Promoting physical activity in the workplace: a stage of change approach

by

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Abstract

Regular physical activity is associated with improved physiological and psychological wellbeing, by reducing the risk of chronic illnesses such as cardiovascular disease, cancer, obesity, diabetes, osteoporosis and depression. There is a common perception that physical activity levels in the population are declining, and one of the biggest changes affecting this is occupational based activity. Since adults spend on average over 50% of their waking hours at work, work sites have the potential to be an important setting for health promotion initiatives. Cognitions and behaviours are key causal factors behind many of today's most widespread health problems and illnesses. The stage of change model has been highlighted as having intuitive appeal because it considers the dynamic nature of attitudes and behaviour change. This thesis is concerned with the application of the stage of change model to an occupational health intervention promoting physical activity.

Several research studies were undertaken to explore the experiences of employees with workplace health initiatives and investigate the strategies and practices used by occupational health to promote healthy behaviours. These research studies highlighted the barriers and facilitators to successful health interventions and contributed towards the design, development and implementation of an activity promotion intervention. Additional research was also conducted to develop information materials based on the stage of change model. The stage approach was simplified and intervention materials were classified based on whether employees were thinking about making a change or not thinking about making a change to their activity levels. In order to test the materials, a twelve month intervention was implemented in ten work sites across the UK that were allocated to one of three groups. Two groups received information materials and one group received no information during the intervention period (control group). The difference between the two groups who received information was that one group received standard activity promotion information (standard group) and the second group received tailored information based on their stage of change construct (staged group).

Participants in the staged intervention group demonstrated significant decreases in body mass index, fat percentage, waist circumference, blood pressure and resting heart rate following the twelve month intervention. In contrast, reductions were identified for the standard intervention group for waist circumference and diastolic blood pressure. Finally, there were no long-term significant improvements identified for the control group. However, group comparisons revealed there were no significant differences between the intervention conditions. The intervention also recorded self-reported psychological outcomes, which demonstrated variations throughout the intervention period for all groups. The potential reasons for these inconsistent outcomes are discussed. A process evaluation following the intervention demonstrated employees valued the health screenings and identified issues relating to knowledge, behaviour change and health implications that were important outputs of the intervention.

Based on these findings, the research concludes there is scope to make physical activity interventions in the workplace more effective by applying the stage of change approach. Using the process of simplifying the stages and focusing on whether employees want to change their behaviours or not allows occupational health to deliver information that could be more meaningful and have a significant impact on behaviour change. By understanding employees' readiness to change their activity behaviours and targeting information based on their beliefs, attitudes and intentions to change may produce significant improvements in health outcome measures compared to standard information. The results also suggest there is potential for this type of tailored intervention to be extended to other occupational health issues.

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Publications and presentations

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List of abbreviations

ACSM: American College of Sports Medicine
BHF: British Heart Foundation
BHFNC: British Health Foundation National Centre for Physical Activity and Health
BMI: Body mass index
BMR: Basal metabolic rate
CIPD: Chartered Institute of Personnel and Development
CDC: US Center for Disease Control and Prevention
DBP: Diastolic blood pressure
GHQ: General Health Questionnaire-12
GP: General Practitioner
HR: Resting heart rate
ITQ: Intention to quit
IPAQ: International Physical Activity Questionnaire
IQR: Interquartile range
JM: Job motivation
JS: Job satisfaction
Kcals: Kilocalories
MET: Metabolic equivalent intensity level
NDA: New Dynamics of Ageing Programme
NEAT: Non-exercise activity thermogenesis
NHS: UK National Health Service
NICE: National Institute for Health and Clinical Excellence
NIDDM: Non-insulin dependent diabetes mellitus
OC: Organisational commitment
OH: Occupational health
OPAQ: Occupational Physical Activity Questionnaire
PA: Physical activity
RSA: Royal Society for the encouragement of Arts, Manufactures and Commerce
SBP: Systolic blood pressure
SD: Standard deviation
TV: Television
WAI: Work Ability Index
WC: Waist circumference

Chapter 1

Introduction

1.1 The problem of physical inactivity

The World Health Organization (2009) states physical inactivity is the fourth leading risk factor for premature mortality. It is estimated the direct cost of physical inactivity to the UK National Health Service (NHS) is £1.06 billion a year and a third of all deaths in the UK could be reduced by increasing physical activity levels (Allender, Foster, Scarborough, & Rayner, 2007). There is a wealth of evidence about the specific health benefits of physical activity, reporting it as one of the most effective modifiable behaviours that can lead to a multitude of health benefits (Warburton, Nicol, & Bredin, 2006). Increases in physical activity have been associated with protection and reduced risk against various chronic illnesses including: cardiovascular disease (Khaw et al., 2006); coronary heart disease (Hu, Tuomilehto, Borodulin, & Jousilahti, 2007; Katzmarzyk & Janssen, 2004); stroke (Lee, Folsom, & Blair, 2003); hypertension (Whelton, Chin, Xin, & He, 2002); cancer (Friedenreich & Orenstein, 2002; Thune, Brenn, Lund, & Gaard, 1997); obesity (Jakicic, 2002; Nemet et al., 2005); diabetes (Hu, Li, Colditz, Willett, & Manson, 2003a; Warburton et al., 2006); and osteoporosis (Khaw et al., 2006; Robling, Castillo, & Turner, 2006). Research has also demonstrated the benefits of physical activity on psychological wellbeing (Craft & Landers, 1998; Leith & Taylor, 1990).

It is estimated that from 1997 to 2008 in the UK, the proportion of adults meeting the physical activity guidelines increased from 32% to 39% for males and from 21% to 29% for females (NHS Information Centre Lifestyles Statistics, 2012a). Despite these increases, the majority of adults do not meet the physical activity guidelines. One of the biggest changes affecting our overall daily physical activity accumulation is occupational based physical activity (Stamatakis, Ekelund, & Wareham, 2007). Large numbers of people in the Western world are now employed in desk based sedentary occupations rather than manual job roles that involve higher levels of physical activity. Since most adults spend more than half of their waking hours at work, work sites have the potential to be a key setting for health promotion activities (Kerr, Eves, & Carroll, 2001a).

Cognitions and behaviours are key causal factors behind many of today's most widespread health problems and illnesses. The transtheoretical model (or stages of change model) has been highlighted as having intuitive appeal because it considers the dynamic nature of attitudes and behaviour change (Haslam & Haslam, 2000). This model recognises that individual differences will affect health related behaviour, and recommends any associated health promotion information should be tailored according to the persons needs (Whysall, Haslam, & Haslam, 2005). The stage of change model has been applied to various physical activity interventions successfully (Kirk, Mutrie, Macintyre, & Fisher, 2004; Kirk, Mutrie, MacIntyre, & Fisher, 2003; Marcus, Simkin, Rossi, & Pinto, 1996; Marcus & Simkin, 1993; Titze, Martin, Seiler, Stronegger, & Marti, 2001). Therefore, there may be potential for occupational health interventions to be modified to include stage-matched approaches to promote physical activity in the workplace.

1.2 Research aims and objectives

The principal aim of this research was to develop physical activity promotion materials based on the stage of change constructs from the transtheoretical model, with a view to implementing, testing and evaluating the effectiveness of these materials in a workplace intervention. Therefore, this research aimed to examine whether tailoring information according to employees' stage of change in relation to physical activity can improve the effectiveness of occupational health interventions. In addition to this aim, additional research was undertaken to explore the occupational health practices and experiences of relevant organisational stakeholders (e.g. occupational health advisors, employees, line managers, etc.) to understand the barriers and facilitators to implementing workplace physical activity interventions. These studies subsequently informed other research phases, including the development of the intervention. Specifically, the main research objectives were to:

- Investigate physical activity levels and sitting time prevalence in a sample of the UK workforce
- Explore the views and opinions of relevant organisational stakeholders and employees in relation to the occupational health service, and the barriers and facilitators to workplace health interventions
- Develop a tailored approach using the stage of change constructs from the transtheoretical model to deliver physical activity information to employees
- Implement a twelve month activity intervention to investigate the impact of the tailored information, and evaluate whether interventions can be made more effective using the stage of change approach
- Conduct a qualitative process evaluation with employees who participated in the intervention

1.3 Research methodology

Development of the research process was iterative and informed by the literature and the outputs from different research stages throughout the investigation. A mixed methods approach was adopted in order to address the research aims and objectives. Mixing methods can be advantageous because it provides the investigator an opportunity to explore the different macro and micro levels of the same phenomenon (Brannen, 1992). The use of both qualitative and quantitative methods allows the potential for more detailed understanding compared to when either approach is used in isolation (Creswell & Plano-Clark, 2007). Both qualitative and quantitative paradigms can be compatible because they share the tenets of theory-ladenness of facts, fallibility of knowledge, indetermination of theory by fact and a value ladened enquiry process (Sale, Lohfeld, & Brazil, 2002). Triangulation is a term that is often used in mixed methods social sciences research, which takes advantage of using a range of methodologies, datasets, investigators or theories to develop an accurate representation of the phenomenon under investigation and improve interpretation of the results (Denzin, 2009). A researcher can use the strengths of one method to enhance the weaknesses of another method thus reducing potential threats to validity and reliability.

Haase and Myers (1988) state both qualitative and quantitative methods share the goal of understanding the world in which we live. This goal of understanding psychological, behavioural and social sciences includes examining holistic phenomena (e.g. intentions, experiences, attitudes, culture, etc.) as well as the more reductive phenomena (e.g. biochemical systems, nerve cells, molecules, physiological responses, etc.) (Johnson & Onwuegbuzie, 2004). Therefore, there is scope for mixing quantitative and qualitative methods without blurring their philosophical positions if the methods investigate different perspectives of phenomena but contribute to the universal aim of the research. Consequently, a combination of quantitative and qualitative approaches were considered appropriate because they facilitated a greater understanding during the exploration, development, implementation and evaluation phases of this research. Furthermore, the mixed methods approach allowed findings from one method to inform subsequent phases of the research, extending the range, breadth and depth of the investigation.

1.4 Context of this research

The data presented in this thesis were collected as part of a larger research project called Working Late, conducted within the Work and Health Research Centre, Loughborough University. It is important to outline the context of the Working Late research for the reader because at various stages throughout this thesis, there are additional components or sections of data that were collected specifically for the Working Late project. The scope and contents of this thesis are outlined in Section 1.6, where each chapter is briefly described.

Working Late is a collaborative research project addressing practice and policy issues associated with later life working. The project is funded by the New Dynamics of Ageing (NDA) Programme, an eight-year multidisciplinary research initiative with the aim of improving the quality of life of older people. The NDA programme is a collaboration between five UK research councils: Economic and Social Research Council; Engineering and Physical Sciences Research Council; Biotechnology and Biological Sciences Research Council; Medical Research Council; Arts and Humanities Research Council. The focus of the Working Late research project is to develop and evaluate interventions and design solutions to promote health and quality of working life. The Working Late project addresses three key areas:

- The employment context – understanding the social and economic drivers of workforce participation and the new dynamics of older workforce membership
- The occupational health context – identifying, developing and evaluating interventions to maintain and promote the health of an ageing workforce
- The work environment context – focusing on the journey to work and optimal design of jobs, work space, tools and technologies to support older workers

The research described in this thesis were components of the occupational health context, but the methods and results throughout the various research phases have been described and analysed with a focus on the aims and objectives described in Section 1.2. Further information about the Working Late research project can be found on the dedicated project website *(www.workinglate.org)*.

1.5 Ethical approval

The research was conducted in compliance with the requirements of the Loughborough University's Ethical Advisory Committee. Ethical clearance checklists were completed and separate submissions were made for the exploratory investigations (questionnaire, interviews and focus groups) and the physical activity intervention. Full ethical approval was granted by the Ethical Advisory Committee prior to conducting any data collection. Guidance was also provided to put in place procedures that dealt with the possibility of discovering abnormal readings (e.g. high blood pressure, irregular resting heart rate, etc.) that could potentially be identified during the data collection process for the intervention study.

1.6 Thesis structure

The research documented in this thesis is presented over nine chapters and a schematic overview of the thesis structure is displayed in Figure 1.1. Following this introductory chapter, Chapter 2 provides a review of the key literature related to physical activity, sedentary behaviour and behaviour change theories. This review is necessary as it describes the health benefits of regular physical activity and research related to sedentary behaviour. Furthermore, physical activity focused workplace initiatives are also discussed, which is important as this research is presented in the context of developing occupational health interventions. Health related psychological models of behaviour change are introduced and their potential applications to workplace activity interventions are described.

Chapters 3 to 8 describe six individual research investigations that were conducted, including the methodology, results and the implications from each study. Chapter 3 presents results from a quantitative phase, where a questionnaire was designed to explore employee experiences of occupational health services, health initiatives in the workplace and self-reported physical activity and sedentary behaviours. Chapters 4 and 5 present a qualitative phase in the development of the intervention components. Chapter 4 details feedback from interviews with occupational health professionals and organisational stakeholders about the barriers and facilitators to delivering health interventions in the workplace. Chapter 5 extends the findings from Chapter 4 to understand health interventions from an employee perspective using focus group discussions.

Chapter 6 describes a content analysis of existing physical activity promotion materials, and the development of new intervention leaflets designed with a focus on delivering tailored information to employees based on their stage of change in relation to physical activity. This chapter also describes the development of a twelve month intervention designed to increase physical activity. Chapter 7 presents results from a quasi-experimental research study investigating the impact of the longitudinal intervention and associated materials described in Chapter 6 on employees, using several physiological and self-reported psychological outcome measures. Chapter 8 reports findings from a qualitative process evaluation, conducted using individual interviews to investigate employee experiences of participating in the physical activity intervention. Finally, Chapter nine discusses the results and potential implications of these research studies, including contribution to the knowledge explored in the literature and recommendations for the development of future research.

Chapter 1
Introduction

Chapter 2
Literature review

Chapter 3
Exploring employee activity and occupational health experiences
Employee questionnaire (n=1141)

Chapter 4
Identification of current occupational health strategies
32 x semi-structured interviews and 2 x focus groups with key occupational health stakeholders (n=55)

Chapter 5
Employee experiences of health interventions
6 x semi-structured focus groups with employees (n=49)

Chapter 6
Developing an occupational physical activity intervention
Content analysis of workplace physical activity promotion materials to develop standard and tailored intervention leaflets and an intervention schedule

Chapter 7
Interventions to maintain and promote employee health and wellbeing
Twelve month longitudinal physical activity intervention implemented in 10 work sites allocated to either staged (information tailored to stage of change), standard (general information) or control (no information) conditions

Chapter 8
Qualitative process evaluation of employee experiences
Post-intervention interviews with participants (n=56)

Chapter 9
Discussion

Figure 1.1: Structure of the thesis chapters.

Chapter 2

Literature review

2.1 Introduction

This chapter provides an overview of the health related behaviours at issue in this research; physical activity and sedentary behaviour. Although the focus of this thesis was based on developing, implementing and evaluating approaches to improve physical activity interventions in the workplace, it is important to understand this in the framework of previous research that has examined physical activity. This chapter will define physical activity, describe the recommended guidelines and discuss the impact of activity and sedentary behaviours on health related outcomes. Occupational physical activity is also discussed, including previous intervention research promoting activity in the workplace. Behaviour change theories provide an important component to aid us in understanding the potential motivators of an individual's behaviour. Therefore, a number of behaviour change theories are described to understand how these theories can be used in the design of future health interventions in the workplace.

2.2 Physical activity

2.2.1 Physical activity definitions

Physical activity, physical fitness and exercise are terms that are often used interchangeably but actually have very different meanings. The World Health Organization defines physical fitness as the ability to perform muscular work satisfactorily (World Health Organization, 1968). According to this definition, physical fitness can be health related or performance related and is associated with carrying out regular tasks with sufficient energy and without fatigue (Caspersen, Powell, &

Christenson, 1985). Physical activity is defined as any bodily movements produced by the skeletal muscles that results in a substantial increase over resting energy expenditure (Bouchard, Blair, & Haskell, 2007). The energy expenditure can be measured in kilocalories (kcals). Types of activities where one can be physically active include both planned and unplanned movements such as exercise and sports training, leisure-time activity, occupational work, housework and transportation, etc. Therefore, exercise is a subcategory of physical activity and is usually planned, repetitive and structured, with the purpose of improving or maintaining physical fitness (Caspersen et al., 1985).

2.2.2 Physical activity guidelines

There has been a dramatic increase in the rate of obesity in the Western world. This has led to the development of physical activity guidelines for the general public. In 1995, the US Center for Disease Control and Prevention (CDC) and the American College of Sports Medicine (ACSM) published joint physical activity guidelines for the general public. They stated "*every adult should accumulate thirty minutes or more of <u>moderate intensity</u> physical activity on most, preferably all, days of the week*" (Pate et al., 1995; p.404). Similarly, the Chief Medical Officer for England stated individuals should undertake a minimum of thirty minutes of at least <u>moderate intensity</u> physical activity, at least five times per week (UK Department of Health, 2004). Moderate intensity activity has been defined as activity that raises the heart rate and increases the amount of oxygen intake, but at a level where you can still hold a conversation. An example of moderate intensity physical activity is brisk walking (Pate et al., 1995).

In 2007, the ACSM updated and extended the recommendations to state that all healthy adults "*need <u>moderate intensity</u> aerobic (endurance) physical activity for a minimum of thirty minutes on five days each week or <u>vigorous intensity</u> aerobic physical activity for a minimum of twenty minutes on three days each week…combinations of moderate and vigorous intensity physical activity can be performed to meet this recommendation…in addition, every adult should perform activities that maintain or increase muscular strength and endurance a minimum of two days each week*" (Haskell et al., 2007; p.1081). Vigorous intensity activity has been defined as activity that causes rapid breathing and a substantial increase in heart rate, such as jogging (Haskell et al., 2007).

The World Health Organization (2009) states inactivity is one of the top ten causes of death and disability in the world. In the USA, the CDC (2008) estimated that approximately 25% of individuals do not perform any leisure-time physical activity and more than 50% of all adults do not reach adequate levels of physical activity. If 10% of these adults began a regular walking schedule it could potentially save an estimated $5.6 billion in heart disease costs. The NHS Information Centre Lifestyles Statistics (2012a) reports that from 1997 to 2008 in the UK, the proportion of males aged sixteen and over that were meeting the physical activity guidelines increased from 32% to 39% and from 21% to 29% for females. This shows that most adults did not meet the physical activity guidelines. Inactivity is reportedly having a negative impact not only on the health of individuals, but also on the UK economy and the NHS, as large proportions of the population are treated for potentially preventable diseases such as obesity and diabetes. It is estimated the direct cost of physical inactivity to the NHS is £1.06 billion a year and one third of all deaths in the UK could be reduced by increasing physical activity levels (Allender et al., 2007). By the year 2020, the UK government has set targets in England and Wales aiming to increase the level of physical activity/exercise adults engage in so that 70% meet the recommendations (UK Department of Health, 2004). This shows that increasing population physical activity is a leading aim of public health policy (UK Department of Health, 2009).

In June 2011, new physical activity guidelines were published by the Chief Medical Officers for the four home countries of the UK (UK Department of Health, 2011). This report was the first to represent UK-wide guidelines and included recommendations for different age groups, including early years (under five year olds) and older adults (over sixty-five year olds). The recommendations state adults should aim to be active daily and accumulate at least 150 minutes of moderate intensity activity per week. In addition, the guidelines suggest similar benefits can be achieved through seventy-five minutes of vigorous intensity activity per week, or a combination of both moderate and vigorous. The updated recommendations also suggest that adults should undertake physical activity to improve muscle strength on at least two days per week. Moreover, for the first time, the physical activity guidelines recommend that adults should minimise the amount of time spent being sedentary (i.e. sitting) for extended periods.

These new additions to the recommendations provide challenges for health professionals and others to accurately measure whether individuals are meeting these guidelines, because there are no optimum thresholds to aim for and there are several combinations possible. The activity guidelines are comprehensive, but they fail to provide information regarding the optimum levels of muscle strength activities and do not provide examples of the type of activities one should aim to complete. Nevertheless, the guidelines do provide important information about what to aim for and both the Department of Health and the British Heart Foundation National Centre for Physical Activity and Health (BHFNC) are working to ensure the meaningful dissemination of these guidelines (BHFNC, 2011). Furthermore, the guidelines recognise that it may be unfeasible to meet all of the requirements and therefore recommend small increases in physical activity may provide some benefits to both mental and physical function.

Mounting evidence currently suggests that time spent in sedentary behaviours represent a unique aspect of human behaviour independent of physical activity levels (Brown, Williams, Ford, Ball, & Dobson, 2005). In developed countries, adults report prolonged periods of sitting time at work, during leisure-time and for transport (Chau et al., 2010). Sedentary behaviour is not a lack of physical activity, but is a cluster of behaviours where sitting or lying down is the dominant posture and energy expenditure is low. Sedentary behaviours can include a variety of behaviours at work, at home, in transport and during leisure-time (UK Department of Health, 2011). Research has demonstrated that even in physically active individuals, prolonged sitting is associated with an increased risk of premature mortality and high amounts of sitting cannot be compensated for by leisure-time physical activity, even if physical activity levels exceed current guidelines (Katzmarzyk, Church, Craig, & Bouchard, 2009). Therefore, the latest guidelines also recommend individuals should minimise the amount of time spent being sedentary for extended periods.

2.2.3 Physical activity measurement

The classification of physical activity intensity has been attempted by standardising the respective metabolic equivalent intensity level (MET) for particular activities. Ainsworth et al. (2000; 2011) developed a compendium of popular and common activities and listed their respective MET values. One MET has been classified as equivalent to the energy expended during rest. Running at 10.9 mph is classified as 18.0 METs, which means this activity is eighteen times more intensive than at rest. Moderate intensity activities typically have a MET value of 3.0. There are several different methods available for researchers to identify and assess physical activity levels. These measures can compare patterns of behaviours in different populations and also measure the dose-response relationships between physical activity and health outcomes. The measurement selection criterion largely depends on the costs and practicality of using any measurement tool; the most common methods are briefly outlined below.

Basal Metabolic Rate (BMR) is the largest component of total energy expenditure but it can also include diet induced energy expenditure and activity induced energy expenditure (Westerterp, 1999). Direct calorimetry assesses energy expenditure by measuring the heat production of an individual, whereas indirect calorimetry is a measurement of respiratory gas exchange, oxygen consumption and carbon dioxide production (Levine, 2005). Both direct and indirect calorimetry are highly accurate measures with very low error rates. However, although direct calorimetry is no longer as expensive or difficult as it once was (Webb, 1985), the various suits, chambers and rooms are still costly for large epidemiological studies investigating daily physical activity levels. Therefore, calorimetry is more widely used as a criterion measure in which other tools to assess energy expenditure are validated against.

Doubly labelled water has been considered the gold standard of measuring energy expenditure (Schoeller, 1988). This technique measures an individual's carbon dioxide (CO_2) production during the beginning and at the end of the measurement period through body water samples. It involves participants being given a dose of doubly labelled water with stable isotopes of deuterium (^2H) and oxygen 18 (^{18}O). Deuterium is lost in water and ^{18}O is lost in both water and CO_2 during the interval measurement period. The differences between the urinary elimination rates of isotopic hydrogen and oxygen provides a measure of CO_2 production (Levine, 2005). Metabolism can be calculated from oxygen-in/CO_2-out. However, this method does not provide any information on actual physical activity levels or patterns.

The two most common motion sensor devices that aim to measure physical activity levels objectively are accelerometers and pedometers. Accelerometers are small electromechanical devices that measure electrical charges from the distortion of piezoelectric material contained within the casing. Accelerometers provide an objective measure of overall movement and can assess the frequency, duration and intensity of activity (Nichols, Morgan, Sarkin, Sallis, & Calfas, 1999). They have the ability to continuously record data over specified time intervals. However, accelerometers are instruments for measuring dynamic activities, not static activities (such as weight lifting) (Westerterp, 1999). Furthermore, the more reliable and validated accelerometers are expensive as they can cost upwards of £150 per unit. In comparison, pedometers are less expensive devices, with the most reliable and validated ones costing between £15–£45 per unit.

Pedometers are simple and affordable motion sensors (Tudor-Locke & Bassett, 2004) that count the number of steps an individual takes by detecting the motion of the hips. However, like accelerometers, pedometers are limited due to their inability to record movements such as twisting or bending (Smith & Schroeder, 2008) or physical activities such as swimming or cycling (Schneider, Crouter, Lukajic, & Bassett, 2003). Pedometers are useful at measuring increased activity from walking interventions and movements in large population groups (Tudor-Locke, Ainsworth, Thompson, & Matthews, 2002). Pedometers are also useful motivational tools, as research has shown step counts with people knowingly using a pedometer increased significantly compared to when the same individuals were not aware they were wearing a pedometer (i.e. sealed pedometers) (Clemes & Parker, 2009). An intervention has the potential to increase daily physical activity levels in individuals when they are given pedometers and an individualised, specific target to work towards (Glazener, DeVoe, Nelson, & Gotshall, 2004). Therefore, even when considering long-term interventions based around walking, pedometers are potentially excellent tools to use to motivate participants (Bravata et al., 2007).

Self-report measures of physical activity include questionnaires and activity diaries. These methods often involve individuals trying to recall the amount of physical activity they have completed and therefore rely on good and honest information from individuals. Furthermore, self-report measures such as diary logs involve a high level of compliance and effort from participants, in addition to in-depth analyses and data entry, making this method impractical for large-scale studies. Research has shown that individuals tend to underestimate the amount of sedentary behaviours and overestimate the amount of physical activity they do (Klesges, Eck, Mellon, & Fulliton, 1990; Sims, Smith, Duffy, & Hilton, 1999; Taylor et al., 1984).

2.3 Physical activity and health

2.3.1 Early health related associations

The relationship between physical activity and health has been recognised for more than 5,000 years. People function, look and feel better when leading healthy and active lifestyles (Bouchard et al., 1995). Even as early as the fifth century, Greek physicians including Hippocrates prescribed exercise to treat a variety of ailments. He stated that "*eating alone will not keep a man well; he must also take exercise. For food and exercise, while possessing opposite qualities, yet work together to produce health*" (Hippocrates, Regimen in Health; in Adab & Macfarlane, 1998; p.389). During the later part of the nineteenth century, sport became widely practised in society with open parks and recreation areas being developed (MacAuley, 1994). Cricket, rugby and rowing were the earliest sports in the UK to have formal rules and organisation (MacAuley, 1994). The Oxford and Cambridge boat race was first organised in 1829 and research by Morgan (1873) reported that the oarsmen who raced in the first forty years of the boat race increased their life expectancy by over two years. Other research, with 355 men in the US who died and were identified as playing college football during 1901 to 1930, found those men who died with coronary heart disease engaged in less vigorous exercise (Pomeroy & White, 1958). These researchers also reported that no individual who maintained a heavy exercise programme developed coronary heart disease.

The London Bus Study (Morris, Heady, Raffle, Roberts, & Parks, 1953) is one of the most famous research studies that confirmed the link between physical activity and health. The researchers found a 40% reduction in cardiovascular disease risk of London bus conductors compared to the bus drivers. This was attributed to the fact the conductors were on their feet 90% of the time and therefore had higher levels of physical activity than the drivers. Paffenbarger et al. (1986) followed 16,936 men during 1962 and 1978 in the Harvard Alumni Study. The numbers of deaths recorded were 1,413 and any health problems of the participants were also recorded. The results showed that men who expended more than 2,000 kcals per week in physical activity lived on average over two years longer than those who expended less than 500 kcals per week. They also found that for each hour the men were active, they received an additional two hours of life.

Research from the Cooper Clinic Aerobics Centre Longitudinal Study showed that moderately fit people have half the risk of all-cause mortality compared with low fit people. With highly fit participants, mortality risk is nearly 15% lower than moderately fit people (Blair et al., 1996). Lee, Blair and Jackson (1999) followed 21,925 men (aged between thirty and eighty-three years old) over an eight year period. Body composition was assessed at baseline and participants were grouped into one of three groups; lean, normal and obese. Forty-two deaths were recorded and the results showed that in each body composition group, unfit men were more likely to die then their fit peers.

2.3.2 Health benefits of physical activity

We have started to consider that regular exercise and physical activity is an essential part of a healthy lifestyle. From an evolutionary perspective, early homosapiens had physically demanding work as hunter-gatherers. Even up until the industrial revolution, individuals took part in strenuous occupational physical activity as an integral component of their daily lives (US Department of Health and Human Services, 1996). Astrand (1988) stated humans have had the same food/energy intake for centuries of approximately 3,000 kcals per day, but because of modern advances in technology, our levels of exercise, physical activity and overall energy expenditure have reduced leading to an imbalance. Even though leisure-time physical activity has increased over the last two decades and the total daily energy intake has declined slightly (Garriguet, 2004), the proportion of overweight or obese individuals is still increasing because of an imbalance in overall energy expenditure due to reduced occupational physical activity (Probert, Tremblay, & Gorber, 2008). In a study among San Francisco Longshoremen, the mortality rate for high/heavy activity workers was 5.6 (per 10,000 work years), compared to 19.9

for moderately active workers and 15.7 for light workers (Paffenbarger & Hale, 1975). Physical inactivity is an unnatural deviation from the bodies adaptive process and the "*exercise boom is not just a fad; it is a return to natural activity - the kind for which our bodies are engineered and which facilitates the proper function of our biochemistry and physiology*" (Eaton, Shostak, & Konner, 1988; p.168).

Non-communicable diseases are the leading cause of death in the world, responsible for 63% of the fifty-seven million deaths. The majority of these deaths (thirty-six million) have been attributed to chronic diseases such as cardiovascular diseases, diabetes, cancers and chronic respiratory diseases (World Health Organization, 2011). However, there is a wealth of evidence and knowledge about the specific health implications of physical activity and how it is one of the most effective modifiable behaviours which can lead to a multitude of health benefits protecting against various chronic illnesses (Warburton et al., 2006).

2.3.2.1 Cardiovascular disease

Cardiovascular disease is the leading cause of human death in industrial countries (Bouchard et al., 2007). Cardiovascular disease is a dysfunctional condition of the heart, veins and arteries and includes sub-diseases such as coronary heart disease, stroke, hypertension and peripheral vascular disease. Being fit and active has been shown to be associated with reducing the risk of death from cardiovascular disease by as much as 50% (Myers et al., 2004). Even a modest energy expenditure increase of 1,000 kcals per week has been shown to reduce mortality risk by 20% (Myers et al., 2004). Increases in walking by women from as little at one hour per week has been reported to provide protective primary prevention effects against the risks of cardiovascular related death, with the most active women having a relative risk of 0.67 (95% confidence interval=0.52–0.85) compared to the least active (Oguma & Shinoda-Tagawa, 2004). Even as a secondary prevention treatment process, engaging in regular exercise for cardiac rehabilitation can significantly reverse the disease process (Warburton et al., 2006). Low-intensity exercises, which are characterised by using less than 45% of an individual's maximum aerobic fitness, are comparable to high intensity activities for improving cardiorespiratory fitness in survivors of acute myocardial infarction (Blumenthal et al., 1988).

There is a direct relationship between cardiorespiratory fitness, body fat percentage, all-cause and cardiovascular disease mortality. For example, Lee et al. (1999) found unfit men (low cardiorespiratory fitness) in all fat mass categories (lean, normal, obese) had a higher risk of all-cause and cardiovascular disease mortality than fit men. Even unfit lean men had a higher risk of all-cause and cardiovascular disease mortality than men who were fit but obese. This illustrates the health benefits provided by improving fitness through increased physical activity levels. Research in women also reported physical activity to be inversely associated with the risk of cardiovascular events (Manson et al., 2002). In fact, both walking and vigorous exercise showed similar risk reductions. However, this inverse relationship with total physical activity and cardiovascular disease risk in women has yielded inconsistent results, with some research reporting no overall significant associations (Sesso, Paffenbarger, Ha, & Lee, 1999). Instead, these data indicate that walking more than six miles per week may be associated with a 33% decreased risk of cardiovascular disease. Research taking into account both work and leisure-time physical activity reported that men and women who were moderately active had a 20% lower risk of all-cause mortality and cardiovascular disease, and those who were highly active had a 30% lower risk compared to those who were inactive (Khaw et al., 2006).

Coronary heart disease is the UK's biggest killer, with one in every four men and one in every six women dying from the disease (NHS, 2009a). Major risk factors for coronary heart disease include smoking, high cholesterol levels, hypertension and high body mass index (BMI) levels. Coronary heart disease is the narrowing of coronary arteries blocking the supply of blood to the heart muscle causing angina (chest pains) or myocardial infarction (heart attack). The London Bus Study described earlier (Morris et al., 1953) compared occupationally inactive London bus drivers to physically active conductors and reported the former experienced higher rates of coronary heart disease, in particular ischaemic myocardial fibrosis. Even after adjustment for confounding variables, the results showed those in the sedentary job roles had coronary heart disease death rates twice as high than those in more active jobs. Furthermore, physically inactive persons have a 45% greater risk of developing heart disease than their physically active counterparts (Katzmarzyk & Janssen, 2004). Research has demonstrated that even if sedentary individuals perform modest amounts of physical activity (e.g. once a week), they will benefit from reduced risk of developing coronary heart disease (Lee & Skerrett, 2001).

A meta-analysis of twenty-three studies reported that cardiorespiratory fitness and physical activity have significantly different relationships to cardiovascular disease or coronary heart disease risk factors (Williams, 2001). For example, individuals below the twenty-fifth percentile of the fitness distribution are at significantly higher risk than those in a higher fitness percentile. However, even though physical activity can promote physical fitness, inactivity may not be the principal cause for being unfit because fitness can be affected by other factors, such as genetics and heritage (Williams, 2001). Another review of the literature concluded that physical activity is inversely related to the incidence of coronary heart disease, and physically active or aerobically fit individuals have a 25% to 50% lower risk of developing cardiovascular disease compared to sedentary individuals (Powell, Thompson, Caspersen, & Kendrick, 1987; Williams, 2001).

Research has shown that moderate or high levels of occupational or leisure-time physical activity, and daily walking or cycling to and from work are associated with a reduced risk of coronary heart disease among women (Hu et al., 2007). Furthermore, this study also found that moderate or high levels of occupational physical activity, and high levels of leisure-time physical activity were associated with a reduced risk of coronary heart disease among men. In addition, a twelve year longitudinal follow-up study has demonstrated that leisure-time physical activity can have a positive long-term effect on reducing the risk of coronary heart disease among men and women (Sundquist, Qvist, Johansson, & Sundquist, 2005).

The US Railroad Study reported that from a population of middle-aged, white males, those who expended less than 1,000 kcals per week in leisure-time physical activity had a 30% to 40% greater risk of dying from coronary heart disease (Slattery, Jacobs, & Nichaman, 1989). In patients with coronary heart disease, an energy expenditure of 2,200 kcals per week is required to see improvements in reducing arterial plaque, and an energy expenditure of 1,600 kcals per week has been reported to be effective in reducing any further development of heart disease (Hambrecht et al., 1993). Generally, physical activity among patients with coronary heart disease who are not attending cardiac rehabilitation programmes is low (Lear et al., 2003). Although, there are new intervention methodologies being developed which focus on providing tailored information to improve patient participation and motivational messages to increase their physical activity levels (Alsaleh, Blake, & Windle, 2012). Furthermore, a follow-up of the original Whitehall study by Jeremy Morris demonstrated that in addition to coronary heart disease, increases in physical activity offered protection against the risk of mortality from stroke, respiratory disease and cancer of the stomach, bladder and rectum (Batty, Shipley, Kivimaki, Marmot, & Davey Smith, 2010).

A stroke occurs when the blood supply to the brain is disturbed. This is usually caused by a blood clot that has blocked a blood vessel. There are over 300,000 individuals living in the UK with long-term moderate or severe disability due to stroke, which has been labelled as the largest cause of complex adult disability (Adamson, Beswick, & Ebrahim, 2004). An investigation with participants in the Northern Manhattan Stroke Study concluded leisure-time physical activity was related to a decreased occurrence of ischemic stroke in patients, with similar benefits being found for males and females (Sacco et al., 1998). A meta-analysis of the literature showed that moderately active individuals have a 17% reduction in stroke risk and highly active individuals have a 25% reduction in stroke risk when compared to inactive individuals (Lee et al., 2003).

In a randomised, controlled clinical trial with impaired stroke patients who had completed inpatient rehabilitation after stroke onset, an exercise programme to improve strength, balance and endurance (especially with an effected extremity) demonstrated individuals with stroke can make significant gains in function (e.g. upper extremity motor function) beyond that which occurs with usual care (Duncan et al., 1998). However, even though this positive effect in gains has been demonstrated for stroke patients in the short-term, the long-term impact on exercise performance and compliance with intervention guidelines is low (Touillet, Guesdon, Bosser, Beis, & Paysant, 2010). After rehabilitation, many stroke survivors adopt or return to inactive lifestyles which results in cardiovascular deconditioning and the deterioration of motor functions (Löfgren, Nyberg, Mattsson, & Gustafson, 1999). Morris and Williams (2009) state physiotherapists and exercise professionals are best placed to develop and test stroke specific interventions that can be used in clinical practice. Interventions must be improved to educate, motivate and facilitate individuals to be more active, especially after significant life changing and life threatening events such as a stroke.

Hypertension (high blood pressure) is defined as having a sustained blood pressure of 140/90mmHg or above (NHS, 2009b). Blood pressure is dependent on the volume of blood pumped by the heart (cardiac output) and the resistance of the blood vessels. Factors such as body composition, race, age and gender have been associated with the occurrence of hypertension, but physical activity has also been demonstrated to play a beneficial role in the prevention and treatment of high blood pressure (Hagberg & Brown, 1995). A review of fifty-four clinical trials (Whelton et al., 2002) found aerobic exercise reduced blood pressure in overweight and normal weight individuals with normotensive or hypertensive blood pressure. A meta-analysis showed that physically inactive individuals have a 30% greater risk of developing hypertension than physically active individuals (Katzmarzyk & Janssen, 2004). On average, exercise training (at intensities of 40% to 70% of VO_2 max) has shown improvements in over 70% of patients and is reported to reduce systolic and diastolic blood pressure by approximately 11.0–8.0mmHg respectively (Hagberg, Park, & Brown, 2000). Hernelahti et al. (2004) reported that intensity of aerobic exercise during the whole lifetime (including adolescence) was associated with low levels of diastolic blood pressure. Furthermore, the researchers also found that high occupational physical loading (during the previous year) was associated with low levels of systolic blood pressure (Hernelahti et al., 2004).

2.3.2.2 Cancer

Cancer is the second leading cause of death in the US after heart disease (Jemal, Siegel, Xu, & Ward, 2010; Murphy, Xu, & Kochanek, 2012). In the UK, over one in four people die from cancer and it accounts for 30% of all deaths in males and 25% in females (Office for National Statistics, 2012a). The most common cancers for men are prostate, lung and colorectal and for women are breast, lung and colorectal. Physical activity and physical fitness have been shown to decrease the risk of developing cancer, although there are limited definitive mechanisms described and more correlations that associate increased levels of physical activity with lower cancer rates (Lee et al., 2003). Cherry (1922) first reported that men who had physically active job roles experienced lower cancer mortality rates than men engaged in less strenuous job roles. The largest amount of research on cancer has been conducted on the association between physical activity and the risk of developing colon cancer. Friedenreich and Orenstein (2002) reported that active individuals have a 30% lower risk of developing colon cancer. An almost 40% reduction in colon cancer risk was demonstrated among moderately active females compared to inactive females (Thune & Lund, 1996). Other research has suggested that approximately thirty to forty-five minutes per day of moderate intensity physical activity may reduce the risks and lower the rates of colon cancer (Lee, Paffenbarger, & Hsieh, 1991; Martinez et al., 1997).

Breast cancer is the most common cancer in UK females accounting for 31.2% of cancer registrations in 2010 (Office for National Statistics, 2012a). Thune et al. (1997) found lower rates of breast cancer in women who were physically active for at least four hours per week in their leisure-time. Additionally, the researchers also reported the same effect in women with physically active jobs. There is a greater protective effect of physical activity in postmenopausal women against breast cancer than premenopausal women (McTiernan et al., 2003). Therefore, these studies show there is an obvious pattern of reduced breast cancer rates among physically active women (Lee, 2003). Women with inactive job roles have an increased incidence of cancer of the breast, ovary and corpus uteri compared to women with inactive occupations (Zheng et al., 1993). Furthermore, among the most active women, research has also shown activity to have a preventive effect, with up to a 40% reduction in cancer related deaths and recurrence of breast cancer compared to the least active women (Haydon, Macinnis, English, & Giles, 2006).

The research on prostate cancer has not been as consistent as colon or breast cancer. Few studies have provided evidence to support the notion that physical activity is associated with a lower risk of prostate cancer. However, Moore et al. (2009) reported the relationship was apparent specifically in Black men. The majority of evidence does not strongly support any relationship (Pierotti et al., 2005; Zeegers, Dirx, & Van den Brandt, 2005). It is unclear why the findings on prostate cancer have been inconsistent but one plausible reason is because of the discrepancies in the screening process and also the different methods of assessing physical activity (Kruk & Aboul-Enein, 2006). For example, research by Johnsen et al. (2009) found an inverse association between prostate cancer and occupational physical activity, but this association was not replicated with leisure-time activity. Therefore, even though regular physical activity has been shown to be a compelling primary prevention and secondary treatment strategy for colon and breast cancer, further research is required to examine the role of activity in the aetiology and development of other cancers (Warburton et al., 2006).

2.3.2.3 Obesity

There has been a dramatic increase in obesity prevalence over recent years, although data now suggests the trend appears to have plateaued (NHS Information Centre Lifestyles Statistics, 2012a). Obesity is estimated to cost the UK £3.7 billion per year, which includes £4.9 million for treatments, £1.1 billion for treating the consequences of obesity, indirect costs for premature death of £1.1 billion and £1.45 billion for sickness absence (UK Department of Health, 2004). In 2010, figures reported show over a quarter of adults (26%) were classified as obese and up to 32% of females and 42% of males were classified as overweight (NHS Information Centre Lifestyles Statistics, 2012a). Obesity is a leading risk factor for several chronic health conditions and premature mortality. Conditions include type 2 diabetes, coronary heart disease, hypertension, stroke and certain cancers. By 2030, costs to the UK economy associated with the treatment of these diseases are estimated to increase by £2 billion per year (Wang, McPherson, Marsh, Gortmaker, & Brown, 2011). Obesity is excessive fat accumulation due to a chronic energy imbalance (intake is more than expenditure) and is assessed using BMI. Even an imbalance of ten kcals per day has been demonstrated to total a weight gain of half a kilogram (kg) per year in women (Brown et al., 2005). Higher levels of physical activity provide beneficial protective effects at all body fat levels and increased adipose (fat) tissue is related to a higher risk of death regardless of physical activity (Hu et al., 2004). These researchers also predicted that both excess weight and physical inactivity could account for 31% of all premature deaths and 59% of deaths from cardiovascular disease in the US.

Physical activity is required to prevent excess weight gain but it also plays an important role in the treatment strategy for obesity. A review of the research on physical activity as a treatment for overweight and obese children reported that exercise and physical activity is important to improve treatment effects (Epstein & Goldfield, 1999). Nemet et al. (2005) added to this evidence by demonstrating short- and long-term benefits of a combined diet and physical activity intervention. Similarly, Jakicic (2002) reported interventions targeted at increasing physical activity levels are necessary to reduce weight gain in the short-term, but also improve long-term weight loss. Put simply, physically active individuals are less likely to develop obesity than inactive individuals. However, physical activity is still important for obese individuals as a secondary or tertiary treatment as part of a multi-dimensional intervention package including healthy nutrition and diet. This is important because physical activity not only reduces the health risks of obesity but obese individuals who are active have reduced mortality and morbidity rates than normal weight individuals who are inactive (Blair & Brodney, 1999). Previous research has demonstrated the challenges faced with prescribing physical activity as a treatment method against obesity. General Practitioners (GPs) often promote dietary management as a primary choice for treating obesity, whereas physical activity is a second-line therapeutic support treatment (Attalin, Romain, & Avignon, 2012). Research with medical students demonstrated that only 40% knew the physical activity guidelines and 52% felt adequately trained to give physical activity advice (Dunlop & Murray, 2013). This suggests improvements may be required in training health professionals about activity guidelines and the benefits physical activity can bring to prescriptions for treating obesity.

2.3.2.4 Diabetes

The increased rates of obesity and reduced amount of physical activity in Western populations correlate with increased levels of non-insulin dependent diabetes mellitus (NIDDM). NIDDM is also known as type 2 diabetes which is frequently linked to obesity because individuals with a high BMI are at a higher risk of developing diabetes (Manson et al., 1992). The age of onset in individuals is typically after forty years. Researchers examined physical activity levels in 5,990 male alumni of the University of Pennsylvania for the development of type 2 diabetes (Helmrich, Ragland, Leung, & Paffenbarger, 1991). The disease developed in 202 men and the results showed the incidence rates declined as energy expenditure increased. The researchers also found the association remained the same when the data were adjusted for hypertension, obesity and parental history of diabetes. Manson et al. (1991) focused on women and found vigorous levels of physical activity at least once a week can reduce risks by 16%, whilst in another study males showed a reduced risk by up to 29% (Manson et al., 1992). Even a modest increase of 500 kcals in energy expenditure per week was associated with a 6% decrease in the incidence rate of type 2 diabetes (Helmrich et al., 1991). Therefore, this suggests physical activity is a powerful means to prevent or delay the onset of type 2 diabetes.

Long-term lifestyle interventions in high-risk individuals have also shown that weight loss through diet and exercise reduces diabetes incidence risk by almost 60% (CDC Primary Prevention Working Group, 2004). A study by Knowler et al. (2006) compared the effects of diet, physical activity and weight loss with metformin treatment (the most widely used antihyperglycemic drug to manage type 2 diabetes) by assigning participants into 3 groups; 1) placebo (control), 2) metformin and 3) diet and physical activity. The metformin group had reduced diabetes incidence rates by 31% but the diet and exercise group had reduced incidence rates by 58%. Exercise also increases insulin sensitivity in peripheral tissues and physically active people have better profiles of blood insulin and glucose concentrations than inactive people (Ross & Janssen, 2001). Therefore, the physical activity, diet and weight loss group was found to be the most effective intervention to prevent the progression of impaired glucose tolerance to type 2 diabetes. Evidence also suggests that we should not only consider leisure-time physical activity, because moderate or vigorous occupational activity have also been found to be significantly associated with lower risk of diabetes among men and women (Hu et al., 2003b).

Regular physical activity, along with a healthy diet and medication have been recommended for patients with type 2 diabetes because of the beneficial effects on metabolic risk factors for the development of diabetic complications (Pan et al., 1997). Exercise interventions for patients with diabetes are effective because they improve glucose homeostasis (Warburton et al., 2006). A meta-analysis reported exercise interventions showed a clinically significant reduction in glycosylated haemoglobin compared with a non-exercise intervention group (Boulé, Haddad, Kenny, Wells, & Sigal, 2001). In another cohort study, physically inactive men with type 2 diabetes had a 1.7 times increased risk of premature death compared to physically active men with type 2 diabetes (Wei, Gibbons, Kampert, Nichaman, & Blair, 2000). Both aerobic and resistance training have been shown to be of benefit for the control of diabetes. However, resistance training may have greater benefits for glycemic control than aerobic training (Dunstan et al., 2002), although these results have been reported with supervised training interventions and have not been replicated in unsupervised home based training activities (Dunstan et al., 2005). Therefore, further research is required to understand the most effective methods (e.g. aerobic or resistance), frequency and intensity levels of physical activity or exercise to prevent and treat diabetes.

2.3.2.5 Psychological wellbeing

This literature review has documented in detail the benefits physical activity can have in maintaining and improving physical health (Bouchard et al., 1995). There is also sufficient evidence to support the use of exercise in the treatment and prevention of depression, anxiety and stress. In 2000, depression was estimated to be costing the UK economy over £9 billion per year (Thomas & Morris, 2003). Recent estimations have revised this figure to £11 billion per year (Morris, 2011), demonstrating the large increase and growing problem of depression. Depression has been defined as having feelings of extreme sadness, despair or inadequacy that last for a long time (UK Health & Safety Executive, 2010). Mild depression is characterised by a period of frequent episodes of unhappiness (Fox, 1999), whereas clinical depression is long-term and is determined against diagnostic criteria through questionnaires such as the Beck Depression Inventory (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). In the workplace, stress is the adverse reaction people have to excessive pressures or other types of demands placed on them at work (UK Health & Safety Executive, 2010). Since October 2011, stress has been confirmed as the most common cause of work related sickness absence in the UK (CIPD, 2011). Depression and stress are estimated to account for 10.4 million lost working days per year (UK Health & Safety Executive, 2012).

Depression has a greater worldwide disease burden than heart disease or cardiovascular disease (Murray & Lopez, 1997) and in general, people with depression are less physically active than non-depressives (Martinsen, Medhus, & Sandvik, 1985). The evidence supporting physical activity as a preventive and treatment strategy against mental illnesses such as depression is strong, and the magnitude of the effect has been likened to the same as psychotherapeutic interventions (Mutrie, 2000). Research has shown those who become or remain active are less likely to suffer from clinical depression. Paffenbarger, Lee and Leung (1994) reported individuals who engaged in high amounts of physical activity (more than 2,500 kcals per week) were at 28% reduced risk and those who engaged in moderate activity (1,000–2,499 kcals per week) were at 17% reduced risk for becoming depressed, compared to those engaged in low levels of activity (less than 1,000 kcals per week). Furthermore, a meta-analysis on studies that used exercise therapy for clinical depression concluded that individuals who exercised were –0.72 of a standard deviation (SD) less depressed than individuals who did not exercise (Craft & Landers, 1998).

