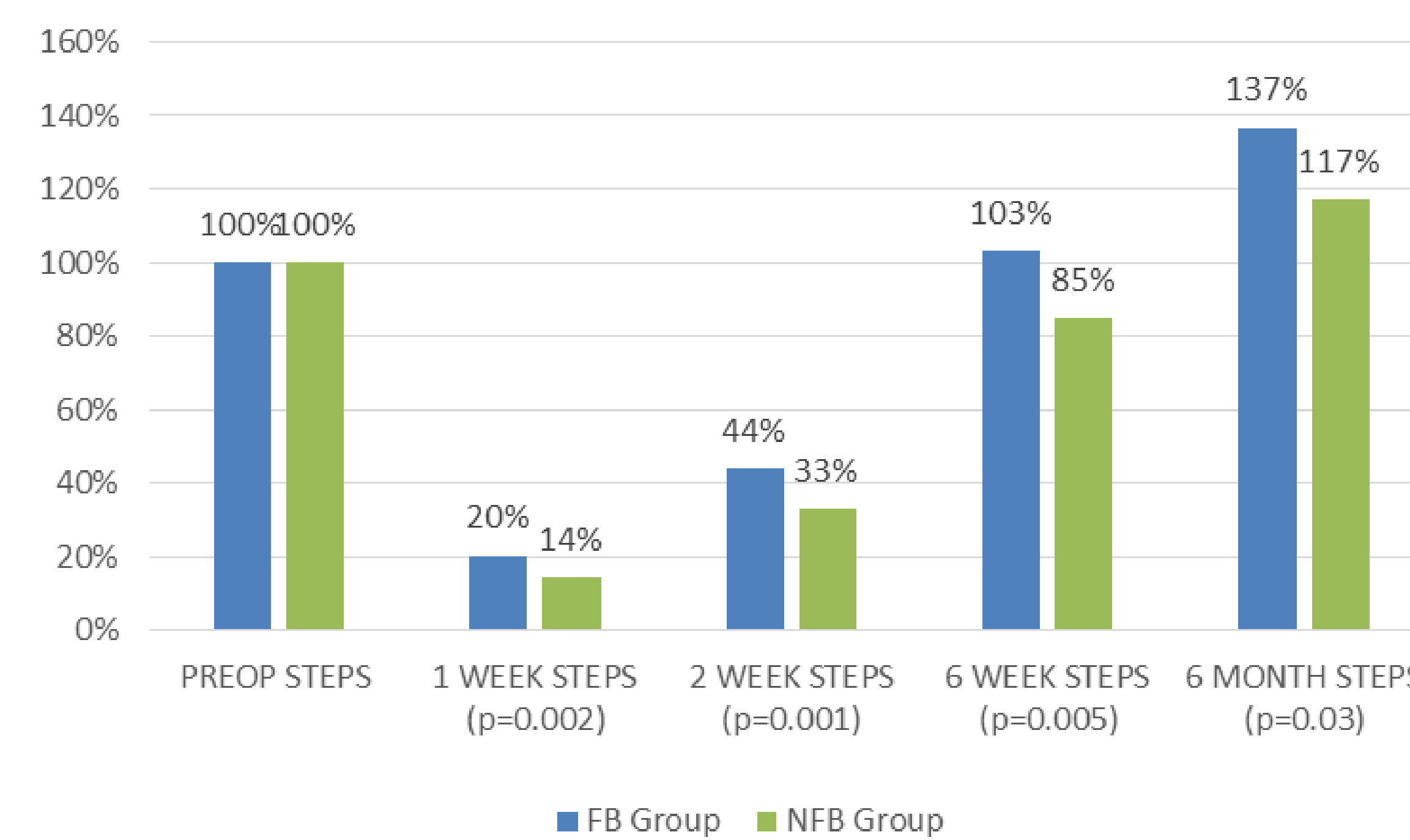


Figure 2: Mean Step Count as a Percentage of Preoperative Steps in the Feedback and No Feedback Group over Time

Subjects in the Feedback Group took

- 45% more steps in week 1
- 34% more steps in week 2
- 26% more steps in weeks 6
- 17% more steps at 6 months compared to Non Feedback Subjects

- 7000 steps per day is recommended as a suitable activity level for subjects over 65 years[1]. The proportion of subjects achieving a mean of 7000 or more steps each day is shown in Figure 3.

