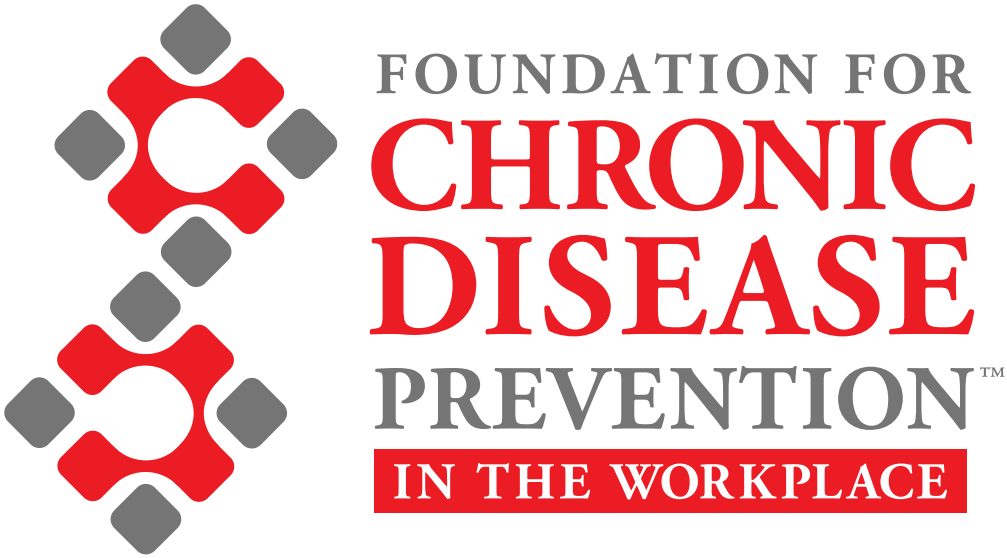

FOUNDATION FOR CHRONIC DISEASE PREVENTION (FCDP) &

CENTRE FOR ORGANIZATIONAL HEALTH AND WELLBEING, LANCASTER UNIVERSITY

Multi- business Study of the Effect of Low Impact Physical Activity on Employee Health and Wellbeing

GCC GLOBAL CORPORATE CHALLENGE®

LANCASTER UNIVERSITY

1. Executive summary

- The main aim of this report is to evaluate a workplace-based initiative Global Corporate Challenge ® – (GCC) aimed at increasing employee's levels of physical activity and its affect on Non Communicable Diseases (NCDs) which include Type II Diabetes, Coronary Heart Disease, high blood pressure and obesity) and psychological measures of performance and productivity.

- The GCC is a corporate wellness programme that encourages employees to be active by walking virtually around the world. The programme, based on a team competition utilising pedometers, ran for 16 weeks. Each team consisted of seven members and their activities were recorded on the internet.

- 752 employees from 5 UK (Hays Recruitment Services, Kraft Foods UK, Tesco plc, Tyco Fire Products and Wood Group) and 1 US based organisation completed a Health and Wellbeing Questionnaire, both before and after taking part in the GCC. This measure assessed employee's physical activity habits, psychological well-being, sources of stress, and quality of life.

- 213 employees, from the 5 UK organisations, took part in the screening programme for the biometric survey, both before and after the GCC. Biometric data was taken for Body Mass Index, total cholesterol and High Density Lipids (good cholesterol), blood pressure, and waist/hip measurements.

- The results showed a significant increase in employee physical activity as well as the frequency and planning of regular exercise.

- The results showed a significant improvement in all aspects of psychological well-being and a significant reduction in all types of stress experienced by the employees by the end of the programme.

- The results showed a significant increase in satisfaction with their quality of life by the end of the programme.

- Significantly higher levels of productivity were reported by the employees after the programme.

- There were some positive indications of a reduction in physical health factors associated with Type 2 diabetes and cardiovascular diseases. For example, over half of the employees lost weight, but overall the results were inconsistent.

- The benefits were particularly evident for employees who were more sedentary before the start of the programme with significant improvements to psychological well-being, reduction in stress levels and greater satisfaction with their quality of life.

- This study suggests organisations can benefit from a healthier workforce by encouraging and supporting their employees to walk more than 7,500 steps a day.

- This study suggests that for organisations to be successful in the future they can benefit from seeing their Employee Wellness programmes not as a 'nice to have' but as a core part of their employee workforce resilience strategy.

2. Background

As the Western world hovers on the edge of recession, again, labour productivity levels are weakening, whilst emerging economies are continuing to drive productivity growth. The conventional economic prescription for this problem comprises a range of measures which include investment in technology and innovation, labour market deregulation, and up-skilling the workforce. While each of these – to a greater or lesser extent – have a part to play, none of them takes account of a fundamental problem which represents an increasingly serious barrier to growing prosperity – that much of the UK and US workforce is not healthy enough to drive the improvements in productivity that they need.

Organisations also need to recognise the increasing burden of a range of chronic diseases – type II diabetes, coronary heart disease, strokes, cancer and obesity (Non Communicable Diseases - NCDs). NCDs not only influence on an individual level but also on the country's socio-economic structure and the World Health Organization (WHO) estimates that loss of national income will be dramatic. For example, in the UK the estimated loss of national income attributable to CVD, stroke and Type 2 diabetes was in 2005 estimated to be 1.6 billion and estimates predict an increase to 6.4 billion in 2015 (WHO, 2006). Further, in 2006 workplace absence totalled 175 million working days in the UK (3.3 % of total working time).

Apart from the financial burden on health care and related budgets, lifestyle related ill health and stress also impacts upon organisational performance in the form of reduced productivity, absenteeism and presenteeism. Indeed, the National Audit Office has estimated the annual cost of treating obesity and associated diseases as approximately £0.5 billion to the NHS and as much as £2 billion to the wider economy. According to the Black report (2008), the overall costs of working age ill health are in excess of '100 billion per year and around 172 million working days are lost to sickness/absence at a cost of over £13 billion'.

There have been growing concerns about the low and declining levels of physical activity within the UK population. An estimated 1 in 4 in the population are considered to be sedentary (i.e. engage in less than 30 minutes of moderate exercise per week) (Parliamentary Office of Science and Technology, 2001). This decline in levels of physical activity has corresponded with a rise in obesity, together with a number of common health disorders such as CHD, diabetes, hypertension and osteoporosis. Many of the health problems of the UK workforce can be attributable to worsening personal/public health with poor diets, growing obesity, smoking and more sedentary lifestyles all playing their part. Some can also be explained by growing levels of workplace 'stress', personal debt and family breakdown, fear of the future, lack of employment security and their links to depressive illness.

Levels of stress, in particular, among UK employees, have soared over the past year increasing long-term absence across all sectors. According to a recent report by the Chartered Institute of Personnel and Development (2011), 35% of employers have reported an increase in stress-

related absence since the previous year and it is the main reason for the continuing high levels of long-term absence in the public sector. The survey found between 50 - 73% of employers rank stress in their top-five common reasons for absence.

Physical symptoms of stress can manifest themselves in a number of ways such having difficulty sleeping at night. The psychological effects of stress though are more subtle, but prolonged stress is associated with depression, anxiety and panic attacks and other serious illnesses like heart disease, gastro-intestinal disorders and migraines. High levels of stress can cause a shortened attention span, poorer memory recall, reduced objectivity, impaired decision making ability and other mental problems. Employees may find it more difficult to concentrate and have much more difficulty making decisions, which can result in lack of motivation, missing deadlines and making careless mistakes (Schabracq & Cooper, 2000) In short, poor employee psychological well-being can have an adverse effect on the efficiency and effectiveness of organisations.