Anxiety disorders have been less frequently studied compared to depression (Ströhle, 2009). Research by Petruzzello, Landers, Hatfield, Kubitz and Salazar (1991) reported that in anxious individuals, exercise training can result in a moderate reduction in anxiety. Furthermore, a review of the literature suggests physical activity has a low-to-moderate anxiety reducing effect and even single exercise sessions will result in reduced levels of state anxiety (Taylor, 2000). One example of this is by Rejeski, Gregg, Thompson, and Berry (1991), who reported that before a public speech, acute exercise on a cycle ergometer at 70% maximum heart rate for forty minutes, followed by thirty minutes of rest, will reduce blood pressure compared to non-exercising controls. Chronic aerobic exercise exerts a significant anti-hypertensive effect in both hypertensive and normotensive persons (Whelton et al., 2002). A qualitative review reported that nearly three quarters (73%) of the studies reviewed discovered reductions in self-reported anxiety, with a period of consistent exercise lasting for over nine weeks providing the best reductions in trait anxiety (Leith & Taylor, 1990).

Physical activity can also have a beneficial effect by improving subjective wellbeing, mood and emotion (Fox, 1999). Research in an adolescent population showed that high intensity aerobic training programmes can act as a buffering mechanism between stress, anxiety and depression (Norris, Carroll, & Cochrane, 1992). A review of the literature by Hamer, Taylor and Steptoe (2006) reported that acute bouts of exercise (moderate to high intensity) attenuate stress related blood pressure responses. This may have significant implications for cardiovascular health because reductions in blood pressure responsiveness could be due to reductions in carotid artery thickness and reduce the risk of acute myocardial infarction (Salonen & Salonen, 1993). Steinberg et al. (1997) also reported that a single session of activity could improve mood and creativity. Increased physical fitness reduces responses to psychological stressors (Hamer et al., 2006). Some studies have shown that exercise activates endorphin secretion; particularly the β endorphin which has been shown to reduce pain and improve mood states (North, McCullagh, & Tran, 1990; Yeung, 1996). Other physiological theories suggest exercise enhances aminergic synaptic transmission of particular monoamines; noradrenaline, dopamine and serotonin (Ransford, 1982).

Self-efficacy theory suggests that confidence is related to one's ability to do the action (Bandura, 1997; Bandura, 1982; Teasdale, 1978). Therefore, successful physical activity and exercise behaviours may provide individuals with a sense of independence, success and a feeling of control that may improve mood, confidence and perceptions of ability. Self-esteem is an important indicator of wellbeing and "*some psychologists would go so far as to say that self-esteem is the core of mental health as it represents our self-rating of overall worth*" (Fox, 1999; p.413). The link between self-esteem and physical activity is weak, with only about 60% of the studies reviewed reporting a positive association (McAuley, 1994). This suggests self-esteem is not easily changed by physical activity and is a more stable construct. Instead, physical activity is said to change individual's perceptions of their physical image and physical self worth in a positive way, which can affect those who have low self-esteem as this positive change can indirectly extend to other positive changes in oneself (Fox, 1999). Furthermore, social affiliation is related to self-esteem and social interaction through sport participation and exercise groups may provide social support for improving self-esteem (Fox, 1999).

Research has shown that vigorous exercise intensity, which requires anaerobic metabolism can have a negative impact on emotional affect and reduce the motivation levels of people participating in intervention programmes (Hall, Ekkekakis, & Petruzzello, 2002). There are no conclusive physical activity recommendations for mental health promotion because different amounts of frequency, intensity and duration will benefit different populations and different mechanisms of wellbeing (Fox, 1999). Most research has focused on the outcomes of aerobic exercise. Therefore, additional research is required to understand the benefits of different forms and frequencies of physical activity on psychological wellbeing.

2.3.2.6 Social benefits

There has been less of a focus on the wider social benefits of physical activity than the individual health benefits, but the influence of social factors, including the social environment, has been recognised as an important determinant in health related behaviours (McNeill, Kreuter, & Subramanian, 2006). There are numerous benefits from the social interaction and support that physical activity can provide through sport and exercise groups (Fox, 1999). The social environment has been defined as the shaping and enforcing of norms, patterns of social control and environmental opportunities, which individuals live in and where behaviour is influenced (Institute of Medicine, 2002). Five modifiable dimensions of the social environment include: social support and networks; socioeconomic status; racial discrimination; social cohesion and social capital; and neighbourhood or environmental factors (McNeill et al., 2006). For example, lower socioeconomic groups have been shown to have a higher risk of being in the lower quartile of leisure-time physical activity (Lindström, Hanson, & Ostergren, 2001). Research has shown that the social environment, such as a neighbourhood green area is found to encourage both social support and physical activity (Fan, Das, & Chen, 2011). Moreover, the social environment reportedly outweighs the role played by the physical environment as determinants of activity or exercise (Giles-Corti & Donovan, 2002). Therefore, the social environment must be considered when attempting to deliver a physical activity intervention.

Psychological theories suggest that exercise simply acts as a diversion from unpleasant stimuli or stressors (Morgan, 1985), and social relationships that are created between exercisers enable support networks that lead to improved affect (Ransford, 1982). Research has demonstrated those with low levels of social support for physical activity were more likely to be inactive (Eyler et al., 1999). Social support can be instrumental, informational, emotional or appraisal based. Instrumental support means practical help is provided (e.g. giving a lift/ride to an exercise class). Informational support is when details about physical activity events or exercise classes are provided to other people. Emotional support is provided when friends discuss how any new exercise programme is progressing. Appraisals provide encouragement or reinforcement whilst taking part in a new activity or sport (Eyler et al., 1999). The attitudes of family, peers and health professionals also influence physical activity habits (Dishman, Sallis, & Orenstein, 1985).

Research by Wallace, Raglin and Jastremski (1995) showed participation and compliance in a physical activity intervention programme was significantly influenced through the support from a spouse or partner. The researchers found lower dropout and higher compliance rates in pairs who were married and reported spousal support plays a bigger influence in physical activity than individual self-motivation (Wallace et al., 1995). Therefore, intervention studies that promote social support and social interactions are likely to be more effective at increasing physical activity levels.

2.3.3 Health risks of physical activity

The numerous benefits that physical activity, exercise and sport participation provide have been discussed in some detail. However, there are also some hazards and risks to physical activity that must be noted, which could possibly negate some of the added benefits (Haskell et al., 2007). As expected, adults who are more active during their leisure-time tend to report more sport and/or activity related injuries than inactive individuals (Haskell et al., 2007). However, inactive individuals are more likely to have higher injury rates during non-sport and non-leisure-time compared to active individuals due to the increased strength, balance and endurance of the more active adults (Hootman et al., 2001). This results in an overall musculoskeletal injury rate that is not much different for both active and inactive adults (Carlson et al., 2006). In terms of running and/or jogging activities, when intensity increases, the risks of musculoskeletal disorders increases among men and women by as much as 55%, even in participants who have lower than average fat percentages and average to above-average cardiorespiratory fitness (Pollock et al., 1977). The risks of cardiac arrest whilst jogging or running in men who do not exercise regularly is over fifty times greater than those who exercise frequently (Siscovick, Weiss, Fletcher, & Lasky, 1984). Research has reported lower rates of injury during walking activities compared to jogging (Colbert, Hootman, & Macera, 2000) and increased walking as a primary mode of physical activity is not associated with any significant increase in risk of injury (Hootman et al., 2001). Therefore, low intensity exercise interventions, such as those based on walking are inclusive and accessible to most people and also provide a low level of risk to participants.

2.4 Sedentary behaviour and health

Technological innovations and economic advances have resulted in the development of many labour saving devices and at the same time appear to have reduced the amount of physical activity we do. There is a common perception that physical activity levels in the population are declining, and one of the biggest changes affecting this is occupational based activity (Stamatakis et al., 2007). Large numbers of people in the Western world are now employed within sedentary occupations in the service sector, rather than manual job roles that involve increased levels of physical activity. The change from a manufacturing industry to service type office work, automation and technological advances have not only contributed to a lack of physical activity, but they have also contributed to a sedentary lifestyle by increasing sitting requirements at work and at home (Sherwood & Jeffery, 2000). Probert et al. (2008) demonstrated that occupational physical activity is associated with reduced risk of developing chronic illnesses independent of leisure-time physical activity levels. Therefore, work related physical activity is an important contributor to daily levels of energy expenditure (Miller & Brown, 2004).

Research using accelerometers to measure physical activity levels objectively has illustrated that on average, adults spend more than half of their waking hours in sedentary activities, 4% to 5% in moderate to vigorous physical activities, and the rest in light intensity activities (e.g. like standing) (Healy et al., 2007). Data from Australian workers have shown that half of their total daily reported sitting time takes place at work (Miller & Brown, 2004). Similar findings have been reported from a small sample of UK workers (Clemes, David, Zhao, Han, & Brown, 2012). Evidence from Dutch workers has shown that individuals who sit for long periods of their working day do not compensate by increasing their physical activity levels during leisure-time (Jans, Proper, & Hildebrandt, 2007). In fact, those who had above average hours of sitting time at work usually reported more time sitting during leisure-time. Therefore, investigating sedentary behaviour and sitting time at work are important factors when considering interventions to increase physical activity (Tudor-Locke, Hatano, Pangrazi, & Kang, 2008). Furthermore, since most adults spend more than half of their waking hours at work, work sites have the potential to be a key setting for health promotion activities (Kerr et al., 2001a).

Sedentary behaviour is rapidly developing into a major public health priority (Craig, Mindell, & Hirani, 2008; UK Department of Health, 2011) as it becomes one of the most popular occupational and leisure-time activities. Sedentary behaviour has been defined as "*any waking behaviour characterised by an energy expenditure of <1.5 METs while in a sitting or reclining posture*" (Sedentary Behaviour Research Network, 2012). The importance of reducing daily activities which involve low metabolic rates such as sitting has previously been reported (Hamilton, Healy, Dunstan, Zderic, & Owen, 2008). Sedentary individuals are characterised by exhibiting high amounts of sitting behaviours, which must be differentiated from insufficiently active individuals, or those who do not meet the recommended physical activity guidelines (Hardy et al., 2012; Sedentary Behaviour Research Network, 2012). Therefore, there have been calls to investigate and explicitly measure sedentary behaviour independently, in addition to physical activity (Owen, Leslie, Salmon, & Fotheringham, 2000).

Increased sitting time has been associated with increased risk of weight gain and obesity, metabolic syndrome, type 2 diabetes, cancer and mortality from all causes and cardiovascular disease (Gierach et al., 2009; Hamilton, Hamilton, & Zderic, 2007; Hu et al., 2003b; Katzmarzyk et al., 2009; Van Uffelen et al., 2010; Wilmot et al., 2012). There is evidence to suggest that increased sedentary behaviour contributes to a number of ill-health conditions and diseases due to a lack of energy expenditure occurring throughout the day. Research by Hamilton et al. (2007) reported that sedentary workers expend 700 kcals per day compared to the 1,400 kcals per day expended by workers who spend large amounts of time standing (e.g. retail sector employees). Hamilton et al. (2007) also discusses the molecular, metabolic and physiological responses to sitting and highlights the lack of measurement of non-exercise activity.

There is growing evidence that total sitting time is more closely related to BMI than total time spent in physical activity behaviours (Helmink, Kremers, Brussel-Visser, & Vries, 2011; Santos et al., 2010). Sitting time has also been shown to be a predictor of weight gain in Australian women, independent of leisure-time activity or even energy (calorific) intake (Brown et al., 2005). This is important because obesity is a leading risk factor for several chronic health conditions and premature mortality. Research by Katzmarzyk et al. (2009) has shown an association between sitting time and risk factors for cardiovascular disease. The researchers also reported that "*high amounts of sitting time cannot be* *compensated for with occasional leisure-time physical activity even if the amount exceeds the current minimum physical activity recommendations*" (Katzmarzyk et al. 2009; p.1003). Therefore, the mechanisms associated with exercise may be different to the mechanisms of sitting. This is potentially a major concern for public health as research now predicts individuals who do not take part in regular exercise may have a significant negative metabolic impact if they also remain sedentary for lengthy periods during the day (Hamilton et al., 2007).

Our understanding of the prevalence of sitting time in UK adults is currently limited to the study of leisure-time screen based sedentary behaviours (Stamatakis, Hamer, & Dunstan, 2011) or to specific occupational groups (Tigbe, Lean, & Granat, 2011). There is currently no single assessment tool that captures every aspect of sedentary behaviour because the measurement of sedentary behaviour has proven to be complicated (Hardy et al., 2012). Sitting behaviours occur in many different situations and are not limited to any single behaviour (Biddle, 2007; Pate, O'Neill, & Lobelo, 2008). Adults typically spend time sitting in the workplace, during leisure-time and for transport (Chau et al., 2010). Previous research has attempted to measure sedentary behaviour by simply assessing television (TV) viewing times, which misrepresent total daily sitting time (Biddle, 2007).

Accelerometers have been used in population surveillance investigations to provide a measure of inactive behaviours (Healy et al., 2007), but they do not distinguish between lying down, sitting and standing still. Therefore, standing still may be incorrectly classified as sedentary behaviour (Clemes et al., 2012). Moreover, accelerometers do not provide investigators with the contexts in which these behaviours occur, such as at work or during transport. It is important to measure all types of sedentary behaviour, across a range of contexts, particularly the workplace, if we are to truly understand patterns and determinants of physical activity and sedentary behaviour in working adults (Clemes et al., 2012).

2.5 Physical activity at work

There are four main domains of physical activity: leisure-time physical activity, active commuting, housework and occupational activity (Armstrong & Bull, 2006). We know that time spent at work represents the largest segment of waking hours for most adults (Church et al., 2011). One of the biggest changes affecting overall daily physical activity levels is occupational based physical activity. Investigations of the US workforce has estimated that in both men and women, occupational related energy expenditure has decreased by more than 100 kcals per day over the past five decades (Church et al., 2011). The researchers estimate that in the 1960s, almost half of private sector job roles required moderate intensity physical activity, whereas now less than 20% demand this level of activity.

We have considered the relationship and associations between leisure-time physical inactivity and a number of ill-health conditions, but we must also consider the amount of activity accumulated during work. Early epidemiological studies found that lower occupational physical activity was also associated with an increased risk of premature mortality from cardiovascular disease (Cassel et al., 1971; Paffenbarger & Hale, 1975). Research evidence shows that not only leisure-time physical activity, but also occupational activity, including active commuting to and from work are associated with lower risks of type 2 diabetes (Hu et al., 2003b). Occupational categories can be used to identify potential target groups for health interventions (Salmon, Owen, Bauman, Schmitz, & Booth, 2000). For example, higher status occupational groups are more likely to have physically inactive job roles (Møller, Kristensen, & Hollnagel, 1991; Slattery et al., 1989), even though leisure-time physical inactivity is highest in those with lower occupational status, income and education (Salmon et al., 2000).

A high level of occupational activity has also been associated with a decreased likelihood of developing obesity, even if levels of leisure-time physical activity are low (King et al., 2001). For individuals who had irregular leisure-time physical activity participation, having a highly active job role reduced the likelihood of being obese by 50% compared to those who were sedentary at work and during their leisure-time (King et al., 2001). Women in low physical activity occupations have been shown to have an increased risk of developing breast, corpus uteri and ovarian cancer (Zheng et al., 1993). The risk of cancer in physically active individuals (both leisure-time and occupationally active) has reportedly been reduced by an average of 50%, and in some cases by up to 70%, when compared to sedentary individuals (Friedenreich & Orenstein, 2002). With regards to colorectal cancer, Thune and Lund (1996) reported a significant decrease in colon cancer risk in males aged over forty-five years old who reported higher levels of occupational physical activity.

Generally, individuals who are active during leisure-time are also active at work, which results in an even higher protective effect (Probert et al., 2008). It is increasingly acknowledged that for populations to be healthier in later life, individuals must adopt positive health related behaviours as early as possible (Ory, Hoffman, Hawkins, Sanner, & Mockenhaupt, 2003; Yancey, Ory, & Davis, 2006). Therefore, health interventions should take a life-course perspective when promoting physical activity. There is strong evidence that shows whilst physical ability to work declines with age, the effects of this decline can be delayed by physical activity. This is because regular physical activity contributes to better balance, coordination, agility and cognitive function, which in turn may help maintain performance at work (Pate et al., 1995; Weuve et al., 2004). The type of physical activity performed is not of primary importance, as the key factor is total energy expenditure (Blair et al. 1992). Some physical activity is better than none and more physical activity provides greater health benefits (UK Department of Health, 2011).

2.6 Occupational interventions

2.6.1 Physical activity interventions

The Office for National Statistics (2012b) state that as of September 2012, the number of people in employment in the UK is 29.56 million. Therefore, large numbers of people can potentially be accessed, targeted and benefit from effective interventions directed at work sites (Prodaniuk, Plotnikoff, Spence, & Wilson, 2004). The workplace is still an important source and contributor of total physical activity for some people, but there are those who spend the whole working day in sedentary tasks without performing any physical activity (Jans et al., 2007). Therefore, managers, occupational health experts and policy makers must realise that "*the health of many millions of humans will benefit from regaining lost opportunities to be physically active within the texture of their daily lives*" (Owen et al., 2000; p.158).

A workplace environment that promotes physical activity and healthy living will also present a positive image of its corporate values to employees and the external community. Research has demonstrated that employees engaged in physical activity initiatives often report greater enjoyment of work, increased concentration and mental alertness, which enhances the health of the organisation (Blake & Lee, 2007). The BHFNC lists direct advantages for employers, which are reduced absenteeism (including long-term absence), workplace injuries, staff turnover and increased productivity, efficiency, staff morale and improved corporate image (BHFNC, 2009). Working for Health (2010) describes real-life success stories. For example, Cadbury-Schweppes implemented an intervention programme that provided health checks, healthy food options, onsite workshops and activity groups (e.g. walking/running clubs, salsa lessons, boxercise, etc). Services were available to all employees (including night-shift workers). After eighteen months, 70% of the workforce had engaged with the programme and results showed a 30% improvement in exercise frequency, 18% improvement in diet and 14% improvement in lifestyle balance.

Even though work sites offer a practical setting for activity interventions, organisational interventions to increase physical activity during work time have yet to demonstrate statistically significant results (Proper, Staal, Hildebrandt, Van der Beek, & Van Mechelen, 2002). These researchers found the "*evidence of an effect was limited for absenteeism, inconclusive for job satisfaction, job stress and employee turnover, and nil for productivity*" (Proper et al., 2002; p.75). Others have commented on the poor scientific quality of the literature in this area (Dishman, Oldenburg, O'Neal, & Shephard, 1998). Marshall (2004) requests researchers to provide detailed intervention strategies that have been extensively evaluated with more complete data sets to enable successful replication. Most of the research the discipline is based on is barely thirty years old and research on sedentary behaviours is still well in its infancy. Therefore, organisational physical activity intervention research is a relatively new and developing area and there is a great deal of opportunity to conduct newly designed innovative and creative research investigations. The following sections will review the available literature on specific physical activity promotion interventions in the workplace.

2.6.2 Incidental interventions

Individuals often find it difficult to regularly meet or exceed the recommended guidelines for physical activity on a daily, or even weekly basis. Incidental activity is a concept that is also known as lifestyle physical activity, and has been defined as any activity built up in small amounts over the day (e.g. walking, gardening, etc.) (Dunn, Andersen, & Jakicic, 1998; McCormack, Giles-Corti, & Milligan, 2003). A lifestyle physical activity intervention is based on daily accumulation of activity which includes all moderate levels of planned or unplanned leisure, occupational and household activities. In order to reliably assess the effects of physical activity, research must measure occupational and household (housework) physical activity levels in addition to any leisure-time activity data collected (Salmon et al., 2000).

Badland and Schofield (2004) reported inactive employees relied on the work site to provide opportunities for physical activity compared to active individuals who undertook activity by engagement in sport and exercise in their leisure-time. Therefore, employees in sedentary job roles may benefit from interventions promoting opportunities for lifestyle and incidental physical activities. In office workers, a six month convenience programme focused on behaviour change through counselling sessions and email contact showed significant improvements in lipoprotein cholesterol and alanine aminotransferase levels compared to a control group (Egawa et al., 2006). A diverse workplace lifestyle intervention programme offering information (e.g. suggestions of how to increase physical activity, local sports facilities, lectures on nutrition, etc.), opportunities for active commuting and incidental activity, exercise sessions and physical activity counselling encouraged participants to be more active during work and leisure-time (Titze et al., 2001). Therefore, working environments may be able to provide an opportunity to promote habitual or incidental activity (Badland & Schofield, 2004).

Encouraging activity at work may offer individuals opportunities to be more physically active during their normal day-to-day job role. Strategies to increase the opportunities for incidental physical activity at work that have been suggested include walking to meetings, parking further away from the work site and using stairs rather than elevators

(Croteau, 2004). Incidental and lifestyle activity interventions may also yield higher participation, completion and success rates compared to vigorous intensity activity programmes that require a high level of commitment from employees. Sherwood and Jeffery (2000) report there is an accumulating body of evidence to support the notion that interventions which promote incidental physical activity are effective at increasing activity levels in inactive populations. Moreover, lifestyle interventions delivered at work by email, telephone and technologies such as the Internet provides opportunities to reach significantly large numbers of people (Dunn et al., 1998).

2.6.3 Walking interventions

Walking is one of the most popular types of activity in the UK (NHS Information Centre Lifestyles Statistics, 2012b; UK Department of Health, 2004). Morris and Hardman (1997) describe walking as near perfect exercise and even healthy but inactive individuals who take up a programme of regular walking will experience beneficial health effects for several known risk factors of cardiovascular disease (Murphy, Nevill, Murtagh, & Holder, 2007). As a value, 10,000 steps is often recommended as a reasonable level of walking activity, although it is estimated that the average number of steps achieved during normal activities is between 6,000 to 8,000 steps per day (Tudor-Locke et al., 2011). Researchers estimate a thirty minute brisk walk would add approximately 3,000 to 3,500 steps, therefore the target of 10,000 steps could be achieved (Tudor-Locke & Bassett, 2004; Tudor-Locke et al., 2008; 2011). A workplace intervention based on walking is cheap, sustainable, has a low risk of injury and requires no training, special equipment or clothing.

Puig-Ribera at al. (2008) conducted a nine-week randomised control intervention trial, which consisted of walking route maps and walking while working information. They found employees in the intervention groups who were classed as sedentary and low active showed significant increases in steps counts (mean increase of 659 steps per day) and they had consistently greater improvements in quality of life than the moderate and active groups. A similar study investigated white collar employees and additionally recorded sitting times (Gilson et al., 2009). The study reported step counts significantly increased, in particular for the walking route group on average by 968 steps per day and for the incidental (at work) walking group by 699 steps per day. However, there were no significant differences for sitting time even though average sitting time values for both groups reduced compared to the controls.

Walking studies did not originally consider non-leisure activities (such as transportation, occupation and household work) (Bates et al., 2005), but researchers have now started to assess, evaluate and attempt to change the amount of walking one does for both leisure and non-leisure activities. Researchers have used pedometers to calculate total daily step counts and the following studies have used pedometers as either motivational or monitoring tools. Chan, Ryan and Tudor-Locke (2004) implemented a pedometer based behavioural physical activity intervention (Prince Edward Island First Step Programme), with sedentary workers using a sealed pedometer so that employees could not view step counts. The study aimed to provide participants with training (e.g. how to become more active, how to initiate behaviours and strategies for overcoming relapse, etc.) and let them set their own goals. They found participants increased their steps taken per day from 7,029±3,100 steps per day (baseline) to 10,480±3,224 steps per day by 3.96±3.28 weeks of the intervention. Other benefits found were significantly decreased waist circumference and reduced resting heart rate.

Thomas and Williams (2006) conducted a four-week intervention programme with staff from the former Department of Human Services in South Australia (n=1,195). They encouraged participants to try and meet the recommendations of 10,000 steps per day. During the intervention, participants wore pedometers and were given a step log diary with information about the programme and tips on how to increase step counts. They were also sent regular emails to provide additional support. Results showed 70% of the participants increased their levels of walking. More encouraging was the three month follow-up results which showed the majority of participants included family members in their walking. This illustrates how workplace interventions can actually cause a change in an individual that may affect the wider population. After all, shifts in populations are made up of small changes performed by individuals (Rose, 1992).

Research by Murphy, Murtagh, Boreham, Hare and Nevill (2006) reported a progressive walking programme (for two days per week) influenced employees to take significantly more steps on the days the prescribed walking was performed compared to rest days. The two-day per week programme showed significant beneficial health effects as participants' systolic blood pressure and body fat levels reduced. Haines et al. (2007) administered a twelve-week computer based educational programme based on physical activity and wellness. Daily pedometer readings were logged and weekly emails provided participants with information consisting of walking and wellness tips. A personal walking programme was created based on baseline pedometer readings. Step counts increased by 27% and mean BMI decreased from 29.06 to 28.76 kg/m^2. The researchers reported that a personal programme of activity should include goal setting, which is important to the success of any pedometer based walking intervention (Haines et al., 2007). A quantitative review of the pedometer literature by Bravata et al. (2007) reported intervention programmes that did not provide participants with a step goal had no significant improvements in their activity levels. Participants who were given a goal and were able to record their step counts using a diary increased their activity by an average of 2,000 steps per day.

The majority of pedometer intervention programmes in the workplace that have been successful are short-term and whether these changes can be long lasting is undetermined because in-depth long-term follow-up research is not as convincing. A systematic review of walking interventions using pedometers with a three month follow-up period reported significant increases in total step counts of participants, but longer-term follow-ups (six to twelve months) showed no sustained changes (Ogilvie et al., 2007). Even after a successful eight week intervention using pedometers and additional support strategies, employee step counts returned back to baseline levels after the support strategies in the organisations were withdrawn, even if the pedometers were kept (Gilson, Burton, & Brown, 2010). Therefore, we must be careful when interpreting the results from short-term intervention studies. Nevertheless, the studies demonstrate using a pedometer in a workplace physical activity intervention can be a useful motivator to encourage increasing daily walking levels, especially when participants are also provided with an individualised goal to work towards (Glazener et al., 2004).

2.6.4 Stair climbing interventions

In laboratory studies, stair climbing has been shown to require 8.6 times more energy expenditure (METs) than resting MET rate (Bassett et al., 1997), whilst in the field it has shown to have a higher rate of 9.6 METs (Teh & Aziz, 2002). Therefore, stair climbing uses more calories per minute than jogging, which has a MET value of 7.0 (Ainsworth et al., 2000; 2011). Stair climbing also uses three times more energy expenditure than stair descent, which is equivalent to that of walking. Regular stair use can have important implications for health by improving cardiovascular fitness (Boreham et al., 2005), reducing cholesterol levels (Boreham, Wallace, & Nevill, 2000) and contributing to weight control (Eves, Webb, & Mutrie, 2006). Any intensity of physical activity will usually have beneficial health effects, although increasing the intensity is always a good goal to continue improving health (Kokkinos, 2012). Like walking, an intervention to promote stair climbing is sustainable and requires no training and no special equipment or clothing. Since stair use opportunities are frequently available and do not involve any associated costs, it is a simple yet effective strategy for employers to encourage as part of a lifestyle and occupational health intervention (Kerr, Eves, & Carroll, 2001b).

The success of most stair climbing interventions has been assessed by observational research methods by evaluating the usefulness of point-of-choice environmental prompts. It is well established that poster prompts at the point-of-choice (between lifts, escalators and stairs) can increase stair use significantly (Russell, Dzewaltowski, & Ryan, 1999). However, results for posters encouraging stair use in the workplace have not been entirely convincing. Interventions in the workplace using point-of-choice prompts that emphasise the benefits of stair use include colourful signs at the lifts (Blamey, Mutrie, & Tom, 1995) with footprints leading to the stairs (Marshall, Bauman, Patch, Wilson, & Chen, 2002), using follow-up emails (Auweele, Boen, Schapendonk, & Dornez, 2005), additional artwork (Boutelle, Jeffery, Murray, & Schmitz, 2001) or music (Kerr, Yore, Ham, & Dietz, 2004), all of which have shown inconsistent results (Eves et al., 2006).

Environmental prompts initially increase stair use, but this change is short lived and the healthy behaviour is not sustained, therefore messages need to be more effective (Marshall et al., 2002). There is little hard evidence of successful increases in stair climbing or long-term follow-up studies to see if any sustained changes have actually been made successfully. Kerr et al. (2001a) found posters to be an effective means of increasing short-term stair use by up to 7.6% in public places, but in workplaces they were found to be ineffective (Kerr et al., 2001b). However, point-of-choice prompts have shown some positive results in occupational settings with blue and white collar workers (Kwak, Kremers, Van Baak, & Brug, 2007). In the workplace, stair use is affected by the availability of an elevator and the occupancy numbers in the building. If demand for the elevator is high, this will increase stair use in employees (Olander & Eves, 2011). However, only sustained activity over a long-term period is likely to benefit health. Furthermore, Kerr et al. (2001b) states employees are only willing to climb a maximum of four flights of stairs, which must be taken into consideration when implementing a stair climbing intervention in a workplace environment with several floors.

2.6.5 Active commuting interventions

Physical activity can also be implemented into daily routines if employees consider commuting methods to and from work. Active commuting is when employees substitute their daily mode of transport to and from work in a car by walking, cycling or using public transport (which often includes walking to and from bus stops or train stations). In a randomised controlled trial, Oja, Vuori and Paronen (1998) found walking and cycling for a thirty-minute commute (one-way) improved aerobic fitness, increased the use of fats as an energy source, decreased cardiovascular strain in standard work and caused slightly favourable changes in high density lipoprotein (HDL) blood cholesterol. In an intervention promoting active transport, Oja et al. (1998) provided information on the benefits of walking and cycling to employees and found physical activity had increased. Cycling was more effective than walking because it could be performed at a higher intensity, but walking was still successful. However, they did not have a control group so the impact of the change cannot be verified (Wen, Orr, Bindon, & Rissel, 2005).

Mutrie et al. (2002) evaluated the effectiveness of a randomised control trial. The intervention, labelled "Walk in to Work Out" provided walking and cycling information packs including a booklet with practical information, activity diaries, workplace maps and reflective safety accessories. The booklet of interactive information materials were individualised to the workplace and provided educational and practical information based on the transtheoretical model of behaviour change. After six months, the results showed a significant increase in the number of workers who walked to work. They suggested that the intervention group were twice as likely to increase walking to work as the control group. The number of people who increased cycling remained unaffected.

Wen et al. (2005) conducted a twelve month pilot intervention with Australian health service employees. The intervention provided group and individualised marketing campaigns (e.g. posters, newsletters, fridge magnets, promotional events, etc.) to raise the awareness of active transport and address possible barriers. The number of participants who drove to work five days a week reduced and participants also reduced car usage on weekends. Attitudes to active transport shifted to be more positive and understanding of the intervention was high among participants. However, Wen et al. (2005) did not directly measure employee activity levels. They measured attitudes to transport, knowledge of options and modes of transport. Therefore, it is less clear whether people actually became more active as a result of these changes, or whether their opinions changed to favour more active travel methods.

Oja et al. (1998) found factors important to influencing change in style of commute were desire for fresh air, short distance to work, cost and convenience (e.g. quality of transport connections). Conversely, factors hindering walking or cycling to work were bad weather conditions, lack of interest, lack of time and distance of commute. Promoting activity in commuting to work has the potential to improve health and fitness by relatively low cost measures, but there are many issues to overcome and not all employees will be willing or able to change their commuting style. Inactive individuals are the least likely to adopt active commuting methods (Merom, Miller, Van der Ploeg, & Bauman, 2008). It may not be practical for some employees because they do not live an active commutable distance and therefore will need to use a car. In these instances, public transport options could be promoted so that employees can add a walk or cycle to and from the bus stop or train station.

2.6.6 Alternative methods to exercise at work

Expecting employees to commute to work or use the stairs more regularly places the responsibility of activity entirely upon them. However, organisations may be able to actively assist and encourage employees to increase their physical activity levels. For example, employers could install fitness centres at work sites (Physical Activity & Health Alliance, 2007). Many large employers have taken the opportunity to provide onsite fitness facilities for their employees (Health at Work, 2007). Such facilities include cardiovascular and resistance equipment, or even group classes like those found in health clubs (e.g. zumba, aerobics, pilates, etc.). Smaller employers may not be able to afford, have the space or justify providing onsite facilities, but they can also contribute to subsidised corporate membership of local gym facilities. A cheaper method to promote activity is for employers to provide quality information (e.g. maps of walking routes, advice booklets, local walking clubs, etc.) on activities to do at break times (Health at Work, 2007). However, to promote physical activity during work times, employers will need to provide flexible working hours to allow successful participation. A review of ten studies has reported flexible working conditions can have positive effects on employee health and wellbeing (Joyce, Pabayo, Critchley, & Bambra, 2010).

Levine (2007) focuses on non-exercise activity thermogenesis (NEAT), which is energy expenditure of everyday activities. NEAT can vary between individuals because daily expenditures and activities vary. One way to enhance NEAT is by attempting to re-engineer computer based environments that employees currently work in. Levine and Miller (2007) found that by using a vertical workstation designed to slide over treadmills, users could stand and work or walk and work. This study reported that if an obese office worker replaced two to three hours of sitting a day by using the treadmill workstation, it could promote a weight loss of more than twenty kilograms a year. These results show that exercise whilst working can be an effective intervention to lose weight, keep fit and promote health (Kemp, 2000). However, this study did not find empirical evidence for weight loss, it was a short-term study and the weight loss figures were calculated based on energy expenditure. Physical activity and energy expenditure cannot be easily inferred from one another because they are not the same thing (Tudor-Locke et al., 2002). Furthermore, disadvantages of using the treadmill in an office are that it is impractical, noisy and costly; the workstation alone costs £1,000.

McAlpine et al. (2007) has promoted the use of a stepping device that could also be used at work. The gains estimated are similar to that of the vertical workstation. The stepping device is a standard device so it is inexpensive to purchase (under £20), near silent when in use and can be easily stored under a desk. However, the stepping device has been designed for use whilst standing up, so we must be careful when encouraging use for this device whilst sitting at a desk because it could result in other musculoskeletal problems. Therefore, in order for the stepping device to be used by employees whilst working, employees may need costly height-adjustable desks. In reality, this device would only be used when employees were on a break or in a meeting, the latter of which could make them look unprofessional unless all attendees are participating, or this type of physical activity is embedded within the culture of the organisation.

To add to the walking-at-work and stepping-at-work devices, research has also investigated the feasibility of a desk based pedalling device (cycle workstations) (Carr, Walaska, & Marcus, 2012). The researchers concluded that introducing pedal machines into the work environment could be an effective method to reduce sedentary time at work. They reported employees used the machine every day at a level that could potentially result in health benefits. There was no specific assessment of energy expenditure, but the concept of the desk based pedal machine works on the same principle that physical activity whilst working can be increased. Decisions about whether these options are realistic, practical and beneficial, or whether they should be used in combination with the other type of interventions discussed above depends on the organisation type, strategy, commitment of management, but ultimately the resources and budget for health promotion activities.

2.6.7 Strategies for promoting activity in the workplace

The previous section has discussed different methods employees can use to get active at work and how employers can facilitate physical activity by providing equipment, encouraging use of stairs and a more active commute to work. However, these provisions for activity will mean nothing if employers do not promote the benefits and effectively communicate to employees the activities they can participate in. Workplace physical activity programmes often fail to engage the groups who need it most and tend to attract staff who are motivated or already sufficiently active (Conrad, 1987). Wong, Koh and Lee (1998) found that a needs assessment prior to planning any intervention programme can provide valuable information in the design of a workplace intervention because physical activity preferences may vary. For example, older men and women often opt for walking, young men prefer jogging and young women enjoy aerobics (Booth, Bauman, Owen, & Gore, 2006). Management or occupational health departments may be able to use surveys or focus groups to identify workers' needs so that interventions can be tailored dependent on age, gender, fitness, etc. Moreover, inactivity is highly prevalent amongst married workers so employers may need to organise programmes that are family-friendly (Wong et al., 1998). This type of consideration could produce multi-dimensional programmes and target diverse groups of employees. With more effective intervention programmes, more employees' will be encouraged to become active (Titze et al., 2001) and enjoyment will increase commitment, leading to sustained long-term changes in activity related behaviours.

Onsite employee health checks are excellent methods of providing workers with information on healthier lifestyles. Free health checks can also be used to identify potential problems by assessing blood pressure, BMI, physical activity levels, etc. Therefore, promotion for physical activity can begin at these events and employees can gain information on methods to become active. The British Heart Foundation (BHF) has provided case studies on their "Think Fit – Activity @ Work" website (BHF, 2007). One example of a successful health check event was by the Government Office for East Midlands Active group, who identified a number of staff having either high blood pressure or high cholesterol levels following three health check events. This resulted in the organisation referring these employees to their GP, who were able to provide help and advice to reduce blood pressure and cholesterol levels immediately (BHF, 2007).

Habits are formed when a goal-directed behaviour is selected and performed frequently, leading to associations between the goal and behaviour (Aarts & Dijksterhuis, 2000). Therefore, in order to prevent or reduce undesirable behaviours (e.g. use of lifts), the link (habit) between the goal and behaviour needs to be broken. Poster prompts are a type of operant conditioning because they attempt to change the environment and provide cues (positive or negative reinforcement messages) to break the habit (Sheeran et al., 2005). However, poster size is an important determinant for behaviour change. Kerr, Eves and Carroll (2001c) recommend posters to be larger than A3 sized. Moreover, messages should not be proscriptive implying that lifts are only available for the physically disabled, but designed to deter use (Russell et al., 1999), which will lead to sustained changes. Poster prompts can also be used for encouraging other health promotion activities such as walking groups and fitness classes.

Groups can be valuable in promoting physical activity (Toropainen & Rinne, 1998) because they possess shared perceptions, shared goals, relationships, social interactions and the opportunity to develop friendships (Winston, Bonney, Miller, & Dagley, 1988). Groups can also be important to why employees begin to take part in physical activity and why they remain active. The "Small Steps Are Easier Together" intervention provides a model for group based interventions in work sites (Warren, Maley, Sugarwala, Wells, & Devine, 2010). The results showed that providing walking groups, marked walking circuits and walking maps significantly increased step counts in 36% of the workforce by on average 10,527 steps per week. The social network created and group dynamics can be a strong reason for hindering or furthering individual goals (Toropainen & Rinne, 1998). Employers can potentially take advantage of these groups and create competitions and provide employee groups with activity related incentives (Eves & Webb, 2006).

Egawa et al. (2006) found consistent, quick and convenient counselling sessions from exercise instructors discussing lifestyle modifications can significantly improve office workers BMI, lipoprotein cholesterol and alanine aminotransferase levels. Counselling interventions can be delivered on an individual level or in large meetings/lectures but sessions should focus on setting targets and specific strategies. Moreover, Proper et al. (2003) reports individual face-to-face counselling at the workplace positively influenced physical activity levels. However, in contrast to these studies, Aittasalo, Miilunpalo and Suni (2004) found no significant differences between control, counselling and counselling+fitness testing groups. This contrasting finding could be due to the difference in counselling methods, such as quick sessions from instructors (Egawa et al., 2006) or in-depth conversations with nurses (Aittasalo et al., 2004). Proper et al. (2003) implemented counselling based on the Patient-centred Assessment and Counselling for Exercise and Nutrition programme (Patrick et al., 1994). Therefore, providing employees with advice, counselling and encouraging physical activity could be vital to the success of any intervention programme.

Changing the culture of the organisation to promote healthier working can also influence employees. This culture change will need to be made from a top-down approach so that employees at all levels are involved and support the culture. One method to do this is by discouraging the sending of emails between workers on the same site or have email-free hours. Managers will need to understand this may reduce work completed, but it could also promote efficiency in the long-term. Employers should also consider delivering information on physical activity and health promotion via internal computer systems. Web (Intranet/email) programmes are more cost effective than print (newsletter) and have shown to be as successful (Marshall, Leslie, Bauman, Marcus, & Owen, 2003). Another culture change would be to provide healthier food options in the employee restaurant, canteen and break areas that are cheaper than the normal options. This may not directly impact physical activity, however, if employees start to consider healthy living options it may influence their choice to become more active.

2.7 Behaviour change theories

2.7.1 Social learning theory/social cognitive theory

Early principles of human behaviour were founded on theories based on linear input-output models, which suggested external stimuli controlled and shaped human behaviours. Operant conditioning theories assume a direct relationship between behaviour and learning whereas cognitive theories allow for the learning process to be modified by individual cognitions. Social learning theory can be considered a transition between behaviourists and cognitive learning theories. The underlying premise of social learning theory is that behaviour is a result of continuous reciprocal interactions between cognitive, behavioural and environmental influences and does not result from any single factor alone (Crittenden, 2005). Figure 2.1 displays the three main components of the theory: person, environment and behaviour. Emphasis in this theory is placed on learning through social rewards and punishments, including vicarious reinforcements and modelling. Therefore, learning can occur without a visible change in behaviour because people can learn through observation of others, and not their own performance (Krugman, 1965).

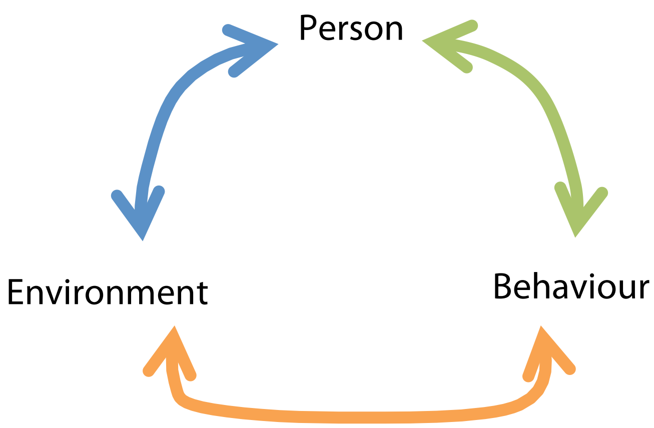

Figure 2.1: Social learning theory indicating reciprocal determinism that promotes learning.

Social cognitive theory (Bandura, 1989; 1997; 2001) is an updated version of social learning theory (Kaplan, Sallis, & Patterson, 1993) and builds on behavioural theories by enhancing the function that cognitive processes influence and are influenced by behavioural associations. The social cognitive theory suggests that human motivations and actions are extensively regulated by forethought. It is a model of causation involving triadic reciprocal determinism where "*behaviour, cognition and other personal factors, and environmental influences all operate as interacting determinants that influence each other bidirectionally*" (Bandura, 1989; p.2). In addition, two specific factors in this theory that are believed to be most influential over behaviour are perceived self-efficacy and outcome expectations. The theory is displayed in Figure 2.2 and relationships between the factors are described below.

Perceived self-efficacy is concerned with people's beliefs and confidence in their capabilities to perform a behaviour or action required for a given outcome. Self-efficacy has become the core construct and pivotal regulative role within social cognitive theory (Bandura, 1997). Self-efficacy can enhance or impede motivations, and individuals with low self-efficacy will often harbour negative thoughts about their ability to accomplish behaviours and their personal development (Luszczynska & Schwarzer, 2005). Four main sources of self-efficacy enhancements include personal experiences (through accomplishments and achievements), vicarious experience (social comparison process considering if a similar individual is able to do the behaviour), social persuasion (by other people verbally) and somatic/emotional arousal (anxiety in intimidating situations and feeling capable of mastering the situation) (Bandura, 1998). Self-efficacy beliefs can vary according to the different situations an individual may find themselves in (Kaplan et al., 1993). These beliefs can affect the amount of effort and persistence one has to continue changing risk behaviours to overcome any barriers that may weaken their motivation (Luszczynska & Schwarzer, 2005).

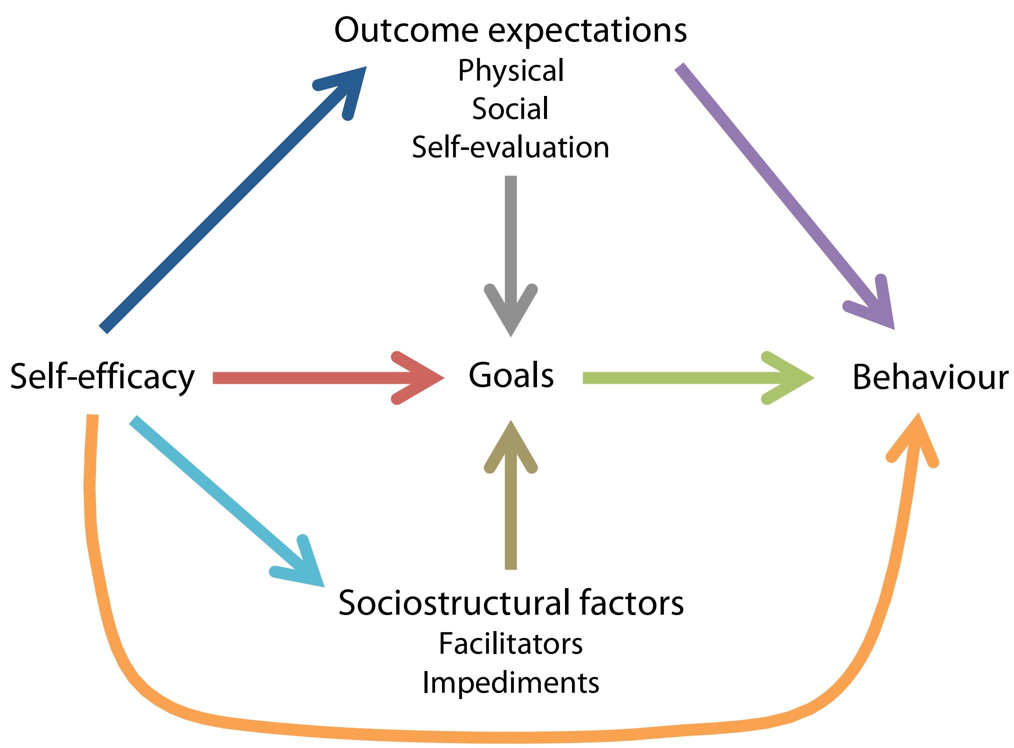

Figure 2.2: An illustration of social cognitive theory.

Outcome expectancies have been described as people's beliefs about the possible consequences of their actions. These outcome expectancies can be positive or negative, short-term or long-term, and effect different areas of behavioural learning (e.g. physical effects, social results or self-evaluative experiences) (Dijkstra, Bakker, & De Vries, 1997). Outcome expectations are constructed from observed conditional relations between environmental events and outcomes. Individuals are predicted to regulate their own actions by selecting behaviours that will produce the desired outcomes and discard actions that will bring punishing or unrewarding results (Bandura, 2001). The likelihood that people will act on a behaviour that they think will have a positive outcome will depend of the beliefs (self-efficacy) about whether they can achieve those behaviours (Teasdale, 1978).

A third postulate of social cognitive theory that has been advocated is self-evaluated satisfaction or dissatisfaction (Dzewaltowski, 1989). This is when individuals evaluate their performances on the basis of certain standards and are either satisfied or dissatisfied, which ultimately impacts their self-efficacy information. Goal formation is vital before any behaviour is executed. Other social cognitive theories label goals as intentions (e.g. I aim to…) as they can be a direct predictor of behaviour. Nevertheless, all cognitive behavioural theories state that either goals or intentions should be as specific as possible (Bandura, 1990; Fishbein & Ajzen, 1975). However, individuals may not pursue a goal if the decisional balance of the outcome expectancies of the behaviour to achieve the goals will have more disadvantages than advantages. Perceived sociocultural factors are the barriers and facilitators that exist within ones environment, such as the health, political and economic systems (Bandura, 1997). Perceived self-efficacy will influence whether or not an individual perceives such life circumstances as impediments or opportunities to achieving their goals. For example, those with high self-efficacy believe they are able to exercise control to overcome obstacles and focus on opportunities.

Research has shown that self-efficacy can influence health behaviours and is related to an increased amount of physical activity in both adults and adolescents (Sallis, Prochaska, & Taylor, 2000; Strauss, Rodzilsky, Burack, & Colin, 2001; Trost, Owen, Bauman, Sallis, & Brown, 2002). For example, older individuals have lower self-efficacy and outcome expectations in relation to physical activity because they expect fewer benefits from exercising (Netz & Raviv, 2004). This is predicted to be a cause for the marked decrease in physical activity participation throughout the life-course because enhanced self-efficacy stimulates physical activity and physical activity, conversely, enhances self-efficacy (Dzewaltowski, 1989). Social cognitive theory has been the driver behind generating many new methods of behaviour change in the field of health psychology. These methods now all focus on incorporating teaching new behaviours through modifying cognitive processes (Kaplan et al., 1993) and often involve an efficacy determinant (Bandura, 1998).

