Paths for All Workplace Step Count Challenge 2014

THE UNIVERSITY of EDINBURGH

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Paths for All Workplace Step Count Challenge 2014:

Changes in physical activity, walking behaviour and motivation for walking, and participant feedback.

Research Report for Paths for All
January 2015

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Key messages

1) This report provides **the first comprehensive assessment** of self-reported changes in physical activity following the Step Count Challenge.

2) Self-report data on **physical activity and motivation** were collected at baseline (12 day window before start of challenge) and at 1 week after the end of the challenge (12 day window).

3) Participants reported being relatively **physically active at baseline.**

4) Overall, the Step Count Challenge led to small **increases in weekly self-reported walking.**

5) The Step Count Challenge led to small **increases in weekly walking for transport and walking for leisure.**

6) Although statistically small, these changes in self-reported walking **equate to more than the recommended physical activity guideline of 150 minutes per week.**

7) The Step Count Challenge **did not lead to changes in walking at work.**

8) The Step Count Challenge **did not lead to changes in other forms of physical activity** including cycling, housework, and moderate and vigorous leisure time activity.

9) The Step Count Challenge also led to a medium level **decrease in sitting behaviour.**

10) By participating in the Step Count Challenge **people felt more competent about walking** for health.

11) By participating the Step Count Challenge **people became more autonomously motivated** for walking for health.

12) Over 80% of participants said they **would do the Step Count Challenge again.**

13) 93% of respondents felt that **they had benefitted from the Step Count Challenge.**

14) The benefits most frequently reported included **enjoyment, building team morale and physical benefits.**

15) **Future research is required** to expand on these findings using a randomised controlled design and objective measures of physical activity.

Contents

Introduction

The benefits of physical activity (PA) for physical and psychological health are well established (Lee et al., 2012); however in 2012 only 67% of men and 58% of women in Scotland were sufficiently active to achieve these benefits (Leadbetter, Geyer, & O'Connor, 2014)[1]. Walking is an ideal way to promote PA due to its health benefits (Murphy, Donnelly, Shibli, Foster, & Nevill, 2012; Murphy, Nevill, Murtagh, & Holder, 2007; Murtagh et al., 2015), because it requires no special skills or equipment, and is convenient and accessible to almost everyone. In 2014, the Scottish Government launched a National Walking Strategy with walking identified as a key mechanism through which the population's PA levels can improve. Paths for All (PFA) is a primary delivery agent for walking promotion in Scotland, and their activities include an annual 8-week Walk at Work Step Count Challenge (SCC) in which teams of 5 aim to increase their walking. The purpose of this report is to detail the effect of the SCC on changes in physical activity generally, walking behaviour specifically and motivation for walking. Additionally, the report includes data on the perceived benefits of the SCC and more general participant feedback.

Walking behaviour

Walking can be undertaken in a number of different domains and for different reasons. Specifically people may walk for leisure, for transport (e.g., active commuting) or for more incidental reasons (e.g., to pick up printing at work). There is evidence that the health benefits of walking increase with an increase in the duration and pace of walking (Murtagh, Murphy, & Boone-Heinonen, 2010). These findings suggest that more walking at a higher intensity is most beneficial. However, there are also benefits from walking at a light intensity, not least because it may lead to the breaking up periods of sedentary behaviour such as prolonged sitting. This breaking up of sitting behaviour is important because sedentary behaviour has been shown to have independent health risks over and above physical activity levels (Bauman, Chau, Ding, & & Bennie, 2013)

Determinants of behaviour change

The ultimate effectiveness of the SCC could be determined by increased walking; however it is also important to understand what has influenced behaviour change in order to inform intervention development (Rhodes & Pfaeffli, 2010). Behaviour change can be influenced by a number of different factors including individual, social and physical environmental, and policy factors (see Figure 1 for an overview of the social ecological model; (Sallis, Owen, & Fisher, 2008). In this current study the focus is on the role of the individual factors in changing behaviour, and specifically the psychological construct of motivation. Motivation is an individual's drive to act and is clearly a key influence on behaviour change.

[1] Based on achieving the recommendation of accumulating 150 minutes of PA per week

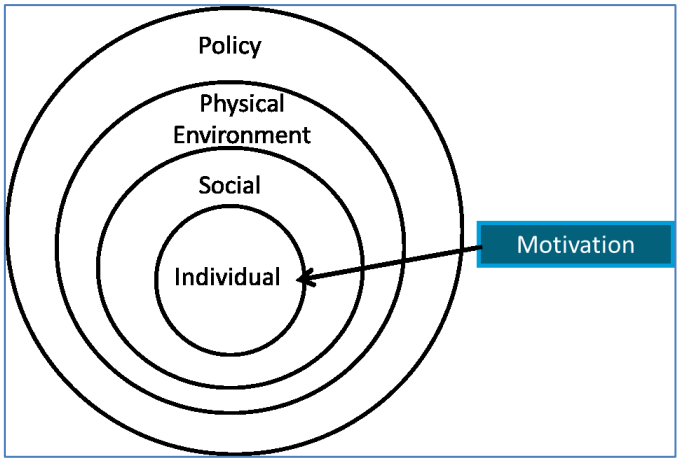


Figure 1: Social ecological framework for understanding physical activity (Sallis et al., (2000); Biddle et al. (in press)

Understanding the role of motivation in walking behaviour change

Self-determination theory (SDT; (Ryan & Deci, 2000)) provides a useful framework for exploring the mechanisms through which an intervention may influence both short term and long term psychological and behavioural change. According to SDT, in order to understand the influence of motivation on behaviour and well-being, we need to consider both the level of motivation (i.e., how much) and also the type and quality of motivation. We may all be motivated to walk frequently, but the underpinning 'drivers' of that motivation may vary from person to person. SDT identifies that there are 6 different drivers of motivation. Figure 2 provides an overview of these drivers, arranged from left to right depicting the extent to which the behaviour is driven by the individual.

On the far left is amotivation, and individuals who are amotivated have no intention in engaging in the behaviour (e.g., 'I am not interested in walking for health'), perhaps due to a lack of self-confidence or sense of control. Next on the continuum is extrinsic motivation and a defining feature of extrinsic motivation is that an activity is done to obtain some outcome separable from the activity itself. Within extrinsic motivation, four sub-types of motivation are distinguished based on the nature of their associated processes and the extent to which they are influenced by the individual themselves. External regulation is characterised by engaging in a behaviour to gain an external contingency (e.g., reward, avoid pressure from family). Introjected regulation relates to individuals being driven by internal pressure to avoid guilt and shame or enhance their feelings of worth. Although introjected regulations have been defined as being partially internalised, both external and introjected regulations have been identified as relatively 'controlling' forms of motivation.

Identified regulation relates to individuals being driven by the conscious valuing of the activity (e.g., 'I value that walking is good for my health'). Integrated regulation occurs when individuals are driven to be active because the activity reflects the individuals' values and broader goals. Identified and integrated regulation are viewed as being more internally driven types of extrinsic motivation than external and introjection regulations. Individuals who are intrinsically motivated and therefore intrinsically regulated do not engage in the activity for external reasons but instead because the activity itself is inherently satisfying (i.e., of interest, enjoyable, challenging). Identified, integrated and intrinsic regulations have been classified together as 'autonomous' forms of motivation that are more volitional than controlled motivation.