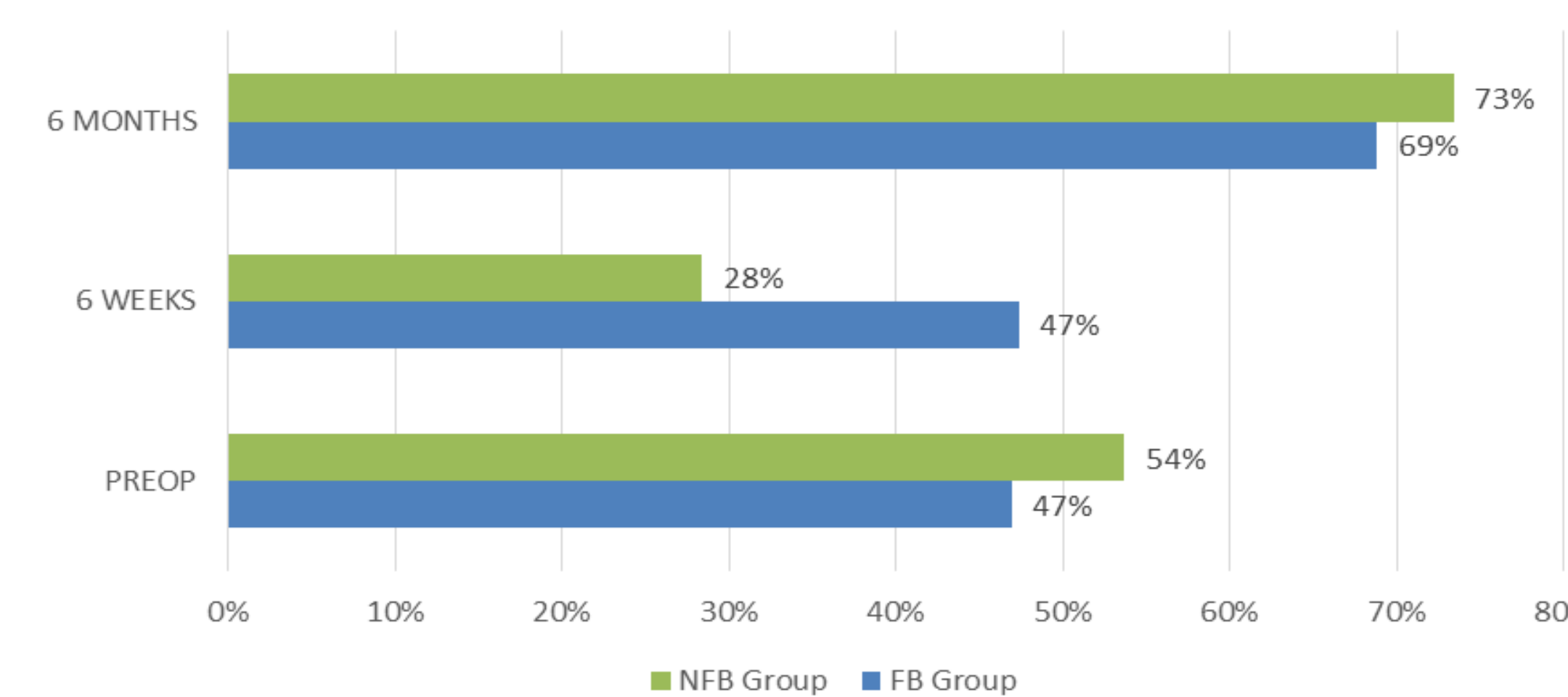


Figure 3: Proportion of Subjects in the Feedback and No Feedback Group taking a mean 7000 or more steps each day

- FB subjects were 1.7 more likely to achieve a mean 7,000 steps per day than NFB subjects at 6 weeks after surgery ( $p = 0.02$ ).
- There was a trend to higher patient satisfaction in the FB Group - 91% of FB and 83% of NFB reported they were satisfied with the results of the surgery ( $p = 0.08$ ).
- At 6 months after surgery 70% of all subjects had a greater mean daily step count compared to their preoperative level.
- There was no significant difference between the groups in Patient Reported Outcomes at 6 months.