2.7.2 Health belief model

The health belief model is the oldest and most widely used model designed to explain health behaviour (Kaplan et al., 1993). The model was first developed in the 1950s after the limited success of public health service programmes (Hochbaum, 1956). It is useful to understand that even though the model is derived from a body of psychological and behavioural theory (Janz & Becker, 1984), it grew out of practical research in health education, rather than within academic psychology (Kirscht, 1988). The health belief model is a value-expectancy model developed to explain an individual's health related behaviours (Becker & Maiman, 1975). The model focuses on two aspects of an individual's representations of health and health behaviours: threat perception (perceived susceptibility and anticipated severity of an illness) and behavioural evaluation (benefits, efficacy, costs and barriers to enacting a behaviour) (Abraham & Sheeran, 2005).

The underlying concept of the health belief model is that several different constructs influence health related behaviours, either individually or in combination, which are the perceived value of an outcome and an expectation that a given action will result in that outcome (Rosenstock, 1974). The model has been developed to include seven different constructs, which are likely to affect cognitions and behaviours, and are displayed in Figure 2.3. Perceived severity reflects an individual's beliefs about the seriousness or severity of a health condition or disease. These perceptions are based on both the medical information an individual has access to and the beliefs a person has about the consequences any condition would have on their lives (Hayden, 2009). Perceived susceptibility motivates individuals to engage in preventive behaviours that decrease the risks of developing any health condition. The greater the perceived risk, the greater the motivation to modify any risk (Bandura, 1990). However, this also means that when people perceive a low risk of susceptibility, unhealthy behaviours can develop (Hayden, 2009). Perceived benefits consider the value or usefulness of a new behaviour in decreasing the risk of developing a disease. Individuals usually only adopt healthier lifestyles when they believe a new behaviour will have a beneficial impact on their health. This is also important for secondary prevention behaviours such as health screenings (Hayden, 2009).

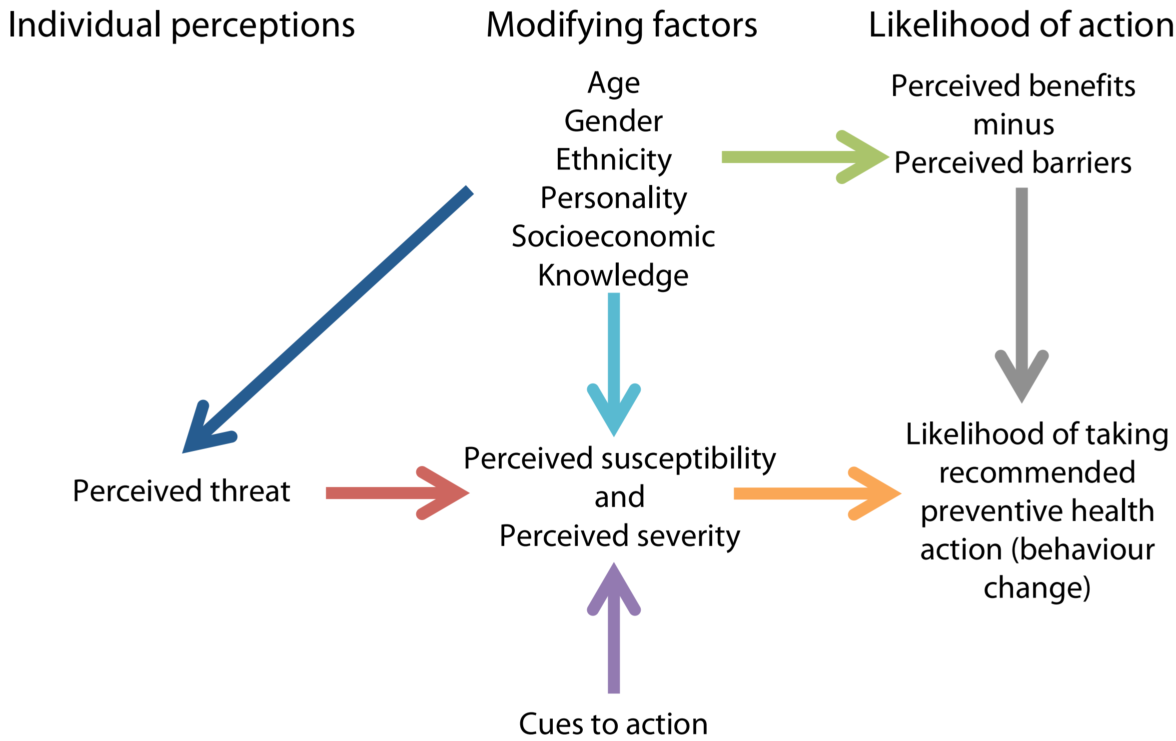

Figure 2.3: Elements of the health belief model (adapted from: Janz & Becker, 1984; p.4).

Perceived barriers is an individual's own evaluation of the obstacles to adopting a new behaviour. Of all the constructs, perceived barriers are the most significant in determining behaviour change (Janz & Becker, 1984). To overcome a barrier, a person needs to believe the benefits of the new behaviour outweigh the consequences of continuing the old behaviour (Abraham & Sheeran, 2005). Modifying variables that can influence the four constructs of perceptions are personal demographic characteristics such as culture, education level, past experiences, skill and motivation. Furthermore, cues to action include events, people or other information (e.g. media campaigns, advice from others, illness of a family member or friend, etc.) that inspire people to change their behaviours. Self-efficacy is the belief in one's own ability to do something (Bandura, 1977). Therefore, in order to change behaviour, one must be capable of achieving the actions required to achieve the benefits of the behaviour. For example, some women do not engage in exercise because they do not believe they can exercise, and this negative perception is a significant barrier (Wallace, 2002).

The health belief model has the advantage of specifying a set of cognitions that appear to mediate demographic variables and modify the outcomes of educational interventions (Abraham & Sheeran, 2005). However, one of the most important limitations of the model in both descriptive development and intervention research is the variability in the measurements of the central constructs (Glanz, Rimer, Viswanath, & Tracy, 2008). There are no clear guidelines on how to operationalise the links between the constructs or how each construct should be weighted against one another. In a meta-analysis assessing the predictive applications of the model, it was concluded that this lack of homogeneity weakens the status of the model (Harrison, Mullen, & Green, 1992)

A review evaluating behaviour change interventions based on the health belief model discovered that 76% of the interventions found evidence of behaviour change (Abraham & Sheeran, 2005). However, some of the studies included in the review highlighted significant methodological limitations such as the lack of control groups or effective randomisation, lack of descriptions for the process of belief change, a variety of techniques making it difficult to identify which technique may be crucial to effectiveness, lack of measurements pre- and post-interventions, determining moderator effects and to whom the interventions may be most effective for.

Weinstein (1988) outlined further difficulties about an individual's perception of susceptibility. For example, before personal susceptibility is accepted, awareness that a health threat exists and determining how dangerous the threat is, or how many people are likely to be affected must be acknowledged. This is important to recognise because individuals may be less likely to change behaviours if they perceive the health risks are insignificant or if changing will not have a drastic improvement in their health status. Furthermore, when behaviours are more complex, the health belief model has failed to explain or predict them. For example, intervention research on smoking cessation in adolescents showed that even though attitudes to the hazards of smoking were changed, they were unable to actually reduce smoking acquisition (Flay et al., 1985). These factors must be taken into account when designing behaviour change interventions.

2.7.3 Theory of reasoned action/theory of planned behaviour

The theory of reasoned action suggests that intention to engage in a particular behaviour is the ultimate cause of any behaviour. Therefore, if a person intends to perform a behaviour, they will do so. Similarly, if a person does not intend to perform a behaviour, then the action is unlikely to be performed (Kaplan et al., 1993). The theory of reasoned action can adequately predict behaviours that are relatively straightforward (volitional control) (Armitage & Conner, 2001). It has received considerable attention within the field of consumer behaviour (Sheppard, Hartwick, & Warshaw, 1988), probably because the intention to purchase items is volitional and therefore very few constraints exist (Belleau, Summers, & Pinel, 2007).

Behavioural intentions represent a function of an individual's motivations to perform a behaviour which are determined by attitudes and subjective norms. Attitudes towards a specific action will have an impact on the intentions to perform a behaviour. Attitudes are determined by the most obvious beliefs about what would happen as a consequence of the behaviour (Jordan, Nigg, Norman, Rossi, & Benisovich, 2002). They refer to an individual's feelings (good or bad) about themselves performing the behaviour. Therefore, there is a distinction between an individual's feelings about someone else performing a behaviour and themselves (Conner & Sparks, 2005). Subjective norms are perceptions developed from the social influences about performing any behaviour. These norms are affected by pressure from the people in one's social environment, where behavioural intentions will be influenced depending on the importance people place on the value of other opinions (Jordan et al., 2002). Therefore, while subjective norms relate to the perceptions of general social influences, the underlying normative beliefs are related to the likelihood that individuals or groups (referents) with whom the person is most motivated to please will approve (or disapprove) the behaviour (Armitage & Conner, 2001).

The theory of planned behaviour (Ajzen, 1991) attempts to understand and predict behaviours not under individual control, and was developed as an extension to the theory of reasoned action (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). This theory states attitudes, subjective norms and perceived behavioural control directly influences an individual's intentions, which is the focal predictor of behaviour as is described in Figure 2.4. The main distinction between the two is the theory of planned behaviour considers perceived behavioural control as an integral part of behaviour, not just actual behavioural control. Perceived behavioural control has been described by Ajzen (1991) as similar to that of perceived self-efficacy, because it "*is concerned with judgements of how well one can execute courses of action required to deal with prospective situations*" (Bandura, 1982; p.122). Therefore, the theory of planned behaviour predicts that intentions to perform a behaviour will be stronger if an individual perceives they have control over the behaviour.

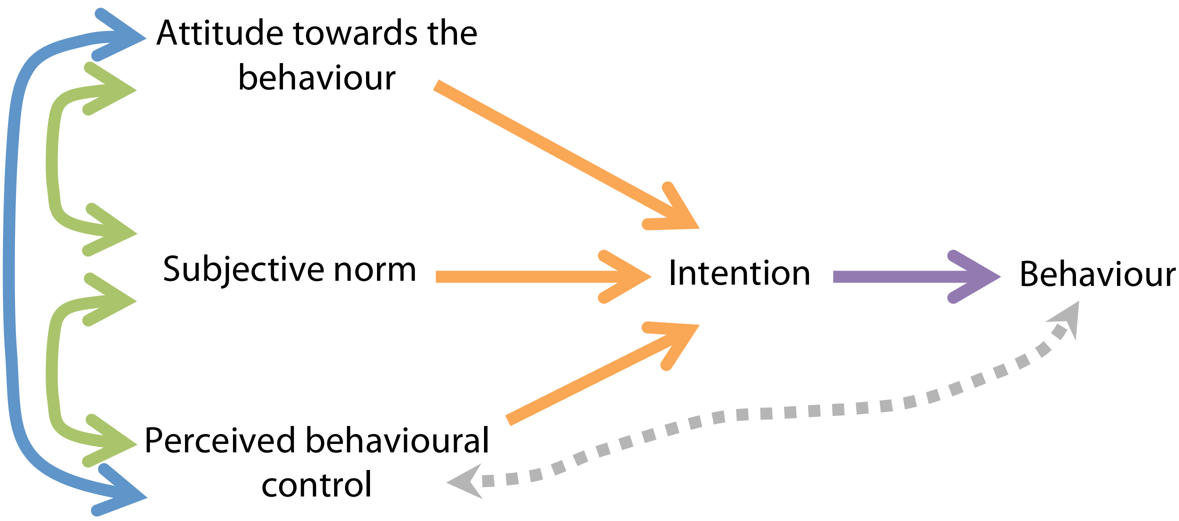

Figure 2.4: Theory of planned behaviour (adapted from: Azjen, 1991; p.182).

The extension included in the theory of planned behaviour allows the model to be applied to more complex goals and behaviours, but also where there may be constraints on any action (Belleau et al., 2007). A major assumption of the theory is that people are rational and usually make predictable use of the information available to them (Kaplan et al., 1993). Therefore, researchers have suggested other external variables such as demographics, personality traits, past behaviours and past experiences might also have influences on behavioural intentions, which could provide a better understanding of the results of any actions (Ajzen & Fishbein, 1980; Bagozzi, Wong, Abe, & Bergami, 2000; Bunce & Birdi, 1998). In terms of activity behaviours, results from a physical activity intervention delivered via email demonstrated that positively framed persuasive messages (constructed based on the theory of planned behaviour) improved exercise behaviour compared to negatively framed messages (Parrott, Tennant, Olejnik, &

Poudevigne, 2008). Therefore, providing physical activity messages focused on the actions an individual can do to improve their health may result in a positive behaviour change.

There has been a failure to distinguish between an individual's intention to perform a behaviour and their expectation of whether they will actually perform the behaviour or achieve the goal (Warshaw & Davis, 1985). As a result, intentions and expectations are two constructs that have been used interchangeably in research studies that use the theory of planned behaviour. Furthermore, there have also been distinctions proposed between perceived difficulty and perceived control. Research has reported that perceived difficulty independently predicts intention, whereas perceived control does not (Sparks, Guthrie, & Shepherd, 1997). Therefore, identifying perceived difficulty can be viewed as more significant to participants and is closer to the original concept of perceived behavioural control (Ajzen, 1991).

The theory of reasoned action and theory of planned behaviour have tended to rely on research using self-report data, despite evidence that questions the reliability of this data compared with more objective measures of behaviour (Gaes, Kalle, & Tedeschi, 1978). The models have also been criticised as being unable to investigate or predict goal intentions accurately. Ajzen and Fishbein (1980) recognised this and have provided suggestions to researchers wishing to investigate goal situations. These suggestions principally recommend studying individual behaviours through the goals that are accomplished. However, a meta-analysis investigation found the application of this solution to be problematic because there could be hundreds of different behaviours that achieve one goal (Sheppard et al., 1988). The difference between intentions and behaviour is an important component to consider in measuring and evaluating an intervention. For example, if an individual's behaviour has not changed after participating in an intervention, it is still possible their intentions may have changed and potentially moves them closer to the goal of the intervention. This demonstrates the importance of tailoring health messages to intentions.

2.7.4 Transtheoretical model of change

Occupational physical activity programmes are poorly attended because the initiatives often do not meet the individual needs of employees (Wong et al., 1998). Cognitions and behaviours are key causal factors behind many of today's most widespread health problems and illnesses. Therefore, it is important for health interventions to provide tailored health information relevant to an individual's needs. Health interventions which provide information in a tailored way have been demonstrated to be more effective, especially in targeting individuals who are mostly sedentary or most motivated to change (Ogilvie et al., 2007).

Stage models of behaviour provide order and direction for health constructs (Glanz et al., 2008). A key assumption of stage theories is that different factors play an important part at different stages of a behaviour (Sutton, 2005a). The transtheoretical model of change (Prochaska, DiClemente, & Norcross, 1992) is one of the most prominent psychological models of behaviour change. The model provides an assumption that people go through distinct stages in the course of modifying behaviours (Callaghan & Herzog, 2006). Some of the first, and still the most popular empirical applications of the transtheoretical model were to smoking cessation (Prochaska & DiClemente, 1983).

The model incorporates four related constructs that are considered central to behavioural change: stages of change, self-efficacy, decisional balance and processes of change (Callaghan, Khalil, & Morres, 2010). The term transtheoretical was applied because the theory attempts to integrate these four separate constructs which originate from different theories of behaviour change and systems of psychotherapy (Sutton, 2005a). The model has been applied to a wide variety of contexts and problem behaviours such as: smoking cessation (Andersen & Keller, 2002; Prochaska & DiClemente, 1983; Velicer, DiClemente, Prochaska, & Brandenburg, 1985); exercise (Clarke & Eves, 1997; Kirk et al., 2003; Marshall & Biddle, 2001); dietary behaviours (Povey, Conner, Sparks, James, & Shepherd, 1999; Sporny & Contento, 1995); diabetes management (Gambling & Long, 2006); blood donation (Ferguson & Chandler, 2005); and musculoskeletal disorders in the workplace (Whysall, Haslam, & Haslam, 2006; 2007).

The central construct and basic organising principle of the transtheoretical model is the stages of change, which is sometimes referred to as the theory name interchangeably. It is an important construct that can be used to understand how people change their health behaviours (Prochaska & DiClemente, 1983; Prochaska et al., 1992). Stages of change reflects the temporal dimension in which attempts to change behaviours occur. The stages of change suggest individuals attempting to change health behaviours move through a series of five distinct stages: precontemplation, contemplation, preparation, action and maintenance. These stages are outlined in Figure 2.5 and described below. The model treats behaviour change as a dynamic rather than an all or nothing phenomenon (Marshall & Biddle, 2001). Movement through these stages often occur in a cyclical, rather than linear pattern because individuals make several attempts to change behaviour before they reach their goals (Marcus et al., 1996).

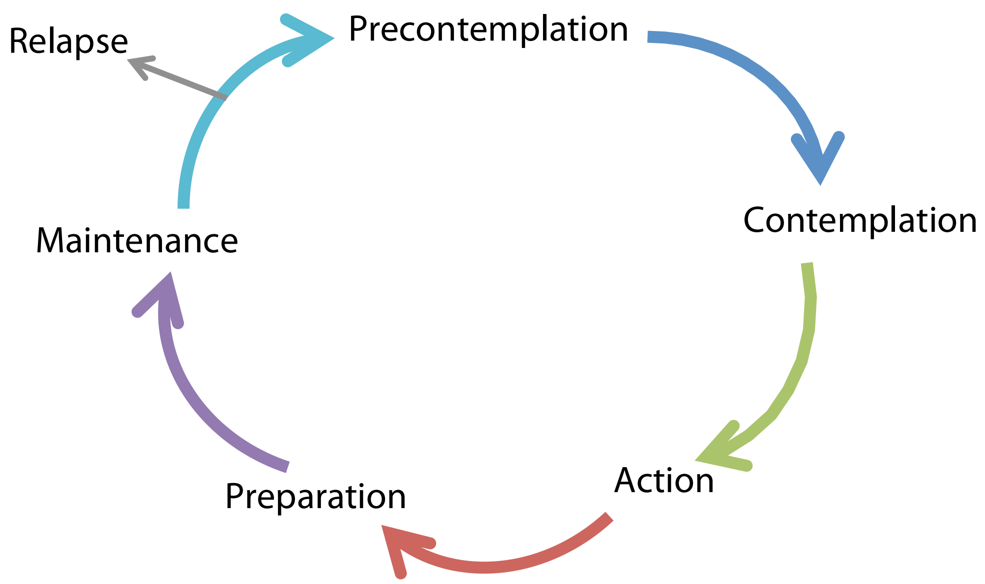

Figure 2.5: The stages of change constructs as part of the transtheoretical model (adapted from Prochaska & DiClemente, 1983).

The precontemplation stage is characterised by not intending to and/or denying to recognise a need for change (usually measured as in the next six months). Individuals in this stage are not informed about the consequences of their behaviour, not concerned about the risks involved and/or have relapsed from trying to change. These individuals tend to avoid reading, talking or thinking about their negative behaviours (Velicer et al., 1985). The contemplation stage is achieved when there is recognition of the problem and one is considering making changes but not ready to act. Individuals in this stage are aware of the benefits and costs of changing their behaviours, which produces a level of ambivalence to moving on to the next change. Individuals in the preparation stage intend to change soon (within the next thirty days) and/or have made specific plans and minor changes to their thought patterns and evaluations. The action stage involves actively engaging in a changed positive behaviour (for less than six months). However, the criterion for action is that individuals must achieve a certain level of change that is sufficient to reduce the risks for disease (Prochaska et al., 1992). The maintenance stage is only achieved when the behaviour change has been initiated and active for over six months. This stage involves consolidating the health gains secured during action and working to avoid relapse. Individuals in this stage are less tempted to relapse than those in the preparation or action stages because they are more confident they can continue their healthy behaviour change. In terms of behaviour change interventions, progression through the stages relate directly to where individuals are at the beginning of the intervention. Those in the contemplation stage are over 60% more likely to have successful behaviour change than those in the precontemplation stage (Sallis et al., 2000). Similarly, those in the preparation stage are over 66% more likely to have successful behaviour change than those in the contemplation stage.

An individual's current stage is underpinned by their knowledge, beliefs and attitudes regarding their behaviour and health related outcomes. Progression through the stages is linked to differences in self-efficacy, decisional balance and habit strength (processes of change). Self-efficacy reflects the confidence the individual has in their ability to change their behaviour (DiClemente, Prochaska, & Gibertini, 1985). Self-efficacy increases as individuals move through the stages (Marcus & Simkin, 1993). In terms of physical activity, individuals who have not yet begun to exercise have been reported as having lower levels of confidence in their ability to exercise than those who exercise regularly (Marcus, Rakowski, & Rossi, 1992). As individuals move through the stages, positive beliefs about exercise should increase and negative beliefs should decrease.

Decisional balance is the individual's relative assessment of the benefits (pros) and costs (cons) of changing a specific behaviour (Velicer et al., 1985). Decisional balance in inactive individuals is generally negative. Alternatively, individuals who exercise regularly have a positive decisional balance where positive beliefs outweigh negative beliefs (Callaghan et al., 2010). With physical activity, in precontemplation the pros of inactivity may outweigh the cons (e.g. finding time for activity, making effort, etc.). The decisional balance point (intersection of pros and cons) has been found to be between the contemplation and preparation stages (Jordan et al., 2002; Prochaska, Norcross, & DiClemente, 1994). An individuals' assessment of their behaviour in relation to the results of a health initiative will be explored throughout this thesis in order to evaluate the success of different interventions.

Finally, habit strength relates simply to the strength of the behaviour and is usually high in the precontemplation stage, but gradually weakens with progression through the stages (Whysall et al., 2007). At each stage, the model proposes that individuals need to engage in stage-specific strategies (known as processes of change) to change their habits and move onto the next, higher stage (Perz, DiClemente, & Carbonari, 1996). DiClemente (1993) stated that in addition to the stages of change, the transtheoretical model integrates ten processes individuals use when changing their behaviour, which are outlined in Table 2.1. These processes have been divided into either the experiential or behavioural second-order factors and are used differently across the stages. Experiential factors tend to be used by people in the contemplation and preparation stages, as they involve emotional and/or cognitive activity. Individuals in the action stage tend to emphasise behavioural factors, such as stimulus control over experiential processes. This reflects a shift in emphasis from the decision making tasks in the contemplation stage to the active strategies involved in an attempt to change behaviour (Perz et al., 1996; Prochaska et al., 1994).

Due to the varying dominance of these constructs over time, an individual's stage of change in relation to a particular behaviour will determine their receptiveness to any information or education materials. Therefore, the model emphasises the importance that interventions must be tailored to suit the individuals' willingness to change (Whysall et al., 2007). Research aimed at promoting behaviour change found stage-matched intervention materials, compared to standard materials were effective for women but not for men (Plotnikoff et al., 2007). This model has also been generalised to exercise behaviour (Marcus & Simkin, 1993) as it integrates cognitions, behavioural processes and principles of change (Jordan et al., 2002). However, the level of support for the transtheoretical model in the exercise domain varies. In a meta-analysis of studies that tested the model, it was concluded the findings are mainly supportive (Marshall & Biddle, 2001). The authors reported the core constructs of behaviour differ across stages and transitions, while other researchers have challenged this stating the model does not specify the causal relationships between the separate constructs (Sutton, 2005a). For example, we do not know to what effect decisional balance will have on self-efficacy. This has resulted in criticisms of the transtheoretical model (Herzog, 2005; Sutton, 2005b), with some reporting patterns of discontinuity between the major constructs (Kirk, MacMillan, & Webster, 2010), others opposing its acceptance in the influence of service delivery (Hodgins, 2005) and even calling for its complete abandonment (West, 2005). Previous research has also argued that staged-focused physical activity promotion interventions in the workplace are not successful because the interventions simplify activity behaviour beyond what is useful (Adams & White, 2005).

The categories in the stages of change have been labelled as arbitrary pseudo-stages because dividing behaviours at six months into different stages is rather random (Bandura, 1998). Individual differences are what make humans human and people do not fit neatly into prefixed categories or recycle through the stages in order. There are different degrees of intentions and possible sub-stages of behaviour that we must consider (Bandura, 1998). Cultural differences may also influence the relationships between the various constructs of the transtheoretical model. There have been differences reported between Americans and Australians within the constructs of self-efficacy and decisional balance (Marcus & Owen, 1992). Nevertheless, the model provides a useful concept that assumes individuals go through distinct stages in the course of modifying behaviours. This is important for changing health related behaviours such as physical activity, because if an individual's stage of change in relation to physical activity can be identified, information can be tailored according to their stage. This model will be included in designing the intervention components included within this thesis. Therefore, this may have a beneficial impact in producing sustainable positive behaviour change, especially for individuals identified as being in the precontemplation, contemplation and preparation changes.

Table 2.1: The constructs of the transtheoretical model (adapted from Perz et al., 1996; Sutton, 2005a).

Construct		Description
Stages of change	Precontemplation	No intention to take any action in next six months
	Contemplation	Intends to take action in next six months
	Preparation	Has plans to take action in next month
	Action	Changed behaviour for less than six months
	Maintenance	Maintained behaviour change for over six months
Decisional balance	Advantages	Pros (benefits) of changing
	Disadvantages	Cons (costs) of changing
Self-efficacy	Confidence	Confidence that one can engage in healthy behaviour
	Temptation	Temptation against unhealthy behaviours in challenging situations
Processes of change		
Experiential	Consciousness-raising	Finding and learning new facts, increasing awareness of a problem and its potential solutions
	Dramatic relief	Intense negative emotional reactions (fear, anxiety, worry) to unhealthy behaviours, related events and information
	Self re-evaluation	Changing appraisals of self and the behaviour due to realisation that change is important
	Environmental re-evaluation	Changing the appraisal of a behaviour and its impact on one's proximal social and physical environment
	Self-liberation	Making a firm commitment to change and creating new alternatives for oneself
Behavioural	Conditioning	Changing one's reactions to stimuli
	Stimulus control	Changing environments to minimise occurrence of stimuli
	Reinforcement management	Changing reinforcements and contingencies for a behaviour (e.g. increasing rewards for positive behaviours)
	Helping relationship	Seeking and using positive and supportive relationships that facilitate change
	Social liberation	Creating new alternatives in the environment and realisation that social norms have changed

2.8 Chapter summary

This chapter has described research that demonstrates the benefits of regular physical activity on an individual's physiological health, psychological wellbeing and social development. Large numbers of people are now employed within sedentary occupations and evidence suggests sedentary behaviour is an independent risk factor for a number of adverse health outcomes. The workplace provides an opportunity to target large numbers of people and the literature review presented in this chapter has considered several options to promote occupational health physical activity interventions. The review has demonstrated that incidental lifestyle interventions focused on increasing walking could offer employees possibilities to create sustainable changes in behaviour, compared to any vigorous exercise activities that might require high levels of planning and commitment. However, workplace health interventions need to consider individual differences that are related to physical activity behaviours.

This chapter has also evaluated common models of health behaviour and reviewed their applicability to potential interventions in the workplace. The transtheoretical model (or stages of change model) has been highlighted as having intuitive appeal because it considers the dynamic nature of attitude and behaviour change (Haslam & Haslam, 2000). The model recognises individual differences that could affect health related behaviour, and therefore recommends health related information should be tailored according to the persons needs (Whysall et al., 2005). The model provides a framework of stages that can be used to help guide the change process, which makes it practical for use in the workplace. This framework of identifying readiness to change and tailoring information will be explored in the following studies included in this thesis.

Health interventions that provide tailored information have been demonstrated to be more effective than generic information (Marcus & Simkin, 1993; Ogilvie et al., 2007). The stage of change model has been applied to various physical activity interventions successfully (Kirk et al., 2004; Kirk et al., 2003; Marcus et al., 1996; Marcus & Simkin, 1993; Titze et al., 2001). Stage-matched interventions have been found to improve the effectiveness of the health initiative in terms of the recruitment and retention of participants, which are important concerns for all intervention and behaviour change programmes. Therefore, there may be potential for occupational health interventions to be modified and include stage-matched approaches to promoting physical activity behaviour change in the workplace. Before interventions are administered, it is useful to understand current behaviours, barriers and facilitators related to physical activity and evaluate employee experiences of occupational health services. The following chapter describes the results from a questionnaire designed to investigate these factors.

Chapter 3

Exploring employee activity and occupational health experiences

3.1 Introduction

This chapter details the findings of the first research phase in this thesis; a cross-sectional survey used to evaluate employees' experiences of occupational health interventions and assess physical activity levels and sedentary behaviours. The main purpose of this survey was to inform the development of the workplace physical activity intervention reported in Chapter 7. In addition, the self-report measures were examined to assess their suitability as data collection tools in the intervention phase of this research. Questions were incorporated which included: evaluating employees use and experience of the occupational health service; feedback on workplace health interventions; assessing physical activity and sedentary behaviours; identifying attitudes towards levels of physical activity/exercise; and classifying stage of change concerning this behaviour. The questionnaire was completed by 1,141 employees in 145 UK organisations. This chapter presents descriptive statistics, the results from several statistical analyses and discusses the key findings and implications.

3.2 Research design and aims

The aim of this study was to explore employee experiences of occupational health services. A secondary aim was to examine physical activity and sedentary behaviours in working aged adults. In order to achieve the research objectives, a cross-sectional questionnaire design was employed to observe a sample of the UK workforce. The questionnaire method was chosen because it allowed sampling a large number of employees for a relatively modest cost compared to other research methods. This type of population based exploratory work lends itself to collecting data through the use of postal and web based questionnaires. With this in mind, this phase of the research offers generalisations about the participants and examines responses in terms of developing recommendations for future research phases. Specifically, the research objectives were to:

1) Explore the views and opinions of employees in relation to the occupational health service and workplace health interventions
2) Assess physical activity behaviour and sitting times in a sample of the UK workforce
3) Investigate participants stage of change in relation to physical activity behaviour
4) Examine the relationship between self-reported physical activity, sedentary behaviour and work ability

3.3 Method

3.3.1 Questionnaire development

To develop the questionnaire, the aims of this phase of the research were first outlined to help identify what types of questions should be included. The questionnaire consisted of a combination of measures from validated sources and bespoke questions developed for this research (described in Section 3.3.2). The first draft of the questionnaire was reviewed by four academics experienced in questionnaire design. The second draft of the questionnaire was piloted on employees working in the staff development and hospitality departments at Loughborough University (n=18). In response to the feedback obtained from these participants, a number of changes were made to the final version of the questionnaire which can be viewed in Appendix 3.1.

Whilst all feedback during the draft and pilot stages were given appropriate consideration, it was not feasible to incorporate all of the comments from the contributors for fear of interfering with achieving the research objectives. For example, the section on work ability focused on exploring how respondents overall health affects their capability to manage work demands and perform work duties. Work ability was assessed using the Work Ability Index (WAI) designed by colleagues in the Finnish Institute of Occupational Health (Tuomi, Ilmarinen, Antti, Katajarinne, & Tulkki, 1998). Many of the participants in the pilot study reported the format of the WAI was unclear, complicated and lengthy. The WAI is an internationally recognised clinical research questionnaire that has been translated and validated into several languages. This was the first time the researcher had used this measure, so it was important to implement the WAI in its entirety to gain experience of the design, data management, analysis and reporting of WAI scores. Since sections from this questionnaire were to be considered as data collection tools in the intervention phase of this research, this experience could provide the researcher with ideas to potentially improve the delivery of the WAI.

3.3.2 Measures and materials

The questionnaire was available for participants in paper format or online via an Internet web-link. The beginning of the questionnaire included a foreword, which provided participants with an introduction to the aims of the research and what the questionnaire findings would be used for. This introduction contained clear and detailed instructions, including the estimated time taken to complete the questionnaire. Participants were also informed what kinds of questions to expect and the various topics covered. Participants were reassured all responses were completely anonymous and individual responses would not be shared with employers. Participants provided written consent on the paper version of the questionnaire, whilst those completing the online version were required to tick a mandatory check box as a way of providing consent at the beginning of the questionnaire. All sections of the final questionnaire, including both existing and bespoke measures are outlined below.

Demographic information included: age; gender; marital status; ethnicity; highest educational qualification; height; and weight. BMI was calculated as kg/m^2. Participants were also asked to identify: the type of organisation they worked for; their job type (full-time, part-time, job share or fixed-term/casual); job role; and the number of hours worked per week.

In terms of evaluating employees use and experience of occupational health services, participants were asked where their occupational health service was located (this question also ascertained whether employees knew if such a service existed) and how many times they had been in contact with the service. If participants reported to have had contact with the occupational health service, they were asked to report who prompted the contact; to explain the reason(s) for contact by selecting reasons from a predefined list of options; and to rate the overall experience of the service using a four-point Likert scale (where 1 = poor and 4 = excellent). Participants were also asked to rate on a five-point Likert scale (where 1 = strongly disagree and 5 = strongly agree) to what extent they agreed with eleven bespoke statements designed to assess the accessibility and impact of the occupational health service (e.g. The occupational health services have led to improvements in my working conditions).

To evaluate occupational health initiatives, participants were asked if their organisation was promoting any particular health initiative, or had done so in the past twelve months. For employees who reported having recent experiences with health initiatives, they were asked to describe the initiative and to report whether they actively participated. If any respondents stated they did not participate in the initiative, they were asked to provide some qualitative feedback as to why this was the case. In addition, two further qualitative questions were asked to collect information on the barriers and facilitators to health initiatives in the workplace.

Lifestyle information was collected by asking participants whether they smoked cigarettes (or did so in the past) and if so, how many cigarettes they smoked per day. Participants were also asked to record how many units of alcohol they drank in an average week. Unit examples and conversions were provided to support calculations. Self-reported physical activity levels were recorded by asking whether participants engaged in physical activity/exercise on a regular basis, and if yes, to describe what type of physical activity/exercise; the length of this physical activity/exercise; how many sessions performed in a usual week; and how many sessions caused sweating and/or shortness of breath. These questions were designed to enable the researcher to identify if individuals were meeting the recommended physical activity guidelines applicable at the time of data collection (UK Department of Health, 2004). Participants were also asked to rate on a five-point Likert scale (where 1 = strongly disagree and 5 = strongly agree) to what extent they agreed with seventeen bespoke statements that were designed to identify the common barriers to physical activity and/or exercise (e.g. I do not have enough free time to exercise).

A three-item bespoke measure to evaluate participants' attitudes towards their levels of physical activity/exercise was developed. This measure was also used to classify participants' stage of change. Figure 3.1 displays how stage of change was classified based on the responses to the Likert style (yes/no) questions, which were:

1) Are you planning to increase the amount of physical activity/exercise you do?
    a. If yes, are you planning to increase the amount of physical activity/exercise you do within the next 6 months?
    b. If yes, are you planning to increase the amount of physical activity/exercise you do within the next month?

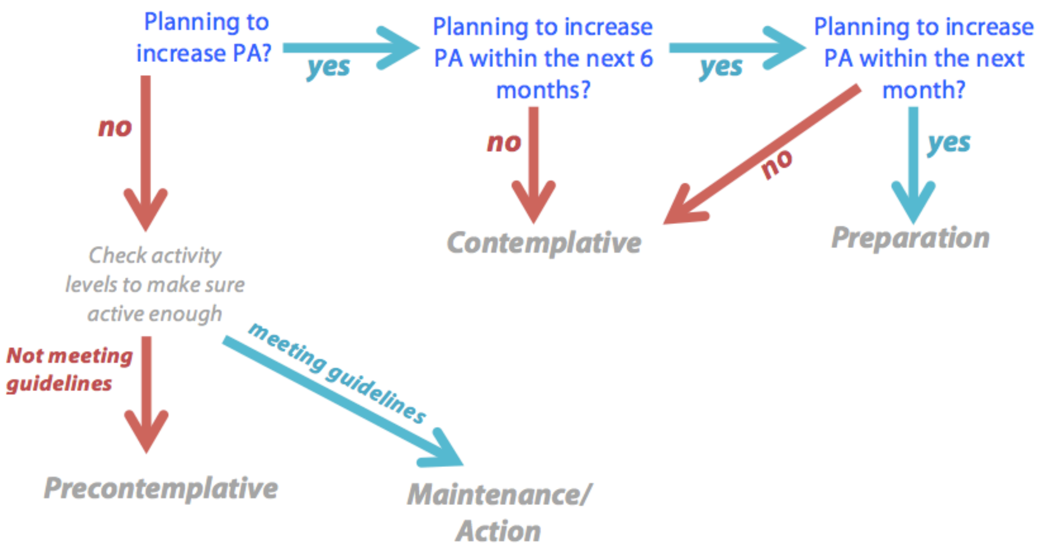

Figure 3.1: Flow chart illustrating classification of stage of change based on responses to these questions (PA=physical activity).

Self-reported sitting times were assessed using the Domain Specific Sitting Time Questionnaire (Marshall et al., 2010; Miller & Brown, 2004). This questionnaire asks participants to estimate the number of hours and minutes they spend sitting on an average weekday and weekend day in specific domains including: travelling; at work;

watching TV; using a computer at home; and during other leisure activities. For the purposes of this research, weekday and weekend day were changed to read work day and non-work day to take into consideration employees who may work on weekend days. Participants were also asked to estimate how much time they spent sleeping at night on a work day and non-work day.

The WAI is an instrument used in clinical occupational health and research to assess work ability. It is based on the answers to a series of questions which take into consideration the demands of work, the employees health status and any additional resources (Ilmarinen, 2007). The WAI is a summary measure of seven areas which are described in Table 3.1. Total WAI scores have a range of 7–49 and high scores indicate high work ability.

Table 3.1: The seven areas of assessment using the Work Ability Index and the scoring range for each section.

	Rating items	Range
1	Current work ability compared with the lifetime best	0 – 10
2	Work ability in relation to the demands of the job	2 – 10
3	Number of current diseases diagnosed by a physician	1 – 7
4	Estimated work impairment due to diseases	1 – 6
5	Sick leave during the past year (twelve months)	1 – 5
6	Own prognosis of work ability two years from now	1 – 7
7	Mental resources	1 – 4
-	**Total Work Ability Index score**	**7 – 49**

This questionnaire was delivered as part of the Working Late project. Therefore, other questions and measures were included that investigated topics important to the Working Late research. The full questionnaire is available to view in Appendix 3.1. Only the measures that were used in this research have been described.

3.3.3 Procedure

The most effective method to distribute the questionnaire to a large sample of potential participants was through organisations, rather than individual employees. Organisations were recruited to take part in the research using an opportunistic sampling strategy. Multiple approaches were employed to recruit collaborating organisations for this study. Firstly, organisations that had previously collaborated with the Work and Health Research Centre, School of Sport, Exercise and Health Sciences and the Loughborough Design School were approached. Secondly, personal contacts of the researcher were invited to nominate their organisation to participate, or to recommend other contacts or organisations that might be interested in participating. Thirdly, an Internet search for organisational contacts was conducted to recruit new companies.

Organisations were contacted via email, letter and/or cold calling and the research project aims were briefly described. If an organisation responded with interest, a facilitator was nominated and a formal invitation to participate in the research was sent. This invitation outlined the aims of the research, the requirements from the organisations and the possible benefits from participating in this research. Future stages of this research, beyond this initial exploratory questionnaire were also described in order to capture the interest of the organisation. Several facilitators from different organisations expressed an interest to review the questionnaire before distributing it to their employees. Therefore, a supplementary guide to the questionnaire was developed which explained the purpose and outcomes of each section (Appendix 3.2). This strategy was used to answer any potential questions the facilitators or organisations might have had in order to obtain organisational level approval.

The distribution method for the questionnaire was established by agreement with each of the facilitators from the collaborating organisations. The use of the Internet is an increasingly popular data collection method for questionnaires (Lindhjem & Navrud, 2011). Using the Internet to conduct surveys offers a number of time and cost saving advantages (Deutskens, 2006; Ilieva, Baron, & Healey, 2002). Research has found the reliability and validity of Internet based surveys is comparable to the outcomes obtained by traditional methods (Krantz, 1997). The questionnaire was accessed by the majority of participants online, via a secure external Internet web-link *(www.surveymonkey.com)* that was emailed to employees by the facilitator for each organisation.

Some organisations, especially those based in the retail sector opted to distribute paper versions of the same questionnaire to their employees. Whenever this was the case, the researcher organised a specific day where the questionnaire would be distributed to the employees through a promotional stand located in a communal area of the site (e.g. employee restaurant). This process allowed the researcher to present the aims of the study to interested individuals and provide these employees with a copy of the questionnaire directly. The research was also promoted using the organisations occupational health offices and through company newsletters. Paper versions of the questionnaire were accompanied with a stamped addressed envelope so they could be returned directly to the researcher. Completed questionnaires could also be returned through a collection box available in the occupational health advisors office at each work site.

3.3.4 Data management and analysis

Any questionnaire responses that were paper based were manually entered into the online survey administration tool for data management. This ensured the entire questionnaire results were in exactly the same format. All data were then downloaded from Survey Monkey into Microsoft Excel files and imported into SPSS (v18.0). Data entry errors were manually checked. No imputation rules were applied for missing data and participant responses were excluded from analyses where any data were missing that were required for a specific analysis. The data were then checked for outliers, which were identified as either data entry errors, measurement errors or genuine values.

Descriptive statistics were calculated for the demographic data to report personal and organisational characteristics. BMI values were classified into normal weight (BMI<25 kg/m^2), overweight (BMI=25–29.9 kg/m^2) and obese (BMI≥30 kg/m^2). Participants were categorised into one of five organisational sectors based on their type of organisation and job role. Descriptive statistics were calculated to explore the use of occupational health and health related initiatives. Percentage distributions of responses to the Likert style statements assessing the accessibility and impact of the occupational health service were also calculated. Descriptive statistics explored responses to the lifestyle and physical activity questions. Respondents were classified as meeting the physical activity guidelines if they reported conducting five or more physical activity/exercise sessions per week, and if these sessions typically lasted for more than thirty-minutes (moderate activity). In addition, individuals who reported conducting three or more physical activity/exercise sessions per week that caused sweating and/or shortness of breath in all sessions, and if these sessions typically lasted for more than thirty minutes were also classified as meeting the physical activity guidelines (vigorous activity). Percentage distributions of responses to the Likert style statement questions investigating barriers to physical activity were also calculated.

Stage of change classifications in relation to reported physical activity was computed based on the responses to the questions described in Section 3.3.2. Descriptive statistics were calculated to explore physical activity health initiatives being promoted in the workplace. Percentage distributions of responses to the Likert style statements investigating the appeal of specific physical activity initiatives at work were also calculated. Total daily sitting time was analysed for a work day and non-work day for each participant by summing reported sitting times across all domains. WAI scores were processed by following the scoring protocols for each section in the WAI guidance manual (Tuomi et al., 1998). Total scores were also grouped according to their WAI classifications (7–27=poor; 28–36=moderate; 37–43=good; 44–49=excellent). Qualitative data from open-ended questions were gathered and coded using thematic analysis (Braun & Clarke, 2006). Similar themes from all of the questionnaires were clustered together and indexed so that a thematic framework could be developed for each question under investigation.

All variables were tested for normality using the Kolmogorov-Smirnov test, which revealed that WAI scores and all sitting time data were not normally distributed, therefore non-parametric analyses were conducted on this data and the median and interquartile ranges (IQR) were calculated as the descriptives throughout. Differences between the WAI scores for males and females, and differences between those who met or did not meet the physical activity guidelines were investigated using Mann-Whitney U tests. A Kruskall-Wallis test also explored differences between the five organisational sectors and WAI scores. Sitting times for each domain, along with total sitting time and sleep time reported on a work day and a non-work day were compared between males and females using Mann-Whitney U tests. Sitting time differences for individual domains between the four WAI groups and the five organisational sector groups were compared using independent-samples Kruskal-Wallis tests. A Wilcoxon Signed Rank Test investigated differences in sitting times reported on work days and non-work days.

3.4 Results

3.4.1 Demographic information

This section presents the demographic characteristics of the participants who responded to the questionnaire. Of the 1,141 employees who participated in this research, 509 (45%) were male and 615 (55%) were female (n=17 did not indicate gender). Table 3.2 displays the personal characteristics of the sample and results from an independent samples t-test demonstrating significant differences between the genders for age, height, weight and BMI. Almost 55% (54.8%) of the respondents in the sample were married, 21.3% were single, 15.3% cohabiting, 7% separated or divorced and 1.6% were widowed. In terms of ethnicity, 94.9% reported their ethnicity as White (British, Irish or other), 2.2% Asian (British, Indian, Pakistani, Bangladeshi, Chinese or other), 1.7% Black (British, Caribbean, African or other), 1.1% Mixed background and 0.4% reported their ethnic background as unknown. Thirty percent of the sample had a university degree, 25.1% had a high school education, 17.3% had a college education, 14% had a postgraduate degree, 10.4% had vocational qualifications and 3.2% had no formal qualifications.

Table 3.2: Demographic data displaying means±SD for the personal characteristics of participants, and results from t-tests comparing gender differences (n=1079).

	Mean	Males	Females	P value
Age (years)	43±12	45±11	41±22	0.001
Height (cm)	171±10	179±7	165±7	0.001
Weight (kg)	78±18	87±18	70±15	0.001
BMI (kg/m^2)	26.5±5.2	27.1±5.1	25.9±5.4	0.001

The responses received were from individuals employed in 145 different organisations. Fifty-nine percent of the participants were from organisations in the private sector and 41% were from organisations in the public sector. Figure 3.2 displays the organisation sectors participants reported working in. Most respondents identified their job type as full-time (80.8%), followed by part-time (14.4%), temporary contract (4.4%) and job-share (0.4%). The average number of hours worked per week for the sample was 38±10 hours. However, hours per week worked by males were significantly higher (41±9 hours) compared to females (35±11 hours) ($p<0.001$).

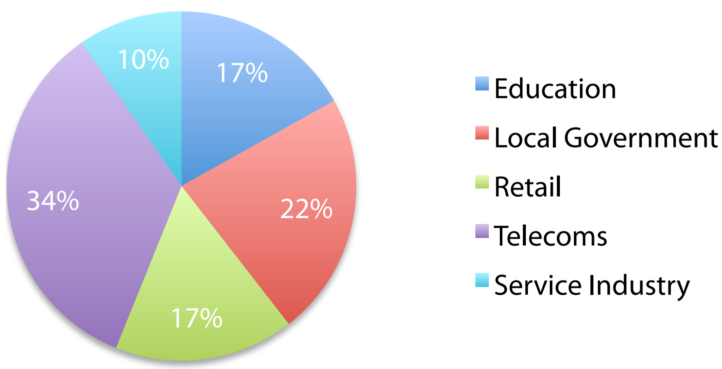

Figure 3.2: Pie chart illustrating the percentages of responses received according to the type of organisation.

3.4.2 Occupational health

Participants were asked if they knew where they could access their occupational health service: 19.6% did not know if such a service existed within their organisation and 12.1% reported their company did not offer any occupational health services. Where occupational health services existed, 18.8% reported access available on the work site, 25.7% had access to the service on another work site and 23.8% reported use of an outsourced service. The majority of the sample (65.7%) had never used or had contact with the occupational health service. Of the 1,141 employees who completed the questionnaire, 391 (34.3%) respondents had contact with occupational health and provided valid data related to their experiences with the service. Of these participants, 45.0% (n=176) were referred to occupational health by their managers, 32.2% (n=126) referred themselves, 20.7% (n=81) were contacted directly by occupational health and 2.1% (n=8) were advised by their GP to contact the service. The mean number of times these participants had used the service was 3.72±9.28 times.

In terms of the services and/or reasons that brought employees into contact with their occupational health department, the majority of respondents reported sickness absence monitoring (29.2%), additional workplace health screenings (26.6%) and musculoskeletal disorders and pain management (25.8%). The complete list of services and/or reasons for contact with the occupational health service is shown in Table 3.3. Stress management services only accounted for 14.6% of contact, although counselling services accounted for 16.1%, and some of the reasons for counselling could be associated with stress. The majority of respondents (from the 391 who had contact) rated their experience of engaging with occupational health services as good (37.3%), satisfactory (32.3%) or excellent (19.7%), with 10.7% rating their experience as poor.

Investigations into the promotion of health initiatives in the workplace revealed that 52.4% (n=575) of the respondents reported their organisation was promoting some sort of a health related initiative, or had done so in the past 12 months. However, 20.5% (n=225) of respondents were unsure whether any health related initiative had been promoted and 27.1% (n=298) reported that no health initiative was, or had been promoted in the past year. The most commonly reported health initiatives focused on increasing physical activity (24.3%), followed by mental health promotion activities (19.1%), health screenings (14.9%), information on illnesses and diseases (14.9%), smoking cessation (14.8%) and nutrition and healthy eating promotions (11.2%). Where these health initiatives were in operation, or had been so in the past 12 months, only 37.7% of employees (n=217) reported actually participating.

Table 3.3: The most common reasons reported by employees for contact with the occupational health service. Percentage scores calculated from the total number of participants who reported having contact with the department (n=391).