In contrast, regular physical activity is associated with a range of positive health outcomes. Exercise has been shown to reduce the risk and symptoms of depression and anxiety, improve mood and to increase self esteem, as well as contribute to cognitive vitality. Taking frequent, effective exercise is one of the best physical stress-reduction techniques available as exercise increases general physical fitness and evidence suggests fit people are better able to cope with long-term effects of stress. Other positive benefits of exercise include relaxing tense muscles; encouraging sleep; improving blood flow to the brain (important when thinking intensely); and releasing endorphins, which increase feelings of happiness and overall well-being. As well as reducing the physical symptoms of stress the more exercise taken, the more “good” HDL (high-density lipoprotein) cholesterol increases. HDL transports “bad” LDL (low-density lipoprotein) out of the blood stream and back to the liver, so managing cholesterol is about maintaining the balance by keeping the bad cholesterol (LDL) low and increasing the good (HDL). As a result this reduces the risk of developing heart disease, stroke, high blood pressure and Type 2 diabetes. An evaluation of peer-reviewed studies and clinical trials (Penedo and Dahn, 2005) concluded that exercise and physical activity are associated with better quality of life and health outcomes.

Despite the demonstrated link between increased physical activity and psychological well-being and better nutrition habits (Whatmore and Cartwright, 1999), and the clinical trials demonstrating the success of healthy diets and physical activity in reducing the incidence of NCDs in high risk individuals, most adults do not take enough exercise to achieve these benefits (Troiano et al, 2008). Generally they fail to achieve the 10,000 daily step count recommended by the WHO, although this recommendation has not been empirically tested.

As a consequence, in recent years there have been a range of UK policy initiatives introduced by the Department of Health, the Department for Education, Transport and Regional Affairs and other government bodies to promote increased physical activity amongst the population. There has been a move towards “social prescribing”, whereby health professionals encourage individuals to adopt a more physically active lifestyle through a referral to walking programmes (Bowden et al, 2011). Walking, as opposed to high intensive aerobic activity, is regarded as

being the activity most likely to increase physical activity at a population level as it carries less risk of injury and ill health problems resulting from over exertion. As a result a large number of studies have used pedometers to promote physical activity amongst patients within primary health care settings. Compared with stress management education and rational emotive behaviour therapy, exercise was found to be a more widespread and beneficial intervention to reduce stress and anxiety amongst a sample of public sector workers (Whatmore and Cartwright, 1999).

Given that 78% of working age people in the UK are in employment (Black, 2008) and that workers spend approximately one third of their waking life at work, the workplace is seen as having significant potential for the promotion of health and well-being. "Organisational Wellness" programmes are recognised to be an effective means of promoting healthy lifestyle practices and positive work behaviours with the potential to reduce sickness absence and increase performance (Parks and Steelman, 2008). Ho (1997) found that employees perceive organisations who offer wellness-type programmes more positively and report higher levels of job satisfaction compared to organisations that do not. Also by implementing these types of programmes it demonstrates the organisation's commitment and caring attitude towards their employees (Zoller, 2004). Faragher, Cass and Cooper (2005) have demonstrated a strong link between job satisfaction and health. It is claimed that an exercise programme at Tenneco Inc (Iverson et al, 1985) more than halved the company's healthcare costs and that a single session of aerobic exercise can be sufficient to reduce anxiety levels (Atchlier and Motta, 1994). A study of US commercial real estate brokers (Sheppard, 1999) found that the employees who exercised three times a week for 12 weeks achieved greater sales commissions compared to non-participant colleagues.

This all suggests that an organisation's interest in health needs to extend beyond absence management policies to a more proactive response to the increasing stress levels and NCD's.

This study aims to evaluate a workplace-based initiative (Global Corporate Challenge ® - GCC) aimed at increasing employee's levels of physical activity and its effect on NCDs and psychological measures of performance and productivity.

3. The project defined

The main aim of this study was to assess whether participation in the GCC (a workplace-based intervention using pedometers), increases low intensity physical activity upon completion of the programme. Also, to measure if the initiative reduces risk factors associated with Type 2 diabetes and cardio vascular disease, and affects recognised psychological measures of performance.

A secondary objective was to assess whether being part of the GCC changes the working environment in the organisations. In particular to measure if the initiative improves productivity measure such as self-reported well-being, reduced stress levels and productivity.

4. The practicalities

4.1. Project design

The study followed a between subjects comparative design with data gathered at two separate time points: up to two weeks before the challenge and up to 3 weeks after the challenge. The study comprised of two parts, a Health and Well-being Questionnaire (HWQ) and a biometric survey. The questions from the HWQ were categorised into four sections (Your Details, Your Health and Well-being, Sources of Stress, and Quality of Life). After persevering through numerous ethics committees the questionnaire was finally delivered and collected electronically through internet links to all participating employees.

A proportion of the employees also participated in the screening programme for the biometric survey. The biometric data collected included height, weight, body mass index; waist and hip measurements, body fat percentage, resting blood pressure, and finger prick tests for total cholesterol and HDL.

4.2. Participants

The GCC programme ran for 16 weeks and was based on a team competition utilising pedometers and the internet for recording activities. The teams consisted of seven team members including a team captain. Each member entered the daily number of steps on their personal log-in page at a website devoted to the programme. The numbers of steps were converted into miles/kilometres and a graphical plot of the individual's and team's progress was provided alongside a world map. Weekly encouragement was sent to the employees and throughout the programme additional information concerning health and the progress of the other teams was given when the employees logged on to the website.

Six organisations agreed to participate in the evaluation of the GCC. Five UK based organisations (Hays Recruitment Services, Kraft Foods UK, Tesco plc, Tyco Fire Products and Wood Group) participated in both the HWQ and the biometric survey. One organisation in the US took part in the HWQ. Out of 3766 HWQs sent out before the challenge, 1993 were returned. After the challenge, 3401 HWQs were sent out and 870 returned. Of these we identified and matched 752 employees who completed the HWQ before and after the challenge. Participation in the programme was voluntary and fully informed consent was given. Of the 752 employees 45% were male and 55% female. The age ranged from 18 to 60 years with a mean age of 38.5 years.

Before the challenge 350 employees took part in the screening programme for the biometric data. After the challenge 213 of these took part. Of the 213 who took part before and after the challenge, 53% were male and 47% female with a mean age of 38.6 years

4.3. Wellbeing measures

Data was gathered through an online questionnaire, which took between 5 and 10 minutes to complete. A web link to the survey was sent by email to individual addresses provided by the participating organisations. The questionnaire is in Appendix 1.

The first section, 'Your Details' asked employees their age and gender and about their work (e.g. work patterns and how sedentary their job is). The second section, 'Your Health', had 16 questions that evaluated psychological well-being over the previous three months. These questions were taken from the General Health Questionnaire (Goldberg, et al, 1997) and tap into recognised psychological measures of performance that are critical in a working environment. All questions were rated on a 4-point Likert-type scale. A further 5 questions in this section assessed approach to exercise, estimated number of steps, overall health, and productivity levels at work.

