The Influence of the UCLH Work-Based Pedometer Challenge on Physical Activity and Exercise Self-Efficacy: A Pre-Post Test Study

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Abstract

Background/Aims: The literature on the effect work-based pedometer interventions on physical activity levels measured by self-reporting scales have shown mixed results. The aim of this study was to explore the impact of the University College London Hospital (UCLH) 6-week work-based pedometer challenge on physical activity levels, perceived health status and exercise self-efficacy. Secondary aims include investigating changes in weight, BMI and waist circumference.

Methods: This study used a longitudinal pre-post intervention study design. 247 participants of the UCLH 2013 pedometer challenge from 580 who registered, filled out the online questionnaire, of these only 103 completed filling out the post pedometer questionnaire two months after the end of the challenge. Pre-and post-data were analyzed with paired t-tests.

Results: Results showed that although there was an increase in reported physical activity after the pedometer challenge, this difference was not significant. Subjective data however showed that 40% of participants reported a change in physical activity after the pedometer challenge. There were significant differences in only perceived health status and waist circumference. No significant differences were identified in exercise self-efficacy, weight or BMI.

Conclusion: Workbased pedometer challenges such as the 6-weeks UCLH pedometer challenge may be of insufficient duration to produce a change in physical activity, and exercise self-efficacy 2 months after the pedometer challenge is over. However a change in waist circumference suggests that some weight loss occurred and was maintained 2 months after the pedometer interventions.

Introduction

Work-based physical activity programs have been found to increase the amount of time participants engage in physical activity and reduce sedentary time. U.K employers are now acknowledging the importance of encouraging their employees to participate in some form of physical activity. Various initiatives have been implemented. Pedometer challenge is one such physical activity initiative. A pedometer is a small body worn device which counts the number of steps taken. As they are considered valid and reliable tools with which to measure physical activity through walking [1], pedometers have been promoted as motivational tools. Findings suggest that pedometers have effectiveness in improving goal setting and exercise compliance.

In a pedometer challenge, participants from teams of about 4 to 5 participants compete with other teams. The team with the most total number of steps taken over a certain period of time wins the challenge. Several studies have investigated the effectiveness of worksite pedometer interventions including pedometer challenges in increasing physical activity levels. These studies have yielded mixed results. Most studies showed an increase in physical activity [2-7], while others showed no change in physical activity [8,9]. Mixed results were also reported regarding weight, Body Mass Index (BMI) and waist circumference [2,6,10,11] reported significant changes in weight and waist circumference with the work site pedometer intervention while studies such as [4,9] show a lack of significant difference in weight and waist circumference. This could be attributed to the duration of the pedometer intervention. Most of these studies were carried out in the United States, Canada and Australia. Therefore, there is an increased need to investigate work-based pedometer challenges in the U.K.
Self-efficacy can be described as self belief in ones capability to perform a specific task in order to achieved a certain goal [12]. It is a significant aspect of the social cognitive theory. Self-efficacy is said to undermine why people persist with difficult tasks. Exercise self-efficacy is an important factor related to adherence with exercise behaviour. When exercise self-efficacy is assessed and specifically targetted, compliance with exercise can be more easily achieved [13]. No significant changes in exercise self-efficacy was reported by two studies that investigated this variable after pedometer interventions [11,14]. These two studies were carried out in Japan and Australia. The influence of a workbased pedometer challenge on exercise self-efficacy has not been investigated in the U.K.

Study Aims

The main aim of this study was to explore the impact of the University College London Hospital (UCLH) 6 week work-based pedometer challenge on physical activity levels and exercise self-efficacy. Other aims included evaluating the influence of the pedometer challenge on weight, BMI, perceived health, and to explore beliefs about exercise and barriers to exercise.

Methodology

Study design and methods

This study was based on a longitudinal design with baseline testing done one week before the pedometer challenge and post-challenge measurements carried out 2 months after the pedometer challenge.