Services and/or reasons for contact	n	%
Sickness absence monitoring	114	29.2
Additional workplace health screening	104	26.6
Musculoskeletal disorders and pain management	101	25.8
Counselling	63	16.1
Accident/incident assessment and advice	60	15.4
Stress management	57	14.6
Work related illness/disease	46	11.8
Pre-employment health screening	46	11.8
Disability	39	10.0
Pregnancy	16	4.1
Information and advice for others	14	3.6
Physical activity initiatives	12	3.1
Other (post surgery advice, bullying, vaccinations)	16	4.1

Participants were asked to rate on a 5-point Likert scale (where 1 = strongly disagree and 5 = strongly agree) to what extent they agreed with 11 statements designed to assess the impact of the occupational health service. Table 3.4 demonstrates the statements with the highest percentages of participants strongly agreeing were: “I can count on a confidential consultation” and “OH is easily accessible”. The statements with the highest percentages of participants strongly disagreeing with were: “OH have benefitted my work performance”, “OH have led to improvements in my working situation” and “OH have benefitted my health”.

Table 3.4: Percentages of the responses from a Likert scale (where 1 = strongly disagree and 5 = strongly agree) to what extent participants agreed with statements designed to assess the accessibility and impact of the occupational health service (n=391) (OH=occupational health).

		Percentages (%)					
#	**Statement**	**Strongly disagree**	**Disagree**	**Neither**	**Agree**	**Strongly agree**	**Don't know/ N/A**
1	OH is easily accessible	6.6	10.1	12.5	25.9	42.4	2.5
2	I am well informed about OH	8.4	20.3	11.2	28.4	30.8	0.9
3	Reason to make an appointment are clear	10.8	21.6	12.2	29.1	24.4	1.9
4	I will contact OH for work related health complaint	11.2	14.8	12.6	24.3	34.8	2.3
5	I can count on a confidential consultation	7.3	7.3	15.1	19.8	46.3	4.2
6	OH have benefitted my health	13.0	10.3	31.3	19.6	23.0	2.8
7	OH have benefitted my work performance	14.1	11.9	41.1	12.1	17.3	3.5
8	OH have led to improvements in my working situation	13.8	12.5	38.3	15.5	16.2	3.7
9	Satisfied with OH provisions/services	8.6	10.3	21.8	27.1	29.3	2.9
10	I would advise colleagues to use OH	5.8	5.8	19.7	27.2	39.7	1.8
11	My manager is well informed of the OH services	6.1	8.7	23.5	20.9	35.7	5.1

Table 3.5 describes 4 themes that were developed from the qualitative components of the questionnaire investigating why employees did not participate in health initiatives that were offered in the workplace (n=358). Furthermore, qualitative data were also gathered from employees who participated in organisational health initiatives (n=217). The data collected included the positive elements of the health initiatives that encouraged these employees to get involved and possible suggestions and/or ideas for how the health initiatives could have been improved. The results from these responses were coded and grouped into 6 broad themes that are described in Table 3.6.

Table 3.5: Themes and examples of why employees did not participate in health initiatives that were offered in their workplace.

Themes	**Examples**
Initiative not applicable to participant	• Non-smoker not going to participate in smoking cessation initiatives • Already physically fit and active so no need to participate in activity information sessions • Using another service (e.g. GP information)
Practicality	• Not enough time for participation • Home or field worker – not fixed to one site where interventions take place • Cannot travel to participate in some initiatives • Cannot afford cost to participate (e.g. reduced price gym facilities)
Poorly executed initiative	• Poor quality services and/or information available • Initiatives were not fully supported by senior management • Issues with confidentiality reported
Not interested	• Do not want to be told what to do by employer • Lack of motivation or interest in changing established routine • Read the information but did not act on it

Table 3.6: Themes and examples of the factors employees have reported as good elements of health interventions and possible areas for improvement.

	Themes	Examples
Good elements	Employee health	• Directly related to helping maintain and/or improve the health of individuals (e.g. stop smoking, improve diet)
	Knowledge and awareness	• Increased awareness of health related facts • Provides health improvement ideas • Improves understanding of particular health topics and/or illnesses
	Workplace atmosphere	• Improved team relationships • Opportunities for team building activities • Creates a feeling that the organisation cares about its employees
Elements that could be improved	Improve accessibility	• Make initiatives available for staff at all sites • Run regularly at different times • Cover more topics
	Company cooperation	• Support actively shown from senior managers • Company allowing staff to participate
	Better resources	• Improve quality of information delivered • Targeted and relevant information that is easy to understand • Create more publicity and awareness of the initiative

3.4.3 Lifestyle and physical activity behaviours

In terms of lifestyle information, 12.7% (n=145) of the sample reported they smoked cigarettes. The mean number smoked per day was 12.6±6.5 cigarettes. In addition, 31.8% (n=363) of the respondents stated they had smoked cigarettes in the past. Of these 363 participants, the average length of time since they had quit smoking was 15 years 5 months (SD=11 years 5 months). The average number of units of alcohol consumed per week for the total sample was 7.6±8.8. However, the average number of units consumed per week by males was significantly higher at 8.6±10.9 compared to females at 5.4±6.4 units of alcohol ($p<0.001$).

Of the 1,141 employees who completed the questionnaire, 744 (65.2%) respondents stated they regularly engaged in physical activity and/or exercise during their leisure-time. Almost half (46.9%; n=349) of those who reported regularly engaging in physical activity indicated that each session typically lasted between 30–60 minutes. Likewise, 29.2% reported each session typically lasted over 60 minutes, 20.9% reported between 15–29 minutes and 3.0% participated in sessions that typically lasted for less than 15 minutes. The average number of physical activity sessions completed in a week by these respondents was 4.1±2.7 sessions. The most common types of physical activity reported were walking (28.8%) and gym based sessions (13.2%). The complete list of common types of physical activities reported by participants can be viewed in Table 3.7. A word cloud graphic was created to illustrate the common types of physical activities reported and can be viewed in Figure 3.3.

Table 3.7: The most common physical activities (comprising 93% of activities) reported by the employees who regularly engaged in physical activity.

Type of Physical Activity	Frequency	%	Type of Physical Activity	Frequency	%
Walking	433	28.8	Football	21	1.4
Gym	198	13.2	Yoga	20	1.3
Cycling	145	9.6	Martial arts	18	1.2
Swimming	131	8.7	Exercise classes	17	1.1
Running	115	7.6	Pilates	17	1.1
Aerobics	43	2.9	Tennis	17	1.1
Gardening	30	2	Weightlifting	17	1.1
Golf	29	1.9	Squash	15	1
Horse riding	27	1.8	Jogging	14	0.9
Badminton	25	1.7	Hockey	10	0.7
Dog walking	24	1.6	Nintendo Wii	10	0.7
Dancing	23	1.5			

Figure 3.3: Word cloud illustrating the common types of activities reported by participants. Words with larger font size signify a more common response than words in smaller font size.

To assess the intensity of the sessions, respondents who reported regularly engaging in physical activity were asked how many sessions caused sweating and/or shortness of breath; 32% reported all of their sessions, 26.5% stated no sessions, 21.1% indicated half or more than half of session and 20.3% reported less than half of their sessions. Even though 65.2% (n=744) of the respondents indicated they regularly engaged in physical activity, only 26.6% (n=198) of these participants actually met the recommended guidelines for physical activity at the time of data collection. Therefore, almost three quarters (73.4%) of the respondents who stated they regularly engaged in physical activity did not actually meet the activity recommendations. Individuals who were classified as meeting the physical activity guidelines (BMI=24.3 kg/m^2) had a lower mean BMI than those who were not meeting the guidelines (BMI=25.1 kg/m^2), although this difference was not significant (p=0.117). There were no significant differences between the proportions of individuals meeting physical activity guidelines across the organisational sectors.

All participants were asked to rate on a 5-point Likert scale (where 1 = strongly disagree and 5 = strongly agree) to what extent they agreed with 17 statements designed to assess the potential barriers to physical activity and/or exercise. Table 3.8 demonstrates the statements with the highest percentages of participants strongly agreeing with were: “I feel too tired after work to be active”, “I do not have enough free time to exercise” and “I cannot afford to exercise at the leisure facilities in my local area”. The statements with the highest percentages of participants strongly disagreeing with were: “I do not think that my health and wellbeing will benefit from exercise/physically activity” and “my health problems prevent me from exercising”.

Table 3.8: Percentages of the responses from a Likert scale (where 1 = strongly disagree and 5 = strongly agree) to what extent participants agreed with statements designed to assess the barriers to physical activity and/or exercise behaviours (n=1126).

		Percentages (%)				
#	**Statement**	**Strongly disagree**	**Disagree**	**Neither**	**Agree**	**Strongly agree**
1	I do not have enough free time to exercise	9.8	28.8	20.6	29.5	11.3
2	I do not feel safe enough to exercise in my local area	31.2	41.4	16.0	8.3	3.1
3	I do not like to get hot and sweaty	26.7	38.0	18.1	14.5	2.7
4	There are not enough available leisure/exercise facilities in my local area	19.9	45.4	18.5	13.1	3.1
5	I do not have enough will power to keep exercising regularly	13.9	27.9	17.7	32.4	8.1
6	I do not think that my health and wellbeing will benefit from exercise/physically activity	48.5	38.5	7.8	3.6	1.6
7	I worry about how I will look when I exercise	23.1	34.5	18.2	18.3	5.9
8	I do not enjoy exercising	20.9	36.9	20.4	16.8	5.0
9	I would exercise more if friends/family were willing to exercise with me	11.6	25.3	20.5	36.1	6.5
10	I cannot afford to exercise at the leisure facilities in my local area	15.0	33.5	18.8	22.0	10.7
11	I would be more physically active if I knew the most appropriate exercises/activities	13.3	30.2	24.4	27.0	5.1
12	My health problems prevent me from exercising	35.6	39.9	11.0	9.6	3.9
13	I worry about injuring myself or getting sore from exercising	29.2	44.3	14.6	10.1	1.8
14	I worry that I will not be able to maintain any increases in my physically activity levels	18.8	39.0	22.3	18.1	1.8
15	Lack of transport limits my exercise options	33.7	46.1	12.0	6.2	2.0
16	I feel too tired after work to be active	7.6	17.1	17.2	42.8	15.3
17	Physical activity takes too much time away from other commitments (work, family, etc.)	9.6	29.3	23.4	29.3	8.4

3.4.4 Stages of change

Of the 1,141 employees who completed the questionnaire, 1,098 (96.2%) provided valid data in response to the questions assessing satisfaction with their current physical activity and/or exercise levels. The majority of these respondents (63.8%) reported that they were not satisfied with their current levels of physical activity and/or exercise. Furthermore, 63.9% (n=702) of the sample also reported that they were planning to increase their levels compared to only 1.7% (n=19) of participants who wanted to reduce their levels of physical activity and/or exercise. Of the 702 participants who had a desire to increase their levels of physical activity and/or exercise, 74.7% (n=524) were planning to increase them within the next month, 20.1% (n=141) wanted to increase them within the next 6 months and 5.2% (n=37) wanted to increase their levels of physical activity and/or exercise, but had no current plans to do so.

Each respondent's stage of change was assessed using the questionnaire tools described in Section 3.3.2. Only 13.0% (n=143) of the respondents were identified as being in the action/maintenance stages. These participants were identified as those who were meeting the guidelines and were not planning to change their physical activity levels. Almost a third (32.0%) of the respondents (n=351) needed to make a change to increase their activity levels, but were not planning to do so (precontemplative). However, 13.0% (n=143) of the respondents needed to make a change to increase their activity levels, and were planning to do so within the next 6 months (contemplation). A further 42.0% (n=461) of participants also needed to make a change to increase their activity levels, but these participants had a desire to change their activity levels within the next month (preparation).

3.4.5 Physical activity initiatives at work

Of the 1,141 employees who completed the questionnaire, 1,119 (98.1%) provided valid data related to occupational activity initiatives. In terms of current physical activity health initiatives being promoted in the workplace, 32.9% of the sample reported there were no health related provisions available, 29.0% reported there were health related initiatives, but none focused on physical activity and 38.1% indicated there were physical activity health initiatives currently being promoted. Qualitative data were gathered where participants reported physical activity focused health initiatives were being promoted (n=426). An overwhelming 73.9% (n=315) of these respondents reported subsidised gym membership or gym facilities were available at the work site. Furthermore, a small number of employees also reported physical activity classes (7.0%) and running (4.9%) and walking (4.1%) groups were available via the organisation.

Participants were asked to rate on a 5-point Likert scale (where 1 = extremely unlikely and 5 = extremely likely) to what extent they would take part in 11 specific physical activity initiatives if they were offered at work. Table 3.9 demonstrates the statements with the highest percentages of participants extremely likely to participate in were: "health and fitness assessments", "flexible working hours to allow for physical activity" and "onsite facilities". The statements with the highest percentages of participants extremely unlikely to participate in were: "company bicycle pool" and "team based activity challenges"

Table 3.9: Percentages of the responses from a Likert scale (where 1 = extremely unlikely and 5 = extremely likely) to what extent participants agreed with statements designed to assess the appeal of specific physical activity initiatives if they were offered at work (n=1096) (PA=physical activity).

		Percentages (%)					
#	**Statement**	**Extremely unlikely**	**Fairly unlikely**	**Undecided/ Don't know**	**Fairly likely**	**Extremely likely**	**Already available/ NA**
1	Talks and presentations on PA	17.0	23.0	17.4	30.0	11.5	1.1
2	Access to weekly PA messages via email and/or bulletin boards	16.5	24.3	19.8	27.4	10.0	2.0
3	Onsite taster activity sessions run by health professionals	11.3	16.4	16.5	37.3	16.8	1.7
4	Health and fitness assessments	7.7	10.8	10.7	40.7	27.1	3.0
5	Lunch time activity groups	16.3	24.5	15.3	27.1	13.2	3.6
6	Specific sport or activity clubs	12.5	24.4	16.7	27.9	13.3	5.2
7	Onsite activity classes	13.8	19.6	15.5	28.6	17.3	5.2
8	Onsite facilities	13.8	19.0	12.4	28.3	20.9	5.6
9	Team based activity challenges	20.3	24.1	18.8	22.6	12.2	2.0
10	Flexible working hours to allow for PA before, during and after work	10.4	14.5	16.7	23.7	25.5	9.2
11	Company bicycle pool	23.8	24.0	19.2	16.2	14.3	2.5

3.4.6 Work Ability Index

Of the 1,141 employees who completed the questionnaire, 824 (72.2%) provided valid responses to the WAI. The WAI scores were calculated for each participant and the median score for the respondents was 37.0 (IQR=7.5), which indicated good work ability. However, this median score was at the lower end of the grouping classification and close to moderate (classifications: 7–27=poor; 28–36=moderate; 37–43=good; 44–49=excellent). In terms of each WAI grouping, nearly half (46.2%) of the 824 respondents were classified as having either poor (5.4%) or moderate work ability (40.8%). The remainder were classified as having good (38.7%) or excellent (15.1%) work ability. A Mann Whitney U test indicated that WAI scores for males (WAI=38.0) were significantly higher in comparison to females (WAI=37.0) (U=113,899, p=0.004). A Mann Whitney U test also demonstrated significantly higher WAI scores for individuals who met the physical activity guidelines (WAI=37.5) compared to respondents who did not meet the guidelines (WAI=37.0) (U=98,916, p=0.031).

The Kruskal-Wallis test revealed WAI varied significantly between the 3 BMI groups (χ^2=21.74, p<0.001). Post hoc analyses demonstrated WAI scores for the normal BMI group (WAI=38.0) were significantly higher than the overweight (WAI=36.5) (U=64,427, p<0.001) or obese (WAI=36.5) (U=33,422, p<0.001) BMI groups. A Kruskall-Wallis test revealed there were significant differences between the organisational sectors and WAI scores (χ^2=175.90, p<0.001). Post hoc analyses revealed WAI scores for respondents working in the service industry (WAI=34.0) were significantly lower than the education (WAI=39.0; U=4,011, p<0.001), retail (WAI=37.0; U=5,593, p<0.001) and telecoms (WAI=40.0; U=7,709, p<0.001) sectors. Furthermore, WAI scores for respondents working in local government (WAI=35.0) were also significantly lower than the education (U=10,776, p<0.001), retail (U=14,525, p=0.010) and telecoms (U=20,550, p<0.001) sectors.

3.4.7 Sitting time

Of the 1,141 employees who completed the questionnaire, 504 (44%) completed all aspects of the Domain Specific Sitting Time questionnaire for work day sitting. The median time reported sitting in each domain, along with total sitting time and sleep time reported on a work day are shown in Table 3.10. More time was reported sitting at work than in any other domain, with work time sitting accounting for more than half of the total daily sitting time on a work day (58.3%). Males reported significantly higher sitting times compared to females in the following domains: at work (U=23,826, p<0.001), using a PC at home (U=26,110, p=0.002) and total work day sitting time (U=24,913, p<0.001).

Table 3.10: Medians (IQR) of self-reported sitting times on a work day across each domain, along with total sitting times and sleep times for the sample as a whole, and by gender and BMI (n=504).

	Total sample	Gender		BMI		
		Males	Females	Normal	Overweight	Obese
Transport	60 (68)	60 (90)	60 (60)	60 (70)	60 (60)	60 (99)
Work	390 (240)	420 (180)	360 (300)	390 (300)	390 (240)	420 (180)
TV	120 (90)	120 (90)	120 (60)	90 (60)	120 (70)	120 (120)
PC at home	60 (75)	60 (90)	57.50 (60)	60 (75)	60 (50)	60 (90)
Other leisure	60 (90)	60 (90)	60 (120)	60 (90)	60 (65)	60 (120)
Total	**680 (290)**	**720 (285)**	**643 (334)**	**660 (288)**	**660 (315)**	**753 (273)**
Sleep	420 (90)	420 (60)	420 (60)	420 (60)	420 (90)	420 (116)

The Kruskal-Wallis test revealed sedentary time varied significantly between the three BMI groups in terms of time spent watching TV (χ^2=10.81, p=0.005), using a PC at home (χ^2=8.11, p=0.017), total sitting time reported on a work day (χ^2=17.19, p<0.001) and time spent sleeping (χ^2=6.83, p=0.033). Post hoc analyses revealed sitting times reported by individuals in the obese BMI group were significantly higher compared to the normal

BMI group in the following domains: watching TV (U=8,085, $p=0.002$), total sitting time (U=7,389, $p<0.001$) and sleeping time (U=8,475, $p=0.009$). The obese group also reported significantly higher sitting times than the overweight group in the following domains: using a PC at home (U=6,078, $p=0.004$) and total sitting time (U=5,655, $p<0.001$).

When investigating differences between the 4 WAI groups and sitting time, a Kruskall-Wallis test revealed that on a work day, sitting time varied significantly between the 4 WAI groups in 2 specific domains; transport ($\chi^2=18.02$, $p<0.001$) and PC at home ($\chi^2=8.22$, $p=0.042$). Post hoc analyses revealed sitting time using a PC at home was significantly higher for the poor (105 minutes) WAI group in comparison to the excellent WAI groups (30 minutes) (U=2,861, $p=0.003$). Sitting time during transport was significantly lower for those with excellent (50 minutes) WAI scores compared to those with poor (60 minutes) (U=2,411, $p=0.006$) and moderate (60 minutes) (U=2,934, $p=0.001$) WAI scores.

The median work day sitting time results for each domain and across each organisational sector are displayed in Figure 3.4. A Kruskall-Wallis test showed sitting time varied significantly between organisational sectors, in particular the domains of sitting at work ($\chi^2=131.14$, $p<0.001$) and during leisure-time ($\chi^2=38.41$, $p<0.001$). Post hoc analyses revealed sitting time at work reported by individuals employed within the retail sector were significantly lower than individuals working in the education (U=1,494, $p<0.001$), telecoms (U=1,571, $p<0.001$) and service industries (U=289, $p<0.001$). Employees working in local government reported significantly lower sitting times at work than those employed in the telecoms (U=3,418, $p<0.001$) and service industries (U=671, $p<0.001$). Moreover, leisure-time sitting reported by individuals within the retail sector were significantly lower than individuals working in the local government (U=1,102, $p=0.001$) and service industry (U=494, $p=0.001$) sectors.

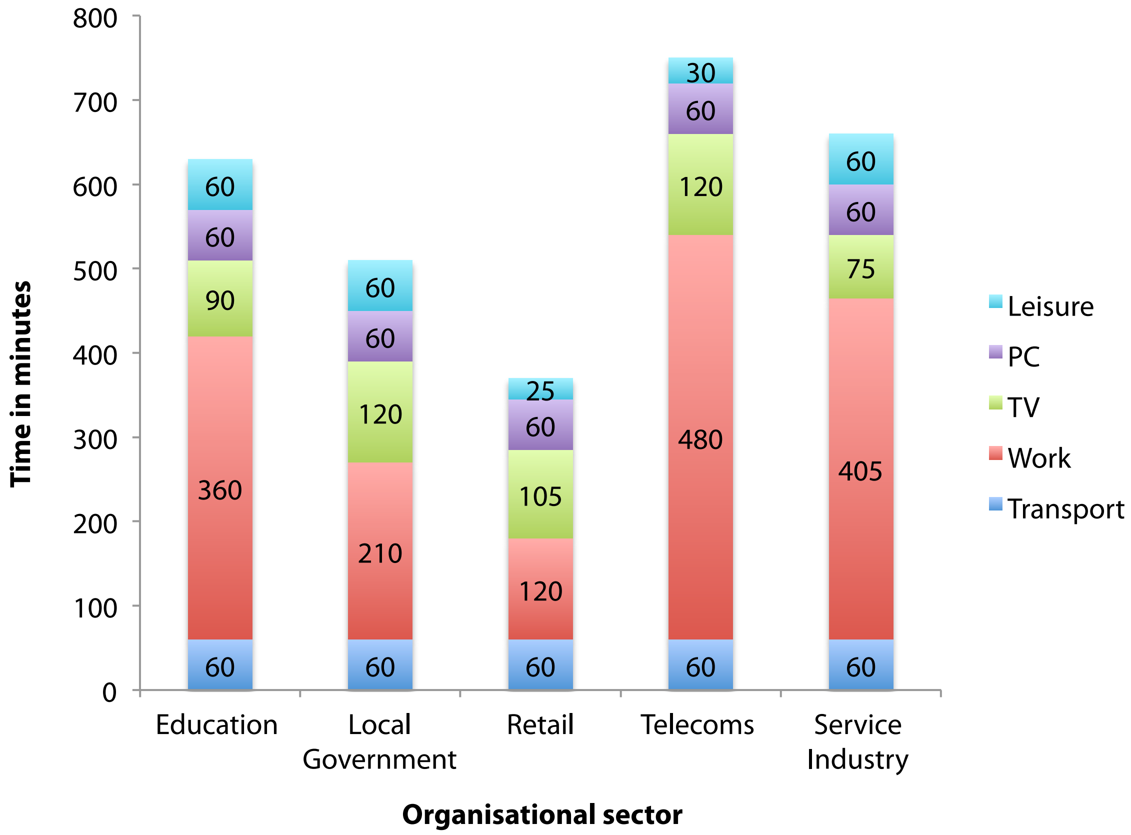

Figure 3.4: Bar chart displaying median sitting times reported on a work day in each domain across each organisational sector.

Of the 504 respondents who provided valid sitting time data for work days, 384 (76.2%) also provided valid sitting time data for non-work days. The proportions of time reported sitting in each domain, along with total sitting time and sleeping time reported on a work day and non-work day are displayed in Table 3.11. A Wilcoxon Signed Rank Test with the participants who provided valid sitting time data for both work days and non-work days (n=384) revealed statistically significant differences between sitting behaviours on both types of day. Individuals reported significantly higher total sitting times on a work day compared to a non-work day ($Z=-3.904$, $p<0.001$). When considering individual domains of sitting behaviour, participants reported higher sitting times on a non-work day for the following domains: watching TV ($Z=-14.68$, $p<0.001$), during leisure ($Z=-17.82$, $p=0.001$) and while sleeping ($Z=-10.89$, $p<0.001$). The only domain that had significantly higher sitting times reported on a work day compared to a non-work day was the domain of work ($Z=-3.73$, $p<0.001$).

Table 3.11: Medians (IQR) of self-reported sitting times on a work day and non-work day across each domain (n=384).

	Work day	Non-work day
Transport	60 (93)	60 (45)
Work	405 (240)	60 (120)
TV	120 (90)	178 (120)
PC at home	60 (64)	60 (79)
Other leisure	30 (60)	173 (180)
Total	**673 (294)**	**570 (360)**
Sleep	420 (90)	480 (90)

3.5 Discussion

3.5.1 Summary of key findings

The results from this study provide an insight into the physical activity behaviours of a sample of UK employees and their participation in occupational health initiatives. The results demonstrate that only a quarter of respondents who reported regularly engaging in physical activity/exercise actually met the physical activity guidelines (UK Department of Health, 2004). These findings are similar to the proportions of individuals meeting activity guidelines reported by the NHS Information Centre Lifestyles Statistics (2012a). The majority of individuals were not meeting the physical activity guidelines even though they reported regularly participating in activity behaviours. This indicates that even though some activity is better than none, individuals may not be aware that their levels of activity and/or exercise are not enough to meet the recommendations. Therefore, the results suggest using activity monitoring tools may help individuals measure sessions of exercise and/or activity and calculate whether they are physically active enough.

The common barriers to performing physical activity were individuals feeling too tired after work to be active, not having enough free time and not being able to afford using leisure facilities in the local area. These are similar to barriers that have been reported in previous research (Booth et al., 2006). Therefore, the results suggest that encouraging individuals to be more active through walking may address these common barriers. Moreover, focusing on walking will mean free and sustainable physical activity that can still provide health benefits (Baker et al., 2008; Batty et al., 2010; Oja et al., 1998).

The results also provided an insight into what specific factors employees would like included in new health interventions. Health assessments would provide personal feedback, allowing flexible working would make any new initiative more accessible and onsite facilities would provide employees with the opportunity to be active during working hours. All these factors are related to individual behaviour changes and tailoring intervention components and feedback to each individual (Ogilvie et al., 2007; Sherwood & Jeffery, 2000). Future interventions may wish to include these components as part of a successful health initiative. Furthermore, the tool to measure respondents' stage of change through the questionnaire provided some useful indication of what stage each employee was in. The different constructs identified highlighted the potential for classifying what stage each individual was in and understanding these individual differences when trying to deliver health related information (Kirk et al., 2004; Titze et al., 2001; Whysall, 2006).

Over half of the respondents reported they either wanted to be more physically active in the next six months (contemplative) or were planning to be more active in the next month (preparation). Therefore, a large proportion of the sample had a desire to be more physically active. These individuals could potentially benefit from practical physical activity information to change their self-efficacy (Marcus et al., 1992), decisional balance (Callaghan et al., 2010) and habit strength (Perz et al., 1996) related to physical behaviour and health related outcomes (Jordan et al., 2002). However, the results from this cross-sectional survey do not provide us with evidence of whether those in the contemplative or preparation stages acted on their desire or intentions to change their behaviour. It could be reasonable to assume individuals in these stages have always had some desire to be more active, but remain in the contemplative or preparation stages because they do not actually take any action to change their behaviour. A longitudinal investigation may be able to assess changes in stage of change and compare these to any behaviour related changes.

Almost a quarter of all occupational health initiatives reported by the employees in this sample were focused on improving physical activity levels, in comparison to only 11% that were focused on nutrition and healthy eating. Therefore results from this exploratory questionnaire indicate that physical activity initiatives are more common in organisations than nutrition initiatives. This may be because focusing on one health behaviour leads to positive changes in other health behaviours (Dunn et al., 1998; Jakicic, 2002). Additionally, initiatives to promote physical activity, such as encouraging individuals to walk more are easier to promote and implement than providing individuals with nutritional information or advice related to calorie consumption. However, the physical activity initiatives offered were mostly subsidised gym membership, which the majority of respondents did not participate in. The qualitative results demonstrate employees' value health interventions because they feel it increases one's awareness and knowledge of health related factors. However, responses suggest that health interventions are often not applicable or not accessible by individuals, and they do not receive the correct support from management, which ultimately affects employee participation. Furthermore, physical activity and sitting time levels reported from this sample indicate there is still potential for approaches that will have a positive impact on changing employee behaviours related to activity in the workplace.

Only a third of the sample reported having any contact with the occupational health service and the most common reasons reported were for sickness absence monitoring, additional workplace screenings and musculoskeletal disorders and/or pain management. Of the employees who had contact with the occupational health service, only 10% reported their experience as poor, with the rest reporting their service as satisfactory, good or excellent. Even though stress is one of the most common reasons reported for sickness absence and ill-health in the UK (UK Health & Safety Executive, 2012; Marmot, Feeney, Shipley, North, & Syme, 1995; UK Department of Health, 2009), it was not one of the major reasons for contact with occupational health reported from this sample. Sickness absence monitoring is a generic term and could cover both stress and musculoskeletal disorders. However, the results may also suggest that some employees were absent from work because of stress, but were having no contact with their occupational health service during this time, or they did not accurately identify the cause for the absence. Further research could investigate sickness reporting and its relation to occupational health.

Individuals who met the physical activity guidelines reported higher work ability than those employees who did not meet the guidelines. Furthermore, individuals classified in the normal weight BMI category reported higher work ability than employees classified in either overweight or obese BMI categories. This demonstrates a potential relationship between physical activity and health affecting employees capability to manage work demands and perform work duties. Research has demonstrated employees engaged in physical activity report greater enjoyment of work, increased concentration and mental alertness, which improves the outputs for the organisation (Blake & Lee, 2007). Furthermore, those classified as having poor work ability also reported higher sitting times for the domains of transport and using a computer at home compared to those with excellent work ability scores. Therefore, these results demonstrate the potential that increasing physically activity and reducing sedentary time could have on benefits for the employees in terms of improving work ability and psychological wellbeing, and ultimately benefiting the organisation (BHFNC, 2009).

Over half of the time reportedly spent sitting on a work day was accumulated at work. These findings agree with research that indicates work is not only a major contributor to the lack of occupational physical activity, but is now a major contributor to sitting time behaviours (Sherwood & Jeffery, 2000). The sitting time results from this research are consistent with sitting time prevalence in previous research with UK and Australian workers (Clemes et al., 2012; Miller & Brown, 2004). This may well be an indication of sitting time prevalence in most developed nations. Chronic energy imbalance from individuals who are sedentary for longer is likely to contribute to fat accumulation and weight gain (Brown et al. 2005). The results for individuals in the obese BMI category showed significantly higher total work day sitting and sleeping times compared to those individuals in the normal or overweight BMI categories. There is growing evidence that total sitting time is more closely related to BMI than total time spent in physical activity behaviours (Helmink et al. 2011; Santos et al. 2010). This is important because obesity is a leading risk factor for several chronic health conditions and premature mortality (Wilmot et al., 2012). These findings are consistent with previous research that reported increased sitting time has been associated with increased risk of obesity, type 2 diabetes and cardiovascular disease (Gierach et al. 2009; Hamilton et al. 2007; Hu et al. 2003b; Wilmot et al. 2012).

Organisational sector had an impact on the amount of sitting time accumulated for individuals. Employees working in the retail sector or local government reported significantly lower sitting times than those employed in the telecoms or service industry sectors. The telecoms or service industry sectors were characterised by office workers. Research has demonstrated that occupational physical activity is associated with reduced risks of developing chronic illnesses independent of leisure-time physical activity levels (Probert et al., 2008). Reducing sitting time at work is vital as the effects of high amounts of sitting at work cannot be compensated for by leisure-time physical activity, even if levels exceed activity guidelines (Katzmarzyk et al., 2009). Therefore, physical activity promotion interventions may have a more significant impact if implemented within office type workforces with sedentary job roles, such as those in the telecoms and service industry sectors.

3.5.2 Strengths, limitations and suggestions for future research

This research offers a unique investigation into self-reported physical activity, sitting behaviours and occupational health experiences of employees in a sample of the UK workforce. The study has recruited a substantial number of respondents from a variety of organisations in both the public and private sectors. The investigation was conducted by an independent group of researchers not affiliated with the organisations involved. This offered advantages to employees because they may have been more willing to participate knowing the data were confidential, information was objective and any outcomes would not directly affect their job roles.

Several important limitations must be considered when evaluating the findings of this study. The research involved asking participants to self-report their physical activity behaviours and the amount of time they spent in physical activity and/or exercise sessions. These self-report questions mean that self-recall estimation errors may exist. Furthermore, classifying those who met or did not meet the physical activity guidelines based on responses to a number of basic questions was a crude method to divide individuals. Participants were also asked to estimate the amount of time they spent sitting and sleeping, which could also be affected by self-recall estimation errors. However, previous research has shown that time spent in habitual activities such as travelling (to and from work) and at work are more accurately recalled than time spent in less structured behaviours, such as leisure activities (Marshall et al., 2010). Nevertheless, given that less than half of the sample provided valid sitting time estimations for a typical work day demonstrates the challenges for individuals to recall this information. In fact, self-reported physical activity may offer more accurate recall than sitting times, because activity sessions occur less often and are probably more memorable. The researcher was unable to obtain objective measures of height and weight to calculate BMI, and participants were asked to self-report these variables. Research has found that weight is likely to be underestimated, especially when reported by women (Wen & Kowaleski-Jones, 2012). Future research may wish to adopt objective measures of height, weight, physical activity and sitting time. Nevertheless, this research study still provides a useful insight into physical activity behaviours, employee experiences with occupational health interventions and sitting time prevalence in the workplace.

3.5.3 Conclusions

The results from this study show that large proportions of the UK workforce are not meeting the physical activity guidelines, and individuals are accumulating the majority of their sitting time behaviour on a daily basis at work. There are many challenges for the future of physical activity at a public health level and the focus of occupational and lifestyle physical activity interventions should include efforts to reduce total time spent in sedentary activities. The results suggest there may be scope to develop workplace interventions to target increasing physical activity behaviours at work. Specific occupational interventions that promote increased walking and reduced sedentary time, which include a tailored component to delivering health information and individual feedback, could be best placed to motivate employees to change their physical activity behaviours. This offers potential benefits for both organisations and society. This chapter has explored employees' opinions of physical activity interventions in the workplace and their use of occupational health services. The following chapter will explore opinions on health promotion campaigns from the occupational health perspective.

Chapter 4

Identification of current occupational health strategies

4.1 Introduction

This chapter details the results of a qualitative phase in this research project. Interviews and focus groups were conducted in order to explore current occupational health strategies and the barriers and facilitators to implementing new health initiatives. Whilst the literature review provided valuable evidence of previous health interventions, this qualitative investigation was necessary to provide detailed feedback from important occupational health stakeholders. This type of investigation can offer real insight into why some strategies are more successful than others in delivering health initiatives, or provide ideas of how to target the most unhealthy or inactive employees. Semi-structured interview and focus group schedules were developed which included questions that were organised into a number of topics including: occupational health feedback; absence management approach; health promotion initiatives; considerations for future interventions; and physical activity interventions. This chapter presents the results from the thematic analysis and discusses the key findings and implications.

4.2 Research design and aims

The aim of this phase of the research was to obtain qualitative data from occupational health stakeholders in different organisations and job roles about their experiences of occupational health service delivery, and their feedback regarding workplace health interventions. The findings would contribute towards the development and design of health focused physical activity interventions in the workplace. A qualitative approach was chosen because it allowed for a detailed and in-depth examination compared to other research methods. Interviews and focus groups were selected in combination as they allowed sampling a large number of participants. The semi-structured qualitative data collection method offers standardisation in terms of the questions and topics discussed. This approach also provides a degree of flexibility to investigate responses by asking additional questions. With this in mind, this phase of the research offers generalisations about participant experiences and examines responses in terms of developing recommendations for future research phases. Specifically, the research objectives were to:

1) Identify occupational health strategies and best practice used to maintain the health and workability of employees
2) Explore the barriers and facilitators to delivering occupational health services
3) Investigate health promotion initiatives the stakeholders involved in managing employee health would like to see introduced
4) Examine the potential of implementing physical activity initiatives in the workplace

4.3 Method

4.3.1 Interview and focus group schedule development

To develop the interview and focus group schedules, the aims of this phase of the research were first outlined to help identify what topics of discussion and types of questions should be included. The semi-structured interview and focus group schedules were developed based on the information in the literature and in consultation with various stakeholders involved in the research. The first draft of the interview schedule was reviewed by three academics experienced in qualitative research, and two individuals working in the occupational health/medicine industry. The second draft was piloted on an occupational health advisor working at Loughborough University. A number of minor revisions were made which included removing or combining similar questions that produced duplicate answers. Prompts were also added to assist the interviewer to stimulate in-depth discussion for particular responses. A senior researcher inspected the final draft of the interview schedule before data collection commenced.

The final version of the interview schedule was divided into five sections and can be viewed in Appendix 4.1.

The first draft of the focus group schedule was designed by using questions from the interview schedule, which the researcher thought would benefit from a more detailed discussion. In particular, question selection was based on investigating the implementation of health initiatives. The first draft of the focus group schedule was reviewed by two of the academics that reviewed the drafts of the interview schedule. In response to the verbal feedback received, questions to gather feedback on the implementation of physical activity interventions, including organisational specific barriers or facilitators were added. The final version of the focus group schedule was divided into three sections and can be viewed in Appendix 4.2.

4.3.2 Sampling

Participants recruited for the interviews included individuals working within the occupational health field (e.g. occupational health advisors, managers, consultants, etc.) and other organisational stakeholders with experience of managing or implementing health initiatives (e.g. wellbeing experts, health promotion specialists, human resource managers, health and safety specialists, etc.). The research employed a convenience sampling technique for the interviews and the interviewees self-selected themselves to participate in the study. The research also recruited one of the largest occupational health service providers in the UK, who agreed to allow their occupational health advisors to participate in two focus groups. Twice a year, the organisation holds a group meeting with all of its occupational health advisors who are based in work sites around the UK. Attending one of these meetings was an efficient method to collect feedback from a large sample of occupational health advisors. The organisation offered a ninety-minute slot to conduct two focus group discussions.

4.3.3 Procedure

For the interviews, an invitation to participate was initially emailed to individual contacts that fulfilled the sampling criteria. This invitation contained an information leaflet which included details about the overall research aims and stages involved, the specific aims of this phase of the research in particular and the type of participants and information required from potential interviewees. The individuals who were initially contacted were associates and previous participants identified from the researchers involved in the Working Late research study. An Internet search was also carried out to identify potential participants from new organisations. These individuals were from occupational health providers and organisations that had experience of implementing health interventions. The invitation to participate was also emailed via a forum newsletter to members of the Society of Occupational Medicine. Interviews were conducted both in person and over the telephone and were determined by the availability and logistical constraints of both the interviewer and interviewee.

For the two focus groups that were being conducted with employees from the occupational health service provider, an information leaflet was distributed to employees one week before the meeting, which contained details about the research aims, the information required from participants and points for employees to consider in preparation for the focus group discussions. These key points were related to their experiences of physical activity interventions in the organisations where they have provided occupational health services.

The focus group meeting was split into two sessions because the organisation requested some variety to the discussions, rather than having two completely separate ninety-minute conversations. The first half of the meeting included all twenty-one employees from the occupational health service provider and contained a fifteen-minute Microsoft PowerPoint presentation about the aims of this research. Following the presentation, there was a thirty-minute group discussion. Participants were asked to discuss their experiences of past health promotion initiatives, including their opinions about what made initiatives successful and/or what could have been improved in these previous interventions, and what kinds of interventions they would like to see introduced in the future.

Following this single group discussion, the occupational health advisors were then split into two separate focus groups in order to have a more detailed forty-five minute discussion about specific physical activity promotion interventions, such as incidental activity, exercise at work sessions, active commuting and pedometer based interventions. During these two focus groups, participants were asked to discuss: the practicality and feasibility of delivering these interventions in the workplace; the requirements and provisions necessary to implement them; the barriers, limitations and facilitators; methods to gain managerial support and employee participation.

Prior to the interviews and focus groups, participants were informed the discussions would be audio recorded for transcription and analysis. Participants were reassured data would remain confidential. Interviewees and focus group participants were requested to provide verbal consent. No incentive was offered to any of the participants.

4.3.4 Data management and analysis

The audio-recorded interviews and focus groups were transcribed verbatim and were analysed simultaneously using thematic analysis by the sorting of material into emergent themes using the method described by Knodel (1993). This method includes stages to identify key themes from the discussions that contributed to a framework of overall themes. First, it is predicted that recollections from interview and focus group data is likely to be selective and partial so the researcher became familiar with the data by reading the transcripts and studying observational notes. Secondly, conceptual observations about the data were made. This included noting down recurrent themes, summaries, explanations and responses to the questions posed by the researcher so that a thematic framework could be developed. Thirdly, similar themes and codes from all interview and focus group transcripts were clustered together and indexed. Any themes that were less important for this research or non-clustered were dropped at this stage. Finally, meaningful conclusions from the overall themes and clusters were interpreted at which the key objectives of the qualitative analysis were addressed. In total, a set of three key overall themes emerged from the analysis identifying barriers and facilitators to the occupational health service and health interventions.

Following the coding of the interview data by the first researcher, a second researcher also trained in qualitative data analysis coded the raw data and derived themes from sections of the text. The secondary analysis also combined the results from the interviews and focus groups in a similar way to the primary analysis. The two sets of data analysis were compared where three new sub-codes were generated that formed part of the overall themes set by the original analyses. This additional analysis to identify inter-rater reliability is a recommended component of qualitative research. There were significant overlaps in the feedback received from both sets of interview and focus group participants. Therefore, the results for both types of qualitative investigations are presented together. The findings are fully summarised along with anonymous quotes to illustrate the theme being described in Section 4.4.

4.4 Results

4.4.1 Participant characteristics

Thirty-four individuals took part in 32 interviews. Two interviews were each conducted with 2 individuals who were in similar roles within their organisations. These pairs of participants requested to be interviewed together because they felt they would share the same experiences based on their similar job roles. Eighteen participants were working within the occupational health field (11=occupational health advisors, 4=occupational health managers, 3=occupational health consultants) and 16 participants were other organisational stakeholders with experience of managing or implementing health initiatives (5=wellbeing experts, 3=health promotion specialists, 6=human resource managers, 2=health and safety specialists). Twenty-one employees from the occupational health service provider participated in the two focus group discussions. Eighteen participants were occupational health advisors with nursing backgrounds and 3 employees were part of the management team. Table 4.1 highlights the themes and sub-themes extracted from the interviews and focus groups.

Table 4.1: Themes from occupational health stakeholder interviews and focus groups.

Sub-themes	Summary of themes
Theme 1: Delivery of the occupational health service	
Service performance	• Focus on tertiary health management rather than primary health promotion due to lack of time and resources • Challenges to communicate services effectively • Budget constraints due to limited management support
Theme 2: Experiences with health interventions	
Effective components	• Typical health interventions included smoking cessation, musculoskeletal, alcohol and drug abuse information • Effective initiatives are ones that encourage incidental activity • Poster placement is important for promotion
Employee support	• Lack of employee engagement due to ineffective strategies used to promote or communicate the interventions • Consulting employees directly ensures genuine impact
Management support	• Reluctance to support initiatives due to indirect benefits • Support has declined because of the economic climate
Organisational culture	• Employees do not want to appear to be taking time off work • Staying at your desks makes you appear more productive
Team based activities	• Team activities and competitions encourage participation • Incentives may encourage those who are most in need of participating in health initiatives
Health screenings	• Demonstrate potential benefits of a health intervention to employers and employees
Tailored feedback	• Tailored and relevant feedback increases knowledge about health related information
Theme 3: Specific physical activity interventions	
Incidental activity	• Increasing walking at work is a commonly used initiative • Difficult to implement in manufacturing workplaces
Exercise at work	• Exercise classes are not appropriate for employees who work shifts as timing of classes can be discriminatory
Active commuting	• Irregular shift work creates safety issues for employees • Increased commitment due to extra time and planning required
Pedometer interventions	• Can be demotivating if inaccurate pedometers are used • Inappropriate in jobs with high amounts of physical activity
Recommendations	• Active commuting promoted by company car park exchanges • Warm up (stretching) training for employees in manual roles • Using media to promote health messages

4.4.2 Theme 1: Delivery of the occupational health service

Participants were asked for their opinions and experiences of the organisations occupational health service and its provisions for managing employee health related issues. A number of common themes became apparent which could function as barriers and facilitators to the service.

4.4.2.1 Service performance

Interviewees and focus group participants discussed a variety of different issues that were related to the practical aspects of delivering a good occupational health service to employees. Occupational health staff reported being responsible for a large number of employees with diverse job roles, which meant they only had enough time to focus on reactive health issues that were of direct concern to the organisation. Health promotion activities were non-existent because advisors were too busy dealing with existing employee issues:

> *"In my branch that I am responsible for, we have got about 650 [employees]…I just do not have the time. I am lucky if I get out on the shop floor to do a workplace assessment, there is just too much to do."*

Moreover, participants recognised that free health promotion activities from external organisations could be received by permitting these organisations to promote their business services to employees. However, they were even struggling to find the time to organise these types of events. Lack of time was said to impact the amount and frequency of contact occupational health staff had with employees, which affected the quality of service at an individual level:

> *"We are trying to keep our waiting times down. So we have looked at ways of working to reduce waiting times, because it is not good…if you have had a long-*

term sickness and you wanted to come back to work, that you manage to put the referral in and you have got to wait a further 3 weeks."

A related practical problem was that occupational health workers were unable to successfully communicate their services to employees across the organisation. Participants reported that this lack of information contributed to poor knowledge of occupational health services and increased communication barriers between various organisational stakeholders:

"One of the biggest things we have is actually communicating that we are there and we are available…I think the majority of them [employees and managers] do not know we exist."

Another issue that determined the level of service employees received was organisational budgets and departmental funding. Budget restrictions meant that some employees reported changing the way they had team meetings. For example, instead of face-to-face meetings with colleagues, they started to use video-conferencing facilities to save money on travel costs. Furthermore, managers reported health treatments for employees that were paid for through their own budgets were reluctant to support additional interventions due to the potential costs associated with new programmes. Employees were also reported as being unwilling to pay for or unable to afford participation in additional occupational health services:

"If I refer one of my members of staff to them [occupational health], chances are that there is going to be a cost coming to me…It puts off managers referring people unless they have to, because of the cost involved in it. Unless they are charging the case [to the company], then the cost is largely absorbed, but I do not think it is all absorbed. Then we are limited because of the time."

"There is certainly something that has come around in the post recently from [company name] about having a health and wellbeing check, which is all very well until you read that it costs £150."

It was reported that because occupational health initiatives had an indirect return on investment, employers and organisations were unlikely to provide support for any additional health activities. Managers reportedly referred to occupational health as a cost to them, rather than an investment for their workforce. Furthermore, the challenging economic climate created even more budget constraints for organisations:

> *"At the moment in the present economic climate there is not an immediate visible financial return for doing health promotion…we have a lot of enquiries about how can we do the same thing cheaper…I mean we have just had our budget halved."*

4.4.3 Theme 2: Experiences with health interventions

The overwhelming majority of participants had significant quantities of previous experience with delivering health promotion initiatives. Most of these initiatives were reactive and addressed common health problems specific to the organisation. Examples included smoking cessation, musculoskeletal disorders (e.g. back pain) and alcohol and drug abuse information leaflets. Some of the participants also discussed their experiences with primary prevention type health promotion initiatives, which included promoting walking and physical activity:

> *"The occupational health team developed maps of the work, the land that the organisation was on and where people could go on walking trips during their lunch hour. You had a health assessment when you started, so it was a general assessment of your health, what sort of things you did, what your lifestyle was like. Then you were given a pedometer and encouraged to do physical activity."*

> *"I have done things like getting people to take the stairs and not the lift by putting posters in there and also having screensavers for people to get up and walk around and do some different exercises, especially the ones who are stuck in front of a screen all day."*

4.4.3.1 Effective components of a health initiative

Participants were asked to discuss the factors and facilitators that they believed contributed to successful health interventions. Interviewees and focus group participants reported that for new interventions to be successful, they needed to be easy to introduce as part of an employees normal working and home life. They recognised that job roles were becoming more complicated, workforces were becoming cross-functional and work loads were increasing. Therefore, for health interventions to be successfully implemented through these changing times, requirements and targets needed to be easily attainable:

> *"I think it has to be made as an integral part of the day, in their working day, their home, and [create] regular interest…If you say something is happening in the same building which does not involve going outside, then that is more likely to happen. So stretching and the like."*

One example of a method to promote physical activity in the workplace commonly cited was focused on changing the office environment to encourage walking. Another example reported by occupational experts was to provide employees with information on exercises they could do at their desks. Desk based exercises were reported to be popular because they involved little effort and also helped to reduce the affects of prolonged sitting, such as back pain and musculoskeletal disorders:

> *"Placing photocopiers every other end, a very simple thing, that. Placing photocopiers much further away, so that people had to walk upstairs to photocopy."*

> *"Exercises you can do at your desk. It means you have to offer people things that are very practical, very sensible, they can do them now…move my legs up and down, that is probably more than I have done for a long time."*

Participants also reported interventions that were easy to implement and promote within the organisation were most likely to be successful in the long-term. Many participants recommended using technology to deliver health messages through emails and information on the company Intranet pages. Using technology enabled organisations to regularly provide their employees across different work sites and in different departments with consistent information:

> *"I have sent an email out saying you know, the weather is going to be great…the benefits of walking more or those kinds of things. So we will send a weekly email out like that to keep the momentum going."*

The most common promotion strategy recommended by the respondents was using posters. However, poster placement was reported as being vital to whether employees were likely to read the information. One particular example provided was to place posters in the washrooms:

> *"We had a guy that seen a poster in the toilets, went home, had a play, found a lump, and he had testicular cancer, got fully cured. We saved a person there."*

4.4.3.2 Employee engagement and support

One of the major barriers reported by all participants was the lack of engagement in health initiatives from employees. If employees were not going to take part then any initiative would stop being offered. Participants revealed employees who needed to be more physically active or healthier by taking part in health initiatives were most likely not to take part. Employees who engaged with health initiatives were often those who were healthy already:

> *"Their [employee] engagement is key and if you do not get the engagement of the core, critical mass, then it is not going to work."*

"Sometimes, with things like that [activity interventions], we have found that those who join up for schemes like that are those that normally go to the gym anyway."