The third part of the questionnaire, 'Potential Sources of Stress', had 10 questions that evaluated personal stress levels over the previous 3 months. These were rated on a 5-point Likert-type scale. The final section of the questionnaire, 'Your Overall Quality of Life' consisted of 14 questions that evaluated the employee's feelings relative to their quality of life during the previous 3 months. These were rated on a 7-point Likert-type scale.

4.4. Physical health measures

Biometric data was gathered on work sites through a screening programme provided by an independent health screening company. The biometric data was benchmarked against recognised norms and, where they fell outside the norms, appropriate feedback, advice and referrals to health practitioners was made.

Blood glucose and lipoprotein was measured using a Cholestech LDX®System.

Blood pressure was measured three times and the average calculated from the last two measurements.

Height and weight was measured with the stipulation the employees wear light clothes. Height was recorded to the nearest 0.1cm up to 200cms using a stadiometer) portable height scale code PE087) and step ladder, ensuring that the top of the ear canal was level with the lower margin of the eye socket. Based on the height and weight measurements Body Mass Index was calculated as weight/height^2 (kg/m^2).

4.5. Procedure

Employees were drawn from the 6 the organisations who had signed up to the GCC. All employees within these organisations were invited to complete the HWQ via an email link, prior to starting the GCC in May 2011. From these employees the 5 UK organisations randomly selected volunteers to take part in the biometric screening before the challenge began. These results formed the baseline measure, 'before challenge'

The employees were provided with a pedometer which they were required to wear each day during the 16 weeks of the programme so they could record their steps. Each day employees were invited to log on to the GCC website and enter their daily steps.

Sixteen weeks (112 days) later, at the end of the challenge, the employees were again emailed the internet link to the HWQ. The volunteers for the first biometric survey were invited to a post challenge screening. These results formed the 'after challenge' measure.

5. Findings

The following results were broken down into six main sections: Demographics (5.1), Wellbeing 5.2), Sources of Stress (5.3), Quality of Life (5.4), Physical Health (5.5) and Productivity (5.6). In each section we compare the results before and after the challenge. In addition we look at how factors, such as physical activity (number of steps), age, gender, and inactivity before the challenge, impacts on the findings.

5.1. Demographics

In this section we describe the employees who participated in the study and explain how their attitude to exercise changed during the challenge. First we look at the change in the number of steps taken by the employees.

5.1.1. Step count

Steps per day	Before	After
Up to 2999	14% (105)	1% (8)
3000-4999	25% (181)	5% (35)
5000-7499	26% (186)	12% (89)
7500-9999	17% (123)	24% (184)
10000-12499	12% (86)	29% (219)
12500-14999	3% (25)	15% (116)
over 15000	3% (21)	14% (102)

There is a significant increase in the number of steps reported before and after the challenge.
Before the challenge:

- Only 35% of the employees achieved 7,500 or more steps a day.

After the challenge:

- 82% of the employees achieved 7,500 or more steps a day.
- 40% more of the employees reported exceeding the recommended 10,000 steps or more each day.

5.1.2. Age

Average age	38.5 years
18 - 30	28% (213)
31 – 40	31% (236)
41 – 50	25% (189)
51 – 60	14% (106)
Over 60	1% (8)

The average age of the employees is 38.5 years with the majority aged between 18 and 40 years of age.

5.1.3. Other demographics

45% Male (340)	55% Female (412)
95% Full time (709)	5% Part time (40)
92% Sedentary jobs (687)	8% Active jobs (63)
93% No shifts (698)	7% Works Shifts (50)

Ten percent more females than males took part in the challenge. The majority of their jobs involved working fulltime, with no shift work and in a sedentary role. Due to the small number of employees reporting they work part-time, on shifts or stand on their feet all day, we do not explore these demographics in any further detail.

5.1.4. Health demographics

This section evaluates the changes in the number of exercise days per week, the attitude to planned exercise and the employees' perception of their overall health.

Number of exercise days per week:

1 -2 days	3-4 days	5-7 days
Before GCC		
55% (408)	38% (201)	17% (121)
After GCC		
39% (293)	37% (274)	24% (177)

Planned exercise:

Not usually	When possible	Usually	Always
Before GCC			
24% (177)	31% (225)	26% (188)	19% (142)
After GCC			
13% (97)	32% (242)	33% (247)	22% (166)

Overall Health:

Poor	Alright	Good	Excellent
Before GCC			
4% (26)	34% (246)	49% (360)	14% (101)
After GCC			
2% (11)	17% (126)	63% (477)	18% (138)

There was a significant positive change in the employee's approach to exercise, and their overall health:

- After the challenge the employees were exercising much more frequently and actively planning to do so.
- 16% more of the employees were exercising 3 or more days a week.
- More notably almost 20% more of the employees felt their overall health had improved to a 'good' or 'excellent' level.
- These findings were consistent for males and females.

5.1.5. Impact of step count

Before the challenge:

- Employees taking 10,000 steps and more rated their overall health as significantly better than those taking fewer steps.

After the challenge:

- Employees taking 10,000 steps and more rated their overall health as significantly better than those taking fewer steps.
- 58% of employees achieved an average of 10000 steps per day by the end of the challenge (an increase of 40%).
- These employees rated their overall health significantly higher than those who took fewer steps.

5.1.6. Impact of other demographics

After the challenge:

- Males increased the number of planned exercise sessions significantly more than females.
- Females significantly increased the number of days they exercised compared to males.
- All age groups reported significantly better overall health after the challenge except for the over 60 group. However, this result may be due to the small number of employees in this group.

Summary
The results show that a work-based intervention with pedometers can increase physical activity levels. There was a significant increase in the number of steps taken by the employees by the end of the programme, with almost 60% of the employees achieving the recommended 10,000 steps per day after the challenge. Also their approach to physical activity became more positive as they began to make plans to exercise, and exercised more frequently.

As a consequence, more employees felt significantly better about their overall health, in particular those who achieved an average of 10,000 steps per day. All age groups benefitted (except the over 60's, although due to the small sample this result should be viewed cautiously). There was a different approach to exercise by the end of the challenge by males and females. Males tended to increase the number of planned sessions, whilst females increased the number of days they exercised. We do not know why this is, but males may have preferred to exercise with other people, which would entail more planning, or their work may have required more advance arrangements.

5.2. Wellbeing

In this section we take each relevant item on the questionnaire and show the changes in psychological well-being. The scales are shown as running on a negative-positive continuum, with better scores on the right.

Worse than usual	Less than usual	Same as usual	Better than usual
Concentration			
Before GCC			
2% (14)	15% (107)	79% (581)	4% (33)
After GCC			
0% (2)	4% (29)	80% (599)	16% (122)

Worse than usual	Less than usual	Same as usual	Better than usual
Playing a useful part			
Before GCC			
2% (14)	17% (122)	68 % (492)	14% (104)
After GCC			
0% (2)	4 % (27)	75% (565)	21% (157)

Worse than usual	Less than usual	Same as usual	Better than usual
Capable of making decisions			
Before GCC			
0% (2)	12% (87)	79% (576)	9% (69)
After GCC			
0% (2)	3% (20)	78% (587)	19% (141)

Worse than usual	Less than usual	Same as usual	Better than usual
Able to enjoy day to day activities			
Before GCC			
2% (15)	18 % (133)	72% (530)	8 % (55)
After GCC			
1% (5)	4% (32)	72% (544)	23 % (171)

Worse than usual	Less than usual	Same as usual	Better than usual
Face up to problems			
Before GCC			
1% (10)	9% (68)	83% (608)	6% (47)
After GCC			
0% (2)	3% (20)	80% (599)	17% (127)