Type of motivation	**Amotivation**	**Extrinsic Motivation**				**Intrinsic motivation**
Type of regulation	Non-regulation	External	Introjection	identified	Integration	Intrinsic
Defining features	Lack of intention to act and personal causation	Action to obtain external contingency	Action to avoid internal feelings of guilt or enhance self-worth	Action because consciously value the activity	Action because activity is related to/integrated with individual's goals and values	Action is based on inherent satisfaction from activity
Position on the autonomy continuum	N/A	**Controlled Motivation** (behaviour governed by external or internal pressures)		**Autonomous Motivation** (volitional behaviour because value activity)		
Example	I am not interested in walking for health	I walk to keep my partner happy	I walk because I feel good about myself if i do it	I walk because i value that it is good for my health	I walk because being active is important to who i am	I walk because i enjoy walking

Figure 2: Overview of the types of motivation and related behavioural regulations on the self-determination continuum (adapted from (Deci & Ryan, 2000)and (Standage & Ryan, 2012)

Which is the best kind of motivation?

There is now consistent evidence from exercise research that highlights the advantages of autonomous motivation over controlled motivation for longer term behaviour change and enhanced well-being (Deci & Ryan, 2000; Teixeira, Carraca, Markland, Silva, & Ryan, 2012). It is still unclear whether identified, integrated or intrinsic regulations are most beneficial, and it most likely that a *profile* of these drivers is most beneficial for sustained physical activity. For example, at times physical activity can be a chore or hard work and therefore is unlikely to be viewed as intrinsically pleasurable. In these circumstances, if an individual is also motivated to be active because it relates to their own goals and values (i.e., integrated) or because they value the health benefits (identified) then they are more likely to be active.

Can we encourage people to have the best kind of motivation?

SDT is a particularly useful theory because it identifies the conditions that will nurture or thwart more adaptive autonomous motivation. Specifically, if an environment provides the opportunity for individuals to fulfil the 'basic needs' of feeling **competent**, **in control** and **connected** to others (the 3Cs) in the environment then this will create the conditions for the individual to be optimally motivated. Exercise based research has shown that if individuals feel competent, connected and in control then this will result in more autonomous motivation, and ultimately more exercise behaviour (e.g., Vlachopoulous et al., 2010), as well as enhanced psychological well-being (e.g., (Sebire, Standage, & Vansteenkiste, 2009)).

A physical activity intervention, such as SCC has the potential to influence the nature of participants' motivation for the activity of walking. If an intervention provides opportunities for individuals to

experience feelings of competence, connectedness and control then this could lead to enhanced short-term and long-term motivation and consequently behaviour. Conversely, an intervention that doesn't provide these opportunities may have more limited or negative effects.

Could the workplace Step Count Challenge enhance motivation?

The annual 8-week Walk at Work Step Count Challenge (SCC) has been funded and developed by Paths for All, who are funded by the Scottish Government. The current delivery model involves sending initial promotional e-mails and pdf flyers in January inviting workplaces to sign up in April to participate in the SCC in work-based teams of five at the cost of £5 per person. The participants receive an information pack highlighting the benefits of being more active, an optional pedometer (for an additional £5 charge) and access to the Step Count Challenge website. The teams set an overall 8-week step-count goal and may identify a theme for their challenge (e.g., map on the wall with a specific destination). Additionally, through the web-site participants provide baseline data from week 1 and from this, self-referenced goals are automatically set for each participant. These automated goals were designed to progressively increase participants' walking throughout the 8-weeks, so that by the end of the intervention participants would be achieving the current physical activity recommendations (i.e., 150 minutes of walking). A Team Captain is charged with encouraging the participants and monitoring the recording of the weekly step-count. Participants also receive e-mail updates from PFA throughout the 8-weeks regarding collective step-count tallies. Individuals also receive a congratulatory email when they achieve their best 'step' day and week, and may receive an e-mail prompt if they have not added data for more than three days. Finally, participants may also choose to participate in an on-line blog.

Utilising the Taxonomy of Behaviour Change Techniques (Michie et al., 2011) it is evident that the intervention incorporates several techniques including i) providing information about the consequences of the behaviour; ii) goal setting; iii) self-monitoring of behaviour; iv) feedback on performance; v) reviewing of goal-setting; and vi) social support; some of which are known to be effective in promoting physical activity (Michie, Abraham, Whittington, McAteer, & Gupta, 2009), and walking specifically (Bird et al., 2013). Table 1 illustrates how each of these components of the intervention may potentially address the 'basic needs' of feeling competent, in control and connected to others

Table 1: Opportunity for 3C satisfaction and thwarting from the Step Count Challenge

Characteristics of intervention	**Opportunity for satisfying the 3Cs**	**Opportunity for thwarting the 3Cs**
1) Providing information on PA benefits (meaningful rationale)	Control	N/A
2) Volunteering to participate	Control	N/A
3) Set own team goals/ activities/locations	Control	N/A
4) Self-monitoring	Competence	N/A
5) Feedback on self-referenced goals/ positive feedback	Competence	Competence (if not achieving)
6) Team participation	Connected	Control (controlled by others)
7) Leader-board on profile (within team and with teams around participants)	Competence	Competence
8) Team captain	Connected	Control (controlled by others)
9) Competition between team members and teams	Competence (if continue to win)	Competence (if not performing well) Control (through enhance ego involvement)
10) Personalised email in best day/best week	Competence	N/A
11) Personalised weekly email on weekly totals and team totals	Competence	Competence (if not performing well)
12) Weekly update on the challenge (competitions, blog link, tweet of the week)	relatedness	

It is evident from Table1 that the SCC does offer potential opportunities for individuals to feel competent, connected and in control. For example, setting and achieving appropriate walking goals may result in the experience of competence. However, there is potential for aspects of the SCC to thwart these feelings. For example, although the emphasis on the intervention is self-referenced improvement there is some likelihood that competition will emerge between team-mates and teams. Such competition can lead to pressure to perform which can enhance ego involvement and may compromise autonomy and competence, ultimately decreasing intrinsic motivation (Standage & Ryan, 2012).

Purpose of this study

The primary purpose of this study was to examine the effect of SCC on changes in physical activity generally, and walking behaviour specifically. In addition to this, the study aimed to explore the mechanisms that may lead to this change in behaviour. Specifically, it was suggested that if the SCC supports satisfaction of the 3Cs, individuals will develop more adaptive autonomous motivation that are likely to lead to greater behaviour change (see Figure 3). Additionally, the study aimed to collect data on the perceived benefits of the SCC and more general participant feedback.