Other participants reported that individual employees were aware of their own behaviours and understood whether they needed to be more active or eat healthier foods. The participants suggested these employees were just not motivated or interested to do so. Furthermore, it was suggested that employees often felt as though health promotion initiatives were public relations activities for the organisation, rather than actually having a beneficial impact on employee health:

"Where we did the health promotion week, that was good, but I think it is still seen as a bit of a nice thing to do if you can, not that it is going to have any real impact."

Participants attributed the lack of engagement to poor quality tools used to motivate or encourage employees to participate in health initiatives. Although emails were seen as a convenient approach to target a large number of people, this method was reported as being ineffective because it was easily ignored. Moreover, participants stated poster prompts were also usually placed in locations where employees were unable to read the information. Some participants reported that employees did not engage with the health initiatives because they did not want their employer to tell them what to do:

"I think, especially at the moment, if the [health] programmes are just put out as emails, people are aware of it, but they will not really take that much notice."

"They [posters] probably do not prompt it. I guess very few people actually see the poster and then just walk up the stairs. People do not like to think they are being told what to do. I certainly don't. They might even take the lift instead, just because."

Organisational stakeholders, such as human resource managers reported that for interventions to have a genuine impact on the workforce and encourage participation, they needed to be relevant to employees at an individual level. These participants reported organisations should investigate the common reasons for sickness absence and ill-health, and provide initiatives with the aim of reducing or preventing these complaints:

> *"Trying to run interventions which have a relevance, so where there are a lot of musculoskeletal disorders, having something like a back care clinic."*

> *"We are trying to do a mixture between the preventative things, rather than people coming to us just when they have got something wrong with them."*

Other participants suggested that consulting the workforce at an employee level to identify what they would like to see implemented is likely to have a more successful impact on participation:

> *"The key thing is to actually gauge interest first and to say, if we were to offer XYZ, would you actually be interested in being involved, and then go with it. So I think you have got to do your homework first because you do not want it to fall flat on its face before it takes off."*

Respondents also reported that shifting the focus of an intervention from a health promotion activity to another unrelated initiative could attract employees who would not normally participate:

> *"If you give the walk a theme, say history or nature, and you have someone being informative as they lead the walk, then suddenly you have a bit of interest. I think that activity is the thing, but I do not think a lot people's eyes light up at the thought of doing more physical activity."*

4.4.3.3 Management support

There were several occupational health advisors and organisational stakeholders who reported their organisations did not implement any health promotion initiatives. Instead, these participants reported their organisational strategy was to focus on absence management issues. Some respondents even suggested that in organisations where health promotion was acceptable, occupational health departments were not able to provide beneficial information on primary prevention techniques to the workforce:

> *"As an organisation, [company name] has not got their head around occupational health in the UK. Really for an organisation of the size it is…the occupational health practitioners do not have enough education in terms of how they could intervene and deliver strategic primary interventions. I think there is not enough education given to preventative strategies. I think all along it has been a case of crisis management."*

Management and organisational support was another factor highlighted as a potential barrier and facilitator for a successful intervention. Participants discussed the difficulties of gaining management support due to the lack of direct research evidence illustrating the benefits to the organisation's bottom-line:

> *"It is getting buy-in from the top by showing it as a cost effective way of doing things, because it is going to help minimise musculoskeletal problems."*

Participants suggested there needed to be commitment from senior management level and this commitment included understanding job roles may need to become more flexible. Furthermore, organisations promoting initiatives such as active commuting needed to put in place solutions to support this message, such as showers, changing rooms and bicycle storage facilities:

> *"We encourage cycling, but we have still got buildings where there is nowhere safe to park a bike, and there is nowhere to get changed…where is the consistency in message? Saying to people, get off the bus two or three stops earlier and walk…if there is not anywhere for people to get changed…you are not being truthful with that."*

Participants reported the costs and time involved with starting, running and maintaining a health promotion initiative acted as a barrier to it being implemented within an organisation. Due to the indirect economic returns associated with health promotion initiatives, any intervention was required to be sold as a business case in order to get management support, funding or budget allocation:

> *"It is all in why are we doing it? What do we want to get from it? What are the costs involved? What is the resource involved? And then selling it as to why it is relevant to their business…it is very much focusing on the financials, rather than the health aspects, but that is the business language that managers understand."*

It was clear the economic conditions had affected current health promotion activities because some participants reported having initiatives cancelled. These decisions were taken by management in order to reduce the costs associated with the occupational health services that were not seen as essential to the day-to-day running of the business:

> *"The plug was pulled on managing back pain and understanding musculoskeletal activities programme because the warehouse operations had decided to cut the nightshift. It was said, oh, they [employees] will be far too worried about that than wanting to know about their backs. I did make the point that there is this really big link between back pain or muscular pain and stress and this would be an excellent time to do it. They don't want to know."*

4.4.3.4 Organisational culture

Lack of time (perceived or real) for regular physical activity was a common barrier to a successful intervention cited by most respondents. Individuals reported employees either did not have time, or did not think they had enough time to participate in health activities at work because of short break times:

> *"Going to walk around the building is a really great idea, but you do not have time to take your lunch break in the first place, or you do not feel like you have."*

> *"With the shift pattern, you only get 20 minutes lunch break. That 20 minutes is enough time to go to toilet, have their butties, go out for a cigarette, or a little chat with your mate, and you are back going again."*

The organisational culture was such that employees did not want to appear to be taking time off their working day for activities that were unrelated to their job roles. Furthermore, it was reported that organisational culture has now developed into believing employees are most productive when they are spending large amounts of time working at their desks:

> *"Everybody is encouraged to spend the least time that they can, away from their desks which is of course the opposite effect of what you are trying to achieve…it is bad form to give yourself too much time doing other stuff."*

> *"There used to be a small group of people who would go for a walk at lunch time and they were looked upon as being odd, funnily enough."*

Initiatives in the workplace where employees were allowed to participate during work time were said to be more successful than if employees needed to use their break time. The health professionals recognised that the employees who needed targeting with health promotion initiatives were usually those individuals who were the most difficult to engage:

> *"The question for me is what has stopped them [employees] doing it before? If we are not catching them with everything that is put out there, the shock tactics and everything else, I am a little bit confused about how we are going to pull them in when we have done those health promotion things before. I am talking about health promotion but I actually find that I am a bit stuck now about how you engage people."*

Focus group participants reported that there is a change in culture that needs to occur. This change is required not only in organisations, but in society as a whole, for people to truly believe that physical activity will have a beneficial impact on their lives, both at home and at work:

> *"It is about getting people to take the responsibility for making their choices… You have got recycling for instance, where a lot of people who recycle now would never have done 10 years ago. What has happened is that society around them has changed and expectations have slowly but surely been changed."*

4.4.3.5 Team based activities

An intervention that would encourage team involvement was reported as a potential strategy to get more employees involved. This was because seeing colleagues participate may inspire other members of the group. Some participants suggested a more aggressive approach was required in order to market health promotion initiatives successfully. For example, by directly confronting and questioning employees who were about to use the elevators could encourage them to climb the stairs. However, this type of approach could offend employees and ultimately have a negative impact on participation:

"We have a gym onsite and it is very proactive, but it is always the same people you see at the gym and it is not the ones that you would like to target. If you say to them, well you could do with losing weight, then they take that as an insult. It is very difficult. You cannot force people to get involved."

"I stood at the bottom of the lift and said, why are you taking the lift? And that was in a call centre environment, because you are very conscious in call centres that they have just got to keep some physical activity going."

Participants reported that organisational level competitions were also good motivators to recruit employees to health initiatives. These competitions created social environments based around healthy activities and encouraged communication between employees:

"People like competing with points, so I think some workplaces have done a thing where you collect points for say, not coming in by car and unbelievably, adults actually compare points with each other rather like kids."

"We ran a strongest man competition. It was on a construction project which I think is a frightfully macho thing to do, but everyone wanted to come and squeeze this bloody dynamometer, but what they did at the same time is they got a little chat about musculoskeletal conditions."

However, it was highlighted by other participants that competitions were not the best strategy to get all of the employees involved:

"With our staff there would be, oh, what would happen to the person who does not win? How would they feel? Could you be seen to be humiliating the loser?

For unhealthy or unfit employees who were unlikely to participate in health initiatives, competitions that would judge individuals and their level of fitness could deter these employees even more. Therefore, having an incentive for participation and progress was reported to be more likely to attract these types of employees. All of the incentives that were suggested were financial:

> *"We have a wellbeing policy within the company, for example, [company name] introduced a points system and giving cash bonuses for keeping fit and doing so many miles…Some of the businesses have given a £10 voucher to each person."*

4.4.3.6 Impact of health screenings

One example of how occupational health can demonstrate the benefits of a health intervention to managers and gain their support is by conducting health assessments to prove their workforce would benefit from some kind of health initiative:

> *"You need to let them identify the need, don't you? I think if there is a need for them to invest into it, it might be by doing things like general health awareness days that identify people who have got high blood pressure, high cholesterol, BMI, that are obese and above, hoping for them to realise we need to do something about this."*

A number of the qualified nurses also discussed the benefits of conducting free health screenings for employees. They mentioned providing individuals with figures of their current health status (e.g. blood pressure/cholesterol) and knowledge of how they can maintain or improve their health would encourage them because this approach was more personal:

> *"They also did this executive type of screening, and everybody wanted that because that was like getting an overhaul, and it was an instigator for getting fit, it made you aware of where your health actually sat. A lot of people have a medical, but some people said it was more personal."*

"I think those little things, like knowing what your cholesterol is and all those sorts of things are quite important if you thought it was just about you and not about how fit you are for work."

The interviewees and focus group participants reported having entertainment days with a variety of health related activities where employees were allowed to bring their families along to participate could be successful:

"They [company] actually hired a marquee and put it up in the car par and invited everybody in the factory, and there were 200 and something [employees] and all their families. We had stands and stalls, reflexology, cholesterol checks, a family came and made bread and we had all sorts of initiatives, demonstrations and activities that covered mostly musculoskeletal, diet, exercise, drugs, alcohol and stress."

The benefits of health promotion days were reported as being successful because they allowed employees to speak with health professionals and get useful information and advice about their health. It also highlighted health issues within the organisation and encouraged employees to be more aware of their health whilst working:

"I would guess that people enjoy them, yes, that there is always something new to learn and also that they have real opportunity to have been able to speak to a real person and get questions answered. I think it is quite good."

4.4.3.7 Tailored feedback

Most participants commented that the information provided to employees should be relevant. They reported that tailored health information or individual feedback would result in a more effective intervention:

"There are opportunities for off the shelf things, and off the shelf products and

packages are very beneficial. But it also needs to be tailored…I think it has to be focused on the group that you are trying to deliver to."

Focus group participants reported that providing employees with more knowledge about health related information, such as appropriate exercise methods, which went beyond that of basic manual handling or health and safety messages, inspired employees to take their health more seriously. This resulted in benefits and cost savings for the organisation due to reduced sickness absence:

> *"We gave them exercise advice about healthy heart exercise, a bit of knowledge and the physio team onsite also had developed a programme about backs for living and managing chronic musculoskeletal back pain. At the moment they are also looking at postural awareness, which is about being fit, keeping your back fit for work outside of work…People can manage their back pain better and they learn that you can exercise with back pain and you do not have to take time off work."*

Occupational health experts explained that tailored feedback at an individual level allowed them to recommend different activities that were relevant to each employee. However, this level of feedback was achieved through individual consultation, which could be costly and time consuming to implement in large organisations:

> *"We run a lot more workplace based health promotion campaigns on a one-on-one basis. We have found them much more effective in producing health change. A leaflet does not do anything, you have to meet people…When people come to their 3-yearly health screening…it is a wonderful opportunity just to go through health and lifestyle, talk about alcohol consumption, whether they had thought about quitting smoking."*

4.4.4 Theme 3: Specific physical activity interventions

In addition to the feedback regarding general health interventions, participants were asked for their opinions about specific heath interventions that were intended to promote physical activity.

4.4.4.1 Incidental activity

When discussing incidental type interventions, the most common promotion initiative described was to get up and talk to colleagues rather than sending emails. However, employees that sent emails to their colleagues often required this chain of communication as written proof of discussions. Furthermore, sending emails to multiple colleagues located in different departments can be a time saving solution compared to locating them individually:

> *"Instead of someone emailing someone on the other side of the office, get up and walk over and ask them, or do not phone them; walk to the other side of the factory and talk to them. That is all obviously timing."*

In manufacturing factories, participants reported that it would not be practical for an employee to leave their work station. Manufacturing work sites were described as being large and where the organisational culture has developed into using machinery to improve efficiency. For example, employees used vehicles to travel to different areas of the factory. The respondents suggested if incidental activity was to be successful, employees had to be more organised and management needed to provide appropriate support:

> *"They [employees] would have to be more disciplined about timing and about people not accepting meetings just off the bat, just looking to check their diary to see they did have that walking time, because it can take almost 10 minutes to walk from 1 end of 1 of the assembly plants and then if you have got to get up to the service*

centre, that is another 5 to 6 minutes walk. So it could take quarter of an hour to walk to a meeting, but because they are so tight for time you can lose meetings."

"They [management] want you to be there as quick as possible, so on the 1 hand they are saying, do not use the car unless they have to, but if you turn up late for a meeting they look like they are chewing a wasp and then you cannot get your point over and tempers get frayed and stress levels go up the wall, so it is almost counterproductive."

4.4.4.2 Exercise at work activities

Participants discussed their success stories with specific exercise at work initiatives. These types of interventions provided variety and often attracted many different types of employees that would not normally participate:

"I am looking at walking and also looking at pilates as we have got loads of space we can do that in. We did tap dancing last year which was hilarious and we had engineer guys, socks with sandal type guys, who I never thought would turn up to do the tap dancing and they loved it."

One major problem in organisations with shift workers was that initiatives such as exercise classes were only available to employees who worked during the day. Those on night shifts for example, were excluded from these exercise initiatives. Therefore, in an effort to not appear discriminatory, management in these workplaces would not support these types of initiatives:

"We have had problems with the shift system. You can have people in on day shifts but because you cannot offer the same on night shifts, the management do not support it because obviously they say it is not fair on the night workers. So if you cannot offer it across all shifts, you cannot offer it basically."

Exercise at work initiatives could not be timed to suit all employees and often required parts of the workforce taking time off from their work in order to participate. If exercise classes were held during break times, employees were unlikely to attend due to short break times and if initiatives were held during work time, obtaining management support would be problematic:

> *"They [employees] do not have a chance to do anything in work time because of their breaks. What do they have? Ten minutes in the morning and then another 20. It is very short breaks. You cannot even get out of the gate. It could take you 10 minutes to walk from where you were walking to the factory gate."*

> *"If it is a really good idea but you then say, well, it is actually going to involve taking time off to walk or it is going to involve some financial outlay, actually their [management] interest quickly disappears."*

The occupational health representatives reported that exercise classes after work were unlikely to attract employees who needed to be more active. Therefore, the responses confirmed that exercise at work interventions were more suitable for employees who had access to flexible working schedules:

> *"They do have classes after work so they [employees] could join then when there are not as many people around, but they do not. It is finish work, go home, sit in front of the telly and that is it, and you will never be able to change them."*

4.4.4.3 Active commuting

Active commuting was reported as a popular physical activity initiative. The most common barriers that prevented the successful implementation of this initiative were personal security and distance from the workplace. Participants highlighted that employees who were on shift work would be reluctant to actively commute to work if they were on early or late shifts. This was because they would need to walk or cycle in the dark, especially in the winter months:

> *"You could have a small group or a couple of people who would walk together…that would definitely help with the safety issue and actually would add like a social element to it as well."*

> *"People are a lot happier to do things in the summer than they are in winter, so maybe it is looking at what you can bring in in the summer months in daylight saving and then what you could do as an alternative in the winter months."*

Active commuting to work was seen as a bigger commitment than other physical activity interventions (e.g. compared to lunch time walking initiatives) because of the extra time required to plan and accomplish it. As a result of the economic climate and increasing job insecurity in both the public and private sectors, employees were reportedly more focused on appearing hardworking:

> *"We all have projects and there is always milestones and then you get really heavy periods where they [employees] just literally come in at 7 and they stay until 7, 8, 9, and they would not have time to be commuting in to work on a bicycle at that time. So I think diet and exercise just goes completely out the window."*

4.4.4.4 Pedometer based interventions

The general feedback of using pedometers to promote physical activity was that it was a positive way to motivate and encourage employees:

> *"We bought these pedometers and gave them out…and so we were encouraging people to walk that way…this little pedometer, whichever role you could do, you could clip it to your belt and you could work out, and get different measurements from there…people were wearing the pedometer all the time."*

It was noted by some participants that good quality pedometers would be costly for use in large workforces and cheap pedometers were often inaccurate and potentially discouraging in the long-term. This highlights the importance of providing reliable and accurate pedometers. Participants with particular experience in the manufacturing sector raised concerns with pedometer based initiatives. They reported these initiatives could highlight the amount of walking employees performed and management would not provide appropriate support:

> *"If we said to the lads [workers], here is a pedometer, they [managers] really would have a hissy fit. I know that the jobs in one of the units, they [employees] will walk in excess of 14 kilometres a day. So if you give them a pedometer then we would be giving ourselves a stick for them to beat us around the head with."*

4.4.4.5 Recommended interventions

Participants were asked what interventions would be successful in the organisations they worked with. The common response was to promote a walking initiative because this was the most cost effective and simplest method in these challenging economic times. One idea was to implement car park exchanges between companies so employees were required to park further away:

> *"We could actually get two companies to swap car parks so people have to walk. Not having your own car park, you have to park down the road in somebody else's."*

For employees who did a substantial amount of manual work, such as those working in the manufacturing sector, participants suggested it was difficult to successfully implement any physical activity initiative. This was because these employees often thought their jobs kept them active enough. However, instead of a specific walking initiative, warm up exercises and stretching before work could be useful:

> *"Where you have production lines…if you ask them what exercise they do, they laugh and say this is enough exercise for me, and they mean it. And you can understand it too. It is hard work. They see that as their physical bit."*

> *"I think a warm-up and a stretch for manual or physical demanding jobs so they could prevent some soft-tissue injury."*

Some participants highlighted the fact that they wanted more direct health promotion to be conducted by the government using various media channels. However, they recognised media advertising was related to promoting and selling products, so there would be a challenge to see a profit for organisations that wanted to promote health initiatives:

> *"The TV could do a bit more, they need to target it at times of the day when they [individuals] are going to be around watching TV or using the cinema…Or in the railway stations or bus stations - the rolling screens…But I do not know how you would advertise that because you are not getting any money to put into the advertising. But it is almost like public information, like the swine flu thing."*

4.5 Discussion

4.5.1 Summary of key findings

The key findings from the interviews and focus group discussions are summarised in Table 4.1. This exploratory study provided an insight into the opinions and experiences of individuals who are important stakeholders in the occupational health field. The results illustrate various different barriers and facilitators that organisations face when trying to deliver occupational health initiatives. These factors are interrelated and must be considered in combination when designing future workplace health initiatives. There was no single cause or reason identified that will guarantee a health intervention will be successful in terms of employee engagement/participation or seeing beneficial impacts for the organisation in reducing sickness absence. The most important results identified were the potential impact of individual health screenings on participants and the desire for tailored health information. As previous research has reported, individuals who participate in health interventions are often those who are healthy already. Those who do not participate are often individuals who need to improve their health status (Conrad, 1987). The results demonstrated individual health screenings could play a useful role in providing employees with the motivation they may require to change their health behaviours. This was recommended because health screenings offer the opportunity for tailored feedback that is relevant to individual participants (Kirk et al., 2004).

Organisation culture appeared to be an underlying issue that contributed to many of the sub-themes that impacted occupational health service delivery and the success of a health intervention (Andersen et al., 2006). In terms of service, the culture of the organisation determined whether managers would use occupational health services appropriately. Moreover, during challenging economic times, management culture influenced the budgets allocated to supporting health initiatives because they did not see a direct impact on business performance. In terms of health promotion, the culture of the workforce determined whether employees would take time off from work to participate in health initiatives, or whether managers would allow flexible working so that employees could introduce physical activity into their working lives. Communication was also highlighted as being vital to the success of any initiative being introduced within the organisation (Evans, 1990).

It is likely that if health initiatives are to be successful it will depend on the knowledge and attitude across the employees, line managers, occupational health representatives and directors within the organisation. Therefore, it is vital to consult these various stakeholders to understand what kinds of interventions will be most successful. For example, managers, directors and occupational health representatives are able to provide organisational level feedback about absence rates and what health promotion ideas may help the workforce. However, employees may be able to provide information about what will benefit them more and what activities can be realistically achieved in consideration of their job roles. This type of consultation is expected to have a positive impact on the organisational culture towards promoting health interventions. It also serves as an evaluation process of past initiatives if conducted regularly (Wong et al., 1998).

The data provided valuable feedback for the future implementation of physical activity focused health interventions in the workplace. In particular, the type of job roles where certain initiatives may not work or suggestions for alternative initiatives that may be more useful. For example, incidental activity or exercise at work initiatives were unlikely to work in large manufacturing factories due to physically active job roles and the requirements for employees to remain at their work stations. However, it was suggested that promoting the benefits of regular stretching to employees in physically active job roles might help reduce work related muscle injury. Promoting incidental walking activities would probably be most suited to employees in highly sedentary, office based job roles (Gilson et al., 2010).

4.5.2 Strengths, limitations and suggestions for future research

Several important strengths and limitations must be considered when evaluating the findings of this study. A primary strength of this research phase is that at the time of this work, a limited number of qualitative investigations of this kind, which provided in-depth views of occupational health strategies and organisational health promotion initiatives had been conducted. A second strength was that the research was conducted by an independent research team not affiliated with any of the organisations represented by the participants. Therefore, participants may have been more forthcoming in their responses after being made aware their answers in the interviews and focus groups would remain anonymous. A third strength was that the sample size was relatively large for a qualitative investigation, representing organisations from across the UK with individuals employed in various different job roles. The variety of job roles enabled the researcher to gather information about occupational health services from a range of perspectives.

In terms of limitations, since the interviews required participants to be self-selecting, individuals who put themselves forward for involvement may have been organisational stakeholders with significant experience of health promotion initiatives, or those with specific favouritism or grievances towards the occupational health service. A second weakness was that only two focus groups were conducted with occupational health advisors that were all employed by the same occupational health service provider. Therefore, results from the focus groups may not be representative of internal occupational health departments, or even other occupational health providers from around the UK. However, feedback from other occupational health advisors was received through the individual interviews, where it appeared that the broad range of working experiences overlapped consistently with the focus group results. A third weakness was that qualitative research studies could be affected by interviewer and researcher subjectivity at the time of asking questions and also during data analysis. However, the generation of semi-structured interview and focus group schedules provided a framework and guidance for each discussion. Moreover, the approach to data analysis and the coding of themes, including inter-rater reliability tests provided a standardised procedure to develop the results. Finally, this study did not include focus groups or interviews with employees who would essentially be end-users in an organisational intervention. Therefore, any feedback from employees in terms of their experiences was omitted. If such employees were included, the data analyses, interpretations and subsequent recommendations may be more representative and more generalisable. This limitation is addressed in the next chapter.

4.5.3 Conclusions

The study described in this chapter aimed to explore the experiences of relevant stakeholders, in order to understand occupational health service delivery and receive feedback regarding workplace health interventions. The specific aims were to identify the barriers and facilitators to implementing health interventions, participants' perceived feasibility of specific interventions, and recommendations for future initiatives. These aims are important because intervention studies described in the literature tend to focus on quantitative or physiological findings (e.g. blood pressure, weight, resting heart rate, etc.), rather than the effectiveness of the intervention in terms of the impact and benefits within organisations. This research has highlighted a gap between the strategies that are used in organisations to help maintain and improve the health of the workforce and the recommendations of best practice. The findings illustrated that occupational health stakeholders recommend interventions could benefit from a tailored element of feedback so that information is relevant to individual employees. Another important point to emerge from the analysis was the importance of the organisational, management and employee culture that affected many of the outcomes for new health initiatives and the occupational health service. As with many organisational level policies, communication was a key factor that appeared throughout as a facilitator or potential barrier and participants recommended consultation at an employee level. The outputs from this study have informed the development of future physical activity focused health interventions (discussed in Chapters 6 and 7). In particular, including health screenings to illustrate the impact of an intervention, tailoring feedback in the development of new initiatives and developing tools to facilitate a culture change within the workplace.

Chapter 5

Employee experiences of health interventions

5.1 Introduction

This chapter details the results of focus groups that were used to explore employee experiences of occupational health initiatives and the barriers and facilitators to implementing organisational physical activity interventions. The main purpose of this qualitative investigation was to add to the research outputs from the previous chapters and contribute towards designing interventions for the workplace. This type of investigation can complement the findings and provide a comprehensive examination by considering the opinions of the recipients of organisational level interventions. Six focus groups were conducted which discussed health promotion initiatives, considerations for future interventions and physical activity interventions. Forty-nine employees from a variety of organisations in the private and public sectors participated. This chapter presents the results from the thematic analysis and discusses the key findings from this qualitative research.

5.2 Research design and aims

The aim of this phase of the research was to obtain feedback from employees in different organisations and job roles about their experiences of occupational health initiatives. A second aim was to understand potential physical activity interventions employees would like to see implemented. In order to achieve the research aims, a semi-structured qualitative research design was employed. Focus groups were chosen instead of individual interviews as group discussions allowed sampling a larger number of participants. Moreover, it was predicted that employees from the same organisation would offer similar information about the same health interventions. Therefore, using a focus group would enable a more in-depth investigation and allow the researcher to gather a variety of perspectives from within the same workforce. In particular, the research objectives were to:

1) Explore employees past experiences of occupational health interventions
2) Understand the barriers and facilitators experienced by employees when participating in health interventions
3) Identify the strategies that are most important in motivating employees to participate in health interventions
4) Gather feedback about the practical implications of implementing physical activity initiatives in the workplace

5.3 Method

5.3.1 Focus group schedule development

To develop the focus groups schedule, the aims of this phase of the research were first outlined to help identify what topics of discussion and types of questions should be included. This phase of the research was an extension of the qualitative research described in the previous chapter. However, it was important the questions related to gathering feedback from an employee perspective. The first draft of the focus group schedule was reviewed by two of the academics that reviewed the drafts of the interview and focus group schedules reported in Chapter 4. A senior researcher inspected the second draft of the interview schedule before data collection commenced. The final version of the focus group schedule was divided into three sections and can be viewed in Appendix 5.1.

5.3.2 Sampling

The research comprised six focus groups with employees from a mixture of different public and private sector organisations. Two of the focus groups were conducted with employees from two organisations who participated in the questionnaire element described in Chapter 3. Of these organisations, one was a utility company in the private sector and the other was a higher education public sector organisation. An additional four focus groups were conducted with a variety of employees who attended the Working Late research employee panels. The Working Late research project organised regular user engagement panels with a number of different stakeholder groups in order to present elements of the research and stimulate discussion, receive feedback and guide the research process. For this research phase, two of these focus group discussions were conducted with employees who attended the user engagement panel and another two discussions with employees from the expert user panel. Each focus group consisted of between seven to eleven employees. The researcher was confident that data saturation would be reached after six focus groups, as recommended by Morgan (1996).

5.3.3 Procedure

For the organisational focus groups, an invitation to participate was initially emailed to individuals by the organisational contacts responsible for working with the researcher. This invitation contained an information leaflet which included details about the overall research aims and stages involved, the specific aims of this phase of the research and the type of questions and discussion points that would be raised in the focus groups. Interested participants were requested to liaise with the organisational contact responsible for coordinating and planning the group discussion. For the Working Late panel focus groups, an invitation to participate was initially emailed to individual contacts that fulfilled the sampling criteria for each type of panel. For the user engagement panel, this included non-managerial employees that would be affected by organisational policies related to occupational health and healthy ageing, including older workers. The expert user panel included employees that were in management or leadership roles within their organisations. These workers were asked to discuss their views as an employee, as data from managers and occupational health stakeholders were analysed in the previous chapter. No incentive was offered to participants.

Prior to the focus group discussions, the participants were verbally briefed about the nature of the research and informed the discussions would be audio recorded for transcription and analysis. Participants were reassured that any data used would be confidential and they would not be identified individually. Each focus group meeting was split into two sessions. The first half contained a ten-minute Microsoft PowerPoint presentation from the researcher which highlighted the research aims. The second part of the session included the main discussion. Participants were asked to discuss their experiences of past health promotion initiatives, including their opinions about what made initiatives successful and/or what could be improved. Participants were also asked for their opinions about specific physical activity promotion interventions, such as incidental activity, exercise at work, active commuting and pedometer based interventions.

5.3.4 Data management and analysis

The audio-recorded focus group discussions were transcribed verbatim and were analysed using thematic analysis by the sorting of material into emergent themes using the method described in the previous chapter. In total, a set of three key overall themes emerged from this analysis exploring previous health interventions, including the barriers and facilitators experienced by employees, and identifying the feasibility of implementing initiatives to promote activity within organisations. A second researcher conducted the inter-rater reliability test also described in the previous chapter. The second researcher coded the raw data in similar themes and the two sets of data analyses were compared, where two new sub-themes were generated.

5.4 Results

5.4.1 Participant characteristics

Forty-nine employees participated in 6 focus group discussions. Ten employees from the higher education public sector organisation were included in a discussion and 9 employees from the utility company in the private sector joined the telephone focus group. Sixteen participants attended the user engagement panel and 14 employees engaged in the expert user panel respectively. The participants in each of these panels were split into 2 groups resulting in 4 separate discussions. The focus group discussions provided detailed information related to the barriers and facilitators to successful organisational physical activity interventions. Table 5.1 highlights the themes and sub-themes extracted from the discussions.

Table 5.1: Themes extracted from the employee focus groups.

Sub-themes	Summary of themes
Feedback from previous experiences	• Job role has the biggest impact on health status in the long-term • Health campaigns run by dedicated employee champions have been proven to be successful • Interventions should be monitored and promoted regularly
Theme 1: Impact of the organisational culture	
Manager support	• Challenge to gain management approval • Managers need to accept flexible working conditions if interventions are to be successful
Peer/social support	• Colleague and family support is important encouragement • Team based initiatives allow development of valuable social networks within the organisation
Perceptions	• Organisational culture can create barriers and facilitators for health initiatives • Physical activity was seen as only being useful if vigorous exercise was conducted
Theme 2: Considerations for future health interventions	
Variety	• A selection of promotion initiatives will provide more opportunities for employees and attract different individuals
Scheduling	• Initiatives that were scheduled during work time were predicted to be more successful
Communication	• Consulting employees to identify what they want • Using different methods to make employees aware of the opportunities available to them
Motivation	• Motivating those that need to be more active will always remain a challenge • Setting individual targets and achievements could motivate
Theme 3: Specific physical activity interventions	
Incidental activity	• Time constraints at work would affect participation • Employees unaware of the variety of incidental type activities
Active commuting	• Weather conditions and safety during the winter months reported as major barriers for employees
Pedometer interventions	• Good motivation tool to make employees aware of inactivity levels
Recommendations	• Compulsory health assessments so potential health issues can be identified earlier • Tailored feedback to employees based on their circumstances

5.4.2 Previous experiences of health interventions

Most participants reported the job role and industry they worked in had a major impact on their health and lifestyle behaviours. For example, construction workers were more likely to have physically active job roles compared to office based administrative employees. One of the biggest occupational changes that participants reported impacted their physical activity levels was the increase in the number of individuals working from home. It was acknowledged that working from home could provide the flexibility required to do more exercise, although it also provided employees with fewer opportunities to be active:

> *"I am thinking of myself marking exams and coursework just sitting there with my cup of tea and not getting up. At least when I come into work the walk from the car park, walking up and down the stairs, if we can get ourselves to do that, it can promote more activity if you are actually leaving the house."*

Working from home also reduced the opportunities for any team based communications or social activities, and home working was reported to promote poor psychological wellbeing. Furthermore, many employees stated working from various offices or work sites made it difficult to participate in activities that were based in one work site. Interventions should be designed to be flexible and include different elements that can be applied to employees working in different areas or locations of the same organisation:

> *"There have now been an increased number of home workers and there are poor social relationships between colleagues since they do not work in teams anymore and this is contributing too poor mental health as well. This is not only the home workers but also for the engineers who are at different sites."*

> *"Work is not in 1 site anymore as people are always moving around constantly. There are home workers, people going to the office, engineers on different sites so you must take this into consideration when trying to target employees."*

Employees who were part-time, or spent most of their working hours away from the office reported that they were not provided with appropriate information or access to health initiatives promoted in the workplace. This included homeworkers and teleworkers:

> *"I work from home and what about part-timers, because there is a perception by employers that if you are part-time then you are not doing a full-time job anyway, so you are okay."*

Participants in an organisational focus group described a health promotion campaign that started over 5 years ago, which was reportedly successful because it targeted a combination of different health issues together. It was also publicised using a variety of methods through the company magazine, online Intranet and through trade union representatives. Furthermore, another reason why this campaign was reported to be successful was because it appeared not to be associated with the occupational health department directly and was run separately by employee champions. Participants mentioned occupational health having a reactive attitude to health and services:

> *"Occupational health give a negative image of themselves and they are viewed as a service to manage absence. The visibility of occupational health is not good, they are reactive rather than proactive."*

> *"Although we have had an open door policy in our occupational health department, people have got to find the door and want to go through it. If you are a bloke you generally go to those if something is falling off or you are about to die."*

When discussing their experiences about the promotion of new initiatives, participants reported that although large poster displays in the workplace looked good, individual leaflets were a more engaging method to promote initiatives directly to employees:

"Displays in canteens were good but not effective. Leaflets worked better and people met eye to eye which engaged the workforce more."

Furthermore, employees reported that if the interventions were not monitored or promoted properly, they would not have any impact on the workforce. One particular example given was in reference to a computer based manual handling training health intervention:

"Back to basics are computer based training packages that are used to train correct manual handling. Things included in the training are examples of what to do at work. Now this is part of all employees on-going development that they have to do but nobody does it because there is no incentive to do it."

5.4.3 Theme 1: Impact of the organisational culture

Participants were asked for their opinions about the barriers and facilitators they experienced when trying to participate in physical activity focused health initiatives. A number of common themes became apparent which have been grouped as organisational culture.

5.4.3.1 Manager support

Top down organisational level support from managers was reported as being vital to the success of any workplace intervention. Interventions were likely to fail without management support and cooperation:

"Implementing anything within the organisation, any promotion activities, we need managers to deliver things and organisational champions to deliver these within organisations."

Participants discussed the difficulty of gaining management support for initiatives that did not have a direct impact on organisational revenues. This was especially true in small, medium and other private sector organisations. It was made clear that the recession had also affected the likelihood of organisations providing appropriate funding and support for healthy workplace initiatives:

> *"I think even before the confines of the current recession took place, there was I believe a lack of intervention by private sector employers into providing facilities for any workers because of cost. Anything that impounded on cost or profitability was something which was seen negatively."*

Employees also reported that even though some managers appeared to support health promotion initiatives, their support was unlikely to be genuine and only apparent because of the initiative being an organisational level policy. Individuals reported it was important to demonstrate the possible benefits managers will gain from permitting their employees to participate in health interventions:

> *"Managers need to support initiatives but they will only support it if it comes from the top. They need to practice what is being preached and show consistency and they can be contradictory sometimes. A manager will say yes to an employee to take part [in an initiative] but when that employees tells them they are going to a [exercise] class the manager will say yes, but are actually reserved and you know they do not really want them to go."*

Participants highlighted that managers needed to allow flexible working practices in order to accept and support healthy initiatives. Employees reported flexibility would enable them to balance the commitments of home life, work life and their health status, which would result in a healthier and more productive workforce:

> *"People will be too frightened to miss a target… but I think they have got to...if they want the benefit of a more healthy organisation the management have got to really support it completely."*

When discussing health screening opportunities at work, some employees reported they would be reluctant to participate if they thought the results from the screening could affect their job role. For example, if an employee was diagnosed with high blood pressure their manager may not provide them with new responsibilities for fear of their health condition affecting their performance:

> *"People actually get concerned if the employer knows they have got a blood pressure problem, [because they] cannot put them under stress or the work environment changes."*

5.4.3.2 Colleague and social support

The social element of sport and activity participation was emphasised, especially the benefits of using a social network for motivation. Team based sports were reported as being motivating for individuals as these provided a social component to a healthy lifestyle:

> *"I think there is a lot of people who want to do exercise but they do not want to go into a gym either…for some there is that social aspect about it. Certainly with the ladies hockey team, it is about socialising. People get together having a chat, they play hockey competitively and then doing events during the year which is around that as well."*

In the workplace, participants reported that health initiatives provided good opportunities to improve team relationships and individual level employee commitment and motivation. This was because of the colleague support that developed from taking part in organisational interventions:

> *"People were happy to come to work because they were looking forward to a lot of social things, the social aspect of it all helps the physical side of it."*

Employees also mentioned initiatives at work encouraged participation from family, friends and community members. Therefore, the impact of workplace health interventions had the potential for wider social impact outside the organisation:

> *" People actually get a social interaction…then that has a spinoff and you will find that they will go back into their homes and friends and communities and start trying to get it going there."*

5.4.3.3 Perceptions

Participants reported physical activity during work time was often difficult because the culture of the organisation and the work environment was not accustomed to taking time off for health activities. The fear of being perceived as lazy or incompetent was often reported as a common barrier to participating in physical activity initiatives:

> *"In a lot of organisations, if somebody disappeared for two hours they would be in a lot of trouble when they got back."*

> *"In one hospital I worked at there was a swimming pool for staff that had been there for ages, and there was a big thing in the paper, hospital managers in the pool and things like that."*

This perception about efficiency and productivity seemed to be embedded into the culture of the workforce, even though it was not always necessarily true:

> *"One of my team members now has a dog, so she has to go home at lunch time, but her productivity has increased. I am not saying she was lazy or a poor worker but because she goes away from her desk, out of work, she goes home, she takes the dog on the field, she has a bite to eat, she comes back and she feels so much better."*

Another organisational and employee level barrier for physical activity interventions was the perception of the act of physical activity itself. Participants highlighted that activity initiatives were perceived to be about promoting vigorous exercises and they did not consider any incidental or everyday activities:

> *"It is possible for people to think that activity is just about going swimming or going gym, without thinking that actually it is as simple as going for a walk around the park for a quarter of an hour or that it even includes things like going dancing, gardening and housework."*

Employees also reported this perception of vigorous exercise isolated those employees who really needed to be targeted. One solution was to change the focus of the intervention away from individual health promotion and implement it alongside other messages. For example, active commuting to work could be associated with messages promoting environmental benefits, or exercise at work sessions helping to raise money for charity:

> *"It was not branded as this great organisation weight loss initiative, it was these are the things that people did and enjoyed, and somehow I think that worked better…people did not see that as sport and that was just a very nice thing to do."*

One other notable example was of lunch time walks that were designed to provide historical knowledge and information of the local area:

> *"The lunch time walks…were in Chancery Lane part of London so a very historic area. There were all these interesting things to go and see and learn about on the way."*

5.4.4 Theme 2: Considerations for future health interventions

The employees outlined a number of ideas in response to questions that related to designing future interventions. The following sub-themes are suggestions that were reported to be valuable for the success of any health related intervention.

5.4.4.1 Variety

One of the most common elements reported that would make an intervention successful was for it to be enjoyable in order to motivate employees to participate:

> *"Our staff association is running a strictly come dancing competition, fuelled by the TV programme…and we did not think we had enough time to be able to pull that off but I think there were about 45 people signed up on a regular basis."*

It was indicated that enjoyable interventions designed to promote physical activity should offer a selection of different opportunities for employees to get involved. Participants suggested that different employees will be attracted to different initiatives, and providing a variety will allow the intervention to be more successful because it will attract more participants in the long-term:

> *"In my previous organisation I think they were very successful in terms of offering a massive range of things. A lot of companies just say they will start the pedometer initiative, you see that in a lot of firms. It does not catch everybody. In this organisation there was a bicycle loan scheme. There was a football league. There was yoga onsite. Everyone had a free gym and swimming pool membership. There was another group that organised lunch time walks. I was not interested in yoga but I played football for example. Most people did something because there was such a range of things that just catered for everybody's individual enjoyment."*

In terms of offering variety, participants also reported positive experiences with initiatives that included both physical and psychological elements. This sub-theme also related to the perception sub-theme reported earlier, part of which focused on encouraging employees to participate in activities without perceiving them as purely exercise initiatives:

> *"We worked in this rather fine country house with grounds and we were in the middle of nowhere, and people played bowls at lunch time, and they played cribbage and dominos so it was mental stimulation as well as the physical."*

Offering a selection of different health promotion activities empowered employees to make better choices about their health behaviours. Participants concluded that although motivating individuals who needed to change their behaviours was difficult, providing a selection of opportunities and correct information would help to influence positive decision making:

> *"It is just about making things available…Having the facilities available if people did want to get involved and make the choice to become more active…But obviously the onus is down to the individual and for you just to provide that information for them to make the decision."*

5.4.4.2 Scheduling

One of the major barriers to taking part in physical activity, especially planned activities like exercising at the gym was the lack of time individuals had at the end of the working day. Lack of time was also reported as a barrier for being active during work time. Participants suggested flexible working times that allowed employees to start earlier, finish later or extend lunch breaks would provide the opportunity for physical activity during the day. This feedback also highlighted the limited knowledge these employees had with regards to quick and effective exercises that could be conducted during short break times:

"I would like to be able to have the opportunity to perhaps have an hour and a half one day, so I have got time to have a shower and come back…that puts me off from going. I do not go to do 20 minutes and come back all warm and bothered where I have not had time to have a shower, cool down properly and be back at my desk within an hour. It is impossible to actually try and eat something as well."

Employees from the user engagement panels reported that health interventions would be more successful if associated sessions were held during work time. For example, if there were exercise classes offered onsite, for these to be available during work time. The participants reported this would provide employees with increased opportunity and encouragement to join new interventions, compared to if these sessions were offered after working hours where other responsibilities take precedent:

"If they had actually made it during the working day I think it would have been better from the point of view of participation and staying power as well."

However, it was noted that interventions during work time would not be appropriate for all employees, such as those who might feel they cannot participate due to their heavy work loads, long working hours or organisational culture:

"My team are predominantly teaching staff and I would say [only] a quarter of them would have a lunch break. That does not mean it is not provided for them, they just do not take it. I will see them with their box of sandwiches on the desk…I will be saying to them; why don't you take that outside? Well, if I take that outside, I will have to sit here until six, they will say."

5.4.4.3 Communication

Participants in all focus groups agreed communication was one of the most important barriers and facilitators to the success of any organisational initiative. Some employees reported being unaware of current initiatives that were available within the workplace until other colleagues in the focus groups highlighted them. Participants also recognised that communication could play a key role as an intervention for employees who spent large amounts of time working on the computer. For example, delivering health messages directly to computer screens:

> *"Messages can be delivered on screens promoting health and wellbeing. For example, encouraging employees to take breaks."*

However, the employees also indicated that electronic messages (e.g. emails) and generic information leaflets were not effective because they were easily ignored. This was reportedly due to the significant amounts of email messages being sent per day. These participants indicated contact directly from employee health champions, managers or other health representatives would have a better impact in encouraging employees to participate:

> *"People will react to the messenger better than they sometimes do to the message. Now, you send an email out and people read it, they may see the sense in it but will not necessarily respond. If you actually go up to somebody and you build a relationship with those individuals…they are more likely to respond to that because it is you."*

Participants recognised the importance of an organisational newsletter that informed employees of the activities available. This communication method was reported to be effective at highlighting individual case studies. Employees with health promotion experience reported case studies would encourage participation rates as employees were likely to relate to other individuals from within the organisation:

> *"In a similar way that we have student nominations…what about having a health champion among the staff? I am just thinking of a particular member of staff who will acknowledge that she was very overweight and she has been going to the gym and she has lost an awful lot of weight and she is very happy to talk about it...that kind of health champion in a newsletter."*

As well as communication being a method to deliver information, employees reported the importance of communicating with the workforce to help design initiatives. For example, the employees indicated that consulting the workforce would provide beneficial information about the types of physical activity initiatives they would like to see introduced, which meant they would be more likely to participate. Employees could also advise on how to deliver communication material:

> *"I remember one organisation brought consultants in that they paid something like £60,000 for signage and things like that…The company noticed people still were not paying attention to the signage that they put up…Then they came back and asked the workforce…and they said; put it on the back of toilet doors, above the urinals and we will notice them."*

5.4.4.4 Motivation

Employees reported the difficulty of attracting participants who were in need of changing their health behaviours would always remain. They stated fit and healthy individuals would participate in physical activity initiatives and it would always be difficult to motivate the employees who were more unhealthy or overweight:

> *"I think our eternal problem is it is very easy to get the people who are naturally fit want to come and I would say 9 times out of 10 that is the type of user generally. The hard work is getting to the people, for whatever barrier exists, won't come, and those are generally the health group that are at risk."*

Employees suggested setting personal individual challenges motivated them to be more active. It was important for them to feel as though they were achieving the desired results or recommended levels of activity, or the motivation for participating in any initiative would soon stop:

"Some days I think, oh, I will go to the gym tonight, and then I think I am knackered, I am tired, I am hungry, I will go tomorrow, you know. And then you do not go."

"I suppose it was the momentum that seemed to stop. I would go on [the website] and have a look and I said, oh, 10,000 steps, how on earth could they do that?…Then it was almost like the momentum was gone."

One particular example was when an organisation tried to promote walking by informing employees their step counts would contribute towards walking to the moon. However, distance to the moon was unrealistic for the workforce, which dissuaded employees from participating:

"We worked out, did the maths, that the distance to the moon, if you divide it by the number of staff here at the time, it was like doing a mile a day, we would have got there in a year if everybody had done a mile a day and we did not get that."

With regards to health interventions in particular, employees reported that motivation and engagement would be higher if initiatives were promoted over a longer period:

"The best programmes we have run are where [organisation] have tied it into a long-term engagement strategy."

5.4.5 Theme 3: Specific physical activity interventions

In addition to the feedback regarding participants' experiences of health interventions, employees were asked for their opinions about specific initiatives intended to promote physical activity.

5.4.5.1 Incidental activity

Participants reported that time constraints was the main factor for not being more active or taking the active choice if different options became available. A common promotion initiative described was to get up and talk to colleagues rather than sending emails. However, many participants reported that they would rather use emails as it provided them with written authorisations for any subsequent actions:

> *"For incidental type activities simple things could work but time is a major issue that stops people. Especially in the call centre worker, they cannot take their breaks when they want, they cannot get away from the phones so they cannot really do this."*

> *"Of course people email now. The act of social engagement is lost. Sadly, they do it to cover their backs a lot of the time."*

In one focus group, participants were discussing the idea of implementing a ban on email for a set period of time each week to encourage employees to walk and communicate with their colleagues. However, the participants concluded this would not be efficient in the long-term:

> *"I think basically it is counterproductive not to have emails all the time, it would be better to take half an hour out and go for a walk rather than trying to find people, walking upstairs and the person is not there."*

5.4.5.2 Active commuting

With particular relevance to active commuting, there were a number of practical issues raised, such as the changeable weather conditions, distance and amount of time employees needed to travel to work:

"For people who use public transport like the bus, they can get off a stop a early and walk the rest making their travel more active, but there is not enough time for this, it is not realistic."

"One of my biggest barriers to walking is the weather."

Safety was reported as another deterrent for employees to actively commute to work. When considering cycling opportunities, employees reported that the roads were unsafe and not appropriate for use by bicycles:

"The problem with cycling, and I do quite a bit to and from work, is that [town] is not a cycle friendly area…There are a few cycle tracks but they are extremely dangerous. So, that stops a lot of people from doing it."

5.4.5.3 Pedometer based interventions

Overall, participants in all focus group discussions reported pedometers would be effective to motivate individual employees. The importance of monitoring activity levels was highlighted as a useful feature of a pedometer, which individuals could undertake themselves. Therefore, given the correct information, participants might be encouraged to increase activity levels if they knew their levels were below the recommendations. Employees also reported pedometers are useful in competitions related to healthy activities:

"People like pedometers because they get to find out what they are doing on a normal day and this may motivate people to do more where they can. It is a direct benefit they can see so maybe you should have a pedometer week and give prizes to the people with the highest counts if people were putting their information on a database and then there was a competition behind it."

"I have gone out in the evening where I realised I have only done 8,000 steps for a day and actually I want to make sure I have done 10,000 and go for a walk at 10 o'clock at night."

Other organisational representatives reported employees could view pedometers as a promotion initiative with a concealed motive and one that is not serious about changing health behaviours. These employees stated the organisational culture would need to be changed if monitoring tools were to be included:

"This is where it is important for us to recognise that this [pedometer] could be perceived as a gimmick and actually to try and get this embedded into the social culture will be hard."