Worse than usual	Less than usual	Same as usual	Better than usual
Feeling reasonably happy			
Before GCC			
1% (10)	14 % (105)	75 % (544)	10 % (72)
After GCC			
1% (8)	5% (35)	73% (550)	21% (158)

Much more	Rather more	No more than usual	Not at all
Loss of sleep over worry			
Before GCC			
5% (37)	16% (113)	71% (522)	8% (59)
After GCC			
2% (14)	9% (70)	64% (483)	25% (186)

Much more	Rather more	No more than usual	Not at all
Feeling under strain			
Before GCC			
4% (32)	19% (138)	70 % (514)	7 % (48)
After GCC			
2% (15)	13% (99)	68% (509)	17% (128)

Much more	Rather more	No more than usual	Not at all
Can't overcome difficulties			
Before GCC			
4% (32)	19 % (138)	70% (514)	7% (48)
After GCC			
1% (9)	6 % (42)	63% (475)	30% (224)

Much more	Rather more	No more than usual	Not at all
Feeling unhappy/depressed			
Before GCC			
7% (50)	20% (148)	65% (475)	8 % (59)
After GCC			
2% (12)	8 % (60)	54% (410)	36% (271)

Much more	Rather more	No more than usual	Not at all
Loss of confidence in your self			
Before GCC			
6% (47)	20% (143)	66% (481)	8% (60)
After GCC			
2% (11)	7% (49)	49% (371)	43% (319)

Much more	Rather more	No more than usual	Not at all
Thinking of yourself as worthless			
Before GCC			
10% (72)	16 % (117)	69% (497)	5 % (38)
After GCC			
1% (4)	3% (24)	39% (291)	57% (428)

These items measured recognised psychological measures of performance and as such are important to the effectiveness of an organisation. There was a significant improvement in all aspects of the employee's psychological wellbeing. In particular:

- 52% more of the employees no longer felt worthless. Self-esteem enables employees to succeed at work
- 35% more of the employees have gained confidence in themselves. Increased confidence reduces the likelihood of depression and anxiety
- 28% more of the employees reported never feeling unhappy or depressed, reducing the chance of feeling stressed
- 23% more of the employees felt they can always overcome difficulties. This reduces the probability of feeling stressed
- 17% more of the employees reported not losing sleep over worry
- 15% more of the employees felt able to enjoy day to day activities more than usual. A more positive outlook can result in a more productive employee

5.2.1. Impact of step count

Before the challenge we noted only one difference between the number of steps employees took and their psychological wellbeing:

- Employees who took 5000-7499 steps were significantly more likely to feel unhappy and depressed than those who reported taking 7500 - 9999 steps.
  One of the assumptions we considered was that employees who took fewer steps before the challenge may have benefitted even more from taking part in the challenge than those who were already active. We looked at the number of steps reported before the challenge in relation to the psychological well-being results after the challenge.
- Employees who took less than 5000 steps significantly improved their ability to concentrate, and decreased how often they felt under strain and felt worthless.
- Employees who took 5000 - 7499 steps significantly improved their ability to concentrate, felt they played more of a useful part in things, were more capable of making decisions and facing up to problems.
- Employees who took 7500 - 9999 steps felt they were more capable of making decisions and felt happier.
- There were no significant changes to the psychological well-being of employees who were already taking 10000 or more steps.

5.2.2. Impact of age

Before the challenge there were no significant differences between age groups in well-being. After the challenge there were some differences:

- The 51-60 age group showed significant improvement in all aspects of their wellbeing.
- The 18 -30, 31 - 40 and 41 - 50 age groups showed significant improvement in all aspects of their wellbeing, although slightly less improvement for feeling under strain.
- The over 60 age group showed significant improvement in all aspects of their wellbeing, although slightly less improvement for losing sleep, losing self confidence and feeling worthless.
- The 51 - 60 age group felt even more able to overcome difficulties than those aged 18 - 30 years.
- The 51 - 60 age group felt even less unhappy and depressed than those aged 18 - 30 years.
- The 51 - 60 age group were even less likely to feel any loss of confidence than those aged 18 - 30 years.
- The 51 - 60 age group were even less likely to feel worthless as a person than those aged 18 - 30 years.

5.2.3. Impact of other demographics

Before the challenge:

- Employees who regularly planned exercise (usually/always) were noticeably more able to concentrate, make decisions, enjoy day to day activities, and felt happier.
- Employees who exercised more frequently were better able to concentrate, make decisions and overcome difficulties.

After the challenge:

- Employees who exercised 6 days a week felt they were less able to play a part in things than those who exercised 1 day a week.
- Employees who exercised 1 day a week felt they were more likely to feel under strain than those who exercised 4 days a week .
- Males and females both experienced significant positive improvements in all aspects of their psychological well-being, apart from females reported no significant improvement in feeling under strain.

Summary
The results showed a significant improvement in all aspects of psychological well-being by the end of the programme. This is important for the effectiveness of an organisation as more positive feelings of self-esteem and confidence, for example, can encourage people to succeed at work. In addition the employees showed fewer signs of depression, anxiety and stress, all of which can impact negatively on organisational performance. A positive finding is that the benefits were generally similar across all age s, but especially so for those aged 51 to 60, and for both males and females.

In relation to the actual steps taken, the results confirmed our assumption, that those who w ere more sedentary before the programme benefitted the most. We noted one negative impact of increasing the number of exercise days, that exercising 6 days a week can limit the time available to join with other activities.

5.3. Sources of stress

In this section we take each relevant item on the questionnaire and show the changes in sources of stress. The scales are shown as running on a negative-positive continuum, with better scores on the right.

High (Score 1-2)	Moderate (Score 3)	Low (Score 4-5)
Family		
Before GCC		
19% (139)	30 % (214)	51% (372)
After GCC		
13% (102)	24 % (176)	63% (467)

High (Score 1-2)	Moderate (Score 3)	Low (Score 4-5)
Significant relationship		
Before GCC		
16% (115)	21 % (156)	63% (454)
After GCC		
8% (61)	18 % (136)	74% (548)

High (Score 1-2)	Moderate (Score 3)	Low (Score 4-5)
Health		
Before GCC		
9% (68)	26 % (186)	65% (473)
After GCC		
5% (39)	17 % (122)	78% (582)

High (Score 1-2)	Moderate (Score 3)	Low (Score 4-5)
Sex life		
Before GCC		
9% (62)	19% (139)	72% (525)
After GCC		
6% (42)	13 % (97)	81% (598)

High (Score 1-2)	Moderate (Score 3)	Low (Score 4-5)
Work		
Before GCC		
30% (216)	39 % (284)	31% (225)
After GCC		
18% (136)	37 % (270)	45% (336)

High (Score 1-2)	Moderate (Score 3)	Low (Score 4-5)
Education/studies		
Before GCC		
5% (41)	8 % (55)	87% (627)
After GCC		
3% (19)	8 % (62)	89% (655)

High (Score 1-2)	Moderate (Score 3)	Low (Score 4-5)
Emotional well-being		
Before GCC		
13% (95)	26 % (188)	61% (439)
After GCC		
7% (53)	17 % (123)	76% (566)

High (Score 1-2)	Moderate (Score 3)	Low (Score 4-5)
Coping with daily problems		
Before GCC		
7% (49)	27% (194)	66% (480)
After GCC		
4% (28)	17 % (123)	78% (592)

After the challenge there was a significant reduction in stress levels in relation to all issues. In particular:

- 15% more employees reported little or no stress about their general, and emotional, wellbeing.
- 14% more employees reported little or no stress in relation to their work.
- 13% more employees reported little or no stress about their health.
- 12% more employees reported little or no stress about their family and finances; and had no stress coping with daily problems.