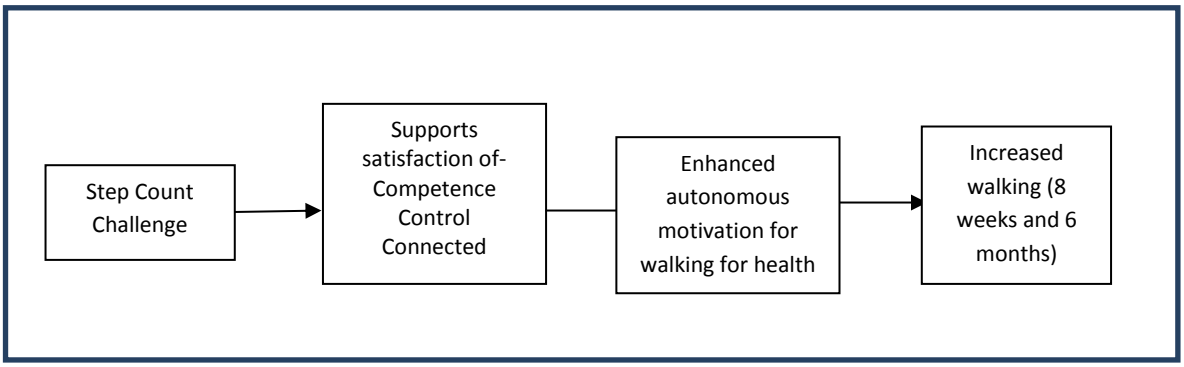


Figure 3: Proposed process of walking behaviour change following the SCC mediated by motivational processes

Method

Participants

Participants were individuals from workplaces who had signed up to the 2014 Workplace Step Count Challenge. Once they had registered for the Step Count Challenge, participants received an email inviting them to participate in the research study. We specifically targeted participants who currently assessed themselves as low active and who had decided to join the SCC with a view to increasing their physical activity primarily through walking. From the 3800 participants in the Step Count Challenge, 418 (11%) started the baseline questionnaire and 360 provided some physical activity data. The 360 participants were largely female (82%) with a mean age of 41.6 (±11.1 years) who worked in the public sector (71%). The distribution of participants across local authorities is shown in Appendix 1.

At the end of the Step Count Challenge, 344 participants who had provided a valid email address were invited to complete the questionnaire again. From these participants, 171 (49.7%) provided physical activity data. There were 150 participants who provided some physical activity data at both baseline and follow-up, although not all participants provided full data sets.

Instruments

Physical activity and walking behaviour

The long version of the self-report International Physical Activity-Questionnaire (IPAQ-long; (Craig et al., 2003)) consists of questions relating to the frequency (days) and duration (hours and minutes) of moderate and vigorous physical activity in the last 7 days in four specific domains, including job-related, transportation, domestic, and leisure as well as a measure of sitting time. The IPAQ also assesses the frequency and duration of walking behaviour in each of these domains. From responses an overall continuous measure of health related physical activity can be calculated to reflect number of minutes of METS expenditure that week (METS/minute/week). The scores can also be used to calculate activity levels in each domain, and overall moderate, vigorous and walking minutes of METS expenditure that week (METS/minute/week).

Satisfaction of the 3Cs

Based on the widely used Psychological Need Satisfaction for Exercise Scale (PNSES; (Wilson, Rogers, Rodgers, & Wild, 2006), we developed the Psychological Needs Satisfaction for Walking Scale (PNSWS) to assess feelings of competence, control and connectedness usually experienced by adults during walking (e.g., I feel capable of completing walks that are challenging to me). The face validity of the revised questionnaire was assessed by a group of researchers and practitioners in the field prior to use in the study. The construct validity of the questionnaire has also been confirmed (Niven & Markland, in preparation).

Quality of motivation

Based on the widely used Behavioural Regulations in Exercise Questionnaire – 2 (BREQ-2; (Markland & Tobin, 2004) we developed the Behavioural Regulations in Walking Questionnaire (BRWQ) to measure the continuum of behavioural regulations specifically focused on walking. The measure included subscales related to amotivation, external, introjection, integrated, identified and intrinsic regulation. The BRWQ can be scored in several ways, but the item-aggregation approach whereby the individual subscale scores are maintained will be used in this study (Wilson, Sabiston, Mack, &

Blanchard, 2012). The face validity of the revised questionnaire was assessed by a group of researchers and practitioners in the field prior to use in the study. The construct validity of the questionnaire has also been confirmed (Niven & Markland, in preparation).

Evaluative feedback on the Step Count Challenge

In the follow-up questionnaire, participants were asked to indicate whether they would participate in the Step Count Challenge again. Participants were also asked to identify how they had benefited from the Step Count Challenge by indicating their agreement with six items relating to potential benefits (e.g., I feel fitter), and were provided with the opportunity to identify additional benefits. Finally, participants were invited to provide open ended feedback comments relating to the Challenge

Procedure

In order to enhance recruitment and retention we followed guidelines related to recruiting participants to walking interventions (Foster, Brennan, McAdam, Fitzsimons, & & Mutrie, 2011) and recruiting participants to questionnaire based studies (Edwards et al., 2009). Following recruitment to the Step Count Challenge, participants were invited by a generic invitation e-mail from Paths for All to participate in the research project and provided with full details relating to the study requirements. All participants who completed the questionnaire were offered the opportunity to be entered into a prize draw. Volunteers were directed to an on-line Survey Monkey questionnaire and indicated their full informed consent on the first page of the questionnaire. At baseline, participants were asked to complete the questionnaire in a 12 day window prior to the start of the Step Count Challenge. The questionnaire included questions relating to personal details (gender, age, contact details) and the IPAQ-Long, BRWQ and PNSWS.

One week after the end of the Step Count Challenge, participants who had provided a valid email address were contacted directly and invited to complete the follow-up questionnaire in a 12 day window through a personalized link to Survey Monkey. The follow-up questionnaire included the IPAQ-Long, BRWQ and PNSWS, as well as questions relating to the perceived benefits and effectiveness of the Step Count Challenge.

Analysis

All data was screened for outliers and assessed for the assumptions of parametric testing. For each of the subscales of the IPAQ-Long, BRWQ and PNSWS descriptive data at baseline and post-intervention were computed. Subsequent paired sample t-tests were calculated to determine the significance of changes in the measures and Cohen's d effect size statistic computed to determine the meaningfulness of any change[2]. Descriptive data from the responses to the perceived benefits were calculated and the responses from the open ended responses were clustered into common themes.

[2] Cohen's d calculation results in a figure ranging from 0 to 1 and a score of 0.2 indicates a 'small' effect, 0.5 a 'medium' effect and 0.8 a 'large' effect

Results

Physical activity and walking

Although it is typical to present median data for the IPAQ-Long at baseline and follow-up, in this case to enhance understanding we have presented mean and standard deviation of minutes of activity in each domain. Table 2 shows the mean minutes of activity at baseline and post-intervention and the change in minutes of physical activity from baseline to post-SCC follow-up categorized by domain and type of activity in each domain, as well as the number of participants who provided data at both time points and the effect size (i.e., meaningfulness) of any significant effect reported.

Activity at baseline

It was evident that at baseline participants reported that they were relatively active across a number of domains. Specifically, on average participants exceeded 500 minutes of activity per week in both the walking and moderate physical activity domains. It is also notable that there were large standard deviations for most forms of activity indicating that there was considerable variation around the mean score in reported levels of physical activity (i.e., some participants reported much more and some much less activity than the mean score).

