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RESEARCH LETTER

Self-regulated use of a wearable activity sensor is not associated with improvements in physical activity, cardiometabolic risk or subjective health status

INTRODUCTION

Physical activity (PA) trackers are a pervasive feature of modern life. It is expected that by 2020, sales of wearable devices will reach approximately 300 million users[1] many with the intention of increasing activity by tracking daily step count and other measures of PA. We assessed whether self-regulated use of a commercial PA tracker without prescribed goals improved (1) PA, (2) cardiometabolic (CM) risk factors or (3) subjective health status (SHS).

METHODS

We recruited 431 healthy, mostly white (59%) male (61%) volunteers aged 41±9 years (mean±SD), body mass index (BMI) 28±6 kg/m^2 (23.6% obese) from a common worksite in North America to wear a commercial PA tracker for 6 months. Behaviour and PA change goals were not prescribed. Participants did not receive any compensation but kept the PA tracker at study completion. The wrist-worn PA tracker (Basis Peak) incorporated standard technology including an optical sensor and 3-axes accelerometer and was synchronised to participants' mobile devices enabling them to follow their PA. Raw accelerometer data from the PA tracker was collected and compiled by the research team for analysis. We defined sufficient data as a minimum of 70 days of wear time with a minimum of 10 waking hours per day as in prior studies.[2]

The average rate of change in mean hourly steps per day (ΔPA) measured change in PA during the study. At study end, participants were asked whether or not their PA increased. At baseline and study end, we measured BMI and CM risk factors (systolic and diastolic blood pressure (BP), A1c, lipids and glucose). SHS was assessed with the short form health status survey (SF-12).[3]

ΔPA was analysed using weighted least squares regression. Changes in BMI, CM risk factors and SHS were assessed via generalised estimating equations. All models were adjusted for age, gender and BMI where appropriate.

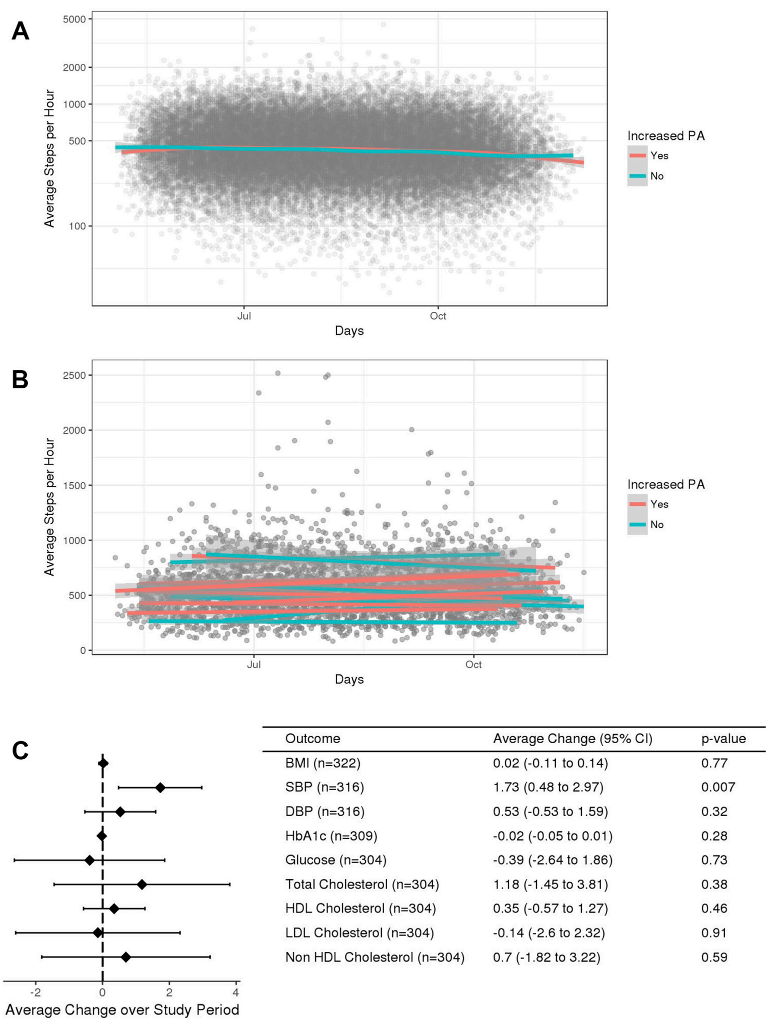

Figure 1 (A) Displays daily average steps per hour during the study period with smoothed curves for participants who reported subjective increase (n=168) in PA versus those who did not (n=129). (B) Displays daily average steps per hour with individual best fit lines for a random sample of 10 participants who reported a subjective increase in PA and 10 who did not. The average rate of change in steps per hour did not differ in those reporting increased PA versus those who did not (−0.27±0.79 vs −0.34±0.74, P=0.68). (C) Average changes (95% CI) in BMI and cardiometabolic risk factor across the study period. BMI, body mass index; DBP, diastolic blood pressure; HbA1C, haemoglobin A1C; HDL, high-density lipoprotein; LDL, low-density lipoprotein; PA, physical activity; SBP, systolic blood pressure.

RESULTS

Over 5.0±0.6 months, 322 (75%) participants completed the study with sufficient PA data. There were no differences between subjects with and without sufficient data with regard to age, gender, BMI or CM outcomes. There was a downward trend of mean hourly steps per day during the study even though 57% of patients perceived their PA to have increased (figure 1A). ΔPA did not differ in those reporting increased PA versus those who did not (−0.27±0.79 vs −0.34±0.74, P=0.68) (figure 1B). Aside from an increase in systolic BP, CM risk factors were unchanged (figure 1C). Physical (54.3±6.6 to 54.5±5.7, P=0.56) and mental (50.7±8.4 to 51.0±8.2, P=0.47) component scores for SHS were also unchanged.[2] Results were consistent after adjusting for ethnicity.

DISCUSSION

Self-regulated use of a commercial PA tracker was not associated with improved PA, CM risk factors or SHS in office-based employees. Importantly, 57% felt their PA had increased despite an objective decline in steps. Our findings extend prior research that challenges the clinical utility of commercial PA trackers over conventional PA promotion and weight loss interventions.[4] Study termination in the winter months may have contributed to higher systolic BP.[5] As shown in figure 1A, the downward trend in step count was consistent across the study duration from July to December suggesting seasonal variation had minimal impact on declining PA. We alert scientists and policy makers to possible false perception of increased PA despite declining step count.

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