5.4.5.4 Recommended interventions

Participants were asked what interventions they would like to see implemented in the organisations they worked at. The common response was to conduct health screenings, as this would be a proactive approach to identify health issues before any obvious symptoms occur and would motivate employees to be healthier. Some participants even suggested making these health screenings compulsory:

"Make it compulsory to have a health check. This is a more proactive approach and you can offer advice to people when they come and see you and identify the at risk cases. For example, if a driver comes to see you can find out how much they drive and explain how that will impact them and things to do."

The employees reported that information and feedback delivered to participants should be better tailored to their needs. Individual and job role differences were highlighted, which indicated feedback needs to represent what employees can actually do at work to make a difference to their health, rather than generic information indicating what one should do. Participants predicted this type of tailored information would have a more successful impact on employees:

> *"You need to be aware of the different types of workers at [organisation]. There are home workers, call centre workers who are different to other office type workers, internal and external engineers. All of these workers are different and have different stressors."*

> *"You could run a health check and the results generated will link to the advice given to employees and what will specifically help them. People are bombarded with lots of information and they do not know what to do with it all so if it is targeted it will be much more effective."*

5.5 Discussion

5.5.1 Summary of key findings

The key findings from the focus group discussions are summarised in Table 5.1. This phase of the research provided an insight into employee attitudes and experiences towards physical activity health interventions. These results provide a valuable opportunity to compare the feedback from employees who health interventions are implemented for, against the results from the organisational stakeholders in the previous chapter responsible for delivering them. The results highlighted various barriers and facilitators employees feel are important contributors to the success of health interventions. The employees also provided several recommendations they considered would help attract more of the workforce to participate in new initiatives. One of the most important outcomes from this part of the research was the lack of knowledge or ideas employees had when it came to performing incidental activities at work. Examples of exercise at work strategies, including desk based workouts or stretches would inform employees of sustainable activities that may benefit them in the long-term. Even though participants reported time constraints as the biggest barrier to incidental activities, employees did not consider the advantageous role exercise at work could play as a health intervention.

Another critical finding was the perception employees had that activity needed to be vigorous for it to be beneficial. Some activity is better than none and previous research has demonstrated the numerous health benefits associated with moderate levels of physical activity and walking (Abadi, Muhamad, & Salamuddin, 2010; Devine et al., 2012; Mackey et al., 2011; Weuve et al., 2004). This finding could also be related to the exercise at work ideas because employees may perceive desk based exercise to be too moderate for them to have an impact on their health status. There appears to be a need for a change in employee culture and their perception that exercise does not need to be intense, gym based or extremely physical for it to provide health benefits. This change in culture towards activity could inspire more ideas where employees can be active. It might also help to modify the organisational culture, which was reported to have a negative attitude to exercising during work time. Employees stated the organisational culture was such that in an effort to appear productive, they would remain sitting at their desks. This would affect their participation in health interventions, especially physical activity ones that required participants to move away from their desks. These outcomes demonstrate that employees may benefit from appropriate information on incidental activities at work, with recommendations including desk based exercises that could be conducted during work time (Miller & Brown, 2004).

As discussed in the previous chapter describing organisational stakeholder experiences, employees also reported the key role line managers played in whether health initiatives would be successful or not. Management support is an additional component of the organisational culture that is necessary in order to facilitate a healthier workforce, and its value has been reported in both Chapters 3 and 4. In terms of physical activity interventions, manager support was reported to be vital to allow employees the flexibility required to participate in physical activities. Furthermore, employees recommended interventions could be improved if the feedback they received was personal and tailored to their job roles. Participants in the previous chapter made a similar recommendation and suggested health screenings could be the source for delivering tailored information. Employees in this study also agreed that health screenings could help to provide tailored information (Kirk et al., 2004; Kirk et al., 2003;

Mutrie et al., 2002). Tailored feedback may produce more meaningful and valuable information. This will enable physical activity strategies and recommendations that are designed according to the employees' individual circumstances.

The focus group employees specified effective communication with the workforce was essential for the organisation. As reported in the previous chapter, consulting the employees would allow organisations to collect feedback about activity initiatives and design interventions employees are more likely to participate in. The results in this chapter also provided an insight into the type of communication methods employees found effective. Newsletters were highlighted as a strategy that could be used to inform the workforce of organisational level activities. Furthermore, using real case studies in communication materials could act to encourage and motivate individuals.

5.5.2 Strengths, limitations and suggestions for future research

This work serves to accompany the findings outlined in the previous chapter and address the limitations of gaining feedback from employees. Therefore, comparing the feedback received from both investigations provided the researcher with a range of perspectives and a dataset that is more representative. The researcher did not receive any background information about the focus group participants, such as their health status or physical activity levels. Therefore, it is reasonable to assume those who put themselves forward for involvement were individuals who regularly participate in health interventions, whereas those who did not participate were employees who do not usually get involved in organisational initiatives. Conducting more focus groups and recruiting a broader sample of employees may provide a more generalisable view. Nevertheless, the sample size was relatively large for a qualitative investigation with employees recruited from a variety of organisations in the private and public sectors. Focus groups require individuals to be comfortable enough to discuss their issues in a group setting. This research asked participants personal questions about their health, activity levels and motivators. Therefore, there may have been participants who were not comfortable to reveal this type of information within a group setting. It may have been more appropriate to supplement the focus group data with individual interviews in order to provide a confidential setting for participants to reveal personal information that was relevant to the research objectives. However, since this was an exploratory investigation, focus groups were deemed appropriate to provide an overview of the important findings.

5.5.3 Conclusions

The research described in this chapter explored the experiences and opinions employees had of workplace health interventions. This research fills the gap in the findings outlined in the previous chapter, where responses from employees were thought to provide an alternative perspective that would strengthen the outputs of the investigation. The specific aims were therefore similar to those outlined in the previous study, but the target sample changed to involve employees. It was also important to gather feedback on the strategies that were most important in motivating or encouraging employees to participate in health interventions. The findings illustrated employees were unaware of incidental type activities they could implement into their working lives. They were also unaware of the benefits moderate intensity activity could have on their health status. These factors are crucial if individuals are to create sustainable long-term changes in health behaviours. As with the findings outlined in the previous investigation, organisational culture was important to employees believing they could participate in a health initiative. Organisational culture included management support for health initiatives and colleague support encouraging participation. The findings from this chapter have contributed to the development of a work site physical activity intervention that is reported and evaluated in Chapter 7. In particular, designing interventions with incidental activities and implementing effective methods to communicate information to employees. The following chapter discusses the development of the specific intervention material used in Chapter 7, which has been informed by the research outputs reported in Chapters 3, 4 and 5.

Chapter 6

Developing an occupational physical activity intervention

6.1 Introduction

One of the most common educational strategies to promote health and persuade people to adopt healthier lifestyles is by campaigning through guidance leaflets (Coulter, 1998). This chapter details the development stages of designing intervention leaflets that focused on the stage of change approach to delivering activity information to employees. Previous research has shown that exercise consultations (Kirk et al., 2003) or counselling (Kirk et al., 2004) based on the stage of change approach are more effective in promoting physical activity than standard leaflets. However, in a work setting, the time taken to conduct individual exercise consultations or counselling sessions with employees could take a significant amount of time. Therefore, the perception (of cost) that employees will be absent from their job roles for a sizeable amount of time for these consultations may outweigh the potential benefits of conducting any health intervention. Occupational health initiatives are considered an employee benefit within organisations (Long & Marquis, 1999) and this type of proposal may make organisations and managers reluctant from participating in an intervention. Leaflets are a popular source for organisations to communicate information to their workforce (Evans, 1990; Rowley, 1998). Therefore, if employees were to receive exercise advice based on the stage of change approach through leaflets and posters, it could potentially lead to a practical and effective intervention for the workplace.

In this phase of the research, pre-existing guidance materials were evaluated using content analysis, which informed the development of intervention leaflets and an intervention schedule. The results presented in Chapter 3 demonstrated an opportunity to develop a successful workplace intervention focused on increasing physical activity. Chapters 3 and 5 presented results from a cross-sectional questionnaire and focus group discussion with employees exploring the barriers to physical activity and the types of health initiatives they would like to see promoted. Chapter 4 collected qualitative feedback from occupational health stakeholders about their experiences of delivering workplace health interventions, with a focus on physical activity. The results in this chapter are informed based on the outcomes from these previous chapters.

6.2 Research design and aims

This phase of the research aimed to develop information materials with the purpose of promoting a physical activity intervention in the workplace. In the context of the stage of change approach, guidance materials were to be designed targeting the principles for each individual according to the stage of change construct they identified themselves in. In order to achieve the research objectives, it was important to understand the types of physical activity promotion information, publications and guidance materials available for individuals. Therefore, a content analysis on existing available materials was conducted to evaluate the types of messages being conveyed. Furthermore, the outputs from the results in previous chapters were incorporated in designing a twelve month physical activity intervention (reported in Chapter 7). Specifically, the research objectives were to:

1) Identify a selection of physical activity promotion materials designed for the workplace and perform a content analysis to evaluate the messages used to encourage active working lives
2) Identify common activity initiatives that have been promoted within the workplace
3) Develop the tools described in Chapter 3 to identify an individuals stage of change in relation to physical activity
4) Develop physical activity promotion materials and leaflets based on the stage of change approach so information is tailored for individuals
5) Design an intervention schedule with themes and ideas to promote activity in the workplace

6.3 Method

6.3.1 Measures and materials

Physical activity guidance and activity promotion resources were gathered for analysis. The materials and information leaflets for review were from specific sources selected because of their authority in the UK with regards to physical activity promotion. The only stipulation was that the information had to be related to promoting activity in the workplace and the materials freely available for the end user. In addition, information available at Loughborough University promoting walks around the campus were also included. There were several promotion materials available from alternative or international websites, which were not included because they did not fit the inclusion criteria. The final sample consisted of twenty-one different types of guidance materials (leaflets, web pages and booklets) which are outlined in Table 6.1.

Table 6.1: Workplace physical activity promotional materials selected for review.

Organisation	Initiative	Resources
British Heart Foundation (BHF)	Free pack of 'Think Fit! Be Active!' promotion materials	5 x information booklets
	'Health at Work' website	3 x physical activity posters
National Institute for Health and Clinical Excellence (NICE)	Report PH13 - Workplace health promotion: how to encourage employees to be physically activity	1 x guidance report (40 pages)
NHS Choices & Change 4 Life	'Promoting Activity Toolkit'	1 x toolkit document (10 pages) 1 x active travel web page
Living Streets	Walking Works website 'Walking and Work'	3 x web pages focused on promoting walking to work
Sustrans	How to promote walking in the workforce: guidance sheet	1 x document on promoting active travel (4 pages)
Loughborough University	Campus Walks - Sustainability	6 x leaflets promoting different walks around the campus

6.3.2 Procedure

A relatively simple qualitative content analysis was conducted to identify what types of messages were being conveyed in the physical activity promotion guidance materials. A content analysis focuses on human communication and offers a systematic approach to understand meanings, intentions, consequences and context (Downe-Wamboldt, 1992). Therefore, this method is effective for creating employee information leaflets with appropriate discourses (Dixon-Woods, 2001) by following guidelines that pertain to readability, layout and terminology (Tutty & O'Connor, 1999). In this phase of the research, the content analysis was applied in a simplistic procedure to collect and classify relevant phrases and written information. The information was grouped into two main categories as outlined in Table 6.2; a standard information category based on general information about physical activity and an attitudinal information category, where the information was categorised in relation to the stage of change constructs. The categories and the messages within them were reviewed in consultation with a senior research associate employed by the Working Late collaborative research project.

Table 6.2: Classifying activity promotion messages according to their stage focus.

Type of information		
Standard information	Standard	Information about the physical activity guidelines Information and advice about walking as a method of physical activity Access to additional sources related to physical activity at work
Stage of change information	Precontemplation	Information based on the risks of inactivity to inform individuals of the needs to be active
	Contemplation	Highlighting the benefits of an active lifestyle to reinforce the beliefs that physical activity is a priority
	Preparation	Practical tips, suggestions and ideas for activity
	Action	Practical tips, suggestions and ideas for activity
	Maintenance	Motivational messages to sustain activity levels over the long-term (e.g. advice for different seasons)

The classification of information for those in the preparation, action and maintenance stages was discovered to be similar because the guidance materials mainly focused on suggestions and ideas for activity. Therefore, the preparation and action constructs were combined for this analysis because it was not possible to differentiate information based on activity being conducted for less than six months (action stage). However, messages that were associated with maintaining activity for the long-term were separated and classified for the maintenance construct. In addition to classifying the information messages, suggestions in these guidance materials for potential initiatives that could be incorporated into a twelve month intervention were recorded. National campaigns that focused on promoting physical activity were also searched in order to help plan an intervention schedule.

6.4 Results

Eighteen out of the 21 (85.7%) guidance materials identified in Section 6.3.1 provided some health promotion information that was identified as standard information. This included information on physical activity recommendations, basic information promoting walking and sources for further activity promoting materials. In terms of classifying information to the stage of change constructs, 12 (57.1%) of the guidance materials provided practical information illustrating the benefits of physical activity that would be relevant to individuals identified in the contemplation stage. Health benefits were relevant for the contemplation stage because this information would strengthen attitudes towards the benefits of physical activity in an effort to progress individuals into the preparation stage. All 21 (100%) guidance materials provided some information of relevance to those in the preparation and action stages, which included prompts, suggestions and practical advice for increasing physical activity. In contrast, 6 (28.6%) guidance materials contained information that would be beneficial to individuals identified in the precontemplation stage. This was identified as information related to the health risks related to inactivity. Only 2 (9.5%) of the guidance materials provided information that could benefit individuals identified in the maintenance stage, which included advice regarding maintaining physical activity over the long-term. The results presented in this section are based on the outcomes from this content analysis.

6.4.1 Intervention leaflets

Analysis of the guidance materials demonstrated the difficulty of differentiating information into the preparation, action or maintenance constructs. The majority of the information from the content analysis was focused on providing practical advice targeting individuals who wanted to be more physically active (contemplative/preparation) and some information based on the risks of inactivity (precontemplative). The aim of this research phase was to use the information from these existing resources to develop additional promotion materials so they could be implemented as part of a tailored workplace initiative that promoted walking and physical activity. However, delivering tailored information specific to employees in five different stages of change would be challenging and difficult in an organisational setting. The classification process during the content analysis demonstrated the potential method of delivery for a tailored intervention needed to be simplified by combining stages together or streamlining the practical delivery of information materials.

The importance of understanding every employees stage of change construct at the beginning of the intervention has been highlighted, so that they could be provided tailored information designed for individuals in their stage. Individuals identified as being in the precontemplation stage would be unlikely to adopt physical activity advice that is given to them because they do not perceive any need for a change. However, individuals in the contemplation stage, who are already convinced of the health implications of activity may benefit from practical advice on how to be more active. Similarly, individuals in the preparation stage, who are intending to take steps to be more active within the next month, would also benefit from practical advice on how to be more active. Individuals in the action and maintenance stages have already taken the necessary steps to be more active, and these individuals may also benefit from the practical advice on how to be more active to help consolidate what they are already doing. Therefore, potential information for the tailored intervention was reclassified into 2 groups according to the emphasis on the stage of change constructs:

1) Precontemplative: employees who are not thinking of changing their behaviour but need to be more active (stage of change construct = precontemplative)
2) Contemplative/preparation: employees who want to be active and are thinking of changing their behaviours or have made changes already (stage of change constructs = contemplative, preparation, action and maintenance)

The content of the intervention leaflets that were to be designed were important to identify whether standard or tailored activity information could have a significant impact on employee behaviour. Therefore, the design of a research study to investigate this would need to include 3 intervention conditions/groups. Two of these intervention groups would receive information materials and 1 group would receive no information during the intervention period (control group). The difference between the 2 intervention groups who would receive information would be that 1 group would receive standard activity promotion information extracted from the content analysis (standard group) and individuals in the second group would receive tailored information based on their stage or change construct (staged group).

By focusing on 2 constructs (precontemplative and contemplative/preparation) to tailor information for the staged intervention group, it meant that only 2 different leaflets needed to be developed for this simplified application of the stage of change approach. Furthermore, creating 1 standard information leaflet (using general physical activity information from the content analysis) for the standard intervention group meant that 3 leaflets were required for this phase of the development. Drafts of the leaflets were provided to 2 academics, 1 senior researcher and an ergonomics business consultant who suggested several revisions:

- Remove attitudinal information from the standard intervention leaflet (e.g. any health benefits)
- Identify health benefits for the contemplation/preparation leaflet that are not just opposites of the risks in the precontemplation leaflet
- Incorporate case study snippets to supplement the risk information in the precontemplative leaflet

The final leaflet design chosen was a double-sided A4 sized tri-fold leaflet, which contained 6 panels of information. The difference between the leaflet designs had to be subtle so they could be distributed in a work site to individual employees without them noticing any major differences. For example, for employees in an organisation allocated to the staged intervention condition, participants would receive different information based on their stage of change classification. Therefore, the different leaflets would need to be subtle so that employees did not become suspicious about receiving different kinds of information. Therefore, the design for all 3 types of leaflets was the same. The individual content for each leaflet is described in their respective sections below and can be viewed in Appendices 6.1, 6.2 and 6.3. In addition to the leaflets being of the same design, the contents in 2 of the panels were the same for all 3 types of leaflets and contained:

1) The front cover panel of all three leaflets included the title of the intervention (Walking Works Wonders) and pictures related to walking. The Loughborough University and Working Late research branding was also included
2) It was important that all participants were aware of the recommended physical activity guidelines. Therefore, one panel in all three leaflets was dedicated to informing them of the guidelines (pre- 2011 update) and how they could monitor step counts using a pedometer
3) All leaflets contained a set of 'did you know' facts or statements related to physical activity/exercise

The aims of the contemplative/preparation leaflets were to provide employees who were identified as contemplative or preparation with practical tips, advice and information to be more physically active. Employees identified in the action and maintenance stages would also be given this leaflet. The four individual panels in this leaflet contained:

1) One panel dedicated to the health benefits associated with activity. These employees would already be aware of the risks of inactivity and this information aimed to reinforce their beliefs about being active

2) One panel dedicated to promoting walking as an important method of physical activity and the benefits associated specifically with walking
3) One panel contained 9 practical, sustainable and incidental activity instructions that could be incorporated into the workplace to meet the activity guidelines
4) One panel dedicated to real-world applications of activity at work, including a comparison table of calories burned whilst being active or inactive at work (e.g. comparing the calories burned in a 5 minute call standing up versus a 5 minute call sitting down)

The aims of the precontemplative leaflets were to get employees who were classified as precontemplative to change their stage of change construct to contemplative/preparation. Precontemplative individuals are those who need to be more physically active but have no intention to change their behaviour. Therefore, unlike the contemplative/preparation employees, there would be little point in providing practical activity advice, as these employees do not have any intention to change their behaviour. Instead, the focus of these leaflets was to try and get precontemplative employees thinking about taking some action because they needed to for the benefit of their health. The 4 individual panels in this leaflet contained:

1) One panel dedicated to the health risks associated with inactivity
2) One panel included a fictional case study example of an employee who experienced pain from weight gained over several years due to inactivity. After initially not wanting to change behaviour, this employee started to incorporate small changes into their daily routine (e.g. reducing sedentary time by standing, stretching, etc.) which had a positive effect on reducing pain
3) One panel with answers to 4 common barriers to physical activity/exercise
4) One panel included simple ideas with the aim to get employees thinking about if they could make any small changes to their daily working lives

The aim of the standard leaflets was to regenerate the standard types of information leaflets that were available. To measure intervention effects, it was important the leaflet for these employees did not contain any specific attitudinal information that focused on employee cognitions. All employees from the work sites allocated to this group would be provided the same standard leaflet. The 4 individual panels in this leaflet contained:

1) One panel promoting walking as an important method of physical activity and the benefits associated specifically with walking
2) One panel dedicated to providing sources where participants could find additional physical activity (walking) information. This list contained the sources of the organisations whose publications and guidance materials were used for the content analysis
3) One panel with standard ideas of incorporating additional walking at work activities
4) One panel with standard advice related to walking (e.g. wearing comfortable shoes, etc.)

6.4.2 Intervention schedule

In addition to the analysis being conducted for the intervention leaflet content, further data were collected to record ideas for potential campaigns promoting activity in the workplace. Data were collected from national physical activity and health focused campaigns that occur every year (e.g. Walk to Work Week; Living Streets, 2010). The aim of the intervention schedule was to promote a variety of themes and activities to the intervention groups that would encourage employees to increase their activity levels at work and enhance compliance and maintain interest in the intervention. The qualitative investigations described in previous chapters with employees (Chapter 5) and organisational stakeholders (Chapter 4) also provided recommendations for multiple themes and were included in the development process. The intervention themes would be the same for both types of intervention groups and the leaflet would remain as the only comparable difference between conditions. The themes would be promoted in organisations via emails and themed posters. These communications would contain information, facts, tips and ideas about the relevant themes.

Three academics, 1 ergonomics business consultant and 2 project managers from the BHFNC reviewed the first draft of the twelve month intervention programme. The advice received from the reviewers, including the BHFNC was valuable as they had a significant amount of experience in delivering physical activity initiatives and interventions in the workplace. The original intervention schedule provided monthly activity themes the employees could focus on in the workplace. The purpose of using multiple themes was to keep the intervention feeling exciting throughout the year and to allow different types of employees to participate in different initiatives. However, feedback from the reviewers suggested the themes should change less frequently to allow individuals an opportunity to implement the initiative into their lives. They suggested multiple themes could cause confusion with employees about what they should focus on, resulting in confused and ultimately disengaged employees. Furthermore, employees may attribute email contact every month or several times a month as junk/spam email and therefore any intervention effects could be reduced. Suggestions were made to extend theme periods to 2 or 3 months by focusing on a small number of core themes. The final intervention schedule is described in Section 6.4.4.

6.4.3 Walking Lunch

The Working Late multidisciplinary research project partnered with the Royal Society for the encouragement of Arts, Manufactures and Commerce (RSA) with the aim to develop additional components to the intervention themes and materials. The RSA organised a national competition as part of their 'Design Directions Student Awards' scheme, a prestigious national competition for early career designers to demonstrate design-led approaches to a problem or scenario. The Working Late competition brief instructed potential entries to design an innovative health intervention for the workplace in order to engage the active participation of employees. The competition was judged by a panel chaired by Professor Jeremy Myerson (Director of the Helen Hamlyn Centre of Design at the Royal College of Art) and included Professor Cheryl Haslam (Director of the Work and Health Research Centre, Loughborough University and Principal Investigator for the Working Late research project), John Corcoran (Director of Wire Design Ltd) and Malcolm Garrett RDI (Creative Director of AIG Applied Information Group).

The winners of the competition were graduates from Kingston University, Jenny Rice *(www.jennyrice.com)* and Racheal Ball Risk *(www.rachaelballrisk.com)* who designed 'Walking Lunch'. The basic idea of Walking Lunch was to encourage and inspire employees to use their lunch break for a walk to explore the local area. Walking Lunch involves placing a large map (1 metre diameter pinboard) on the wall in a communal area of a work site (e.g. reception area, break room, etc.). The map has a radius of 1.5km and displays the surrounding areas of each work site, which is located in the centre of the map. Employees are encouraged to explore areas on the map to find cafés and restaurants, parks and picnic spots, commuting and walking locations, and places of interest, and return to record this information on multi-coloured tags that are pinned to the corresponding location on the map.

The colour of each tag signifies a particular reason of interest. For example, green highlighted a park or picnic spot and red highlighted active commuting (e.g. walking from a car park location or the local railway station). Every work site would be provided with an inkless mini photo printer and photo paper, so that employees could take a photo of a location using their smartphones or digital cameras (e.g. a recommended café for lunch), print out the photo and stick it on the information tags. The printers supported both USB connected printing (for digital cameras) or wireless printing using bluetooth (for smartphones). The tags also included space to record other relevant information such as the number of steps taken to get there (e.g. from a pedometer issued to participants). Printing pictures was not necessary as employees could just write information and descriptions on the tags. A3 sized (foldable to A6 pocket sized) leaflets were also developed which included a scaled down version of the map, instructions about how Walking Lunch worked, ideas for personal or office challenges and space to record any notes, targets and goals. Figure 6.1 displays the Walking Lunch equipment. A scaled down version of the A3 leaflets can be viewed in Appendix 6.4. The purpose of Walking Lunch was to develop a community within the work site sharing ideas about these locations, with the aim of encouraging employees to explore the local area, increase their physical activity and improve their health.

The Walking Lunch component would be implemented during the final three months of the twelve month intervention in order to reinvigorate the employees participating in the intervention.

Figure 6.1: Images of the Walking Lunch equipment.

6.4.4 Final intervention schedule

The final schedule for each intervention condition is displayed in Figure 6.2. Four intervention themes were selected from the draft programme for implementation within organisations allocated to the standard and staged intervention groups. Two additional promotion leaflets were developed for each intervention theme that would be emailed to participants and placed around the work site. The purpose of these leaflets were to make participants aware of the themes during the course of the intervention period, provide additional information specifically related to the theme and enhance compliance and interest in the intervention. Examples of these leaflets can be viewed in Appendix 6.5. The implementation and results of the intervention are discussed in Chapter 7.

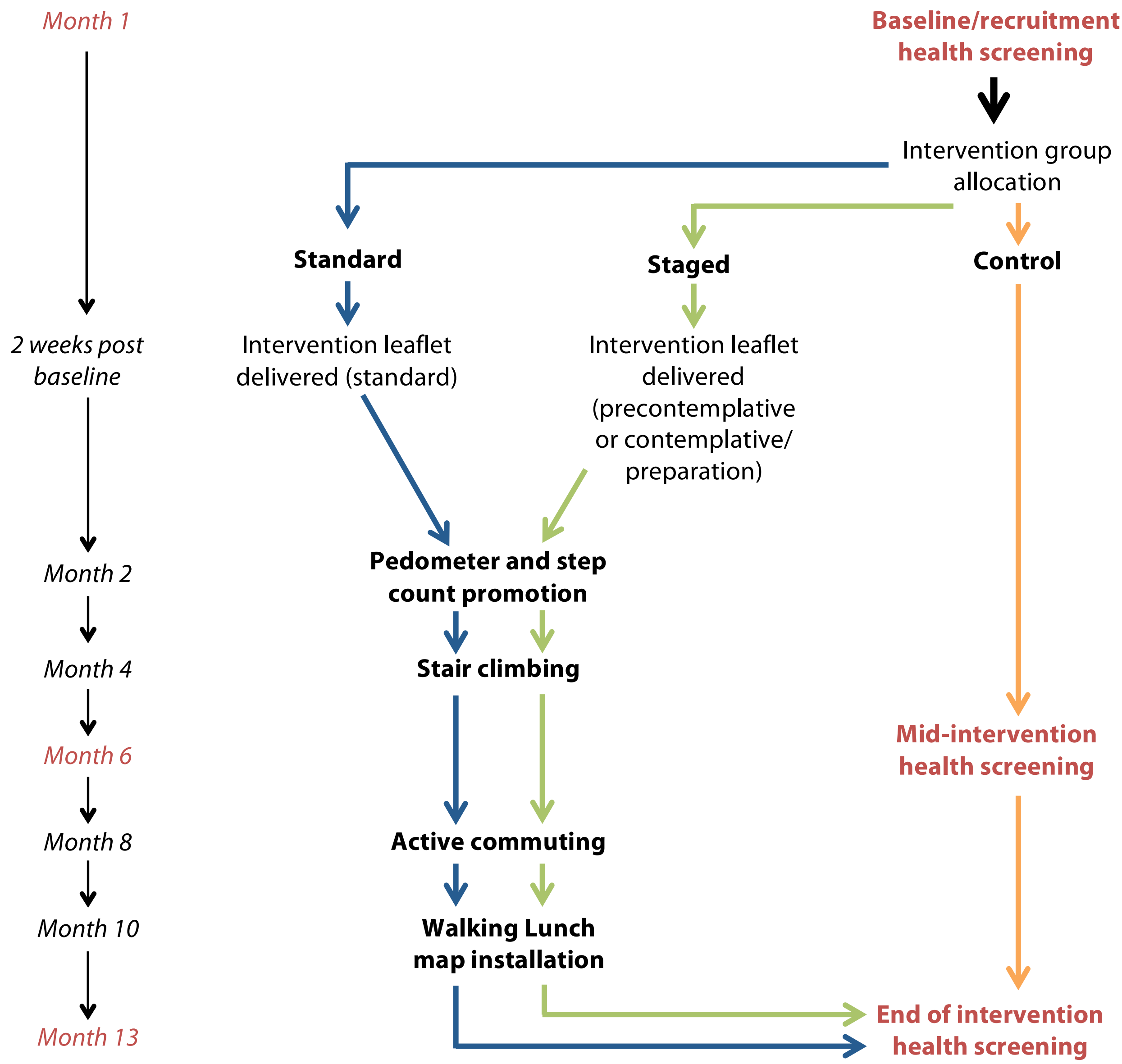

Figure 6.2: Intervention timeline and schedule for each condition.

6.5 Discussion

6.5.1 Summary of key findings

The investigation described in this chapter is an exploration into health education materials used to promote physical activity in the workplace. This chapter has included the results from a content analysis, which evaluated and classified different activity communications according to the type of messages they were trying to convey. The results were important because they contributed to the design of health promotion leaflets focused on walking, which contained information that was either standard or tailored according to an individual's stage of change construct in relation to physical activity. The outputs from this assessment, previous research phases and additional discussions with colleagues experienced in activity interventions contributed to the development of a physical activity intervention schedule that would be implemented in organisations to test the effects of the leaflets on physical activity and employee health (Chapter 7).

A total of twenty-one physical activity promotion guidance materials (leaflets, web pages and booklets) were obtained for analysis from reputable UK sources. A content analysis was conducted to classify the activity messages according to whether they were emphasising attitudinal (tailored) or non-attitudinal (standard) information. Information that was classified as appropriate for the tailored intervention was coded according to what particular stage of change construct it could target (precontemplative, contemplative, preparation, action or maintenance). Further data were collected to record ideas for potential campaigns promoting activity in the workplace.

The results from the coding exercise demonstrated the most appropriate way to classify the tailored information for the staged intervention group was to combine the outputs into two constructs. Critics of the stage of change categories state that splitting up behaviours at six months is arbitrary and meaningless (Bandura, 1998). People have constantly changing levels of physical activity and an individual could be active and meet the recommended guidelines one day, and not be active enough to meet the guidelines on another day. Therefore, the stage implications of health behaviours related to physical activity could be different when compared to lifestyle behaviours such as smoking, where the model has been implemented successfully (Andersen & Keller, 2002; Prochaska & DiClemente, 1983; Velicer et al., 1985). The intervention leaflets were designed based on classifying participants to one of two constructs; precontemplative or contemplative/preparation. The precontemplative information was for employees who were not thinking of changing their behaviour but needed to be more active (stage of change classification = precontemplative). The contemplative/preparation information was for employees who wanted to be active and were thinking of changing their behaviour or had made changes already (stage of change classification = contemplative, preparation, action and maintenance). Therefore, these results suggested that only two types of leaflets needed to be designed for the staged (tailored) intervention group (i.e. those thinking of changing versus those not thinking of changing). This approach is similar to previous research that suggests a practical method of applying the stage of change approach to health and safety interventions in the workplace can provide tailored information to workers and managers based on whether they are not considering changing their working practices or if they are contemplating changing to safer working practices (Haslam & Haslam, 2000).

In order to test the effects of the leaflets that were developed, a quasi-experimental design was proposed with three conditions. The difference between the intervention conditions would be the type of intervention leaflet employees would receive:

1) Standard information: this group would be given the standard physical activity leaflet. The leaflet also contains details of where to access additional information

2) Staged information: this group would be given a version of the tailored information after their stage of change construct was identified. Precontemplative participants would be provided with information based on the risks of inactivity. Contemplative/preparation participants would be given information on the benefits of activity and practical tips and ideas to increase daily levels of walking

3) Control information: this group would receive no intervention material

A five-item measure to evaluate participants' attitudes towards their levels of physical activity/exercise and to identify their stage of change concerning this behaviour would also be included. This measure was developed from the original three-item measure discussed in Chapter 3 to include two additional questions that could determine participant allocation to the separate action or maintenance stages. Figure 6.3 displays how stage of change was classified based on the responses to the questions. The Likert style (yes/no) questions designed were:

1) Are you planning to increase the amount of physical activity/exercise you do?
    a. If yes, are you planning to increase the amount of physical activity/exercise you do within the next 6 months?
    b. If yes, are you planning to increase the amount of physical activity/exercise you do within the next month?
2) Have you recently increased your levels of physical activity/exercise?
    a. If yes, did you make this change…(within the last 6 months/more than 6 months ago)

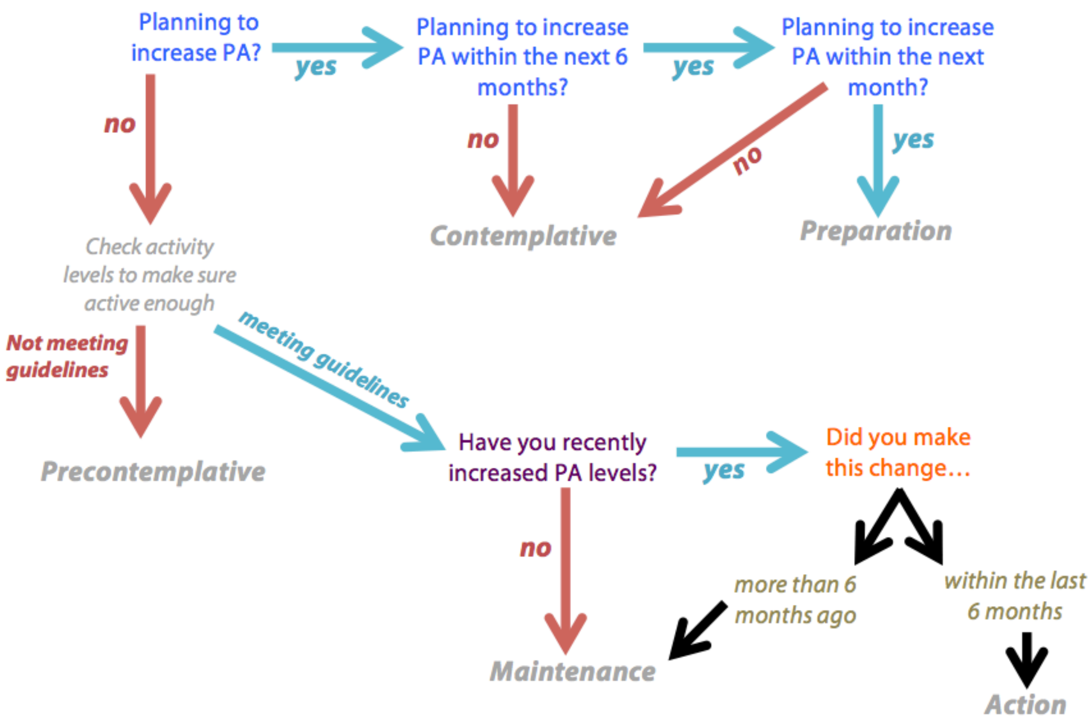

Figure 6.3: Flow chart illustrating classification of stage of change based on responses to these questions (PA=physical activity).

An intervention schedule was developed to promote a number of themes within participating organisations where the intervention leaflets would be tested. In the employee focus group results described in Chapter 5, employees stated they wanted incidental activities where time constraints at work would not impact their participation. Furthermore, they requested a variety of initiatives that would help attract a number of different employees. Walking is relatively easy, not bound by time constraints and can have beneficial health effects for several illnesses (Murphy et al., 2007). By focusing on walking, the intervention programme was designed to demonstrate a selection of simple and effective methods employees could use to increase their walking activities and reduce the amount of time spent being sedentary at work.

Feedback from the occupational health stakeholder interviews and focus groups in Chapter 4 suggested that manager support and communication were key facilitators and barriers to any health intervention within the workplace. Regular communication promoting each theme was also identified as a key component of the intervention schedule. Participants would be sent emails with information, facts, tips and ideas about the relevant themes to accompany the themed posters. Organisation culture was also highlighted in Chapter 4 as being important for the success of a health intervention. The Walking Lunch initiative is an innovative concept that could help to support the culture of an organisation that is trying to improve the health and wellbeing of its employees by encouraging activity during the work day.

Feedback in both Chapters 4 and 5 suggested that employee health assessments and tailored feedback would encourage more workers to participate. The leaflets that have been developed provide tailored activity information based on participants' stage of change. Moreover, individual health assessments to collect physiological data would be part of measuring the intervention effects for the different conditions, the results of which (personal to each participant) would be provided to employees (described in Chapter 7).

6.5.2 Strengths, limitations and suggestions for future research

One of the principle strengths of this research was that the intervention design was developed based on previous research and trustworthy sources for the health education guidance materials. The information sourced for the content analysis was from organisations and societies recognised for having an interest in physical activity, exercise and public health. However, only a small selection of leaflets, web pages, booklets and guidance materials were selected for this review. Conducting an Internet web search *(www.google.co.uk)* for phrases such as 'physical activity at work' (92,500,000 results), 'workplace health activity' (4,740,000 results), 'workplace activity' (44,300,000 results) and 'employee exercise' (82,700,000 results) revealed millions of potential web resources that could have been used for the analysis. Information technology has become an integral part of health informatics and the Internet is an important tool to deliver health related information to consumers (Eysenbach, 2000; Eysenbach, Powell, Kuss, & Sa, 2002). The amount of information available on the Internet is vast and one can probably find some form of guidance for almost every type of health promotion initiative. However the quality of health information varies significantly (Eysenbach et al., 2002). The options for quality control of health information on the Internet are virtually non-existent and researchers should be aware of how to assess the quality of information (Eysenbach, 2000). Therefore, using information materials that were generated from reputable sources ensured the contents of the analysis were reliable.

One of the limitations to consider in this investigation is the classification of the activity information to each stage of change construct was simplistic. Furthermore, the subjective nature of the coding meant researcher bias might have affected the outcome of the results. For example, the distinctions between the different constructs of the stage of change model are subtle. The researcher may have forced these differences when analysing the data to create distinct groups. However, this method was deemed appropriate because the guidance materials were of different styles and from multiple sources, which meant a more detailed method of coding might not have been applicable to all sources of information. Furthermore, a second investigator assessed the coding of the information to improve the reliability of the groupings.

Physical activity promotion initiatives are popular and as the results in Chapter 3 demonstrated, they are the most popular type of health initiative to be promoted within organisations. Furthermore, the results in Chapter 3 also reported that the majority of employees did not participate in the health initiatives being promoted at their work site. Nevertheless, feedback from employees and organisational stakeholders in Chapters 4 and 5 demonstrate there is still an opportunity to deliver successful physical activity focused initiatives, if the barriers to participation are overcome. Including the input from the field of art and design was an important strength of developing the intervention schedule. This component could enhance the intervention experience for participants because it provides an innovative and encouraging approach to lunch time walking. The collaborative model of allowing employees to contribute and inform others may also have a significant social impact for employees (Fox, 1999).

The intervention themes selected (pedometer and step count promotion; stair climbing; active commuting; Walking Lunch) were based on the outputs from previous chapters and consultation with collaborators experienced in delivering organisational health interventions. Furthermore, focusing on increasing walking may attract a larger number of potential employees than other more vigorous activity programmes. Therefore, these factors mean the intervention could appeal to individuals who would not normally participate in health interventions, such as those who are overweight, have a low level of physical fitness or have a health condition that may prevent them from participating in other more intensive health initiatives (Conrad, 1987; Titze et al., 2001; Wong et al., 1998).

6.5.3 Conclusions

The aims of this phase of the research were to develop health promotion materials in the context of the stage of change approach, with the purpose of promoting a physical activity intervention in the workplace. The results demonstrate that stage of change information can be dichotomised so that education and guidance materials can be tailored according to if an individual is not thinking about making a change (precontemplative), or if an individual is thinking about making a change (contemplative/preparation). This simplified model of applying the stage of change approach to an activity intervention in the workplace demonstrates a practical method to identify an employee's stage and administer them the appropriate staged-matched materials in a work setting. Therefore, these results extend the literature for the stages of change construct of the transtheoretical model, which has been applied to physical activity interventions (Jordan et al., 2002; Kirk et al., 2004; Kirk et al., 2003; Marshall & Biddle, 2001) to include using the approach for physical activity interventions in the workplace. The results from implementing the intervention leaflets and schedule are evaluated in Chapter 7.

Chapter 7

Interventions to maintain and promote employee health and wellbeing

7.1 Introduction

This chapter details the findings from the intervention phase of this research; a longitudinal twelve month occupational health intervention used to evaluate the stage of change approach to deliver physical activity promotion information. The intervention incorporated behaviour change theories, particularly the stage of change construct of the transtheoretical model (Prochaska & DiClemente, 1983) which was reviewed in Chapter 2. As discussed in previous chapters, changes in lifestyle that reduce physical activity and increase the daily accumulation of sedentary behaviour are related to significant chronic health problems. Despite the amount of information about the benefits of regular physical activity available, the sedentary nature of many job roles forces employees to be inactive for lengthy periods of time, even though they may know it could have a negative impact on their health in the long-term. Data were collected at baseline, mid-intervention and end of intervention measurement time-points using a questionnaire and health screening assessments. This chapter presents the descriptive statistics, the results from several statistical analyses and discusses the key findings and implications of the results and intervention.

7.2 Research design and aims

The aims of this phase of the research were to assess whether a longitudinal workplace physical activity intervention can be made more effective by tailoring approaches that target health information according to the stage of change of employees. The tools that were used to deliver the intervention have been described in Chapter 6. The intervention targeted increasing physical activity levels and improving psychological outcomes. A secondary aim was to assess whether this physical activity intervention also had a reduction in participants sedentary behaviour. The outcome measures were collected using a questionnaire (self-report physical activity, sitting time and psychological data) and health screening assessments (physiological data). In order to achieve the research objectives, the longitudinal results of the intervention were monitored at mid-intervention and end of intervention assessments, which were compared to the baseline measurements. Therefore, the variables under investigation were examined at three points in time with the same participants.

A quasi-experimental design method was chosen because it allowed evaluating the longitudinal results of the intervention by exploring significant changes in the participant outcome measures that were selected at each measurement time-point. Multiple work sites within the same organisation were selected to reduce the contamination effects between the intervention groups (standard, staged and control) while at the same time minimise the potential for variation due to organisational differences. With this in mind, this phase of the research evaluates the intervention results and offers recommendations for organisational physical activity interventions. Specifically, the research objectives were to:

1) Implement an intervention aimed at increasing physical activity levels
2) Collect longitudinal repeated measures data (the same pre-determined outcome measures collected at baseline) at six months (mid-intervention) and at the end of the intervention to evaluate the effectiveness of the intervention
3) Identify whether significant differences exist between changes in the outcome measures for the intervention conditions (standard, staged and control)
4) Provide help and advice to participating employees and contribute towards developing healthier lifestyles

7.3 Method

Results from randomised control trials are regarded as the gold standard in the hierarchy of research designs (Concato, Shah, & Horwitz, 2000). However, research away from laboratories with real people in societies and social structures provides many challenges for evaluating the effectiveness of an intervention. Research in organisations makes it virtually impossible to randomly allocate employees to different conditions, and therefore a pragmatic approach to this investigation was adopted. This research study aimed to assess whether a workplace physical activity intervention can be tailored to target health information according to the stage of change of employees (staged intervention condition), and whether this approach would be more effective than providing standard information (standard intervention condition), or no information at all (control intervention condition). Therefore, individual work sites were allocated to an intervention condition based on their geographic location, to ensure that no cross-contamination of intervention material was possible.

7.3.1 Measures and materials

When identifying what data needed to be collected, the researcher took into consideration the psychological outcomes, physiological measures, sitting time information and physical activity data that would be most appropriate to assess the effectiveness of the intervention. It was important to measure both the psychological and physiological health of participants as the literature identified in Chapter 2 has shown that physical activity provides numerous health benefits for individuals who engage in regular periods of exercise and/or physical activity. Furthermore, specific outcomes for the organisation were also required as this information is essential in assessing the success of any organisational intervention. The psychological outcomes, sitting time information and physical activity data were based on self-report data collected using a questionnaire. Physiological measures were collected through non-invasive measurement processes. The data were collected on each site of the participating organisations during working hours. Therefore, it was important that data collection sessions for each participant would measure the entire set of required variables in an efficient and professional procedure. The specific days when these data collection sessions were held were branded as 'health screening assessments' within the organisations.

7.3.1.1 Questionnaire development

A questionnaire was used to collect self-report data on psychological outcomes, physical activity levels and sitting time. The questionnaire was available for participants in paper format or online via an Internet web-link. The beginning of the questionnaire included a foreword, which on the first recruitment/baseline health screening assessment provided participants with an introduction to the aims of the research and what the questionnaire findings would be used for. On subsequent revisits for the mid-intervention and end of intervention assessments, this introduction acted as a reminder to participants of the research project. For these revisits, the beginning of the introduction was modified to notify employees the questionnaire was only to be completed by those who had already been recruited and were participating in the research. This notification ensured any employees who were not taking part in the research, but may have been forwarded the web-link by a colleague, would not complete the questionnaire.

A number of the outcome measures included in the questionnaire were tested in the previous quantitative phase of this research (Chapter 3). The bespoke questions that assessed lifestyle physical activity in the questionnaire were replaced by the International Physical Activity Questionnaire (IPAQ) (Craig et al., 2003). The aims of the bespoke physical activity questions used in Chapter 3 were to develop a validated self-report measure of individuals meeting the physical activity guidelines. However, lack of responses during a validation exercise meant there was little time to collect and analyse data from additional participants. As with other self-report measures, the IPAQ has its limitations (Bauman et al., 2009; Lee, Macfarlane, Lam, & Stewart, 2011). However, it is an established tool that provides physical activity output in MET-minutes per week and has been validated in numerous countries (Craig et al., 2003) and shows good test-retest reliability (Brown, Trost, Bauman, Mummery, & Owen, 2004).

In Chapter 3, the WAI was reported as unclear, complicated and unnecessary lengthy. Therefore, after gaining experience of using the WAI in its entirety, three specific edits were made to condense the WAI for this phase of the research. Firstly, the option for respondents to self-diagnose conditions was removed, as this selection was not included in any subsequent analyses. Only two options remained; 'no condition' and 'condition diagnosed by a physician'. Secondly, all of the individual conditions were removed from the list, which left fourteen overall groupings where participants could record any conditions/diseases they were reporting under. Thirdly, as well as including examples of diseases for each grouping (taken from the original WAI), there was space for participants to describe any conditions. This helped to identify the number of conditions reported by participants (used for analyses). These changes meant the original WAI was condensed by almost 50%, and the tool remained the same in terms of its use to reveal how well a worker is able to perform their work.

Three academics, one ergonomics business consultant and one health economist reviewed the first draft of the questionnaire. Due to the questionnaire being similar to that used in Chapter 3, it was deemed not necessary to pilot the entire questionnaire. The section with the modified version of the WAI was piloted on three academics experienced with using the WAI. Feedback to the changes was generally positive especially in terms of the length of the WAI and the time taken to complete the questionnaire. The researcher felt that changing the format of the WAI was necessary in this longitudinal phase of the research. This was because participants were expected to complete this questionnaire on three separate occasions (baseline, mid-intervention and end of intervention). Therefore, it was important that the questionnaire was as short as possible to reduce the burden on employees. The final version of the questionnaire can be viewed in Appendix 7.1.

7.3.1.2 Questionnaire measures and materials

The introduction contained clear and detailed instructions, including the estimated time taken to complete the questionnaire. Participants were also informed what kinds of questions to expect and the various topics covered. Participants were reassured all responses were completely confidential and individual responses would not be shared with employers. With this in mind, individuals were asked to respond openly and honestly and were informed of their right to withdraw at any point from this research.

Participants were required to tick a mandatory check box as a way of providing consent at the beginning of the questionnaire.

Participants were also asked to record their name and email address at the beginning of the questionnaire. These details were recorded and used in order to contact the employees in the future. These details were important because the intervention materials, notifications of future health screenings and the Internet web-link to complete questionnaires for future revisits were sent via email. On the questionnaire for the revisits, participants were requested to ensure they recorded the same email address that was used to contact them by the researcher. The email address was also used to match responses for each participant with their results from previous readings. Each email address was allocated to an identification number, which ensured the results remained confidential as only the researcher had access to these details. Furthermore, for both of the revisits, an additional question was added that asked participants if they were interested in taking part in a short interview to discuss the research study and the impact of the intervention. All sections of the final questionnaire that were used to collect the outcome measures from the participants at baseline, mid-intervention and end of intervention health screenings are outlined below.

Demographic and lifestyle information collected has been described in Chapter 3. Self-reported physical activity levels were recorded using the self-administered IPAQ short version in English (Craig et al., 2003). The IPAQ is a widely used measure of self-reported physical activity. Research has shown self-reported physical activity using the IPAQ is comparable to results using objective criterion instruments such as accelerometers (Bauman et al., 2009; Hagströmer, Oja, & Sjöström, 2007; Sallis & Saelens, 2000). The IPAQ has also been used as an outcome measure in previous intervention research (Baker et al., 2008; Ferreira, Matsudo, Matsudo, & Braggion, 2005). The scoring protocol for the IPAQ short was followed, which was downloaded from the IPAQ website *(sites.google.com/site/theipaq)*.