Changes in walking

Figure 4 provides a graphical illustration of the changes in each domain and each type of activity from pre-SCC to post-SCC. As illustrated, the biggest behaviour change occurred in walking for transport, where there was a significant increase in average walking time of 109 minutes per week. There was also a significant increase in leisure walking of 55 minutes. There was an increase in work-related walking (26 minutes), but this was not statistically significant. Overall, walking from the four combined domains had a statistically significant increase of 192 minutes. Although the statistical significance of this increase is only considered a small-medium sized effect (d=0.33), the clinical significance of this change may be considered large. Specifically, 192 minutes is greater than the 150 minutes of physical activity that is recommended for health benefits suggesting that participation in the SCC could lead to a change in activity that may be meaningful for health.

Changes in other forms of activity and combined domains

There were no significant changes in the amount of moderate or vigorous physical activity undertaken at work, in the household or during leisure time. There was no significant change in cycling transport.

In addition to the significant change in total walking behaviour, there was a significant change in total physical activity of 175 minutes, which is mainly accounted for by the change in walking. There were no significant changes found for total moderate or vigorous physical activity.

Changes in sitting

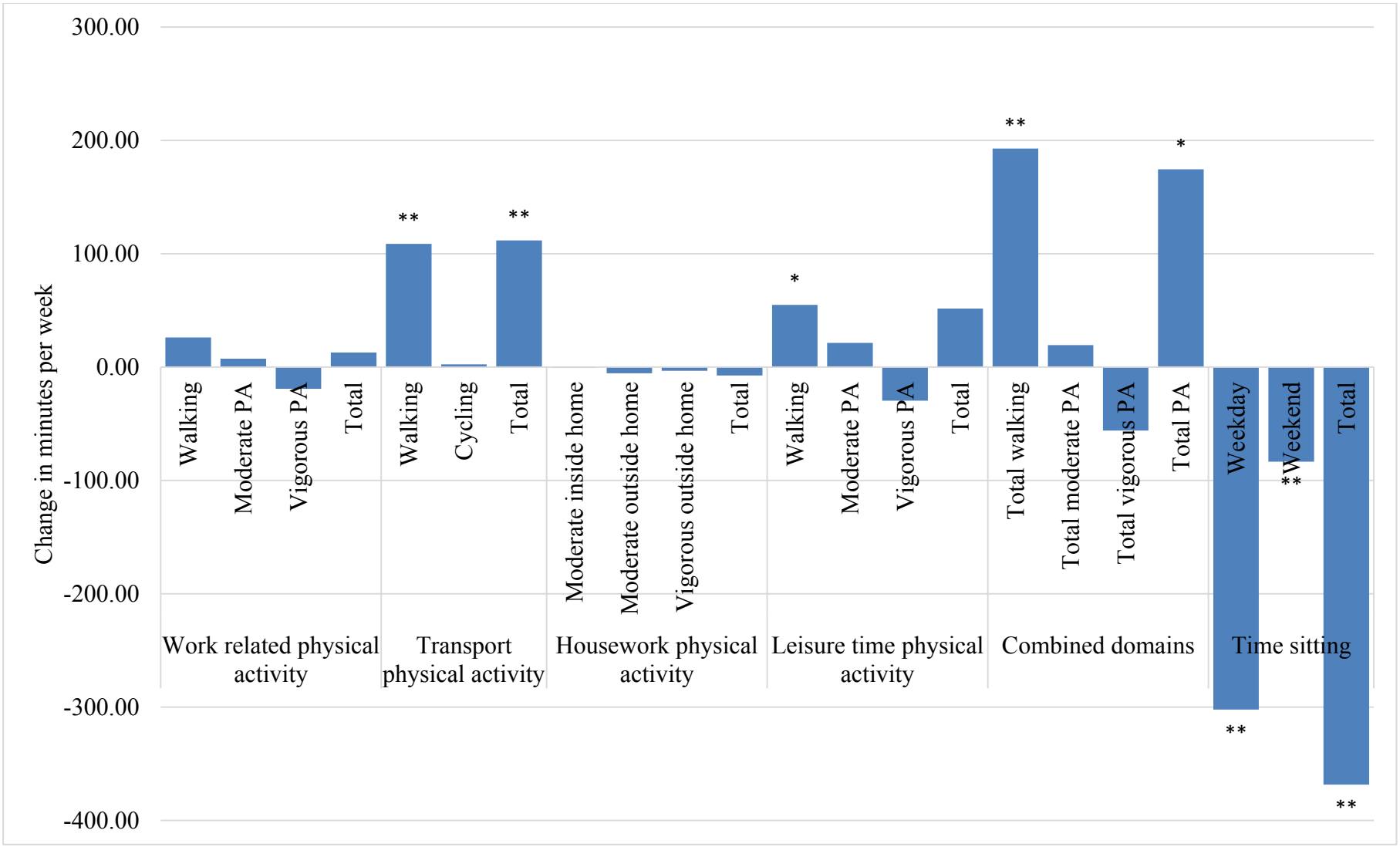
Interestingly, there were considerable changes in reported time spent sitting. Participants reported a decrease of over 300 minutes in sitting during the week and 80 minutes at the weekend representing a medium sized effect. This decrease cannot be completely explained through the displacement of sitting with walking behaviour as this would equate to only 192 minutes. It is possible that the challenge has resulted in greater incidental and light activity (that may not be picked up by the IPAQ) that has had the advantageous effect of also decreasing sitting time.

Table 2. The mean and standard deviation baseline, post-intervention and change from baseline to post-SCC in minutes of activity per week and size of effect.

	Number of participants	Baseline	Post-intervention	Mean Change	Size of effect (where significant)[a]
Work related physical activity					
Walking	146	107 (312)	133 (318)	26 (232)	-
Moderate PA	147	85 (233)	92 (270)	7 (274)	-
Vigorous PA	150	55 (195)	36 (113)	-19 (166)	-
Total	146	248 (612)	261 (539)	12 (443)	-
Transport physical activity					
Walking	140	233 (265)	342 (335)	108** (346)	0.31
Cycling	141	19 (77)	22 (77)	2 (47)	-
Total	139	249 (271)	361 (346)	111** (351)	0.32
Housework physical activity					
Moderate inside home	139	225 (258)	225 (316)	-0.36 (279)	-
Moderate outside home	138	141 (245)	136 (214)	-5 (281)	-
Vigorous outside home	139	89 (213)	85 (187)	-3 (183)	-
Total	136	460 (577)	453 (570)	-7 (511)	-
Leisure time physical activity					
Walking	138	224 (242)	279 (302)	54* (273)	0.20
Moderate PA	138	59 (100)	81 (148)	21 (157)	-
Vigorous PA	137	128 (280)	99 (145)	-29 (260)	-
Total	137	410 (441)	462 (411)	51 (376)	-
Combined domains					
Total walking	137	568 (542)	761 (684)	192** (586)	0.33
Total moderate PA	135	522 (566)	542 (580)	19 (549)	-
Total vigorous PA	136	274 (448)	218 (275)	-55 (363)	-
Total PA	132	1360 (1218)	1534 (1171)	174* (973)	0.18
Time sitting					
Weekday	129	2387 (803)	2085 (787)	-302** (704)	0.43
Weekend	134	589 (330)	505 (303)	-83** (287)	0.29
Total	129	2961 (1022)	2592 (961)	-368** (822)	0.45