5.3.1. Impact of step count

Before the challenge we noted some differences between the number of steps employees took and their stress levels:

- Employees who took less than 7500 steps were significantly more likely to be stressed about their health than those who took 10000 and above steps.
- Employees who took 7500 - 9999 steps were significantly more stressed about work than those who took 10000 and above steps.
- Employees who took less than 5000 steps were significantly more stressed about their general wellbeing work than those who took 10000 and above steps.

We looked at the number of steps reported before the challenge in relation to stress levels after the challenge:

- Employees in all step categories felt significantly less stressed about everything except 'Education/studies'. This is probably because few employees were studying and therefore few were affected by the stressor.
- The reduction in stress over health was even greater for the employees who reported taking fewer than 7500 steps before the challenge
- However, employees who reported the most steps before the challenge (10000 and above) remained the least stressed over their health

5.3.2. Impact of age

Before the challenge there were a few significant differences in sources of stress for different age groups:

- The 41 -50 group were more stressed over their health than the 18 - 30 age group.
- The 18 - 30 group were more stressed over their finances than the 41 - 50 age group.
- The 31 - 40 group were more stressed over their finances than the 41 - 50 age group.

- The 18 - 30 group were more stressed over their education/studies than the 41 - 50 and 51 - 60 age groups.

After the challenge:

- All age groups reported significantly less stress for all the different issues.
- The 51 - 60 age group were significantly less stressed over finances than the 18 -30 and 31 - 40 age groups.
- The 18 - 30 group were significantly more stressed over their education/studies than the 31 - 40 and 51 - 60 age groups.

5.3.3 Impact of other demographics

Before the challenge:

- Employees who regularly planned exercise (usually/always) had noticeably lower stress levels in relation to family, health, finances, work, general and emotional well-being, and daily problems.
- Employees who exercised more frequently (5 days) had noticeably lower stress levels in relation to work and general well-being.

After the challenge:

- Employees who regularly planned exercise (usually/always) had noticeably lower stress levels in relation to health, work, general and emotional well-being
- Males showed a significant reduction in all sources of stress.
- Females showed significant reduction in all sources of stress except for education/studies.

Summary

High levels of employee stress, either due to external factors or the work itself, can result in a number of productivity problems for organisations due to sickness absence, decreased performance, reduced commitment and high turnover, for example. The results showed a significant reduction in all types of stress experienced by the employees by the end of the programme. Again the findings show the benefit of taking more than 10,000 steps a day, as these employees were the least stressed over a number of issues. However, the increase in physical activity did reduce stress levels for all employees, of all ages and gender, and particularly those who used to take less than 7,500 steps a day. Any differences in stress levels for different age groups may be put down to different stages in life. For example, younger people were more likely to be studying than older people, and older people were more likely to have less demand on their finances. The results also indicated that more regular and planned exercise may also contribute to reducing stress levels.

5.4. Quality of life

Very poor (Score 1-2)	Dissatisfied (3)	Mixed (4)	Satisfied (5)	Very good (Score 6-7)
Personal life				
Before GCC				
3% (22)	3% (21)	17% (122)	36% (261)	41% (293)
After GCC				
3% (20)	3% (20)	14% (101)	32% (235)	48% (355)

Very poor (Score 1-2)	Dissatisfied (3)	Mixed (4)	Satisfied (5)	Very good (Score 6-7)
Wife/husband/significant other				
Before GCC				
6% (39)	5% (38)	14% (98)	22% (152)	53% (366)
After GCC				
5% (38)	3% (21)	13% (91)	21% (144)	58% (410)

Very poor (Score 1-2)	Dissatisfied (3)	Mixed (4)	Satisfied (5)	Very good (Score 6-7)
Romantic life				
Before GCC				
8% (55)	8% (56)	19% (137)	26% (183)	39% (274)
After GCC				
7% (49)	5% (36)	17% (126)	23% (162)	48% (343)

Very poor (Score 1-2)	Dissatisfied (3)	Mixed (4)	Satisfied (5)	Very good (Score 6-7)
Job				
Before GCC				
5% (39)	7% (48)	30% (215)	34% (242)	24% (174)
After GCC				
4% (36)	7% (53)	24% (180)	35% (257)	30% (205)

Very poor (Score 1-2)	Dissatisfied (3)	Mixed (4)	Satisfied (5)	Very good (Score 6-7)
Co-workers				
Before GCC				
1% (9)	3% (23)	23% (163)	41% (290)	32% (232)
After GCC				
1% (8)	4% (25)	19% (140)	39% (288)	37% (271)

Very poor (Score 1-2)	Dissatisfied (3)	Mixed (4)	Satisfied (5)	Very good (Score 6-7)
Actual work you do				
Before GCC				
3% (22)	7% (49)	27% (194)	35% (248)	28% (203)
After GCC				
4% (28)	6% (42)	21% (158)	36% (264)	33% (239)

Very poor (Score 1-2)	Dissatisfied (3)	Mixed (4)	Satisfied (5)	Very good (Score 6-7)
Handling of problems in your life				
Before GCC				
2% (12)	6% (44)	26% (186)	44% (316)	22% (157)
After GCC				
1% (11)	3% (18)	23% (168)	40% (292)	33% (251)

Very poor (Score 1-2)	Dissatisfied (3)	Mixed (4)	Satisfied (5)	Very good (Score 6-7)
What you are actually accomplishing in your life				
Before GCC				
5% (46)	10% (73)	30% (207)	33% (237)	22% (155)
After GCC				
3% (24)	8% (58)	27% (197)	32% (234)	30% (217)

Very poor (Score 1-2)	Dissatisfied (3)	Mixed (4)	Satisfied (5)	Very good (Score 6-7)
Physical appearance				
Before GCC				
11% (79)	15% (110)	30% (213)	30% (215)	14% (101)
After GCC				
5% (23)	11% (77)	27% (199)	35% (257)	22% (164)

Very poor (Score 1-2)	Dissatisfied (3)	Mixed (4)	Satisfied (5)	Very good (Score 6-7)
Your self				
Before GCC				
5% (39)	8% (59)	30% (212)	36% (260)	21% (147)
After GCC				
3% (20)	4% (30)	23% (165)	40% (293)	30% (223)

Very poor (Score 1-2)	Dissatisfied (3)	Mixed (4)	Satisfied (5)	Very good (Score 6-7)
Ability to adjust to change in your life				
Before GCC				
3% (20)	6% (41)	23% (165)	41% (294)	27% (196)
After GCC				
2% (15)	3% (24)	20% (147)	35% (256)	40% (289)

Very poor (Score 1-2)	Dissatisfied (3)	Mixed (4)	Satisfied (5)	Very good (Score 6-7)
Life as a whole				
Before GCC				
2% (16)	4% (27)	22% (159)	37% (267)	35% (247)
After GCC				
2% (14)	3% (24)	18% (132)	32% (234)	45% (327)

Very poor (Score 1-2)	Dissatisfied (3)	Mixed (4)	Satisfied (5)	Very good (Score 6-7)
Overall contentment with your life				
Before GCC				
2% (13)	5% (32)	21% (154)	40% (290)	32% (228)
After GCC				
2% (12)	3% (25)	17% (124)	34% (246)	44% (322)

Very poor (Score 1-2)	Dissatisfied (3)	Mixed (4)	Satisfied (5)	Very good (Score 6-7)
The extent to which your life is as you want it life				
Before GCC				
5% (37)	7% (53)	29% (210)	34% (240)	25% (176)
After GCC				
4% (26)	5% (37)	25% (185)	33% (241)	33% (239)

There was a significant improvement in all aspects of the employees' quality of life except in relation to their physical appearance. How they feel they about the way they look to others has not improved as much as all the other aspects of life. Of particular interest is the increase in the number of employees who were now pleased or delighted in their ability to handle change (13% more) and cope with problems (11% more) as well as their overall contentment with life (12%).