Sample

The study sample was made up of willing volunteers from the UCLH pedometer challenge. Interested participants were sent information about the study and a link to the online questionnaire once they registered on the pedometer challenge. All participants were employed at the University College London Hospital.

The UCLH pedometer challenge

The UCLH pedometer challenge is a twice-yearly event. In the June 2013, 580 UCLH staff participated in the challenge. Each registrant was given a pedometer and formed a team of four with other registrants. 145 teams were formed. All participants were encouraged to accumulate more than 10,000 steps a day. The team with the greatest number of steps won the challenge with incentives for all members of the teams in first, second and third place. The challenge lasted for 6 weeks between 3rd June 2013 and 14th July 2013.

Information about the pedometer challenge was posted on the hospital intranet, this included a link for registration, guidelines for taking part, individual and team record sheets. Information about this research study was added to the hospital internet page with the information about the pedometer challenge itself. All employees of UCLH were emailed information about the challenge, the research study and the link to the intranet page which had further information.

Teams of 4 participants had an appointed team leader who emailed their weekly step to the pedometer challenge co-ordinator who posted their accumulated weekly steps on the hospital intranet. Each team used various different methods to encourage team members, this included twitter and Facebook posts, encouraging text messages, emails, group and one to one meeting. Individual and group goal setting were encouraged however this was not uniform across the teams.

Inclusion criteria

- Age between 18-65
- If any of the registrants had any underlining medical condition, which was deemed a risk factor or contra-indication for the pedometer challenge they must have, been cleared by their GP or a medical practitioner prior to inclusion. This is in line with the challenge organizers entry requirements.
- The participant must be working at UCLH.

Exclusion criteria

- UCLH employees with medical conditions preventing them from participating in exercise without medical clearance.

Testing/procedure

UCLH pedometer participants interested in taking part in the research study were required to fill in an online questionnaire via Opinio. This online questionnaire included questions about age, weight, height and waist circumference, perceived health status, physical activity (Global Physical activity questionnaire) exercise beliefs and exercise self-efficacy. See appendix for these questionnaires.

Pre study data collection

May 15th-3rd June 2013.

Post study data collection


Global physical activity questionnaire

Participants completed the Global Physical Activity Questionnaire (GPAQ) which measures physical activity participation in three domains: Activity at work, travel to and from places and recreational activity. The GPAQ also collects information about sedentary behaviour i.e time spent sitting or total hours spend watching TV. Participants had to mention how many days a week and how long they spend doing vigorous, or moderate intensity physical activity at work and during recreational activities. Participant also had to mention how many days a week and time spent traveling to work either by walking or cycling at least 10 mintues contiously.
Total minutes spent weekly on various activities were converted into Metabolic Equivalents Of Task (METS). Time spent on vigorous intensity physical activity was multiplied by 8, while time spent on moderate intensity physical activity was multiplied by 4. Total physical activity METs-minute/week (= the sum of the total MET minutes of activity computed for each setting).

**Exercise self-efficacy scale**

Participants also completed the Exercise Self-Efficacy Scale (ESES). The Exercise Self-efficacy Scale is an 18 item scale which rates a person's confidence in carrying out exercises in various situations. This scale was developed by Bandura in 1977 [12]. Participants were asked to rate their ability to press through barriers to exercise on a scale of 1 (denoting cannot do) to 10 (very confident that they can do). Total exercise self efficacy score was the sum of the score on all 18 items.

**Ethical Consideration**

Ethical Approval was obtained from the University College London and University College Hospital London. Informed consent was obtained from all participants prior to them filling the questionnaire. Participants were informed of their right to withdraw from the study at any time without giving a reason. They were told that they would be notified of the results of the study on completion. All participants were asked to create their own unique ID number on the online questionnaire. Participant records were kept in a safe place and information stored in a computer had a secure password.