*p<.05; **p<.01

[a]0.2 = small; 0.5= medium; 0.8=large

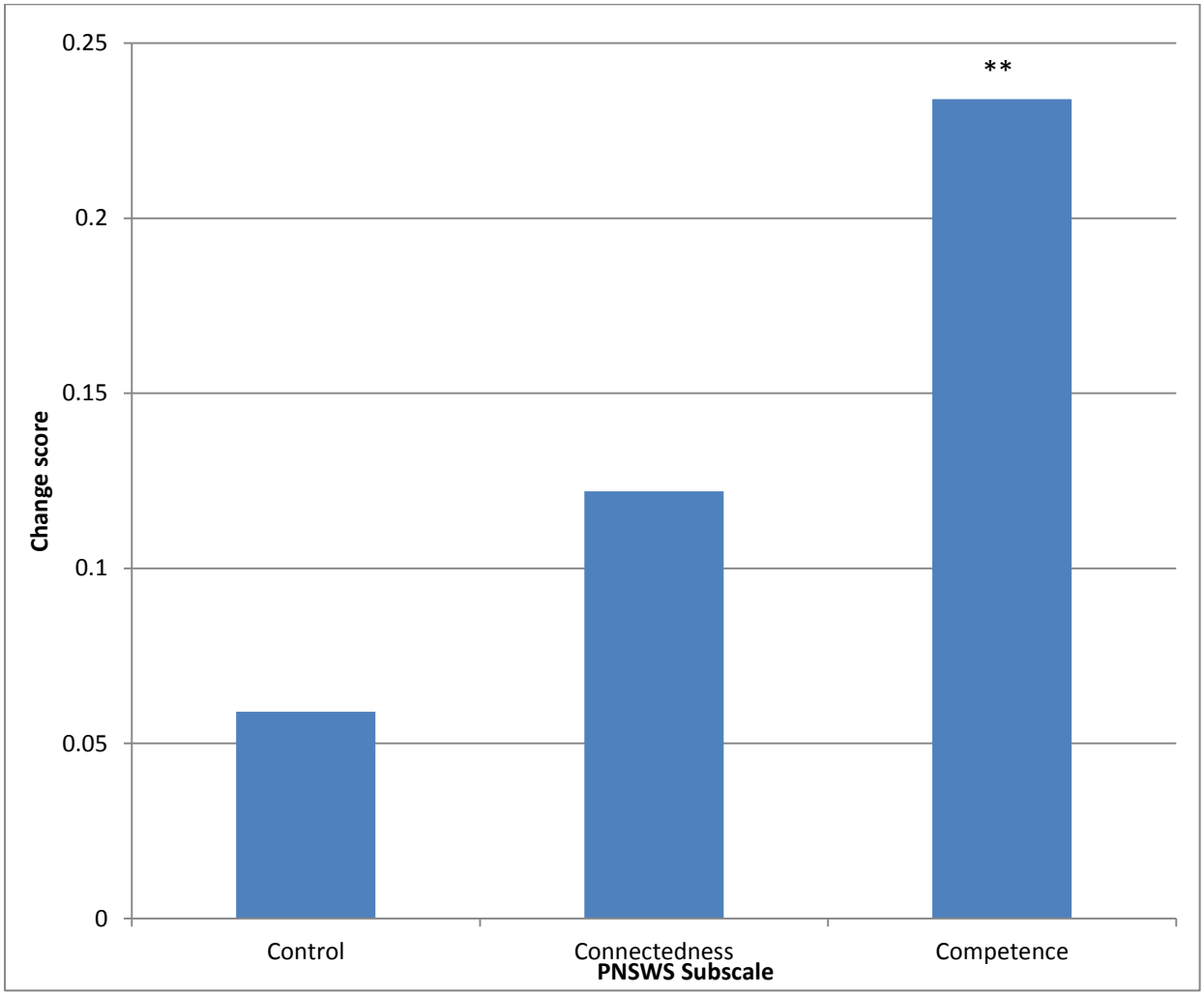


*p<.05; **p<.01

Figure 4. ***Mean change in minutes of physical activity from baseline to post-SCC follow-up.***

Satisfaction of the 3Cs

Figure 5 illustrates the changes in participants' perceptions of feeling competent, in control and connected related to walking following the SCC. It was evident that there was a small increase in each of these factors, but only perceptions of competence was significant with an effect size indicating a small to medium effect.