5.4.1. Impact of step count

Before the challenge:

- Employees who reported less than 5000 steps felt significantly less satisfied with their physical appearance than those who reported taking 10000 and above steps.
- Employees who reported less than 5000 steps felt significantly less satisfied with themselves than those who reported taking 10000 and above steps.

After the challenge:

- Regardless of the number of average steps taken before the challenge all employees reported positive improvements in their quality of life.
- Employees who reported fewer than 7499 steps before the challenge reported significant improvements for all aspects, except for their co-workers.
- Employees who reported 7500 -9999 steps before the challenge reported significant improvements to their romantic life, physical appearance and themselves overall.
- Employees who reported more than 10000 steps before the challenge reported significant improvements for all aspects, except for their job and actual work.

5.4.2. Impact of age

Before the challenge:

- There were no significant differences between age groups and feelings relative to their quality of life.

After the challenge:

- All age groups reported positive improvements in all aspects of their life.
- 41 - 50 age group reported feeling significantly more satisfied with their job than 18 - 30 age group.
- 41 -50 age group reported feeling significantly more satisfied with their actual work than other age groups.
- 18 - 30 age group reported significant improvements in ability to handle problems, their accomplishments' physical appearance, their self, ability to adjust to change, overall contentment, and life being as they want it.
- 31 -40 age group reported significant improvements in everything except their co-workers and the actual work.
- 41 - 50 age group reported significant improvements in everything.
- 51 - 60 age group reported significant improvements in everything except their job, co-workers and the actual work.
- Over 60 age group reported significant improvements in their romantic life, the job, handling problems, their accomplishments, self, life as a whole, and life being as they want it.

5.4.3. Impact of other demographics

Before the challenge:

- Males were significantly more delighted with their physical appearance and self, than females.
- Employees who didn't usually plan exercise had noticeably lower quality of life in relation to all aspects, except for co-workers, actual work and their job.
- Employees who exercised more frequently (4 days) were significantly more satisfied with their physical appearance, self, life as a whole, and were more contented overall.

After the challenge:

- Both males and females reported positive improvements in all aspects of their quality of life.
- Males reported significant improvements in all aspects except for their personal life and physical appearance.
- Females reported significant improvements in all aspects except for their significant other and physical appearance.
- Males were still significantly more delighted with their physical appearance and self, than females.
- Employees who always planned exercise were noticeably more satisfied with their physical appearance than those who did not, or only when possible.

- Employees who only exercised 1 day a week were significantly satisfied with their accomplishments (compared to 7 days), physical appearance (compared to 3-7 days), and self (compared to 4 and 7 days).

Summary
Overall the employees were significantly more satisfied with their quality of life at the end of the programme, regardless of age or gender. Again the benefits appear even greater for the more sedentary employees, those who took less than 7,500 steps before the challenge. The main benefit of increased planning, and exercising more regularly, was greater satisfaction with physical appearance.

5.5. Physical health

Weight loss:
Being overweight increases the risk of a range of conditions including heart disease, high blood pressure, arthritis and many cancers.

Before the challenge:

- Total weight of all employees (222) was 17361Kg.

After the challenge:

- 133 Kg of weight was lost in total.
- The average weight loss was 0.6Kg.

If we look just at the employees (117) who lost weight:

- 333Kg of weight was lost in total.
- The average weight loss was 2.8Kg, which equates to a 3.6% loss

Male Body Fat Percentage			
	Underweight	Healthy	Overweight
Pre event	3(3%)	26(22%)	89(75%)
Post event	4(3%)	28 (24%)	86(73%)
Movement +/-	+1	+2	-3

Female Body Fat Percentage			
	Underweight	Healthy	Overweight
Pre event	4(4%)	32(31%)	68(65%)
Post event	4(4%)	29(28%)	71(68%)
Movement +/-	0	-3	+3

The amount of body fat people carry (body fat percentage), makes a difference to the body shape and health. Body shape is affected by body fat percentage because muscle tissue is more compact than fat. It is important to note the difference between males and females to determine body fat percentages. Mainly, women are healthier with higher body fat percentages than men. This is because women require higher fat levels for safe pregnancy.

- 3% of males reduced their body fat percentage to a healthy level.
- 3% of females increased their body fat percentage to 'overweight'.

Male Waist/Hip Ratio			
	Good	Average	High
Pre event	61(59%)	27(26%)	16(15%)
Post event	74(71%)	15(14%)	15(14%)
Movement +/-	+13	-12	-1

Female Waist/Hip Ratio			
	Good	Average	High
Pre event	61(59%)	27(26%)	16(15%)
Post event	74(71%)	15(14%)	15(14%)
Movement +/-	+13	-12	-1

The waist/hip ratio is used as an indicator or measure of the health of a person, and the risk of developing serious health conditions. Research shows that people with "apple-shaped" bodies (with more weight around the waist) face more health risks than those with "pear-shaped" bodies, who carry more weight around the hips.

- 10% of males reduced their waist to hip ratio to a 'good' level.
- 12% of females reduced their waist to hip ratio to a 'good' level.

BMI					
	Underweight	Normal	Overweight	Obese class 1	Obese class 2
Pre event	2 (1%)	87(39%)	94 (42%)	33 (15%)	6 (3%)
Post event	1 (0%)	90(40%)	91 (40%)	33 (15%)	7 (3%)
Movement +/-	-1	+3	-3	0	1

Body Mass Index (BMI) is a way to work out if your weight is appropriate for your height. The calculation is your weight divided by your height. Generally, the higher your BMI the greater risk of health problems. Here we are looking for a reduction in readings. Although there were no significant changes to the number of employees in each category our findings did show:

- 48% of employees had some reduction in BMI.

- 8% of employees had a reduction in BMI greater than 5%.
- However 52% of employees increased their BMI.

Blood Pressure					
	Systolic	Desirable	Pre hypertension	Stage 1 hyper	Stage 2 hyper
Pre event		71 (32%)	112 (51%)	33 (15%)	4 (2%)
Post event		97 (44%)	96 (44%)	25 (11%)	2 (1%)
Movement +/-		+26	-16	-8	-2
	Diastolic	Desirable 60–79	Pre hypertension or 80–89	Stage 1 hyper or 90–99	Stage 2 hyper or 100–109
Pre event		94 (43%)	85 (39%)	33 (15%)	8 (4%)
Post event		103(47%)	79 (36%)	27 (12%)	11 (5%)
Movement +/-		+9	-6	-6	+3

Systolic pressure is the maximum pressure in the circulatory system and is generated when the heart beats. Diastolic pressure is the minimum pressure that occurs just before a heartbeat. Hypertension is the medical word for high blood pressure and here we are looking for a reduction in both readings.