The five-item measure to evaluate participants' attitudes towards their levels of physical activity/exercise and to identify their stage of change concerning this behaviour was also included. The measure was developed in Chapter 6 from the original three-item measure described in Chapter 3 and fully described in Section 6.5.1. Self-reported sitting times were measured using the Domain Specific Sitting Time Questionnaire (Marshall et al., 2010; Miller & Brown, 2004), which has been fully described in Chapter 3. The names of the sitting domains have been shortened throughout this chapter to: transport; work; TV, PC at home; other leisure; and sleeping.

Physical activity at work was measured using a modified version of the Occupational Physical Activity Questionnaire (OPAQ) (Reis, Dubose, Ainsworth, Macera, & Yore, 2005). The OPAQ is a seven-item measure that identifies the average time per week spent in three occupational activity categories: (a) sitting or standing; (b) walking; and (c) heavy labour. For each category, participants were asked if they performed any of these activities and if they did, to identify the number of hours they performed each activity for during a usual working week. For the purposes of this questionnaire, the question that assessed sitting or standing activities at work was edited to read standing activities at work. Sitting time at work was omitted because data on sitting time at work was collected by the Domain Specific Sitting Time Questionnaire. Participants were also asked to indicate the distance they travelled to work and their usual method of travel to work. Work ability was assessed using the WAI (Tuomi et al., 1998), which has been fully described in Chapter 3. For this research phase, the WAI was modified and condensed by almost 50%, and the tool remained the same in terms of its use to reveal how well a worker is able to perform their work.

Psychological wellbeing was measured using the General Health Questionnaire 12 (GHQ-12; Goldberg & Williams, 1988). The GHQ-12 is a twelve-item self-report questionnaire that serves as an indicator of psychological distress or potential psychiatric morbidity and has robust psychometric properties (Goldberg et al., 1997). The GHQ-12 asks respondents to report how they felt recently on a range of variables using a four-point Likert scale. The GHQ-12 includes twelve questions; six questions are positively worded and six questions are negatively worded and the response scale is reversed for the two different types of questions. For the six questions that are positively worded (e.g. Have you been able to concentrate on what you are doing?) the responses run from 0 = more so than usual to 3 = much less than usual. Similarly, for the six questions that are negatively worded (e.g. Have you felt constantly under strain?) the responses run from 0 = not at all to 3 = much more than usual (Baksheev, Robinson, Cosgrave, Baker, & Yung, 2011). There are several ways of scoring the GHQ-12. The two most common methods are binary GHQ scoring (0–0–1–1), which yields a possible score range of 0–12, and Likert scoring (0–1–2–3), which gives a possible score range of 0–36. Higher scores on the GHQ-12 indicate greater levels of general psychiatric distress. Likert scoring was selected as this method has been shown to produce a wider and smoother score distribution if a researcher wishes to assess severity (Goldberg et al., 1997). Likert scoring has also been previously used in Australian validity studies (French & Tait, 2004; Tait, French, & Hulse, 2003). The reliability of the GHQ-12 was good (Cronbach's alpha = 0.92).

Organisational commitment (OC) was measured using a nine-item scale developed by Cook and Wall (1980). Participants were asked to rate each item using a seven-point Likert scale (where 1 = strongly disagree and 7 = strongly agree). This measure contained three subscales relating to identification, involvement and loyalty, with these subscales summed to give an overall commitment score (with a range of 9–63, and high scores indicating high commitment). Identification is defined as pride in the organisation leading to internalisation of the organisation’s goals and values. Loyalty is defined as attachment to the organisation leading to a sense of belongingness manifesting as ‘a wish to stay’. Involvement is defined as the willingness to invest personal effort as a member of the organisation, for the sake of the organisation (Cronbach’s alpha = 0.82). *Note: items two, three and eight are reversed scored.*

Job satisfaction (JS) was measured using a three-item scale taken from the Michigan Organizational Assessment Questionnaire (Cammann, Fichman, Jenkins, & Klesh, 1979). Participants were asked to respond on a seven-point Likert scale (where 1 = strongly disagree and 7 = strongly agree). The scale was scored by averaging the responses, with a possible range of 1–7, with high scores indicating high levels of job satisfaction (Cronbach’s alpha = 0.84). *Note: the second item from the three statements is reversed scored.*

Intention to quit (ITQ) was measured using another scale from the Michigan Organizational Assessment Questionnaire (Cammann et al., 1979). This three-item scale was split into two sections, where the first two questions asked respondents to rate the extent to which they agreed with two statements using a seven-point Likert scale (where 1 = strongly disagree and 7 = strongly agree). The third item asked participants to answer the question 'How likely is it that you will actively look for a new job in the next year?' using a different seven-point Likert scale (where 1 = not at all likely and 7 = extremely likely). The measure was scored by calculating the average response across the three items, with a possible range of 1–7, with high scores indicating a strong intention to leave the job (Cronbach's alpha = 0.86).

Intrinsic job motivation (JM) was measured using a six-item scale designed to assess the degree to which a person wants to work well in his or her job in order to achieve satisfaction (Warr, Cook, & Wall, 1979). Responses are given to each statement using a seven-point Likert scale (where 1 = strongly disagree and 7 = strongly agree). Responses were summed to produce a score for the measure, with a possible range of 6–42, with high scores equating to high intrinsic job motivation (Cronbach's alpha = 0.78).

This questionnaire was delivered as part of the Working Late project. Therefore, other questions and measures were included that investigated topics important to the Working Late research. The full questionnaire is available to view in Appendix 7.1. Only the measures that were used in this research have been described.

7.3.1.3 Physiological measures and materials

Before any physiological measures were collected, participants were requested to complete a health screening questionnaire (Appendix 7.2). The screening questionnaire ensured participants did not have any condition, disease or illness that could be made worse by participating in this intervention. Employees were also asked if any health conditions identified using the health screening questionnaire impacted their ability to walk or would affect their participation in the intervention. All components of the health screening assessments that were used to collect physiological measures from the participants at baseline, mid-intervention and end of intervention are outlined below.

An accurate measure of height (in centimetres) was required at each measurement time-point in order to calculate BMI. Height was measured (without shoes) using the Leicester Height Measure (Child Growth Foundation, London), which is a portable plastic stadiometer consisting of a footplate, four-piece vertical ruler and a movable head.

Weight and body composition were measured using professional Tanita BC-418 MA scales. The body composition analyser provided readings for weight, BMI, BMR, fat percentage, fat mass, fat free mass and total body water through bioimpedance analysis. These scales also provided a small printout, which included desirable body fat ranges and was attached to each participant's results sheet. For the purposes of this research, the measures of interest were weight (kg), BMI (kg/m^2) and fat percentage (Fat %). There is a wide range of individual error when assessing fat percentage. The literature has revealed that compared to dual-energy X-ray absorptiometry, bioimpedance analysis may underestimate fat mass for those in the lower ranges of the population by 12% and may overestimate fat mass for those in the upper ranges of the population by 8% (Völgyi et al., 2008). Nevertheless, measuring body composition by bioimpedance is gaining acceptance in science (Jaffrin, 2009). For the purposes of this research, the Tanita BC-418 MA scales are a validated eight-contact electrode system (Pietrobelli, Rubiano, St-Onge, & Heymsfield, 2004), which provided a non-invasive method to collect data with a wide range of participants in different work settings. Participants were instructed to use the restroom before the Tanita scales were used to minimise the effects from body water volume and distribution.

Waist circumference (WC) measurements were taken using flexible anthropometry tape. Medical screens were used to protect the privacy of the participants and where possible, the same-sex researcher would be used for this part of the assessment. Permission was gained verbally to locate relevant anthropometric areas. The World Health Organization (2008) suggests waist circumference measures should be taken at the midpoint between the bottom rib and the top of the iliac crest. People with excessive fat around the waist area are at greater risk of lifestyle related diseases such as obesity, heart disease and diabetes (World Health Organization, 2000, 2008).

To measure blood pressure (systolic blood pressure = SBP; diastolic blood pressure = DBP) and resting heart rate (HR), the fully automated Omron 705-IT upper arm blood pressure monitor was used. This is a clinically validated blood pressure monitor (El-Assaad, Topouchian, & Asmar, 2003). On the basis of the circumference of the participant's arm, a regular adult or large cuff was chosen. The cuff was placed on the participant's left arm, which was resting on a table at the heart level and inflated at high an increment rate as possible, until the cuff pressure was 30mmHg above the level at which the radial pulse disappeared. There was at least a thirty-second interval between two separate measurements, and for the analyses the mean of the two measurements was considered as the participant's blood pressure and heart rate. If both of the readings were significantly different, a third reading was taken to collect a more accurate average reading from three measurements.

If any abnormal blood pressure or heart rate readings were identified (e.g. high blood pressure), for ethical reasons, participants were provided with a referral letter that requested them to visit their GP for further consultation. If this was identified at the baseline health screening, participants were asked to confirm their GP agreed to their participation in this research, and GPs were asked to send a signed confirmation letter to the researcher (see Appendix 7.3 for examples).

7.3.2 Procedure

Two specific approaches were employed to recruit collaborating organisations for this phase of the research using an opportunistic sampling strategy. Firstly, organisations were recruited following successful recruitment and completion in the previous, exploratory phases of the research (described in Chapters 3–5). Secondly, an Internet search for contacts was also conducted to recruit large multi-site organisations. Contact with organisations was primarily via email and telephone conversations, where the aims of this study were explained and organisations were invited to participate.

Four organisations originally expressed an interest to participate. However, one public sector higher education supplier was rejected for participation because after investigation of the workplace policies, it became apparent there had been similar walking focused interventions in place from the occupational health and wellbeing team. Therefore, the employees may not have significantly benefitted from additional interventions promoting walking and any intervention effects may have reached saturation. Another public sector local authority who signed up to participate (education subdivision with secondary school teachers) dropped out before the recruitment/baseline health screening assessments were due to commence without prior warning.

Two organisations were committed to participate in this longitudinal research; one large private sector telecommunications organisation and one medium public sector local authority council. In total, ten different work sites from these two organisations across the UK were nominated to participate in the intervention. The management teams responsible for delivering this intervention nominated a facilitator within each work site to act as the main contact for the site. The facilitators were responsible for organising the logistical and security issues related to the health screening assessment visits. Some facilitators soon became champions of this research programme and helped in recruiting employees and delivering the intervention materials onsite. Facilitators at each site were emailed a set of room requirements, which included options for the room configuration and any other additional equipment required to conduct the visit. It was important to have a workspace large enough to conduct the health screenings professionally and collect all relevant psychological and physiological data.

7.3.2.1 Baseline measurements

Approximately two to three weeks prior to the first recruitment/baseline health screening assessment visit from the research team, employees at each site were emailed by the nominated site facilitator inviting them to participate in the research. Reminders were also sent a week before the visit and on the first day of the visit. The email outlined the purpose of the research project, the requirements from each employee when attending the health screenings and during the intervention period, the dates and location of the research team's visit and a link to an online booking system to reserve an appointment for a health screening. The initial recruitment/baseline health screening assessment visit to all ten work sites was conducted over a period of three consecutive days. The three-day period was set because there was no information given from the site facilitators about how successful recruitment was predicted to be or what level of interest the research would receive at each location. Therefore, in order to recruit as many employees as possible, it was important to be onsite for a substantial amount of time to create awareness of the research, generate interest to participate and have enough time to measure potential participants.

The information in the email encouraged all employees, of all ages and of any level of physical fitness/activity to attend the health screening and join the research programme. Employees were attracted with the offer of a free pedometer and feedback from a free independent physiological health assessment. Furthermore, it was reiterated that this research would be longitudinal and participating meant these employees would receive further free health screening assessments.

If employees were interested in taking part, they were instructed to click on an Internet web-link which directed them to an external website *(www.doodle.com)*. This website contained the appointment schedule of the research team for the three day visit. Participants were instructed to record their names and select their preferred day and time to be inducted into the research programme and have their first health screening. If participants could not access the online appointment scheduler, they were instructed to visit the research team to make an appointment in person. Furthermore, a number of appointments were made through direct email communication as employees emailed the researcher with their preferred day and time for an appointment.

At the end of the invitation, it was reiterated that the organisation was helping to facilitate this research because it supported the opportunity for employees to improve their health. Therefore, employees were requested to make sure that if they had arranged to visit the research team during work time, they gained the permission of their line manager to do so. The number and type of employees that were invited to participate in the research were dependent on agreement by the organisation and site facilitator. Some sites were able to email all of the employees on location, while other sites had selected a certain work group or floor level in the particular building. Specific issues concerning each site are described in Appendix 7.8.

In addition to the email invitation, a poster was created which was placed on noticeboards around the work site by the site facilitator at the same time the email was sent. The aim of the poster was to generate interest in the research campaign and to encourage employees to participate. The poster contained the title of the intervention research, 'Walking Works Wonders', the date and location of the visit and the web address for the appointment scheduler (Appendix 7.4). The research was also promoted in site-specific newsletters and company Intranet pages, with articles being prepared by the editors for these communication outputs.

For each visit, after a short briefing about the site and safety information by the facilitator, the research team would arrange the room in an optimum layout for the health screenings. The room was split into several measurement stations: questionnaire station; blood pressure and heart rate station; waist circumference station; height station; body composition station. Signs were also placed around the building and in the elevators directing employees towards the health screening assessment room.

Participants were provided with a verbal description of the research project, the process of the health screening and informed that there will be future health screenings. For the staged and standard intervention sites, employees were informed to expect regular contact throughout the duration of the intervention with tips and ideas to increase physical activity and improve health. Employees were then provided with an information sheet to read (beginning of Appendix 7.1), an informed consent form (Appendix 7.5) and a health screening questionnaire (Appendix 7.2). The health screening questionnaire was assessed and participants completed the paper questionnaire, which formed part of the psychological outcomes of the health screening assessment. The questionnaire took approximately twenty-minutes to complete, after which the physiological measurements described in Section 7.3.1.3 were undertaken.

At the end of each assessment, the participants were given a copy of their physiological measurements on an A5 sheet, an example of which can be viewed in Appendix 7.6. The assessor also explained what each result meant by comparing the results to population wide desirable ranges. Participants also received an A4 sheet containing an explanation of each measurement.

Participants in all intervention groups were provided with a free pedometer and a paper diary so that they could monitor and record their step counts on a daily basis. At this stage, they were given no additional information and were requested to continue with their daily routine. Pedometers have been proven to accurately detect number of steps taken, as an indication of volume of physical activity (Crouter, Schneider, Karabulut, & Bassett, 2003). The pedometer issued to all participants was a Working Late branded Yamax® SW-200 Digiwalker™ Pedometer (Yamasa Corporation, Tokyo, Japan). This pedometer was chosen because it is the most widely used pedometer in both intervention and surveillance studies, in children and adults (Barriera et al., 2012; Cleland, Schmidt, Salmon, Dwyer, & Venn, 2011; Marshall et al., 2009; Pavlidou, Michalopoulou, Aggelousis, & Taxildaris, 2011). This pedometer has been validated and has shown to accurately measure steps taken during free-living physical activity (Gosney, Scott, Snook, & Motl, 2007; Schneider et al., 2003; Schneider, Crouter, & Bassett, 2004). In this research study, the pedometer was used as a motivator of physical activity.

7.3.2.2 Organisation details

In total, ten different work sites from across the UK participated in the research. Figure 7.1 and Figure 7.2 display the breakdown and percentages of the participants recruited from the private/public organisational sectors and the numbers recruited from each work site. The map in Figure 7.3 illustrates the site locations that were recruited, including the number of employees who registered to participate and whom baseline measurements were collected from. The private sector organisation selected eight of its work sites (Dundee, Edinburgh, Glasgow, Ipswich, Leeds, Liverpool, London and Newcastle) to participate, while the public sector local authority agreed to involve both of its work sites (Gipping and Grafton).

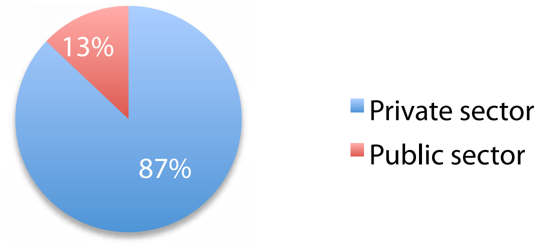

Figure 7.1: Pie chart illustrating the percentage of employees participating from the large private sector organisation and the medium public sector organisation.

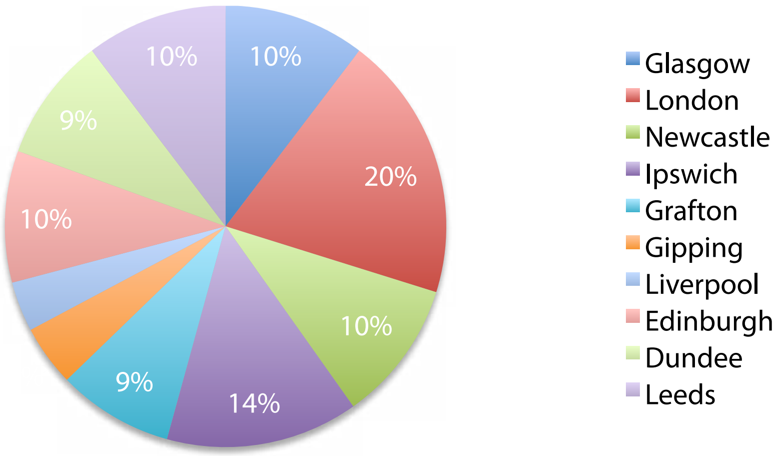

Figure 7.2: Pie chart illustrating the percentages of employees recruited from each participating work site.

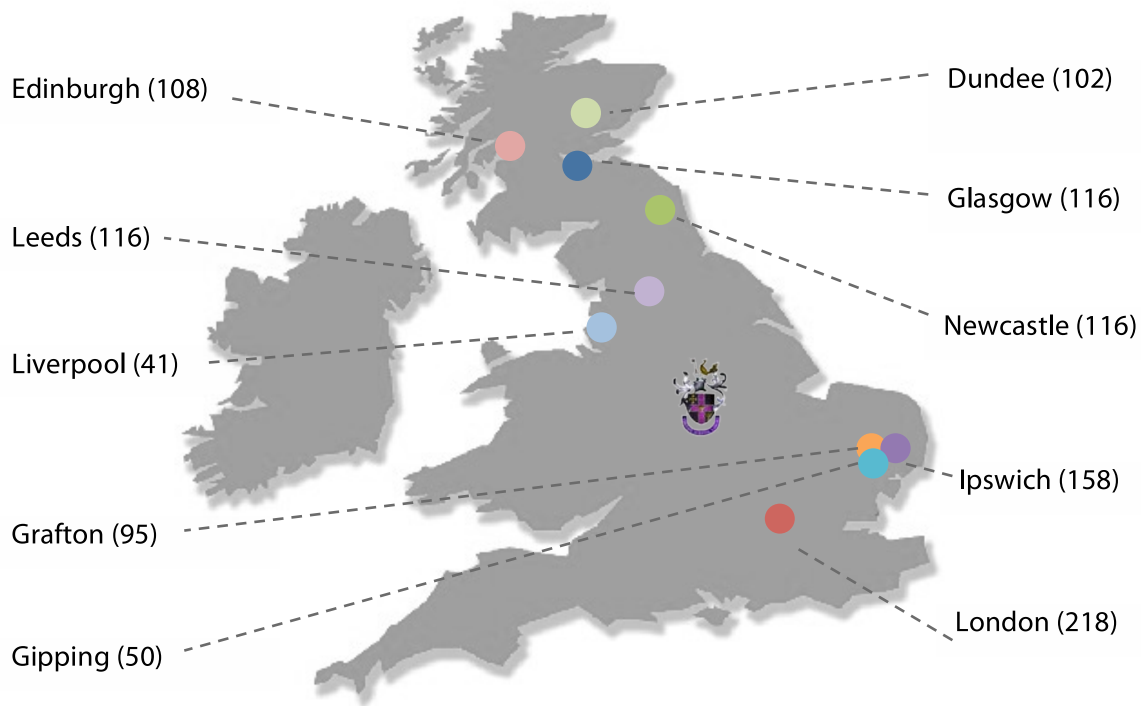

Figure 7.3: Map displaying the locations of each participating site across the UK and the numbers of employees recruited from each site.

Each site was allocated to an intervention condition, which is displayed in Table 7.1. This allocation to an intervention group was loosely based on the order each site was nominated by the participating organisation, and also the order in which the researchers were able to visit and begin recruitment from. Therefore, each site was allocated to either the standard, staged or control intervention group once the recruitment/baseline data collection were completed. The percentage of the sample allocated to each intervention condition is displayed in Figure 7.4.

Table 7.1: Details of the intervention group allocation per site and the numbers of employees in each intervention condition.

	Intervention condition					
	Standard	**n**	**Staged**	**n**	**Control**	**n**
	Edinburgh	108	Glasgow	116	Dundee	102
	Gipping	50	Grafton	95	Leeds	116
	Ipswich	158	Liverpool	41		
	Newcastle	116	London	218		
Total per condition		**432**		**470**		**218**

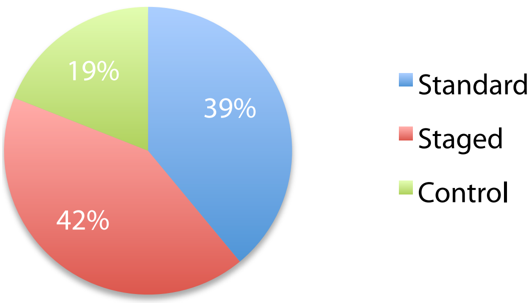

Figure 7.4: Pie chart displaying the allocation of the total sample to each intervention group.

7.3.2.3 Intervention delivery

The intervention to be evaluated was based on the different types of physical activity promotion information that has been described in Chapter 6. To summarise, there were three intervention groups and the information these groups received differed:

1) Standard information: participants allocated to this group were given standard physical activity promotion information. The information also contained details of where to access additional information online

2) Staged information: this group were given a version of the tailored information. The tailored approach was a simplified version of the stage of change approach in relation to physical activity. The approach considered if an individual was precontemplative (not considering changing their behaviour but needed to) or contemplative/preparation (thinking about making a change or was already active). Precontemplative participants were given information based on the risks of inactivity. Contemplative/preparation participants were given information on the benefits of activity and practical ideas to increase daily levels of walking

3) Control information: this group received no intervention material but did participate in the health screening assessments and also received a pedometer

Following the baseline health assessments, the work sites allocated to the standard and staged intervention groups were revisited after approximately two-weeks so the intervention leaflets could be delivered to each participant. Any participants who were unable to attend and collect the intervention information were emailed an electronic version of their leaflet. For work sites allocated to the control intervention condition, no contact was made with participants until the next (mid-intervention) health screening assessment. The stage of change for all participants in all the conditions was calculated to investigate any significant changes during the intervention period. Following this initial delivery of subtle differences in the physical activity promotion information, the rest of the intervention process for the standard and staged intervention condition was the same and as described in Chapter 6.

At this stage (approximately two-weeks post recruitment), participants in all intervention groups were also emailed login details for secure private access to an online website *(www.walkingworkswonders.com)*, which was specifically developed for the Working Late research programme. Participants were able to record their step counts electronically using this website. Outputs provided were records of their step count data and comparisons against average figures from their work site (see Appendix 7.7).

7.3.2.4 Mid-intervention and end of intervention measurements

Employees were emailed an invitation to return for a health screening assessment approximately two to three weeks prior to each revisit. Reminders were also sent a week before the revisit and on the day of the first revisit. The researcher emailed participants directly using the contact details provided on the baseline questionnaire.

In an effort to streamline the assessment process, the questionnaire was available for participants to complete online before they attended the health screening. When the invitation to the mid-intervention and end of intervention were emailed to participants, as well as including a web-link to the online appointment scheduler, this invitation also included an external web-link that would direct participants to the online version of the questionnaire *(www.surveymonkey.com)*. In the invitation email, participants were requested to make an appointment for their health screening and then complete the online questionnaire before their visit. This reduced the length of time taken to complete the screenings by 50%. Moreover, as employees became familiar with the measurements being taken, they also required less information about what the results meant, which reduced the time taken to collect physiological measurement data. Feedback at both the mid-intervention and end of intervention revisits was focused on comparing the physiological results to the previous screening(s).

Prior to the measurements being taken at each time-point, participants completed another health screening questionnaire (Appendix 7.2) to ensure they were still eligible to participate in the study. Furthermore, if the online questionnaire was not completed by any of the participants before their scheduled appointment, they were either provided with a paper copy to complete or reminded to access the online version after their health screening. Any participant who did not complete the questionnaire following their health assessment was sent a reminder email each week (up to a maximum of three weeks). Most participants did complete the online version after receiving the reminder emails. There were other participants however, who did not complete the questionnaire after being sent multiple reminder emails. For these participants, their physiological measures were still recorded into the returning datasets.

During the mid-intervention and end of intervention health screenings, participants who had lost their pedometers and were still keen to monitor and record their step counts were provided with a replacement. Furthermore, if participants contacted the researchers in the months between the revisits requesting a replacement pedometer, it was sent out to them by post. Replacement pedometers were sent to maintain employee interest and motivation. A maximum of three pedometers (one original and two replacements) were to be given to any single employee. This limit would ensure participants would not take advantage of the opportunity to receive a free pedometer.

7.3.2.5 Data management and analysis

After every health screening assessment, the questionnaire data were matched with the physiological data and entered into the online tool *(www.surveymonkey.com)*. All data were then downloaded from Survey Monkey as separate Microsoft Excel files for each measurement time-point. The files for all time-points were combined using Microsoft Access scripting and each row of responses were matched using the participant identification number. The files were merged and saved as one single Microsoft Excel file and imported into SPSS for Mac OSX (v19.0). The data were first screened to identify any data entry errors, which were corrected by checking against the raw data collected. Subsequently, the data were inspected for missing data, which were excluded if the missing data were required for the analyses. The data were then checked for outliers, which were identified as either data entry errors, measurement errors or genuine values.

Descriptive statistics were calculated on the outcome measures data such as personal and demographic characteristics (age, weekly hours worked and monthly hours worked), physiological measures (height, weight, BMI, Fat %, WC, SBP, DBP and HR), psychological outcomes (WAI, GHQ, JS, OC, JM and ITQ), sitting times reported on a work day and non-work day (transport, work, watching TV, using a PC at home and other leisure), total MET-minutes per week in physical activity (walking, moderate and vigorous) and stage of change allocations.

The data were tested for homogeneity of variance and normality to assess for the assumptions of parametric analyses using the Kolmogorov-Smirnov test, which revealed that all physiological, psychological, sitting time and MET expenditure data were not normally distributed (all significance values = $p<0.05$). Non-parametric tests are most useful for small studies and using non-parametric tests in large studies (e.g. >500 participants) may provide answers to the wrong questions (Hill & Lewicki, 2005). With large sample sizes, tests for normality will detect minor deviations as statistically significant and therefore report skewed results (i.e. not normally distributed). Therefore, the graphical outputs (Q-Q plots) were consulted along with the skewness and kurtosis values, which indicated the distributions did not deviate from the normal distribution to a range that justified transforming the data or using non-parametric analyses. Furthermore, some outcome measures were skewed because of the nature of the construct (e.g. GHQ = positively skewed) and using non-parametric analyses would incorrectly interpret conditions of the central limit theorem (Fagerland, 2012). A sensitivity analysis was also undertaken with the physiological measures and psychological outcomes where the parametric and non-parametric test equivalents were conducted on the same data, the results of which demonstrated the same conclusions for both types of analyses. With large sample sizes, *"t-tests and their corresponding confidence intervals can and should be used even for heavily skewed data"* (Fagerland, 2012; p.1). Therefore, due to the sample size involved in this research (i.e. >1000 participants), parametric tests and analyses were conducted on this data and the means and standard deviations have been reported as the descriptives for the baseline results section.

To investigate statistically significant differences at the baseline time-point within the physiological measures, psychological outcomes, sitting times and MET expenditures, independent t-tests were used to identify gender differences, and one-way analysis of variances (ANOVA) were used to explore differences between participants in the three intervention conditions (standard, staged and control). For sitting times, a paired t-test demonstrated sitting time differences between the domains of sitting on a work day and non-work day. For physical activity MET-minutes per week, a one-way ANOVA was used to explore differences between the physical activity groupings and psychological outcomes. A Mann Whitney U test examined differences between the stage of change allocations by gender and a Kruskal Wallis test investigated differences between the stage of change allocations by intervention condition.

The total participant numbers for the longitudinal comparisons were much smaller than those assessed at baseline due to attrition throughout the intervention period. Therefore, these smaller samples of data were tested for normality to assess for the assumptions of parametric analyses using the Kolmogorov-Smirnov test. The results revealed the assumptions of normality for all the physiological measures, the psychological outcomes of WAI, OC, JM and ITQ, and the MET-minutes reported per week were satisfied for all intervention groups. Therefore, parametric tests and analyses were conducted on this data and the means and standard deviations have been reported as the descriptives throughout. In addition, the Kolmogorov-Smirnov test and visual inspection of the histograms and Q-Q plots revealed the psychological outcomes of GHQ and JS, and data for reported sitting times in all domains of sitting on a work day and non-work day were not normally distributed. Therefore, non-parametric tests and analyses were conducted on the GHQ, JS and sitting time data, and the median and interquartile ranges (IQR) were calculated as the descriptives for these results.

To investigate statistically significant differences longitudinally between all three measurement time-points for each intervention condition, independent t-tests were used to identify differences between the demographic characteristics of the participants who did and did not return. A chi-squared goodness of fit test was used to indicate significant changes in the distribution of participants for each stage of change state. Repeated measures ANOVAs were used to explore differences between the means for the physiological measures, psychological outcomes and MET-minutes per week for those who completed all health screening assessments. Friedman tests were used to explore differences between the GHQ, JS and sitting times reported at each measurement time-point. A repeated measures ANOVA with a between groups factor and a Kruskall-Wallis test were used to investigate significant differences between the intervention groups and the change from the baseline to the end of intervention measurements for the respective parametric and non-parametric data.

7.4 Results

7.4.1 Baseline measures

7.4.1.1 Demographic information and physiological measures

This section presents the demographic characteristics of the employees who volunteered to participate in the study. Of the 1,120 employees that were recruited, 601 (54%) were male and 519 (46%) were female. Almost 55% (54.5%) of the participants were married, 22.2% single, 15.4% cohabiting, 7.0% separated or divorced, 0.7% in civil partnerships and 0.3% widowed. In terms of ethnicity, 86.9% reported their ethnicity as White (British, Irish or other), 8.1% Asian (British, Indian, Pakistani, Bangladeshi, Chinese or other), 2.8% Black (British, Caribbean, African or other), 1.3% Mixed background and 0.9% reported their ethnic background as unknown. Almost a third (29.1%) of the sample had a university degree, 23.3% had a high school education, 14.2% had a college education, 15% had a postgraduate degree, 16.7% had vocational qualifications and 1.7% had no formal qualifications. In terms of lifestyle, 12.2% of the participants reported they smoked cigarettes. The mean number smoked per day was 10.4±6.5 cigarettes. An additional 24.4% of the respondents stated that they had smoked cigarettes in the past. Of these participants, the average length of time since they had quit smoking was 10 years 8 months (SD=9 years 11 months).

Table 7.2 indicates the demographic characteristics and physiological measures of the complete sample at the baseline measurement, including results from t-tests and an ANOVA assessing gender and intervention group differences. Independent t-tests demonstrated there were some significant gender differences at the baseline measurement between the physiological measures. Average height, weight, WC, SBP, DBP, weekly hours worked and monthly hours worked were significantly greater in males in comparison to females. However, Fat % and HR were significantly greater in females in comparison to males. There were no significant differences between age and BMI for males and females.

Table 7.2: Demographic information and physiological measures for the total sample at baseline, by gender and per intervention condition, including significance values of the t-tests and ANOVA assessing gender and intervention group differences (n=1080).

	Mean scores±SD							
	Total sample	**Male (n=572)**	**Female (n=508)**	**P value t-tests**	**Standard**	**Staged**	**Control**	**P value ANOVA**
Age (years)	42.2±10.3	42.3±10.4	41.63±10.4	0.262	43.7±10.1	42.1±10.5	39.6±9.9	0.001
Height (cm)	170.7±9.8	177.3±7.2	163.2±6.6	0.001	172.3±9.9	169.4±9.9	170.9±9.6	0.001
Weight (kg)	78.3±16.3	84.7±14.6	70.9±15.1	0.001	80.8±16.1	75.3±16.3	79.8±15.4	0.001
BMI (kg/m²)	26.8±4.8	26.9±4.1	26.6±5.5	0.215	27.1±4.5	26.2±4.8	27.2±4.7	0.003
Fat %	28.9±9.1	23.2±5.8	35.5±7.5	0.001	28.5±8.8	28.9±9.1	29.5±9.3	0.306
WC (cm)	90.6±13.4	95.1±11.7	85.5±13.3	0.001	92.9±13.1	88.2±13.5	92.3±11.9	0.001
SBP	130.8±16.7	135.9±15.0	125.0±16.6	0.001	132.5±16.9	129.3±17.0	130.9±15.5	0.005
DBP	78.8±10.4	80.7±10.1	76.6±10.3	0.001	79.6±10.6	78.2±10.2	78.6±10.2	0.083
HR	67.2±11.2	65.9±11.7	68.9±10.6	0.001	66.2±11.2	66.9±10.7	69.9±12.0	0.003
Weekly hours	36.4±5.6	37.6±4.6	35.0±6.3	0.001	36.0±5.4	36.7±5.7	36.7±5.4	0.078
Monthly hours	147.6±39.5	154.7±36.8	139.1±40.8	0.001	146.9±36.3	148.2±41.7	147.3±40.9	0.935

A one-way ANOVA revealed there were significant differences between the intervention groups and most of the demographic and physiological measures at baseline: age, height, weight, BMI, WC, SBP and HR. Post-hoc Tukey HSD comparisons indicated mean height for the standard intervention group was significantly higher than the staged intervention group ($p<0.001$). Average age for the control group was significantly lower than both the standard ($p=0.001$) and staged ($p=0.002$) intervention group. Mean weight, BMI and WC for the staged intervention group was significantly lower than both the standard ($p<0.001$, $p=0.008$ and $p=0.018$) and the control intervention group ($p=0.004$, $p=0.018$ and $p=0.001$). Average SBP for the staged intervention group was significantly lower than the standard intervention group ($p=0.004$). Average HR for the control intervention group was significantly higher than both the standard ($p=0.003$) and the control intervention group ($p=0.014$).

7.4.1.2 Psychological outcomes

Table 7.3 indicates the psychological outcomes of the complete sample at the baseline measurement, including results from t-tests and an ANOVA assessing gender and intervention group differences. Independent t-tests demonstrated there were some significant gender differences at the baseline measurement between the psychological outcomes. Average WAI scores for males were higher than females. Average GHQ scores for females were higher than males indicating higher psychological distress. However, females also reported significantly higher JM than males. There were no significant gender differences between scores for JS, OC or ITQ.

A one-way ANOVA revealed there were significant differences between the intervention groups and the psychological outcomes of JS, OC, JM and ITQ. Post-hoc Tukey HSD comparisons indicated mean JS and OC scores for the standard and staged intervention groups were significantly higher than the control group (all significance levels=$p<0.001$). Mean JM scores for the standard ($p=0.026$) and staged ($p=0.002$) intervention groups were also significantly higher than the standard control group. Mean ITQ scores for the standard ($p<0.001$) and staged ($p=0.001$) intervention groups were also significantly lower than the control group. There were no statistically significant differences between the intervention groups and the psychological outcomes of WAI and GHQ.

Table 7.3: Psychological outcome results for the total sample at baseline, by gender and per intervention condition, including significance values of the t-tests and ANOVA assessing gender and intervention group differences (n=1084).

	Mean scores±SD							
	Total sample	**Male (n=584)**	**Female (n=500)**	**P value t-tests**	**Standard**	**Staged**	**Control**	**P value ANOVA**
WAI	42.2±4.5	42.4±4.5	41.9±4.6	0.049	42.4±4.1	42.4±4.7	41.7±4.9	0.183
GHQ	11.1±5.0	10.7±4.9	11.4±5.1	0.019	10.7±4.9	11.2±5.1	11.6±5.2	0.065
JS	5.3±1.3	5.2±1.3	5.3±1.3	0.297	5.4±1.2	5.3±1.3	4.9±1.4	0.001
OC	45.9±8.2	45.9±8.2	45.9±8.2	0.998	46.4±7.8	46.6±8.1	43.6±8.8	0.001
JM	34.8±3.9	34.5±3.9	35.0±3.9	0.037	34.8±3.7	35.1±4.0	33.9±4.1	0.003
ITQ	2.9±1.6	2.9±1.7	2.9±1.6	0.931	2.7±1.5	2.9±1.6	3.4±1.9	0.001

7.4.1.3 Physical activity

Table 7.4 displays the mean physical activity MET-minutes per week reported by the complete sample at baseline, including results from t-tests and an ANOVA assessing gender and intervention group differences. Independent t-tests demonstrated there were some significant gender differences at baseline between the MET-minutes for moderate and vigorous activity. Average MET-minutes reported of moderate and vigorous activity for males were higher in comparison to females. This also meant the combined total MET-minutes per week were significantly higher for males than for females. There were no significant gender differences between the reported MET-minutes for walking.

A one-way between-groups ANOVA was conducted which indicated no statistically significant differences between the intervention groups and the MET-minutes expended per week for walking, moderate activity, vigorous activity and total METs per week.

Table 7.4: Average MET-minutes expended per week calculated from the IPAQ for the total sample at baseline, by gender and per intervention condition, including significance values of the t-tests and ANOVA assessing gender and intervention group differences (n=1120).

	Mean MET-minutes per week±SD							
	Total sample	Male (n=601)	Female (n=519)	P value t-tests	Standard	Staged	Control	P value ANOVA
Walking	819±866	805±829	834±907	0.297	751±902	889±827	802±868	0.055
Moderate PA	296±618	362±693	219±508	0.001	339±675	290±621	222±470	0.069
Vigorous PA	712±1118	891±1239	504±916	0.001	733±1162	686±1055	726±1161	0.807
Total	1826± 1745	2058± 1868	1557± 1550	0.001	1823± 1817	1865± 1653	1749± 1801	0.720

7.4.1.4 Physical activity and work

In terms of distance to work, 7.1% of the participants stated they travelled less than 1 mile to their place of work and 34.5% travelled between 1–5 miles to work. Over a quarter (27.0%) of all participants travelled between 6–10 miles, 18.0% travelled between 11–19 miles and 13.4% travelled over 20 miles to work. The most common form of transport to work was by car (49.1%), followed by public transport (35.1%), walking (8.9%), cycling (5.2%) and by motorbike (1.1%).

With regards to physical activity at work, Table 7.5 displays that over half (56.9%) of the participants reported they did not perform any standing, walking or heavy labour activities as part of their job roles. Over a fifth (21.5%) reported their job roles involved walking activities only and 16.9% stated their job roles involved both standing and walking activities.

Table 7.5: Number of participants reportedly undertaking standing, walking and/or heavy labour activities as part of their job roles (n=1101).

Activities at work	Frequency	%
No standing, walking or heavy labour	626	56.9
Standing only	33	3.0
Walking only	237	21.5
Heavy labour only	0	0.0
Standing and walking	187	16.9
Walking and heavy labour	0	0.0
Heavy labour and standing	3	0.3
All standing, walking and heavy labour	15	1.4

7.4.1.5 Sedentary behaviour

Table 7.6 displays the self-reported sitting times across each domain for work days and non-work days collected at baseline, along with total sitting time and sleep time, including results from t-tests and an ANOVA assessing gender and intervention group differences. More time was reported sitting at work than any other domain, accounting for more than half of the total daily sitting time accumulated on a work day (60%).

Independent t-tests demonstrated there were significant gender differences for sitting time within the sample at baseline on both work days and non-work days. On work days, sitting time at work and while using a PC at home were higher for males in comparison to females. Sitting time during leisure activities and sleep time were significantly higher for females than for males. There were no significant gender differences for sitting time during transport and while watching TV on work days. On non-work days, sitting time at work, while watching TV and using a computer at home were higher for males in comparison to females. Sleep time was significantly higher for females than for males. There were no significant gender differences for sitting time during transport and during leisure activities on non-work days.

A one-way ANOVA revealed there were significant differences in sitting time on a work day between the intervention groups within the domains of transport, TV and sleeping. Post-hoc Tukey HSD comparisons indicated that mean sitting times during transport for the staged intervention group were significantly higher than the control group ($p=0.004$). Mean sitting times whilst watching TV for the control intervention group were significantly higher than the staged group ($p=0.034$). Mean sitting times whilst sleeping for the standard intervention group were significantly higher than the staged group ($p<0.001$). There were no statistically significant differences on a work day between the intervention groups and the sitting domains of work, PC at home, other leisure and total work day sitting.

The one-way ANOVA also demonstrated there were significant differences in sitting time on a non-work day between the intervention groups and the domains of work, TV, PC at home and total non-work day sitting. Post-hoc comparisons indicated that mean sitting times at work and whilst watching TV for the control intervention group were significantly higher than the standard ($p=0.006$ and $p<0.001$) and the staged group ($p<0.001$ and $p<0.001$). Similarly, mean sitting times whilst using a PC at home for the control intervention group were significantly higher than the standard ($p=0.014$) and the staged group ($p=0.001$). Total non-work day sitting times for the control intervention group were significantly higher than both the standard ($p=0.001$) and staged ($p<0.001$) intervention groups. There were no statistically significant differences on a non-work day between the intervention groups and the sitting domains of transport, other leisure and sleeping.

A paired-samples t-test indicated statistically significant differences between the time spent sitting in individual domains on a work day and non-work day. Participants reported significantly higher sitting times on non-work days for the domains of TV [$t=-21.52$, $p<0.001$], PC at home [$t=-9.53$, $p<0.001$] and other leisure [$t=-24.43$, $p<0.001$] in comparison to work days. Participants reported significantly higher sitting times on work days for the domains of transport [$t=-4.63$, $p<0.001$] and at work [$t=-70.72$, $p<0.001$] in comparison to non-work days.

Table 7.6: Sitting times across each domain on a work day and non-work day for the total sample at baseline, by gender and per intervention condition, including significance values of the t-tests and ANOVA assessing gender and intervention group differences (n=1114).

		Mean sitting times±SD							
		Total sample	**Male (n=598)**	**Female (n=516)**	**P value t-tests**	**Standard**	**Staged**	**Control**	**P value ANOVA**
Work day	**Transport**	55±50	56±51	53±48	0.330	53±43	60±45	47±54	0.006
	Work	376±120	383±116	368±124	0.019	372±125	379±118	386±104	0.383
	TV	95±67	96±65	95±69	0.466	96±63	92±69	103±67	0.044
	PC at home	57±89	67±87	45±90	0.001	52±72	59±101	59±78	0.174
	Other leisure	44±59	41±55	48±63	0.035	43±54	45±57	40±53	0.361
	Total	623±180	640±170	604±190	0.002	615±163	636±188	636±177	0.338
	Sleep	429±55	425±53	432±56	0.044	437±55	422±52	429±56	0.001
Non-work day	**Transport**	46±53	48±57	44±48	0.304	49±47	49±53	40±46	0.057
	Work	42±104	48±114	34±91	0.011	37±90	32±83	59±121	0.001
	TV	162±105	167±100	154±111	0.013	158±88	157±99	189±117	0.001
	PC at home	88±95	106±102	66±81	0.001	87±91	82±81	100±95	0.002
	Other leisure	118±103	117±98	120±108	0.778	116±96	123±101	126±109	0.534
	Total	457±225	479±225	431±222	0.001	448±213	443±217	516±254	0.001
	Sleep	471±65	468±63	475±68	0.049	472±63	469±66	476±67	0.287

7.4.1.6 Stage of change

Each participant's stage of change in relation to their physical activity level was assessed using the questionnaire tools described in Chapter 6. Table 7.7 displays the number and percentage of the participants in each domain of the stage of change at baseline for the total sample, by gender and by intervention group. An independent sample Mann Whitney U test indicated there were no statistically significant differences between gender and participants stage of change in relation to physical activity (U=154,020, p=0.215). An independent sample Kruskal Wallis test indicated there were no statistically significant differences between intervention groups and participants stage of change in relation to physical activity (χ^2=5.793, p=0.055).

Table 7.7: Numbers and percentages of participants in each stage condition at baseline for the total sample, by gender and by intervention group (n=1092).

	N (%)					
	Total sample	**Male (n=588)**	**Female (n=504)**	**Standard**	**Staged**	**Control**
Precontemplative	195 (17.9)	118 (10.8)	77 (7.1)	88 (8.1)	76 (7.0)	31 (2.8)
Contemplative	165 (15.1)	96 (8.8)	69 (6.3)	61 (5.6)	75 (6.9)	29 (2.7)
Preparation	603 (55.2)	293 (26.8)	310 (28.4)	228 (20.9)	255 (23.4)	120 (11.0)
Action	107 (9.8)	67 (6.1)	40 (3.7)	41 (3.8)	37 (3.4)	29 (2.7)
Maintenance	22 (2.0)	14 (1.3)	8 (0.7)	5 (0.5)	12 (1.1)	5 (0.5)
Total	1092 (100)	588 (53.8)	504 (46.2)	423 (38.7)	455 (41.7)	214 (19.6)

7.4.1.7 Correlation matrix

Table 7.8 displays a correlation matrix for the variables in the intervention at baseline. There are several significant correlations although these are weak or negligible with low coefficient scores. These significant correlations are a result of the large sample size. The table also demonstrates that moderate or strong relationships were only discovered between variables that are related. For example, there is a strong positive correlation between BMI scores and Fat % ($r=0.521$, $p=0.001$). This suggests that it is not necessary to control for any particular intervention variables during the longitudinal analyses.

Table 7.8: Correlation matrix for all variables in the intervention at baseline (n=1105).

		Physiological						Psychological			
		BMI	**Fat %**	**WC (cm)**	**SBP**	**DBP**	**HR**	**WAI**	**GHQ**	**JS**	**OC**
Physiological	**BMI (kg/m^2)**	1.000									
	Fat %	0.521**	1.000								
	WC (cm)	0.829**	0.251**	1.000							
	SBP	0.339**	-0.42	0.420**	1.000						
	DBP	0.401**	0.173**	0.449**	0.733**	1.000					
	HR	0.127**	0.240**	0.123**	0.035	0.140**	1.000				
Psychological	**WAI**	-0.142**	-0.156**	-0.139**	-0.010	-0.070*	-0.091	1.000			
	GHQ	0.069*	0.111**	0.051	-0.047	0.036	0.116**	-0.399**	1.000		
	JS	-0.049	0.001	-0.072*	-0.011	-0.015	-0.018	0.273**	-0.394**	1.000	
	OC	-0.018	0.012	-0.033	0.006	0.012	-0.045	0.228**	-0.321**	0.684**	1.000
	JM	-0.018	0.021	-0.058	-0.040	-0.014	-0.023	0.096**	-0.052	0.288**	0.318**
	ITQ	-0.054	-0.048	-0.058	-0.101**	-0.077*	0.066*	-0.177**	0.350**	-0.569**	-0.641**
MET score	**Walking**	-0.068*	-0.046	-0.043	-0.002	0.003	-0.003	0.038	0.013	0.013	0.014
	Moderate PA	-0.058	-0.059**	-0.034	0.013	0.001	-0.151**	0.072*	-0.036	-0.012	0.039
	Vigorous PA	-0.097	-0.290	-0.109**	-0.005	-0.152**	-0.241**	0.093**	-0.047	-0.027	-0.062*
	Total	-0.097**	-0.250**	-0.077**	0.006	-0.096**	-0.196**	0.116**	-0.054	0.005	-0.008
Sitting time work day	**Transport**	0.015	-0.010	0.030	0.032	0.039	0.002	-0.043	-0.021	-0.006	0.023
	Work	0.026	-0.010	0.043	-0.007	0.035	-0.098**	-0.013	-0.022	0.010	0.020
	TV	0.045	0.046	0.069*	0.036	0.042	0.073	0.037	-0.016	-0.042	0.006
	PC at home	0.027	-0.180	0.087**	0.076*	0.024	0.040	-0.016	-0.011	-0.012	-0.014
	Other leisure	-0.009	-0.017	-0.046	-0.051	-0.036	0.038	0.003	-0.003	-0.005	-0.017
	Total	0.051	-0.044	0.071*	0.043	0.044	0.005	-0.015	-0.014	-0.038	-0.001
Sitting time non-work day	**Transport**	0.014	-0.037	0.006	0.018	0.008	-0.003	-0.036	0.002	0.007	0.060*
	Work	0.037	-0.025	0.031	0.028	-0.021	-0.012	0.001	0.016	-0.014	-0.022
	TV	0.073*	0.007	0.086**	0.086**	0.084**	0.007	0.020	0.033	-0.019	0.010
	PC at home	0.001	-0.211**	0.036	0.047	0.027	-0.023	0.004	-0.001	0.007	-0.004
	Other leisure	-0.032	-0.048	-0.059*	-0.029	-0.038	0.012	0.057	-0.005	0.007	-0.021
	Total	0.063*	-0.054	0.053	0.049	0.033	0.068*	-0.019	0.038	-0.034	-0.041

*p<0.05 **p<0.01 significance levels.