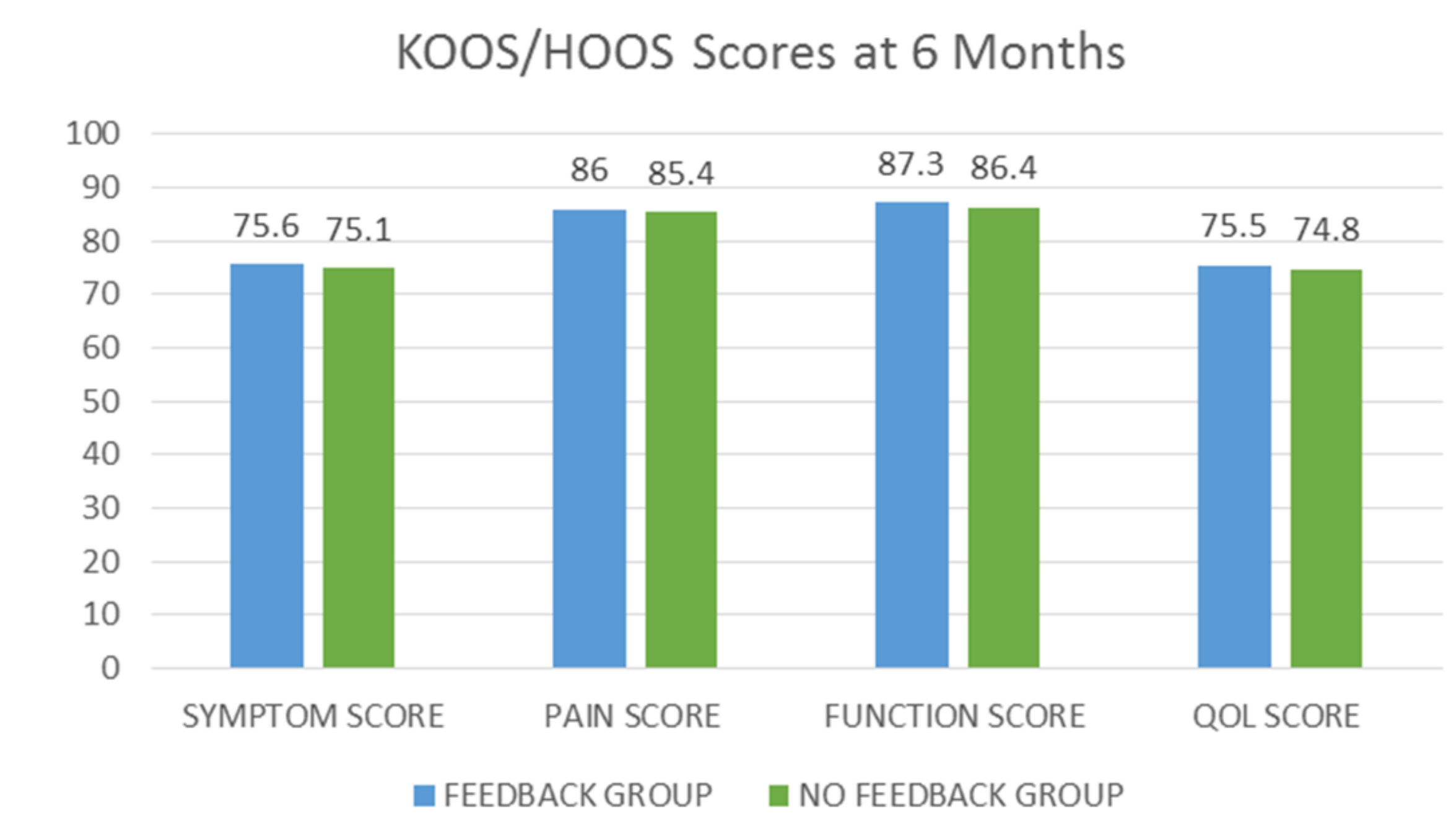


Figure 4: KOOS/HOOS Scores at 6 months after surgery.

## Conclusions:

- Subjects who received feedback from a commercial activity tracker with a daily step goal had significantly higher activity levels after hip and knee arthroplasty over all measured time points, compared to subjects who did not receive feedback in a randomized controlled trial.
- The positive effect of feedback in the first 2 weeks after surgery had a sustained effect on activity levels for 6 months after surgery.
- The proportion of subjects taking the recommended 7000 steps or more steps per day increased from 50% prior to surgery to 70% at 6 months after arthroplasty.
- Commercial activity trackers may be a useful and effective adjunct to improve activity levels after arthroplasty.



## References:

- Tudor-Locke et al. International Journal of Behavioral Nutrition and Physical Activity 2011 8:79