After the challenge there were changes to the number of employees in each category:

- 26 more of the employees were in the desirable category for systolic pressure.
- 9 more of the employees were in the desirable category for diastolic pressure.
- In total 63 (28%) employees moved to a lower category of systolic pressure.
- In total 53 (24%) employees moved to a lower category of diastolic pressure.

However, 25 (11%) employees moved to a higher category of systolic pressure and 43 (20%) moved to a higher category of diastolic pressure

Total Cholesterol				
	Desirable	Borderline high	Mod high	High
Pre event	172(77%)	42 (19%)	5 (2%)	4 (2%)
Post event	148(66%)	58 (26%)	10(4%)	7 (3%)
Movement +/-	-24	+16	+5	+3

HDL				
	Low	Borderline low	Desirable	Desirable high
Pre event	62 (28%)	11 (5%)	72 (32%)	78 (35%)
Post event	44 (20%)	17 (8%)	90 (40%)	72 (32%)
Movement +/-	-18	+6	+18	-6

High levels of total cholesterol (TC) are related to a greater risk of cardiovascular diseases including coronary heart disease and stroke. But TC includes both "good" high-density lipoprotein (HDL) cholesterol, and "bad" varieties, chiefly low-density lipoprotein (LDL), so here we are looking for the right balance, for example a reduction in TC overall but an increase in HDL.

After the challenge:

- For TC the number of employees in the desirable category reduced.
- For HDL the number of employees in the desirable category increased.
- In total 67 (31%) employees had some reduction in TC.
- In total 102 (49%) employees had some increase in HDL.

5.5.1. Impact of step count

Average change	BP-Sys	BP-Dia	TC	HDL	BMI
<5000	-2.0%	-0.6%	+4.9%	+3.6%	0%
5000-7499	-3.9%	0%	+2.8%	-1.0%	-0.1%
7500-9999	-2.5%	-0.1%	+9.4%	+10.2%	-0.7%
>10000	-8.0%	-3.8%	+3.5%	-0.7%	+0.7%

The step count is based on the reported step count before the challenge as one of our assumptions was that employees who took fewer steps before the challenge may have benefitted even more from taking part in the challenge than those who were already active.

After the challenge:

- BP-Systolic mainly reduced for all step count categories.
- BP-Diastolic reduced, or had no change, for all step count categories.
- TC increased for all step count categories.

- HDL increased for those who took less than 5000 and between 7,500 to 9999 steps before the challenge.
- BMI reduced more for the more sedentary employees (less than 9999 steps).

Average change	BP-Sys	BP-Dia	TC	HDL	BMI
18-30	-1.6%	-0.6%	+6.4%	+3.4%	-0.3%
31-40	--3.1%	+0.4%	+3.1%	+1.0%	-0.1%
41-50	-3.4%	-1.1%	+3.7%	-1.1%	+0.3%
51-60	-1.3%	-2.3%	+6.5%	+12.4%	+0.1%
>60	-15%	-3.7%	+6.6%	+8.2%	+0.4%

- BP- Systolic reduced for all ages
- BP- Diastolic reduced for all ages, except 31-40
- TC increased for all ages
- HDL increased for all ages except 41-50
- BMI decreased for those 18-40

5.5.2. Impact of other demographics

Average change	BP-Sys	BP-Dia	TC	HDL	BMI
Males	-4.1%	-2.6%	+4.2%	+7.3%	-0.4%
Females	-3.1%	+0.4%	+5.6%	+1.0%	-0.1%

Gender:

- BP reduced for male and females.
- BP- Systolic reduced for males and females.
- BP- Diastolic reduced for males.
- TC increased for males and females.
- HDL increased for males and females.
- BMI decreased for males and females.

Summary

Although there were no significant, consistent changes to the physical health results after the challenge there were some positive indications. Over half the employees lost weight and a proportion reduced their waist to hip ratio; almost half the employees reduced their BMI; three

quarters decreased their BP-systolic pressure and a quarter decreased their BP-Diastolic pressure. Blood pressure results were variable, but they can be influenced by the actual situation, known as "white coat syndrome". Almost a third of employees reduced their TC and half increased their HDL. On the other hand a number of employees reported worse results.

The more sedentary employees before the challenge showed some positive benefits, but so did the more active employees. There were no significant changes for different age groups either. However, some caution needs to be taken when interpreting the physical health results. Any number of factors may have occurred during this period to influence the readings. For example, the measurements can be affected by a number of variables such as time of day, caffeine taken in, meals eaten prior to the tests, smoking, alcohol intake and type of clothes worn. Unlike psychological change, physical change often takes months to manifest.

5.6. Impact on productivity

Less than 80%	80-89%	90-99%	100%
Before GCC			
15% (108)	44% (322)	32% (236)	9% (69)
After GCC			
8% (58)	34% (256)	45% (340)	13% (100)

After the challenge:

- Employees felt they were significantly more productive.
- 17% more employees report they were 90% or more productive in their job.

5.6.1 Impact of step count

Before the challenge:

- Employees who reported taking 10000 and more steps felt significantly more productive at work than those who reported taking fewer steps.

After the challenge:

- Employees who were taking more than 7500 steps a day at the end of the challenge felt more productive.

5.6.2. Relationship with other study variables

Before the challenge:

- There were no significant differences between males and females in productivity levels.
- There were no significant differences between age groups and productivity.
- Employees who took more planned exercise felt significantly more productive.

After the challenge:

- Both males and females felt significantly more productive.
- All age groups were significantly more productive except for the over 60 group. However, this result may be due to the small number of employees in this group.

Summary

Self-reported measures of productivity have shown to be a good indicator of actual productivity levels. The results show the employees felt they were significantly more productive after the challenge. Again, there appear to be even greater benefits for taking more than 7500 steps.

6. Discussion

One of the main aims of this study was to assess whether participating in a workplace-based intervention (using pedometers) increases low intensity physical activity upon completion of the programme. The results showed that a work-based intervention with pedometers can significantly increase levels of physical activity by increasing the number of steps taken daily and the frequency and planning of regular exercise. Although, whether this behaviour continues beyond the final few weeks after the programme is unknown.

Maintaining optimum levels of performance and productivity are crucial for successful organisations but an increase in NCDs, and stress-related illness, resulting in high sickness absence levels can have a detrimental impact. As over 50% of UK absenteeism is now mental health related, it is important to consider whether regular physical activity can play a part in improving people's psychological well-being and reducing sources of stress. The results showed a significant improvement in all aspects of psychological well-being and a significant reduction in all types of stress experienced by the employees by the end of the programme. In particular fewer employees felt worthless and depressed, or lost sleep over worries, and many felt more confident, more able to overcome difficulties, and generally enjoyed their day to day activities. These improvements suggest increases in self-esteem and a more positive outlook, which can result in feeling more successful at work, resulting in an increase in productivity, and a diminishing likelihood of the employees experiencing stress. In addition the employees felt better about their general and emotional well-being and felt less stressed by their work, health, family, finances and daily problems. The implication of this to organisations was supported by the significantly higher levels of productivity reported by the employees at the end of the programme.

Another objective was to measure any reduction in physical health factors associated with Type 2 diabetes and cardiovascular disease. Although there were no significant consistent changes to the physical health results there were some positive indications. For example, over half of the employees lost weight; and a number of employees showed a decrease in their BMI, blood pressure and total cholesterol and an increase in their HDL. Health screening though is problematic when variables such as an individual's diet are not controlled.