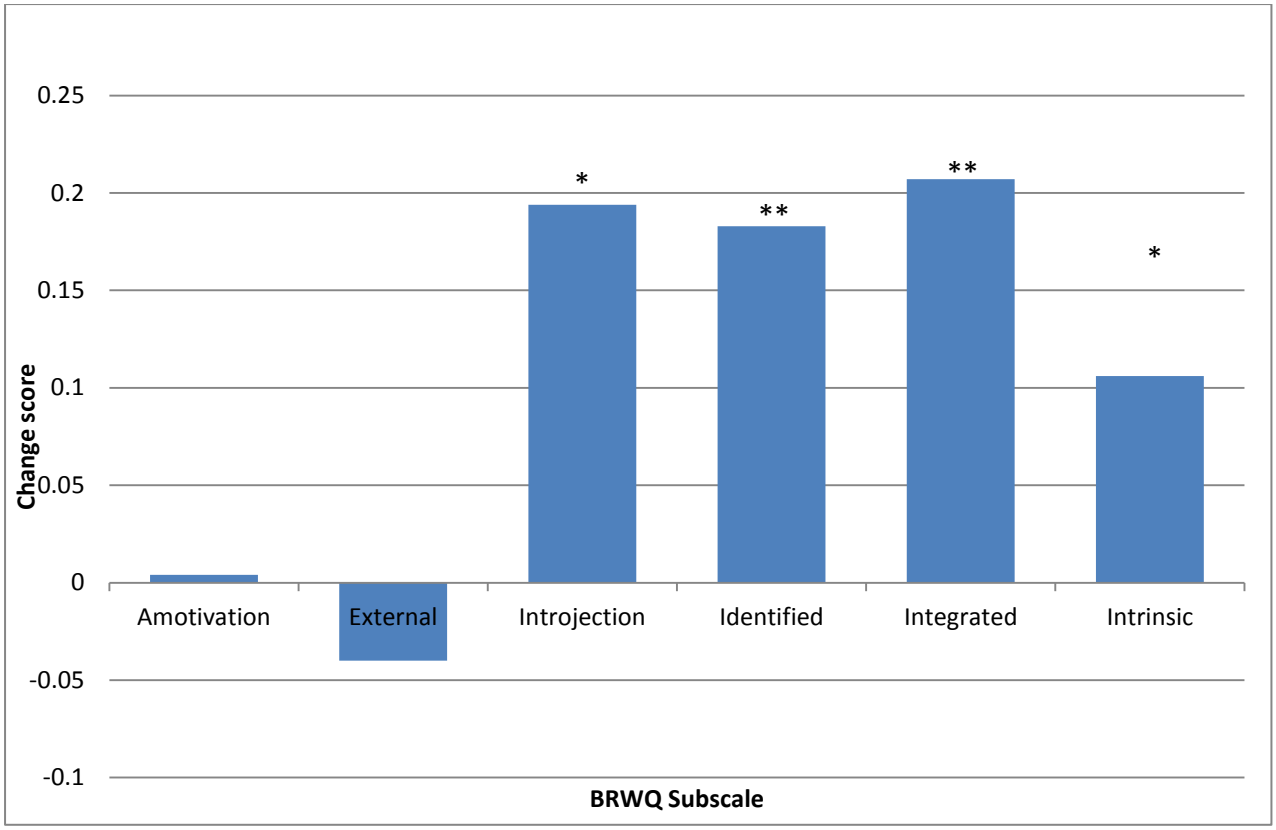


**p<.01

Figure 5: Changes in participants' perceptions of feeling competent, in control and connected related to walking following the SCC

Quality of motivation

Figure 6 shows changes in the different subscales of motivation relating to walking. It was evident that following the SCC there were small but significant improvements in the autonomous motives for walking, as well as introjected motives, representing a small effect. There was a slight (non-significant) decrease in external motives and no significant change in amotivation. This suggests that the SCC resulted in increases in the more adaptive forms of motivation that are likely to lead to greater walking behaviour.



*p<.05; **p<.01

Figure 6: Changes in participants' drivers of motivation for walking following the SCC

Linking the 3Cs, quality of motivation and walking behaviour

It was proposed that walking behaviour change may be partly due to changes in perceptions of competence, connectedness and control whilst walking, that in turn enhances autonomous motives and results in increased walking behaviour. Indeed, it was evident that the Step Count Challenge did positively enhance perceptions of competence and autonomous motives, and walking behaviour, as illustrated in Figure 7.

Further more sophisticated analysis is required and will be undertaken in due course to statistically examine the pathways evident in the data and to determine the amount of walking behaviour change accounted for by the changes in the 3Cs and autonomous motivation.

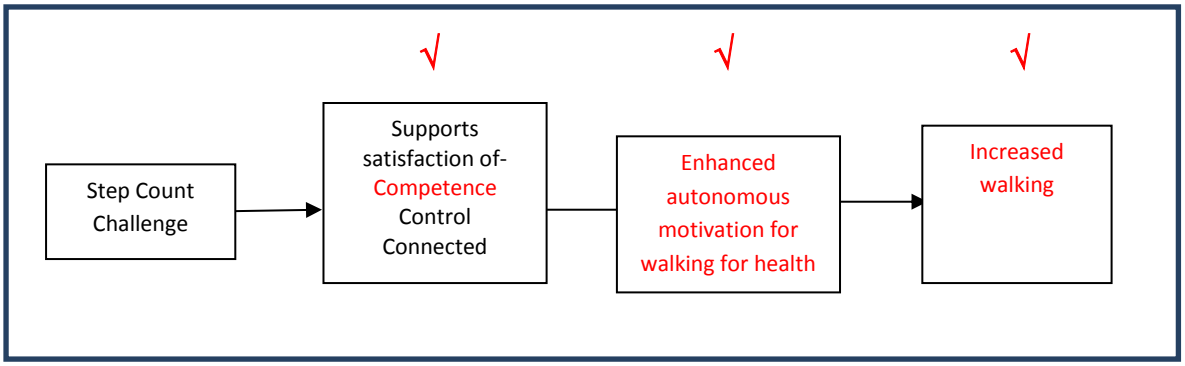


Figure 7: Possible mechanisms for walking behaviour change following the SC

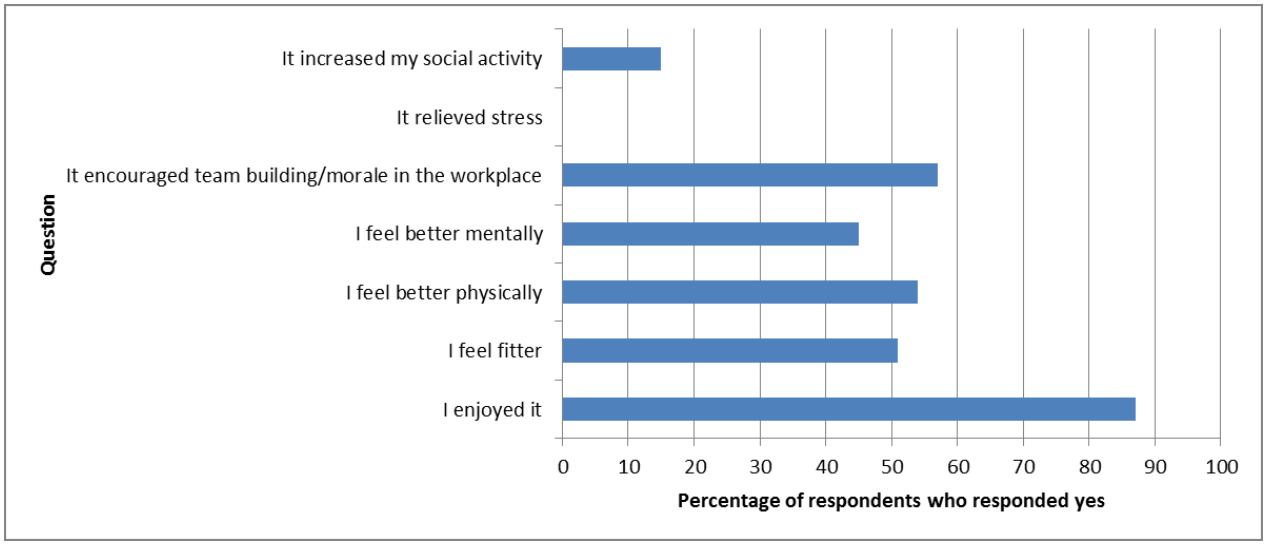
Evaluative feedback on the Step Count Challenge

Benefits

The majority of the participants (93%) stated that they felt they had benefitted from the Step Count Challenge. Figure 8 illustrates the percentage of participants who agreed with statements relating to the benefits of the Step Count Challenge. It was evident that the greatest perceived benefits came from enjoying the challenge as well as building morale in the workplace. More than half of participants perceived they had benefitted physically and felt fitter. Interestingly, no participants perceived the Step Count Challenge had helped relieve stress.

Sixteen participants also highlighted a number of additional benefits that were labelled as relating to i) Becoming more aware of physical activity levels (e.g., '*it has made me aware of how little walking/activity I usually do and that I need to improve on this going forward');* ii) Increased physical activity (e.g., '*it increased the amount of walking I did and made me walk when I wouldn't have otherwise)*; iii) Motivation (e.g., '*it got me going again'*; iv) Physical benefits (e.g., '*lost weight :)')*.