**Statistical Analysis**

Data was analysed statistically with the use of the Statistical Package for Social Sciences Version 21 (SPSS). Descriptive statistics was obtained for all the variables investigated. Correlational data was explored between Global Physical Activity Scores (GPAQ), body mass index, perceived health status and total exercise self-efficacy scores. Pearson’s correlation was used to evaluate these associations.

Differences between the same variables pre and post pedometer challenge data was explored with paired t-tests for continuous variables which were normally distributed. Significance was set at an alpha level of \( P < 0.05 \).

**Results**

**Pre-challenge sample demographics**

The pre-challenge sample was made up of 247 participants: female 181 (73.3%), and male 64 (26%). Table 1 shows other demographic data from the pre-challenge sample.

<table>
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<tr>
<th>Table 1: Demographics of pre-challenge sample.</th>
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<td><strong>Gender</strong></td>
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<td>Female</td>
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<tr>
<td>73.3%</td>
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<tr>
<td>Male</td>
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<td>26%</td>
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<tr>
<td><strong>Race/ethnicity</strong></td>
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<tr>
<td>White</td>
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<tr>
<td>71%</td>
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<td>Asian</td>
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<td>9.7%</td>
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<td>Black</td>
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<td>2.4%</td>
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<td>Mixed</td>
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<td>2.4%</td>
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<tr>
<td>Other</td>
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<tr>
<td>3.6%</td>
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<tr>
<td><strong>Marital status</strong></td>
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<td>44.1%</td>
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<td>Separated/divorced</td>
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<td>5.7%</td>
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<tr>
<td>Other</td>
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<td>4.9%</td>
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<th>Table 2: Means, differences and t-tests statistics of variables assessed during the pre- and post-pedometer challenge phases.</th>
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Pre-challenge Sample correlational analysis
Rated health correlated significantly with physical activity measured by weekly METS. However, this was a weak correlation ($r = 0.13$, $p < 0.05$). A stronger correlation ($r = 0.32$, $p < 0.05$) was obtained between rated health and total Exercise Self-Efficacy score (ESE). In other words those participants who rated their health in a more positive way had higher exercise self-efficacy. Physical activity measured by total weekly METS correlated significantly with total exercise self-efficacy ($r = 0.23$, $p < 0.05$).

Pre and post pedometer challenge comparisons
Table 2 and Table 3 show the means, differences and t-tests statistics of variables assessed during the pre- and post pedometer challenge phases.

Self-reported physical activity METS scores
There was an increase in the mean of weekly METS but paired T-test analysis showed no significant difference was found in weekly MET scores pre and post the pedometer challenge. ($p > 0.05$).

Perceived health status (rated health)
Paired t-test analysis showed a significant difference in perceived health status pre and post the pedometer challenge ($t = -2.7$, $p < 0.05$).

Exercise self-efficacy
Paired T-test analysis showed no significant difference between the pre challenge and post challenge exercise self-efficacy scores.

Weight, BMI changes
Paired T-test analysis showed no significant difference in body weight before and after the pedometer challenge. There was a corresponding lack of significant difference in BMI pre and post the pedometer challenge ($p > 0.05$).

Waist circumference
Paired T-test analysis showed a significant difference in waist circumference pre and post the pedometer challenge ($t = 3.5$, $p < 0.05$).

Subjective changes - Post pedometer challenge
Participants were asked in the second phase of filling in the online questionnaire, whether or not they perceived a change in their level of physical activity 2 months after the pedometer challenge and what that change was. 57% responded ‘NO’, while 41% responded ‘YES’. Below is a list examples given of changes that were reported:

Examples of Changes with the Pedometer Challenge from Participants
- Certainly, walk more, both shorter and longer distances
- Climb the stairs to work every morning - 9 floors.
- Climbing stairs more, particular at tube stations, walking more, more conscious of how much I am working
- During the challenge I walked significantly more than I did before. The survey I undertook as part of the challenge made me realise how inactive I was so I have started swimming at least weekly.
- Gone down. Pedometer challenge was motivating - became demotivated afterwards
- I am cycling more and walking about the same amount
- I am now more active walking much further each day and feel much fitter