The benefits were particularly evident for employees who were more sedentary before the start of the programme with significant improvements to psychological well-being, reduction in stress levels and greater satisfaction with their quality of life. This could suggest that organisations can benefit more by targeting their employee wellness programmes towards the less active employees, in particular those who take less than 7,500 steps a day. The WHO recommends taking 10,000 steps a day, and this study seems to provide support for this recommendation. However, encouraging employees to walk more than 7,500 steps a day could be as effective in creating a healthy workforce.

7. Conclusion

Overall the evaluation provided evidence to support that participating in the Global Corporate Challenge ® increased low intensity physical activity, and significantly improved people's psychological well-being, stress levels and quality of life. The benefits were particularly notable for the more sedentary employees at the start of the challenge and, by encouraging employees to take more than 7,500 steps a day, an organisation could benefit significantly in terms of improvements to performance and productivity levels. Although the initiative suggested some positive reduction in risk factors associated with Type 2 diabetes and cardiovascular diseases these results were less conclusive.

This study suggests that for organisations to be successful in the future they can benefit from seeing their Employee Wellness programmes not as a 'nice to have' but as a core part of their employee workforce resilience strategy.

Future research may wish to incorporate a control group to further strengthen the findings identified within this study. It would also be useful to identify if these good health behaviours are sustained over time and how organisations can help to promote the maintenance of these positive exercise habits.

Cautionary note

Although it appears the programme did have a positive impact upon employee health it is important to note that there may have been other factors during this period which were not part of the programme and presented within this analysis that could account for these changes. It is also important to note that due to the nature of the analysis employed within this study there is always a possibility that some of the findings may have occurred by chance. Consequently

caution must be made when making any assumptions or generalisations of these findings. Similarly all findings only apply to employees that were analysed within this study so again care should be taken when making generalisations.

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9. Appendix

HEALTH AND WELLBEING QUESTIONNAIRE

1. YOUR DETAILS

In participating in the Global Corporate Challenge ® (GCC) you are committing to increase your daily activity levels. We are interested in understanding the extent to which your participation in the GCC improves your health and general wellbeing and are conducting a research project in conjunction with the Foundation for Chronic Disease Prevention. The Foundation for Chronic Disease Prevention is the research arm of the Global Corporate Challenge ®.

The project will involve you in completing two short questionnaires. The first one is to be completed prior to the start of the challenge and the other after the challenge is completed.

Individual details will remain confidential to the research team at Lancaster University. Your organization will only receive a summary of the results. In order to compare your levels of personal health and wellbeing over the period of the Challenge your email address will be used as an identifier, but no names will be recorded against the data to ensure anonymity. If you have any health concerns during the period of the Challenge please contact your occupational health department or your GP.

Participation is entirely voluntary and you can withdraw from the study at any time. If you require any further information, or have any concerns or queries, please contact the project leader Professor Susan Cartwright (susan.cartwright@lancaster.ac.uk) or the Head of the Division of Health Research at the School of Health and Medicine, Dr. Katherine Froggatt (k.froggatt@lancaster.ac.uk).

We hope that you will enjoy taking part in the GCC and that you will also contribute to the evaluation study and complete the questionnaire which will only take you about 10 minutes. Please try and answer all the following questions.

Thank you for your cooperation.

Firstly could you provide some brief demographic information about yourself and your role?

1. What is your gender?

Male **Female**

2. What is your age (in years)?

3. What is the name of the organization you work for?

4. Is your work primarily:

Sitting down most of the day **On your feet most of the day**

5. Do you work shifts?

Yes **No**

6. Do you work?

Full Time **Part Time**

2. YOUR HEALTH

We would like to know how your health has been in general over the last three months.

Please read the questions below carefully and select the response that best applies to you.

1. Over the last 3 months have you.....

	More so thanusual	Same as usual	Less than usual	Much less than usual
Been able to concentrate on what you're doing?	◯	◯	◯	◯
Felt that you are playing a useful part in things?	◯	◯	◯	◯
Felt capable of making decisions about things?	◯	◯	◯	◯
Been able to enjoy your normal day to day activities?	◯	◯	◯	◯
Been able to face up to your problems?	◯	◯	◯	◯
Been feeling reasonable happy, all things considered?	◯	◯	◯	◯

2. Over the last 3 months have you....	**More so**	**Same as**	**Less than**	**Much less**

	thanusual	usual	usual	than usual
Lost much sleep over worry?	◯	◯	◯	◯
Felt constantly under strain?	◯	◯	◯	◯
Felt you couldn't overcome your difficulties?	◯	◯	◯	◯
Been feeling unhappy or depressed?	◯	◯	◯	◯
Been losing confidence in yourself?	◯	◯	◯	◯
Been thinking of yourself as a worthless person?	◯	◯	◯	◯

3. Do you take planned exercise?

Always Usually When possible Not usually

4. On average, how many days per week do you exercise?

One Two Three Four Five Six Seven

5. On average, how many steps do you think you take each day?

Up to 2,999 steps 7,500 9,999 steps Over 15,000 steps

3,000 4,999 steps 10,000 12,499 steps

5,000 7,499 steps 12500 14,999 steps

6. Over the last three months, how would you rate your overall health?

Excellent Good Alright Poor

7. Over the last three months, roughly how productive have you felt in your job?

100% Productive 90-99% Productive

80-89% Productive Less than 80% Productive

3. POTENTIAL SOURCES OF STRESS

A number of factors can affect your day to day wellbeing; therefore we would like to know how your personal stress levels have been over the last three months.

Please read the questions below carefully and select the response that best applies to you.

1. Could you please indicate your stress levels over the past three months relative to the following:

	None	Slight	Moderate	Pronounced	Extensive
Family	○	○	○	○	○
Significant relationship	○	○	○	○	○
Health	○	○	○	○	○
Finances	○	○	○	○	○
Sex life	○	○	○	○	○
Work	○	○	○	○	○
Education/Studies	○	○	○	○	○
General wellbeing	○	○	○	○	○
Emotional wellbeing	○	○	○	○	○
Coping with daily problems	○	○	○	○	○

4. YOUR OVERALL QUALITY OF LIFE

We would like you to evaluate your feelings over the past three months relative to your quality of life.

Please read the questions below and select the response that best applies to you.

1. Please indicate your feelings relative to your quality of life:

	Terrible	Unhappy	Mostly dissatisfied	Mixed	Mostly satisfied	Pleased	Delighted
Your personal life	○	○	○	○	○	○	○
Your wife/husband or "significant other"	○	○	○	○	○	○	○
Your romantic life	○	○	○	○	○	○	○

Your job	○	○	○	○	○	○	○
Your co-workers	○	○	○	○	○	○	○
The actual work you do	○	○	○	○	○	○	○
The handling of problems in your life	○	○	○	○	○	○	○
What you are actually accomplishing in your life	○	○	○	○	○	○	○
Your physical appearance/ the way you look to others	○	○	○	○	○	○	○
Yourself	○	○	○	○	○	○	○
Your ability to adjust to change in your life	○	○	○	○	○	○	○
Your life as a whole	○	○	○	○	○	○	○
Overall contentment with your life	○	○	○	○	○	○	
The extent to which your life has been as you want it	○	○	○	○	○	○	