Figure 8: Percentage of respondents who responded yes to questions relating to the benefits of the SCC



Eleven respondents indicated why they felt they had not benefitted from the challenge that were labelled as relating to i) Already physically active (e.g., '*I take quite a lot of exercise anyway and I didn't really feel it changed how I exercised*'); ii) The SCC was too long and demotivating (e.g., '*the goals were not achievable, so it was demotivating*'; and iii) External factors (e.g., '*I have a young family (including a 6 month old baby) and am not in control of how I spend my time').*

Importantly, from 164 respondents, 84% of participants indicated that they would take part in the Challenge again, with 15% indicating 'maybe' and 1% stating 'no'.

Additional feedback

Forty-seven participants provided additional feedback relating to the Step Count Challenge. As illustrated in Table 3, these comments were categorized into themes relating to i) Perceived benefits of the challenge; ii) The desire to continue with the challenge; iii) Feedback relating to specific

aspects of the Challenge; and iv) Feedback relating to the research questionnaire. The corresponding quotes for each theme are listed in the Appendix.

Table 3: Themes that emerged from the open-ended response question

Sub-themes	Themes	Overall Themes
	Motivating (n=7)	**Perceived benefits of the Step Count Challenge**
	Increased awareness of PA (n=2)	
	Appreciate surroundings (n=1)	
	Changed behaviour (n=1)	
	Family effects (n=1)	
	Desire to continue (n=3)	**Desire to continue**
	Suggestions for future developments (n=1)	**Feedback relating to specific aspects of the Step Count Challenge**
	Views relating to the challenges (n=5)	
Positive response to duration (n=1)	Duration of the challenge	
Negative response to duration (n=4)		
	Pedometers (n=2)	
Positive response to on-line platform (n=3)	On-line platform	
Negative response to on-line platform (n=2)		
	Recording activity (n=3)	
	Unrealistic targets (n=3)	
	Baseline week required (n=1)	
	Didn't like competition element (n=1)	
	Negative comments relating to length and repetitiveness of questionnaire (n=3)	**Feedback relating to research questionnaire**

Highlight points

Recruitment and questionnaire

- Over 400 participants started participating in the study at baseline, representing 11% of the potential participants. However, only 150 participants provided full data at both baseline and post-Step Count Challenge data collection
- Survey monkey was an effective method of collecting data and matching participants at each stage of data collection. It is likely that the length of the questionnaire was a factor in participant drop-out.

Findings

- Participants reported being relatively physically active at baseline.
- Overall, the Step Count Challenge led to small, but statistically significant, increases in (self-reported) walking.
- The Step Count Challenge led to small, but statistically significant, increases in walking for transport and walking for leisure.
- **Although small, these changes in self-reported walking are clinically meaning and equate to more than the recommended physical activity guideline of 150 minutes per week.**
- The Step Count Challenge did not lead to changes in walking at work.
- The Step Count Challenge did not lead to changes in other forms of physical activity including cycling, housework, and moderate and vigorous leisure time activity.
- The Step Count Challenge also led to a medium level statistically significant decrease in sitting behaviour.
- By participating in the Step Count Challenge, participants reported a statistically significant increase in feelings of competence about walking for health
- By participating in the Step Count Challenge, participants reported a statistically significant increase in autonomous motivation for walking for health.
- Over 80% of participants said they would do the Step Count Challenge again
- 93% of respondents felt that they had benefitted from the Step Count Challenge
- Benefits most frequently reported included enjoyment, building team morale and physical benefits.

Strengths and Limitations

- This report provides the first comprehensive assessment of changes in physical activity following the Step Count Challenge by tracking changes in physical activity of individuals.
- The instruments used for data collection are credible with recognised reliability and validity.
- However, the use of self-report methods of physical activity has some limitations, including the likely over-estimation of activity levels.
- Although we tried to recruit low active participants, it was apparent that at baseline the participants reported being active.
- The lack of a control group limits the conclusions that can be drawn as changes may be due to other factors out with the intervention.

Future research

- Future research using objective measures of walking and incorporating a control group would provide further evidence of the effectiveness of the Step Count Challenge.
- Qualitative research would provide further insight into the participants' experiences of the Step Count Challenge and the influence on psychological and behavioural outcomes.

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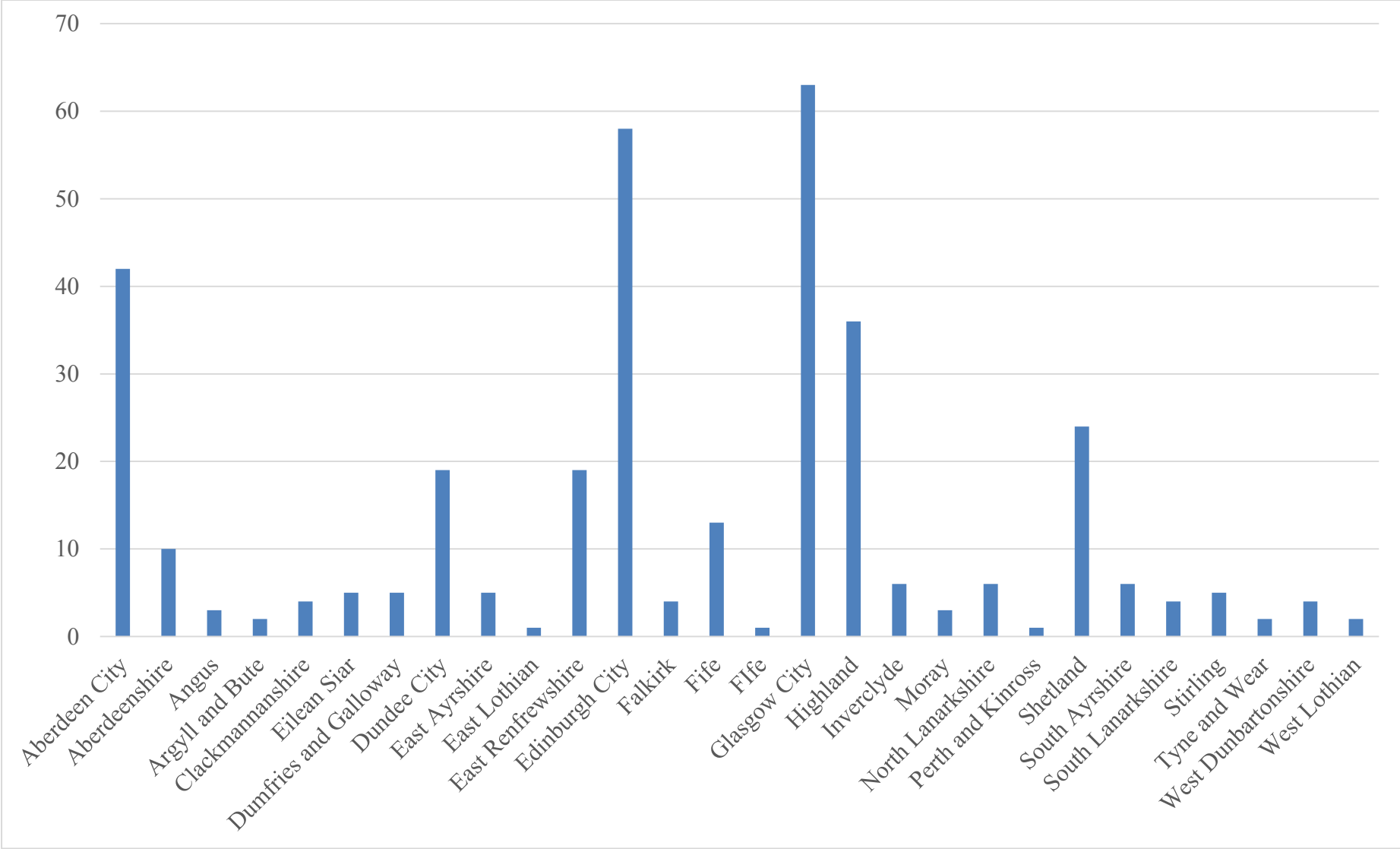
Acknowledgements

This project was primarily funded by a University of Edinburgh College of Humanities and Social Sciences Knowledge-Exchange grant.