Discussion
Pedometer challenge and Physical activity
The main aim of this study was to evaluate the influence...
ence of the UCLH pedometer challenge on self-reported physical activity which was translated into weekly METS, and exercise self-efficacy. No significant change in physical activity, and exercise self-efficacy was found between one week before the pedometer challenge and 2 months after the challenge statistically. Other studies have reported similar results [8,9]. Several studies however have reported contradictory results [5-7,10,15]. These studies all report significant increases in physical activity with a worksite pedometer intervention. A possible reason could be the use of different outcome measures in assessing physical activity. Most of these studies used actual pedometer steps in addition to self-reported physical activity questionnaires in assessing change in physical activity levels. Another difference between the current study being reported and those with contradictory findings in the literature is the duration of the pedometer intervention. It is possible that the time i.e. 6 weeks of the UCLH pedometer challenge was not sufficient to produce sustained change in physical activity levels 2 months after the pedometer challenge. Most studies reporting change used a pedometer intervention that ranged from 8 weeks to 6 months [4,5,7]. Only one other study showing change in physical activity did the intervention last for only 6 weeks but the pedometer intervention included strict guidelines on increasing step count by 1000 steps every 2 weeks for 6 weeks [15]. Subjective data collected from participants 2 months after the end of the pedometer challenge showed that about 40% participants who completed the research study found the pedometer challenge beneficial despite lack of statistically significant findings. Majority of these participants mentioned an increase in walking after the pedometer challenge.

Pedometer challenge and weight/waist circumference

No changes in body weight or Body Mass Index (BMI) were identified. Other studies have reported a similar finding [4,9]. Significant changes in body weight and BMI were reported by [2,6,10,11]. These significant changes in weight could also be attributed to longer durations of the pedometer intervention.

Significant changes however were identified in waist circumference post the UCLH pedometer challenge, suggesting a positive change occurred with the pedometer challenge. Carr et al. [2], also reported a change in waist circumference after a 12-week work based intervention. However their change in waist circumference occurred alongside a significant reduction in sedentary time and increase in light physical activity. Maruyama et al. [11], also reported changes in waist circumference after a 4-month work based intervention with middle aged men. Other changes reported also included changes in weight BMI, and lipid levels. In the current project, change in waist circumference did not occur with changes in body weight or BMI, this could be explained by an increase in muscle mass [6]. The lack of change in other outcome measures i.e. physical activity levels and exercise self-efficacy could be explained by the use of self-reporting scales. Participants are said to exaggerate physical activity levels when using self-reporting scales.

Study Limitations

Study participants were from the UCLH staff registered to take place in the UCLH pedometer challenge. Thus our sample may not be a true representation of the population. In addition to this, it is possible that participants already possess a high exercise self-efficacy, as individuals with low exercise self-efficacy might not volunteer to participate in the pedometer challenge. All data collected was self reported, thus the possibility of misinformation is likely.

Less than half of the participants who filled out the pre-pedometer challenge were available for the 2 month follow-up. The results reported may thus not be a true representation of the total participants in the pedometer challenge. The lack of a control group is another limitation of this study.

Conclusion

Work-based pedometer challenges such as the 6-weeks UCLH pedometer challenge may be of insufficient duration to produce a change in physical activity, and exercise self-efficacy 2 months after the challenge is over. However a change in waist circumference suggests that some weight loss occurred and was maintained 2 months after the pedometer interventions. Subjective data collected 2 months after the pedometer challenge showed that 40% of participants found it beneficial and noticed a change in their physical activity levels afterwards. More studies are required to evaluate the effect of duration of such a pedometer intervention on maintained weight loss, and physical activity levels.

References