Both Dr Mhairi Macdonald and Matthew Pearce provided invaluable research assistance.

Appendices



Appendix 1: Number of participants at baseline by local authority.

Appendix 2: Raw data on participant feedback post Step Count Challenge.

RAW DATA	THEME	OVERALL THEME
It was great. it motivated me to walk a lot more than normal.	Motivating	Benefits
I enjoyed being part of the challenge and felt motivated every day to get walking!	Motivating	
A well-run programme that was a pleasure to take part in. It helps to motivate me to do a bit more exercise every day.	Motivating	
I liked the introduction of the personal targets this year. This motivated me more than the team challenge. I would actually prefer an individual step count challenge.	Motivating	
the weekly challenge was a good motivation this year, as was the on-line recording system. Our step count team, all walked individually and we didn't do any communal walking, though encouraged each other	Motivating	
It was a great way to motivate myself.	Motivating	
It was a great motivational tool for me, and I'd love to be able to log my steps year round.	Motivating	
Am still wearing my pedometer, it has made me conscious how sedentary my job is	Increased awareness	
It alerted me to how little walking I do through the day at work - something which I improved upon	Increased awareness	
I started to appreciate my surroundings more and took my time getting from point A to B.	Surroundings	
I have increased my early morning runs to 4 days per week	Changed behaviour	
Looking forward to next year. Gettign the family more physically active at the weekends is my next challenge	Family effects	

Would love it if the Challenge website was open year-round to log activity. I've kept my pedometer attached since, but miss having the conversion ability for swimming/cycling/running to walking steps	Desire to continue	**Desire to continue**
Absolutely fabulous challenge, wish it was continuing!!	Desire to continue	
my team is keen to continue with the challenge and although we have set up a spreadsheet it is not as motivating as the website - it would be really great to have the website continue or something like it to encourage people to sustain the momentum	Desire to continue	
Great idea! Should see more advertising about this & perhaps more suggested or planned events for all involved e.g. mass walk on such & such a date	Suggestions for future developments	**Feedback relating to SCC**
I actually found it quite hard to do the challenges as I have Chronic Fatigue Syndrome (which is quite well managed), and so I was getting tired towards the end and couldn't reach the goals in the last week (hmmm... maybe two wks). However, I would still do it again, as I would take time to pace it better. I was slightly disappointed that the challenges were step ones rather than fun ones (eg: all wear something red and go for a walk - which is rubbish but just an idea). However, some of the other photo challenges were fun. Thank you too for giving me the opportunity to be part of the Moonwalk, Edinburgh through your competition which would never have crossed my mind to do and I was proud to take part in.	Views relating to the challenges	
I've done other walking challenges that felt more ""fun"" this was a bit of a chore with nothing to get me motivated. The team aspect of this was lacking, there were no team challenges or goals.	Views relating to the challenges	
I didn't enjoy the challenges. They were too samey (didn't change) and completely unachievable by the end. I walk a lot anyway so increasing this to the level suggested for 5 days a week was completely unobtainable.	Views relating to the challenges	

- The challenges were not flexible enough (if you were sick the first week or just really active for some reason, the goals for the remaining time were completely unrealistic) - More mini challenges would have been good (e.g. walk more than 10k for 10 da	Views relating to the challenges	
too much about walking groups. not much available when we live and work 100miles apart	Views relating to the challenges	
..the length of time helped to cement some changes in behaviour i.e., if I'd only walked to work one day then I wouldn't see it as a viable option to the car, but walking at least a couple of times a week over at least a couple of weeks showed that a walking commute could mostly be accommodated in my normal routine	Positive response to duration	
I think the timespan was far too long. Not easy to find time to always fill out the daily steps taken on system	Negative response to duration	
Thought it was a bit long at eight weeks to keep people motivated	Negative response to duration	
8 weeks was too long to be able to remain focused. Previously it has been 6 weeks which I think was better.	Negative response to duration	
I feel it was a bit of a burden having to enter walking distances for 8 weeks (in fact I didn't manage to enter details of my last week)	Negative response to duration	
It was a good motivator to be part of a team. I found it useful to see progress using the pedometer - only slight issue being it wasn't always compatible with summer clothing!	Pedometer	
If we are paying for pedometers they need to be of a quality that will last the challenge as most of ours stopped working before the end. Then we ended up having to buy more or guess what we had walked.	Pedometer	
It was a pain having to sign in every day	Online platform (negative)	
new website was very good	Online platform (positive)	

It would be better if the website made it easier to check team progress	Online platform (negative)	
Website was a big improvement but it would for team leaders to be able to see when team members had added their scores.	Online platform (positive)	
would be good for team captains to have access to all team members activity so that they can keep an eye on who was walker of the week, or to add steps if people on holiday etc. Other than that it's great and the new website has worked well.	Online platform (positive)	
should be able to record exercise classes not just running/cycling etc	Recording activity	
Wasn't sure if I liked the new recording system to begin with. However changed my mind - loved it!	Recording activity	
I think it should be clear whether it's a 'step' challenge or if swimming/cycling count towards the totals. Personally I think it should be purely steps.	Recording activity	
The targets were unrealistic for people who started walking a lot in the first week	Unrealistic targets	
I had a slightly higher than normal level of activity on my first week. This made the generated targets unrealistic and unobtainable, and thus they were no motivation at all.	Unrealistic targets	
Weekly goals were very challenging.	Unrealistic targets	
Suggest a 'baseline' week beforehand so that we can measure our 'normal' walking and see how much we have improved over the 8 weeks	Include baseline	
it shouldn't be a competition	Competition - negative	
Although I had a 'team' I feel the committment wasn't equal from all.	Poor teamwork	
yes if you want people to give you times in hours and minutes for different tasks then you have to prepare them in advance and ask them to keep a diary , plus your survey did not allow responders to answer with don't knows re time ..I think a false methodology to quantify that which is often a natural and spontaneous activity and as for how long on a 'couch' ....get real any reports on such are deserving only of derision.	Research questionnaire	**Research questionnaire**
this questionnaire is extremely repetative.	Research questionnaire	
This survey is really irritating. the questions are too similar so it feels like a waste of tie answering them.	Research questionnaire	