Table 7.8 (continued): Correlation matrix for all variables in the intervention at baseline (n=1105).

		Psychological		MET Score				Sitting time work day			
		JM	ITQ	Walking	Moderate PA	Vigorous PA	Total	Transport	Work	TV	PC at home
Physiological	BMI (kg/m²)										
	Fat %										
	WC (cm)										
	SBP										
	DBP										
	HR										
Psychological	WAI										
	GHQ										
	JS										
	OC										
	JM	1.000									
	ITQ	-0.146	1.000								
MET score	Walking	0.050	-0.034	1.000							
	Moderate PA	0.039	-0.016	0.056	1.000						
	Vigorous PA	-0.044	0.091**	0.005	0.287**	1.000					
	Total	0.031	0.018	0.572**	0.471**	0.672**	1.000				
Sitting time work day	Transport	-0.002	-0.052	0.032	-0.004	-0.027	-0.012	1.000			
	Work	0.038	-0.019	-0.059*	-0.090**	-0.018	-0.107**	-0.032	1.000		
	TV	0.021	-0.019	-0.026	-0.032	-0.077*	-0.035	-0.038	-0.015	1.000	
	PC at home	-0.006	0.028	0.009	0.021	0.004	-0.002	-0.002	-0.004	0.080**	1.000
	Other leisure	0.064	0.038	-0.004	-0.006	0.010	-0.018	0.047	0.018	0.131**	0.212**
	Total	0.039	-0.004	-0.040	-0.073*	-0.040	-0.092**	0.204**	0.577**	0.446**	0.453**
Sitting time non-work day	Transport	0.025	-0.012	0.006	0.049	-0.003	0.013	0.176	-0.058	0.049	0.056
	Work	-0.025	0.034	0.034	0.062*	0.069*	0.079**	-0.020	-0.029	-0.050	0.066*
	TV	-0.023	-0.014	-0.012	-0.072*	-0.049	-0.046	-0.027	-0.018	0.455**	0.045
	PC at home	0.009	0.051	-0.047	-0.032	0.001	-0.059	-0.047	0.092**	-0.001	0.495**
	Other leisure	0.041	0.081**	-0.002	0.013	-0.030	-0.035	0.032	0.093**	0.044	0.087**
	Total	-0.026	0.065*	-0.003	-0.057	-0.024	-0.025	-0.002	0.048	0.231**	0.277**

*p<0.05 **p<0.01 significance levels.

Table 7.8 (continued): Correlation matrix for all variables in the intervention at baseline (n=1105).

		Sitting time work day		Sitting time non-work day					
		Other leisure	**Total**	**Transport**	**Work**	**TV**	**PC at home**	**Other leisure**	**Total**
Physiological	**BMI (kg/m^2)**								
	Fat %								
	WC (cm)								
	SBP								
	DBP								
	HR								
Psychological	**WAI**								
	GHQ								
	JS								
	OC								
	JM								
	ITQ								
MET score	**Walking**								
	Moderate PA								
	Vigorous PA								
	Total								
Sitting time work day	**Transport**								
	Work								
	TV								
	PC at home								
	Other leisure	1.000							
	Total	0.430**	1.000						
Sitting time non-work day	**Transport**	0.112**	0.076*	1.000					
	Work	0.052	-0.002	0.082**	1.000				
	TV	0.057	0.217**	0.095**	0.062*	1.000			
	PC at home	0.064*	0.225**	0.082**	0.075*	0.204**	1.000		
	Other leisure	0.414**	0.249**	0.220**	0.045	0.228**	0.202**	1.000	
	Total	0.291**	0.351**	0.284**	0.373**	0.566**	0.481**	0.592**	1.000

*p<0.05 **p<0.01 significance levels.

7.4.2 Longitudinal intervention results

This section of the results describes the longitudinal results and outcomes following the organisational intervention that was implemented. Differences (e.g. gender) identified at baseline (Section 7.4.1) have been controlled for. There was a 33.2% return rate at the mid-intervention health screening and a 22.0% return rate at the end of intervention health screening. Table 7.9 displays the return rates of the participants according to the site they were recruited from and the groups participants were allocated to. There were some participants who did not return for the mid-intervention screening but did return for the end of intervention screening. Therefore, the return rate percentages for both mid-intervention and end of intervention have been calculated based on the original recruitment figure from the baseline measurement. There were several research related issues (e.g. organisational restructuring, site changes, security issues, etc.) that affected the practical delivery of the intervention programme in the organisations, which are discussed in Appendix 7.8. These issues had the potential to negatively impact employee enthusiasm to continue in the research and therefore may have had an impact on the return rates of participants over the course of the intervention.

Table 7.9: Numbers of participants recruited and the return rates per site. Return rates have been calculated as a percentage from the original number recruited.

Site name: Grouped by condition	Baseline recruitment (n)	Mid-intervention (n)	Return rate (%)	End of intervention (n)	Return rate (%)
Edinburgh	108	39	36.1	32	29.6
Gipping	50	12	24.0	9	18.0
Ipswich	158	97	61.4	51	32.3
Newcastle	116	12	10.3	7	6.0
Standard	**432**	**160**	**37.0**	**99**	**22.9**
Glasgow	116	10	8.6	14	12.1
Grafton	95	30	31.6	19	20.0
Liverpool	41	7	17.1	9	22.0
London	218	79	36.2	47	21.6
Staged	**470**	**126**	**26.8**	**89**	**18.9**
Dundee	102	32	31.4	19	18.6
Leeds	116	54	46.6	39	33.6
Control	**218**	**86**	**39.0**	**58**	**26.0**
Total	**1120**	**372**	**33.2**	**246**	**22.0**

7.4.2.1 Demographic data for returners

The intervention results presented in this section are according to the comparisons between the outcome measures in relation to each individual intervention condition (i.e. comparison results for each intervention group are presented separately). The results in Section 7.4.2.2 compare the differences between all 3 intervention groups. Section 7.4.2.3 are the statistical analyses presented for the participants allocated to the standard intervention condition, followed by Section 7.4.2.4, which presents the results for the participants allocated to the staged intervention. Finally, section 7.4.2.5 presents the results for the participants allocated to the control intervention.

Table 7.10 displays the characteristics collected at the baseline measurement of the participants who did not return for any follow-up health screenings and the employees who participated in all 3 data collection time-points. There were 192 participants who complied and returned for all follow-ups and provided sufficient data for inclusion in the longitudinal analysis. There were 694 participants who attended the baseline measurement but did not return for any follow-ups. From the original sample of 1,120 participants, some individuals (n=234) only provided data at 2 time-points and therefore did not fully comply with the research to be included in the longitudinal analysis. For example, there were some participants who only provided data at the baseline and mid-intervention time-points (n=180) and other participants who only provided data at the baseline and end of intervention time-points (n=54).

Independent t-tests demonstrated there were significant differences at the baseline measurement between participants who provided data at all 3 time-points and those who did not return after the baseline measurement. At baseline, participants who completed the intervention were significantly older than those who did not complete the study. In addition, Fat % and HR were higher for the participants who only completed the baseline health measurements in comparison to those who completed all 3 screenings. Furthermore, those who completed the intervention had a significantly higher SBP and DBP than those who only provided baseline measurements. In terms of psychological outcomes, ITQ scores were significantly higher and JS scores were significantly lower for participants who did not fully comply with the study compared to those who completed all 3 screenings, indicating lower job satisfaction and greater intention to quit the job. Furthermore, Mann Whitney U tests revealed median GHQ scores were significantly lower for those who fully complied with the research compared to those who did not return following the baseline measurements, indicating lower psychological distress. There were no significant differences between any of the sitting time domains on a work day or non-work day from the data collected at the baseline measurement between the employees. MET-minutes per week expended in vigorous physical activities were significantly higher for participants who completed the study compared to those who did not return after the baseline measurement.

Table 7.10: All outcome measures data (means±SD or medians and IQR) collected at baseline of the participants who returned for all 3 measurement time-points (male n=136; female n=56) compared to participants who did not return at all (male n=331; female n=363), including results from independent t-tests (parametric) and Mann Whitney U tests (non-parametric).

		Complete data (3 time-points) (n=192)	Baseline data only (n=694)	P value
	Age (years)	43.9±9.9	41.4±10.4	0.003
Physiological	**Height (cm)**	173.7±9.4	169.9±9.9	0.001
	Weight (kg)	80.1±15.1	77.7±16.3	0.109
	BMI (kg/m²)	26.5±4.0	26.8±4.9	0.262
	Fat %	26.6±8.3	29.9±9.1	0.001
	WC (cm)	92.2±12.5	90.4±13.4	0.110
	SBP	135.1±18.2	129.6±15.9	0.001
	DBP	81.3±10.9	77.9±10.1	0.001
	HR	65.4±11.1	68.1±11.2	0.002
Psychological	**WAI**	42.5±4.1	42.1±4.6	0.213
	OC	46.9±7.5	45.7±8.3	0.058
	JM	34.9±3.8	34.6±4.0	0.396
	ITQ	2.7±1.4	3.0±1.6	0.024
	GHQ°	9.0 (5.0)	10.0 (7.0)	0.034
	JS°	6.0 (1.3)	5.7 (1.7)	0.128

°Median (IQR) reported for non-parametric data.

		Complete data (3 time-points) (n=192)	Baseline data only (n=694)	P value
Work day sitting°	**Transport**	40 (41)	45 (50)	0.629
	Work	420 (68)	390 (120)	0.267
	TV	120 (60)	120 (60)	0.652
	PC at home	45 (60)	30 (60)	0.056
	Other leisure	25 (60)	30 (60)	0.323
	Sleeping	420 (90)	420 (90)	0.169
Non-work day sitting°	**Transport**	30 (50)	30 (60)	0.853
	Work	0 (0)	0 (0)	0.721
	TV	180 (120)	150 (120)	0.237
	PC at home	60 (90)	60 (90)	0.079
	Other leisure	120 (120)	120 (120)	0.206
	Sleeping	480 (90)	480 (60)	0.099
MET-minutes	**Walking**	734±792	854±903	0.074
	Moderate	356±654	270±598	0.084
	Vigorous	873±1145	645±1105	0.015

7.4.2.2 Between group comparisons of the outcome measures

Table 7.11 displays the mean differences between the baseline and end of intervention measurement time-points for each intervention group for the physiological measures, psychological outcomes and physical activity MET-minutes per week. Specific outcome measures figures for all groups can be inspected in the results section for each intervention condition. A repeated measures ANOVA with an intervention group factor revealed there were no statistically significant differences between the intervention groups for changes in any of the physiological measures. The staged intervention group exhibited a greater reduction in WC and SBP by the end of the intervention compared to both the standard and control intervention groups. The staged intervention group also exhibited a greater reduction in BMI and Fat % compared to the control intervention group over the course of the intervention. However, these between group differences were not statistically significantly. There were no significant differences between the intervention groups for psychological outcomes of WAI, OC, JM and ITQ. There was a statistically significant difference between the intervention groups for the MET-minutes per week reported for walking. Both the standard and the staged intervention groups exhibited increases in walking MET-minutes per week compared to the control intervention group, who actually reported a reduction by the end of intervention measurement. There were no significant differences between the intervention groups for the MET-minutes per week reported for moderate and vigorous intensity activities.

In addition, the differences between the median baseline and end of intervention time-points were calculated for the psychological outcomes of GHQ and JS. A Kruskall-Wallis test revealed there were no significant differences between the changes in physiological measures. The staged intervention group exhibited a higher median increase (improvement) in GHQ scores by the end of intervention compared to both the standard and control intervention groups, but this difference was not statistically significant. The differences between the median baseline and end of intervention time-points were calculated for each domain of sitting on a work day and non-work day. A Kruskall-Wallis test revealed there were no significant differences in the changes in median sitting time between the three intervention groups. Table 7.11 shows that the median sitting time difference (reduction) by the end of intervention during transport on a non-work day was highest for the staged intervention group (-30 minutes), compared to the standard

(-10 minutes) or control intervention groups (0 minutes), but this difference was not statistically significant.

Table 7.11: Change (differences) between the baseline and end of intervention time-points for all intervention groups. Significance values reported from a repeated measures ANOVA with a between groups (intervention group) factor for parametric data and a Kruskall-Wallis test investigating median differences for non-parametric data.

		Mean Differences±SD			
		Standard	**Staged**	**Control**	**P value**
Physiological	**BMI**	-0.43±1.80	-0.50±1.26	-0.12±1.07	0.274
	Fat %	-0.71±3.48	-0.86±3.23	0.05±2.16	0.542
	WC	-1.73±5.33	-2.54±4.22	-1.63±5.63	0.100
	SBP	-0.41±11.47	-5.30±13.82	0.91±9.82	0.351
	DBP	-2.25±7.32	-2.86±7.97	-1.05±6.42	0.323
	HR	2.50±10.59	0.54±9.27	-2.03±9.44	0.128
Psychological	**WAI**	-2.17±11.34	-1.19±15.59	-2.59±13.35	0.538
	OC	-2.34±11.91	-5.58±17.32	-3.03±13.60	0.231
	JM	-2.46±8.47	-2.89±11.54	-3.32±9.88	0.056
	ITQ	-0.26±1.44	0.58±1.96	-0.59±1.81	0.270
	GHQ°	-0.50 (4.00)	1.00 (7.50)	0.00 (8.00)	0.932
	JS°	0.00 (1.17)	-0.40 (1.83)	0.40 (1.50)	0.401
MET-mins per week	**Walking**	490±997	376±861	-191±731	0.032
	Moderate PA	-36±928	-96±989	127±810	0.141
	Vigorous PA	-29±1254	-191±1372	49±1827	0.990

Median differences (IQR)

		Work day			P value	Non-work day			P value
		Sn•	**Sg•**	**C•**		**Sn•**	**Sg•**	**C•**	
Sitting time (mins)°	**Transport**	-10 (25)	-8 (30)	-8 (35)	0.582	-10 (30)	-30 (50)	0 (10)	0.673
	At work	-30 (90)	-30 (90)	-30 (60)	0.830	0 (0)	0 (0)	0 (60)	0.613
	TV	-30 (60)	-30 (90)	0 (90)	0.451	-30 (120)	0 (90)	-30 (120)	0.658
	PC at home	0 (60)	-10 (60)	-5 (62.5)	0.904	0 (30)	0 (75)	0 (120)	0.190
	Other leisure	0 (35)	-10 (60)	-10 (60)	0.682	-60 (120)	-60 (120)	-60 (120)	0.818
	Sleeping	0 (37.5)	0 (60)	0 (60)	0.150	0 (60)	0 (90)	0 (60)	0.729

°Median (IQR) differences between baseline and end of intervention reported and Kruskall-Wallis test results. • Sn=standard, Sg=staged, C=control intervention groups.

Comparisons between organisational sectors were conducted to investigate significant differences for the outcome measures between the public (n=21) and private (n=171) sectors. A repeated measure ANOVA (with an organisational sector group factor) revealed there were no significant between sector differences for any of the changes in physiological measures (BMI: p=0.607; Fat %: p=0.762; WC: p=0.528; SBP: p=0.347; DBP: p=0.739; HR: p=0.295), psychological outcomes (WAI: p=0.445; OC: p=0.790; JM: p=0.503; ITQ: p=0.633) and physical activity in MET-minutes per week (walking: p=0.076, moderate: p=0.919; vigorous: p=0.870). An independent samples median test also revealed there were no between sector differences for the median changes in the psychological outcomes of GHQ (p=0.366) and JS (p=0.926), or any of the sitting time domains on a work day (transport: p=0.230; work: p=0.377; TV: p=0.199; PC at home: p=0.256; other leisure: p=0.833) and non-work day (transport: p=0.577; work: p=0.152; TV: p=0.319; PC at home: p=0.553; other leisure: p=0.179).

7.4.2.3 Standard intervention condition

To assess the longitudinal results of the intervention, data from participants in the standard intervention group who complied and provided data for all follow-up measurements were used in the analyses below (n=75). Figure 7.5 illustrates the percentages of the standard intervention group participants in each phase of the stage of change at the baseline, mid-intervention and end of intervention measurements. At the baseline measurement, the majority of the employees were in the preparation, contemplation and precontemplation stages, 38.4%, 17.8% and 26.0% respectively. Only 15.1% were in the action stage and 2.7% in the maintenance stage. A chi-squared goodness of fit test indicated significant differences in the proportion distribution of participants for each stage of change construct at the mid-intervention and end of intervention measurements compared to baseline. As displayed in Figure 7.5, at the mid-intervention there were fewer workers in the contemplation and action stages and more participants in the maintenance stage (χ^2=70.68, p<0.001). By the end of intervention there were fewer workers in the preparation stage and more in the maintenance stage in comparison to baseline (χ^2=30.20, p<0.001).

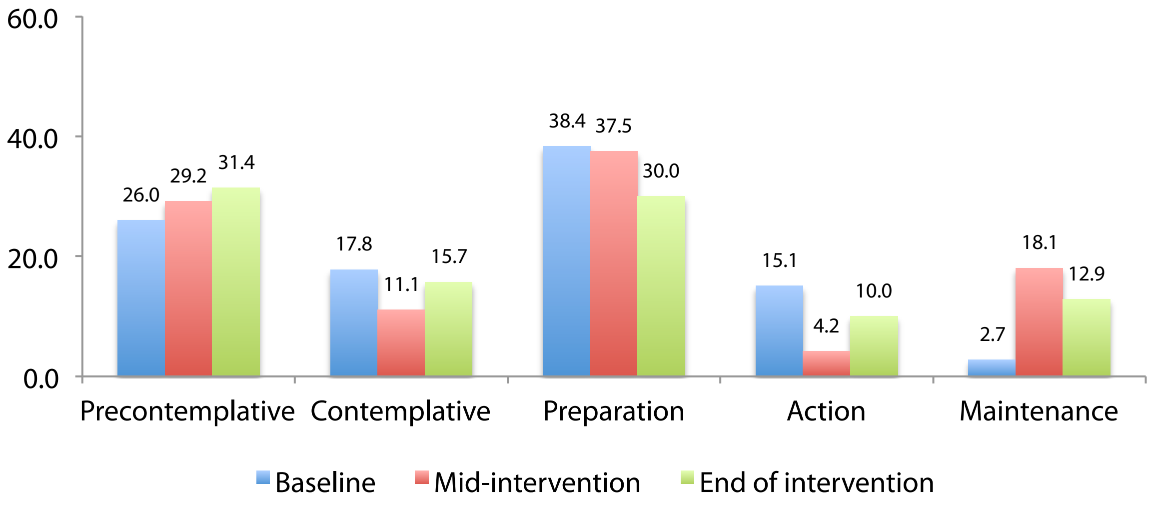

Figure 7.5: Bar chart displaying the percentages of the standard intervention group participants in each domain of the stage of change at the baseline, mid-intervention and end of intervention measurements.

Comparisons between the physiological measures collected during each stage of the intervention are shown in Table 7.12. A repeated measures ANOVA revealed that WC and DBP differed significantly across the measurement time-points. Post hoc analyses demonstrated that WC was significantly lower at the end of intervention relative to baseline. In addition, DBP was significantly lower at end of intervention in comparison to baseline and mid-intervention. There were no significant differences between the time-points and the physiological measures of BMI, Fat %, SBP and HR for the standard intervention group.

Table 7.12: Results from a repeated measures ANOVA for the standard intervention group assessing differences between the physiological measures for the data collected at all 3 time-points (n=69).

		Mean±SD	F	P	Comparison between	Mean difference	95% CI	
							Lower	Upper
BMI°	Baseline	26.5±3.9	3.33	0.054	Mid – Baseline	-0.11	-0.41	0.19
	Mid	26.4±3.7			End – Baseline	-0.43	-0.96	0.97
	End	26.1±3.8			End – Mid	-0.32	-0.74	0.10
Fat %°	Baseline	26.0±8.4	1.27	0.280	Mid – Baseline	-0.85	-1.49	-0.21
	Mid	25.2±8.1			End – Baseline	-0.71	-1.74	0.33
	End	25.3±8.0			End – Mid	0.14	-0.82	1.10
WC	Baseline	92.9±11.9	3.72 *	0.021	Mid – Baseline	-0.69	-2.39	1.00
	Mid	92.2±10.9			End – Baseline	-1.73 *	-3.32	-0.14
	End	91.1±11.4			End – Mid	-1.03	-2.44	0.37
SBP	Baseline	135.8±16.9	0.59	0.551	Mid – Baseline	-1.29	-4.14	1.55
	Mid	134.5±14.5			End – Baseline	-0.41	-3.79	2.98
	End	135.5±14.9			End – Mid	0.89	-2.39	4.18
DBP	Baseline	82.0±11.2	3.19 **	0.007	Mid – Baseline	-0.23	-1.98	1.51
	Mid	81.8±10.3			End – Baseline	-2.25 *	-4.42	-0.07
	End	79.8±9.4			End – Mid	-2.01 *	-3.86	-0.17
HR°	Baseline	62.6±10.4	3.30	0.045	Mid – Baseline	0.01	-2.34	2.37
	Mid	62.6±10.4			End – Baseline	2.50	-0.63	5.63
	End	65.1±12.1			End – Mid	2.48	-0.23	5.20

°Mauchly's Test of Sphericity indicated the assumptions of sphericity had been violated for BMI, Fat % and HR so the Greenhouse-Geisser correction (Epsilon=ε) was applied to these outcomes.
*p<0.05 **p<0.01 significance levels.

Table 7.13 displays the comparisons between the psychological outcomes collected at each measurement time-point of the intervention. A repeated measures ANOVA revealed that WAI, OC and JM differed significantly across the measurement time-points. Post hoc analyses demonstrated WAI scores were significantly lower at mid-intervention relative to baseline. However, at the end of intervention measurement WAI scores increased significantly relative to the mid-intervention time-point. Similarly, OC scores were significantly lower at mid-intervention compared to baseline, but significantly increased at the end of intervention compared to mid-intervention. JM scores were significantly lower at the end of intervention compared to baseline. There were no significant differences between the time-points and the psychological outcome of ITQ for the standard intervention group. In addition, a Friedman test revealed there were no significant differences between GHQ and JS over the course of the intervention period for the standard intervention group.

Table 7.13: Results from a repeated measures ANOVA and Friedman test for the standard intervention group assessing differences between the psychological outcomes for the data collected at all 3 time-points (n=61).

ANOVA results		Mean±SD	F	P	Comparison between	Mean difference	95% CI Lower	95% CI Upper
WAI°	Baseline	43.0±3.6	22.89 ***	0.001	Mid – Baseline	-7.33 ***	-8.35	-6.32
	Mid	35.7±3.8			End – Baseline	-2.17	-5.40	1.05
	End	40.8±10.2			End – Mid	5.15 **	1.90	8.41
OC°	Baseline	46.8±6.7	11.88 ***	0.001	Mid – Baseline	-6.07 ***	-7.84	-4.29
	Mid	41.0±4.3			End – Baseline	-2.34	-5.80	1.11
	End	44.8±12.4			End – Mid	3.72 *	0.04	7.41
JM°	Baseline	35.7±3.2	4.35 *	0.030	Mid – Baseline	-0.84	-1.97	0.29
	Mid	35.0±3.6			End – Baseline	-2.46 *	-4.84	-0.08
	End	33.4±8.4			End – Mid	-1.62	-4.09	0.85
ITQ	Baseline	2.4±1.3	2.31	0.104	Mid – Baseline	0.08	-0.28	0.43
	Mid	2.5±1.2			End – Baseline	-0.26	-0.71	0.19
	End	2.1±1.2			End – Mid	-0.34	-0.74	0.07
Friedman results		**Median (IQR)**	**X^2**	**P**	**Comparison between**	**Median difference**		
GHQ	Baseline	8.0 (5.0)	1.225	0.542	Mid – Baseline	1.00		
	Mid	9.0 (5.0)			End – Baseline	-0.50		
	End	7.5 (6.0)			End – Mid	-1.50		
JS	Baseline	6.0 (1.3)	2.940	0.230	Mid – Baseline	0.00		
	Mid	6.0 (1.3)			End – Baseline	0.00		
	End	6.0 (1.8)			End – Mid	0.00		

°Mauchly's Test of Sphericity indicated the assumptions of sphericity had been violated for WAI, OC and JM so the Greenhouse-Geisser correction (Epsilon=ε) was applied to these outcomes.
*p<0.05 **p<0.01 ***p<0.001 significance levels.

Comparisons between participants MET-minutes per week spent walking and in moderate and vigorous physical activity reported during each stage of the intervention are shown in Table 7.14. A repeated measures ANOVA revealed that reported MET-minutes per week whilst walking differed significantly across the measurement time-points. Post hoc analyses revealed that MET-minutes per week reported for walking were significantly higher at the mid-intervention and end of intervention time-points relative to baseline. There were no significant differences between the MET-minutes per week for moderate and vigorous activity at the 3 time-points for the standard intervention group.

Table 7.14: Results from a repeated measures ANOVA for the standard intervention group assessing differences between the reported MET-minutes per week for the data collected at all 3 time-points (n=75).

		Mean±SD	F	P	Comparison between	Mean difference	95% CI Lower	95% CI Upper
Walking	Baseline	634±807			Mid – Baseline	510***	236	784
	Mid	1144±1183	11.95***	0.001	End – Baseline	490***	207	772
	End	1124±1255			End – Mid	-20	-331	291
Moderate	Baseline	449±675			Mid – Baseline	78	-143	300
	Mid	528±688	0.66	0.519	End – Baseline	-36	-298	226
	End	413±802			End – Mid	-114	-347	117
Vigorous	Baseline	845±1038			Mid – Baseline	-12.8	-323	298
	Mid	832±1136	0.03	0.976	End – Baseline	-29	-384	324
	End	815±1300			End – Mid	-17	-344	310

Mauchly's Test of Sphericity indicated the assumptions of sphericity had not been violated for any of the activity outcome measures. *** p<0.001 significance level

Table 7.15 displays median self-reported sitting times across the domains on work days and non-work days for each intervention time-point. A Friedman test revealed sitting times did not differ significantly over the intervention period in any domain of sitting on a work day and non-work day for the standard intervention group. Sitting times on a work day for the domains of transport, at work and watching TV showed reductions by the end of intervention relative to baseline, although these differences were not significant.

Table 7.15: Results from a Friedman test for the standard intervention group assessing differences between the reported sitting time domains on a work day and non-work day at all 3 time-points (n=72).

		Median (IQR)				
		Baseline	Mid-intervention	End of intervention	χ^2	Sig.
Work day	**Transport**	40 (30)	40 (40)	30 (49)	1.240	0.538
	Work	390 (113)	360 (105)	360 (134)	5.783	0.055
	TV	120 (68)	90 (60)	90 (71)	3.254	0.197
	PC at home	30 (71)	30 (59)	30 (60)	0.910	0.634
	Other leisure	30 (60)	30 (60)	30 (60)	1.977	0.372
	Sleep	420 (60)	420 (90)	420 (90)	6.757	0.340
Non-work day	**Transport**	40 (43)	30 (45)	30 (45)	0.612	0.736
	Work	0 (0)	0 (0)	0 (60)	0.239	0.888
	TV	150 (135)	120 (90)	120 (143)	1.539	0.463
	PC at home	60 (90)	60 (90)	60 (90)	3.304	0.192
	Other leisure	120 (60)	60 (90)	60 (60)	4.105	0.128
	Sleep	480 (60)	480 (60)	480 (60)	6.350	0.042

The results for the standard intervention condition have demonstrated the intervention effects for this group have been varied. In terms of physiological measures, significant improvements (reductions) in WC and DBP have been shown, although other physiological measures remain unchanged. Alternatively, results for the psychological outcomes of WAI and OC showed significant negative effects by mid-intervention, but then some improvements by the end of intervention assessment. Walking activity increased significantly over the course of the intervention, however no changes in moderate physical activity were found.

7.4.2.4 Staged intervention condition

To assess the longitudinal results of the intervention, data from participants in the staged intervention group who complied and provided data for all follow-up measurements were used in the analyses below (n=66). Figure 7.6 illustrates the percentages of the staged intervention group participants in each phase of the stage of change at the baseline, mid-intervention and end of intervention measurements. At the baseline measurement, the majority of the employees (54.7%) were in the preparation stage. The rest of the participants in this intervention group were in the precontemplative (14.1%), contemplative (17.2%) and action (10.9%) stages, with few in the maintenance (3.1%) stage. A chi-squared goodness of fit test indicated significant differences in the proportion distribution of participants for each stage of change construct at the mid-intervention and end of intervention measurements compared to baseline. As displayed in Figure 7.6, at the mid-intervention there were fewer workers in the contemplation stage and more participants in the maintenance stage (χ^2=22.31, p<0.001). By the end of intervention there were fewer workers in the preparation stage and more in the maintenance stage in comparison to baseline (χ^2=30.20, p<0.001).

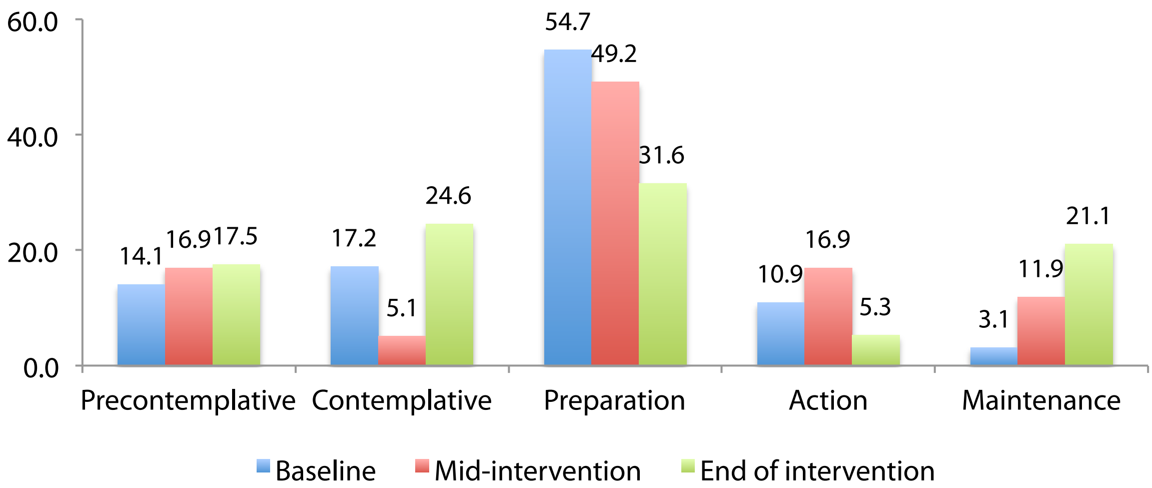

Figure 7.6: Bar chart displaying the percentages of the staged intervention group participants in each domain of the stage of change at the baseline, mid-intervention and end of intervention measurements.

Comparisons between the physiological measures collected during each stage of the intervention are shown in Table 7.16. A repeated measures ANOVA revealed that all of the physiological measures (BMI, Fat %, WC, SBP, DBP and HR) differed significantly across the measurement time-points. Post-hoc analysis demonstrated that BMI, SBP and DBP were significantly lower at mid-intervention and end of intervention relative to baseline. There were no significant differences between the mid-intervention and end of intervention assessments for these measures. Therefore, the results demonstrate BMI, SBP and DBP reduced by mid-intervention and remained at this reduced level for the duration of the intervention. In addition, Fat % and HR were significantly lower at mid-intervention relative to baseline. However, HR at end of intervention was significantly higher relative to mid-intervention. Finally, WC was significantly lower at the end of intervention relative to both the baseline and mid-intervention measurements.

Table 7.16: Results from a repeated measures ANOVA for the staged intervention group assessing differences between the physiological measures for the data collected at all 3 time-points (n=62).

		Mean±SD	F	P	Comparison between	Mean difference	95% CI	
							Lower	Upper
BMI°	Baseline	25.9±4.4	9.39 ***	0.001	Mid – Baseline	-0.48 **	-0.83	0.14
	Mid	25.5±4.4			End – Baseline	-0.50 **	-0.89	-0.11
	End	25.5±4.3			End – Mid	-0.02	-0.22	0.18
Fat %°	Baseline	27.5±7.9	3.36 *	0.038	Mid – Baseline	-1.07 *	-2.07	-0.07
	Mid	26.4±7.6			End – Baseline	-0.86	-1.87	0.15
	End	26.6±8.0			End – Mid	0.21	-0.38	0.79
WC	Baseline	89.9±13.9	12.32 ***	0.001	Mid – Baseline	-1.22	-2.47	0.03
	Mid	88.8±14.9			End – Baseline	-2.54 ***	-3.87	-1.22
	End	87.4±13.9			End – Mid	-1.32 *	-2.52	-0.12
SBP°	Baseline	135.0±20.7	13.67 ***	0.001	Mid – Baseline	-7.43 ***	-10.96	-3.89
	Mid	127.6±16.7			End – Baseline	-5.30 *	-9.64	-0.95
	End	129.7±16.2			End – Mid	2.13	-0.62	4.89
DBP	Baseline	80.9±11.1	7.76 **	0.005	Mid – Baseline	-3.30 **	-5.51	-1.09
	Mid	77.5±10.1			End – Baseline	-2.86 *	-5.38	-0.35
	End	78.0±9.4			End – Mid	0.44	-1.52	2.39
HR	Baseline	67.1±11.9	5.04 **	0.008	Mid – Baseline	-2.63 *	-5.24	-0.02
	Mid	64.5±11.9			End – Baseline	0.54	-2.37	3.45
	End	67.7±12.2			End – Mid	3.17 *	0.83	5.51

°Mauchly's Test of Sphericity indicated the assumptions of sphericity had been violated for BMI, Fat % and SBP so the Greenhouse-Geisser correction (Epsilon=ε) was applied to these outcomes.
*p<0.05 **p<0.01 ***p<0.001 significance levels.

Table 7.17 displays the comparisons between the psychological outcomes collected at each measurement time-point of the intervention. A repeated measures ANOVA revealed that the psychological outcomes of WAI, OC, JM and ITQ differed significantly across the measurement time-points. Post hoc analyses demonstrated WAI scores were significantly lower at mid-intervention relative to baseline. However, at the end of intervention measurement WAI scores increased significantly relative to the mid-intervention time-point. JM scores were significantly lower at the end of intervention compared to the baseline measurements. Conversely, ITQ scores were significantly higher at end of intervention compared to baseline. Finally, OC scores were significantly lower at both mid-intervention and end of intervention compared to baseline.

Table 7.17: Results from a repeated measures ANOVA and Friedman test for the staged intervention group assessing differences between the psychological outcomes for the data collected at all 3 time-points (n=49).

ANOVA results		Mean±SD	F	P	Comparison between	Mean difference	95% CI	
							Lower	Upper
WAI°	Baseline	42.9±3.8	23.49 ***	0.001	Mid – Baseline	-7.04 ***	-8.10	-5.98
	Mid	35.8±3.4			End – Baseline	-1.19	-4.60	2.21
	End	38.7±3.3			End – Mid	5.85 ***	2.65	9.04
OC°	Baseline	49.1±6.7	15.40 ***	0.001	Mid – Baseline	-8.92 ***	-11.78	-6.06
	Mid	40.1±4.6			End – Baseline	-5.58 *	-10.07	-1.09
	End	40.5±16.0			End – Mid	3.33	-1.32	7.99
JM°	Baseline	35.4±3.7	4.67 *	0.021	Mid – Baseline	-1.17	-2.77	0.43
	Mid	34.4±3.8			End – Baseline	-2.89 *	-5.65	-0.12
	End	32.3±6.9			End – Mid	-1.72	-4.37	0.92
ITQ	Baseline	2.4±1.4	3.22 *	0.046	Mid – Baseline	0.01	-0.74	0.76
	Mid	2.5±1.7			End – Baseline	0.58	-0.09	1.26
	End	2.9±1.9			End – Mid	0.57 *	0.03	1.12
Friedman results		**Median (IQR)**	**X^2**	**P**	**Comparison between**	**Median difference**		
GHQ	Baseline	9.0 (5.0)	0.298	0.861	Mid – Baseline	2.00		
	Mid	11.0 (6.0)			End – Baseline	1.00		
	End	10.0 (9.0)			End – Mid	-1.00		
JS	Baseline	6.0 (1.0)	8.244 *	0.016	Mid – Baseline	0.00		
	Mid	6.0 (1.0)			End – Baseline	-0.40		
	End	5.6 (2.0)			End – Mid	-0.40		

°Mauchly's Test of Sphericity indicated the assumptions of sphericity had been violated for WAI, OC and JM so the Greenhouse-Geisser correction (Epsilon=ε) was applied to these outcomes.
*p<0.05 **p<0.01 ***p<0.001 significance levels.

In addition, a Friedman test revealed there were differences between JS over the course of the intervention period for the staged intervention group (Table 7.17). Post hoc comparisons revealed the median JS score at the end of intervention was less than the baseline (p=0.067) and mid-intervention (p=0.156) time-points, although these differences we not found to be statistically significant. The Friedman test also revealed there were no significant differences between GHQ and the 3 time-points for the staged intervention group.

Comparisons between participants MET-minutes per week spent walking and in moderate and vigorous physical activity reported during each stage of the intervention are shown in Table 7.18. A repeated measures ANOVA revealed there were no significant differences between reported MET-minutes per week for walking, moderate and vigorous activity at the 3 time-points for the staged intervention group. However, even though the results were not statistically significantly, average MET-minutes per week reported for walking were higher at end of intervention when compared to the baseline or mid-intervention time-points.

Table 7.18: Results from a repeated measures ANOVA for the staged intervention group assessing differences between the reported MET-minutes per week for the data collected at all 3 time-points (n=66).

		Mean±SD	F	P	Comparison between	Mean difference	95% CI Lower	95% CI Upper
Walking°	Baseline	783±737	2.52	0.098	Mid – Baseline	109	-183	401
	Mid	893±994			End – Baseline	376	-95	849
	End	1160±1642			End – Mid	267	-213	748
Moderate	Baseline	386±774	0.47	0.623	Mid – Baseline	-10	-331	310
	Mid	375±779			End – Baseline	-96	-395	202
	End	290±600			End – Mid	-85	-371	199
Vigorous°	Baseline	937±1189	0.83	0.438	Mid – Baseline	-100	-466	264
	Mid	836±950			End – Baseline	-191	-606	224
	End	746±1072			End – Mid	-90	-401	221

°Mauchly's Test of Sphericity indicated the assumptions of sphericity had been violated for walking and vigorous activity so the Greenhouse-Geisser correction (Epsilon=ε) was applied to these outcomes.

Table 7.19 displays median self-reported sitting times across the domains on work days and non-work days for each intervention time-point. A Friedman test revealed sitting times did not differ significantly over the intervention period in any domain of sitting on a work day and non-work day for the staged intervention group.

Table 7.19: Results from a Friedman test for the staged intervention group assessing differences between the reported sitting time domains on a work day and non-work day at all 3 time-points (n=54).

		Median (IQR)				
		Baseline	**Mid-intervention**	**End of intervention**	χ^2	**Sig.**
Work day	**Transport**	60 (58)	60 (68)	52 (76)	4.682	0.096
	Work	390 (110)	372 (180)	360 (145)	1.979	0.372
	TV	90 (90)	60 (98)	60 (120)	1.052	0.591
	PC at home	30 (50)	20 (60)	20 (60)	1.282	0.527
	Other leisure	30 (60)	30 (60)	20 (83)	1.082	0.582
	Sleep	420 (60)	420 (60)	420 (90)	2.513	0.285
Non-work day	**Transport**	30 (56)	30 (45)	30 (60)	3.771	0.152
	Work	0 (0)	0 (0)	0 (20)	2.471	0.291
	TV	120 (60)	120 (128)	120 (105)	0.209	0.901
	PC at home	60 (90)	60 (90)	60 (120)	1.407	0.495
	Other leisure	120 (120)	120 (120)	60 (135)	4.563	0.102
	Sleep	480 (98)	480 (60)	480 (60)	1.244	0.537

The results for the staged intervention condition have demonstrated that the intervention effects for this group to be more successful in comparison to the standard intervention group. In terms of physiological measures, significant improvements (reductions) have been demonstrated for all of the outcome measures (BMI, Fat %, WC, SBP, DBP and HR) throughout the course of the intervention period. Even though the MET-minutes per week for walking were not found to be statistically significant between the 3 time-points, mean MET-minutes per week spent walking appeared to be higher at the end of intervention compared to the baseline and mid-intervention measurements. The psychological outcomes displayed negative changes similar to the standard intervention group, which could be an indication of other stressors impacting the psychological wellbeing of the participants during the course of the intervention.

7.4.2.5 Control intervention condition

To assess the longitudinal results of the intervention, data from participants in the control intervention group who complied and provided data for all follow-up measurements were used in the analyses below (n=51). Figure 7.7 illustrates the percentages of the control intervention group participants in each phase of the stage of change at the baseline, mid-intervention and end of intervention measurements. At the baseline measurement, the majority of the employees (56.3%) were in the preparation stage. The rest of the participants in this intervention group were in the precontemplative (16.7%), contemplative (12.5%) and action (10.4%) stages, with few in the maintenance (4.2%) stage. A chi-squared goodness of fit test indicated significant differences in the proportion distribution of participants for each stage of change construct at the mid-intervention measurement compared to baseline. As displayed in Figure 7.7, at the mid-intervention there were fewer workers in the preparation stage and more participants in the maintenance stage (χ^2=40.30, p<0.001). However, these differences were not maintained by the end of intervention measurement, as there was no significant difference in the proportion of employees for each stage of change state compared to the baseline assessment (χ^2=5.16, p<0.271).

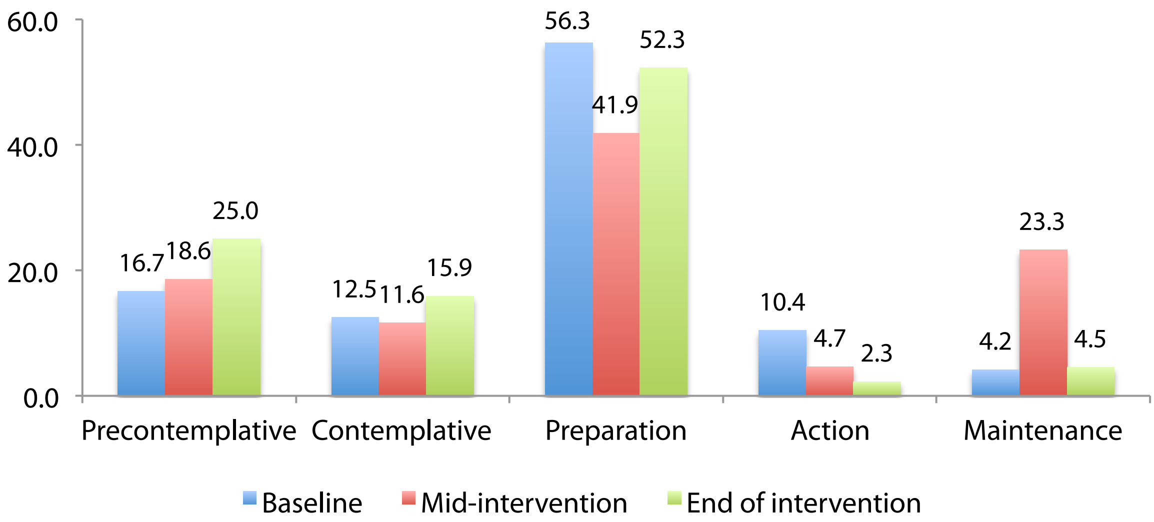

Figure 7.7: Bar chart displaying the percentages of the control intervention group participants in each domain of the stage of change at the baseline, mid-intervention and end of intervention measurements.

Comparisons between the physiological measures collected during each stage of the intervention are shown in Table 7.20. A repeated measures ANOVA revealed that SBP and HR differed significantly across the measurement time-points. Post hoc analyses demonstrated that SBP and HR measures were significantly lower at mid-intervention relative to baseline. However, at the end of intervention measurement, SBP score increased significantly relative to the mid-intervention time-point. There were no significant differences between the time-points and the physiological measures of BMI, Fat %, WC and DBP for the control intervention group.

Table 7.20: Results from a repeated measures ANOVA for the control intervention group assessing differences between the physiological measures for the data collected at all 3 time-points (n=40).

		Mean±SD	F	P	Comparison between	Mean difference	95% CI	
							Lower	Upper
BMI	Baseline	26.9±3.9	2.38	0.099	Mid – Baseline	-0.33	-0.70	0.05
	Mid	26.5±4.2			End – Baseline	-0.12	-0.54	0.30
	End	26.8±4.1			End – Mid	0.21	-0.13	0.55
Fat %	Baseline	25.3±8.9	1.52	0.228	Mid – Baseline	-0.41	-1.10	0.28
	Mid	24.9±9.0			End – Baseline	0.05	-0.83	0.93
	End	25.4±8.6			End – Mid	0.46	-0.23	1.15
WC	Baseline	93.8±13.1	2.28	0.109	Mid – Baseline	-1.76	-3.84	0.33
	Mid	92.0±13.7			End – Baseline	-1.63	-3.85	0.59
	End	92.2±12.6			End – Mid	0.12	-2.43	2.68
SBP	Baseline	132.3±12.3	4.64 *	0.013	Mid – Baseline	-3.99 *	-7.45	-0.52
	Mid	128.3±10.1			End – Baseline	0.91	-2.91	4.73
	End	133.2±12.3			End – Mid	4.90 **	1.07	8.73
DBP	Baseline	78.5±9.1	3.35	0.170	Mid – Baseline	-2.18	-4.73	0.38
	Mid	76.3±7.4			End – Baseline	-1.05	-3.55	1.45
	End	77.4±9.4			End – Mid	1.13	-1.44	3.69
HR	Baseline	65.0±10.9	3.25 *	0.044	Mid – Baseline	-3.90 *	-7.72	-0.08
	Mid	61.1±10.8			End – Baseline	-2.03	-5.79	1.74
	End	63.0±10.9			End – Mid	1.88	-2.02	5.78

Mauchly's Test of Sphericity indicated the assumptions of sphericity had not been violated for any of the physiological measures. *p<0.05 significance level.

Table 7.21 displays the comparisons between the psychological outcomes collected at each measurement time-point of the intervention. A repeated measures ANOVA revealed that WAI and OC differed significantly across the measurement time-points. Post hoc analyses demonstrated WAI and OC scores were significantly lower at the mid-intervention time-point relative to baseline. There were no significant differences between the time-points and the psychological outcomes of JM and ITQ for the control intervention group. In addition, a Friedman test also revealed there were no significant differences between GHQ and JS over the course of the intervention period for the control intervention group.

Table 7.21: Results from a repeated measures ANOVA and Friedman test for the control intervention group assessing differences between the psychological outcomes for the data collected at all 3 time-points (n=34).

ANOVA results		**Mean±SD**	**F**	**P**	**Comparison between**	**Mean difference**	**95% CI Lower**	**95% CI Upper**
WAI°	Baseline	42.6±3.9			Mid – Baseline	-6.75 ***	-8.09	-5.41
	Mid	35.9±2.1	9.70 **	0.002	End – Baseline	-2.59	-7.25	2.08
	End	40.0±10.8			End – Mid	4.16	-0.46	8.79
OC°	Baseline	46.1±8.3			Mid – Baseline	-5.79 **	-9.34	-2.25
	Mid	40.3±4.1	4.87 *	0.016	End – Baseline	-3.03	-7.83	1.78
	End	43.1±13.4			End – Mid	2.77	-2.73	8.26
JM°	Baseline	34.6±3.5			Mid – Baseline	-0.44	-2.07	1.19
	Mid	34.1±4.2	3.54	0.059	End – Baseline	-3.32	-7.12	0.48
	End	31.3±9.6			End – Mid	-2.89	-7.13	1.37
ITQ	Baseline	3.2±1.6			Mid – Baseline	-0.23	-0.76	0.31
	Mid	3.0±1.6	2.51	0.089	End – Baseline	-0.59	-1.36	0.19
	End	2.6±1.5			End – Mid	-0.36	-1.04	0.31
Friedman results		**Median (IQR)**	**X^2**	**P**	**Comparison between**	**Median difference**		
GHQ	Baseline	10.0 (5.0)			Mid – Baseline	0.00		
	Mid	10.0 (6.0)	0.278	0.870	End – Baseline	0.00		
	End	10.0 (6.0)			End – Mid	0.00		
JS	Baseline	5.6 (1.8)			Mid – Baseline	-0.30		
	Mid	5.3 (1.8)	1.836	0.399	End – Baseline	0.40		
	End	6.0 (2.3)			End – Mid	0.70		

°Mauchly's Test of Sphericity indicated the assumptions of sphericity had been violated for WAI, OC and JM so the Greenhouse-Geisser correction (Epsilon=ε) was applied to these outcomes.
*p<0.05 **p<0.01 ***p<0.001 significance levels.

Comparisons between participants MET-minutes per week spent walking and in moderate and vigorous physical activity reported during each stage of the intervention are shown in Table 7.22. A repeated measures ANOVA revealed there were no significant differences between the MET-minutes per week for walking, moderate and vigorous activity at the 3 time-points for the control intervention group.

Table 7.22: Results from a repeated measures ANOVA for the control intervention group assessing differences between the reported MET-minutes per week for the data collected at all 3 time-points (n=51).

		Mean±SD	F	P	Comparison between	Mean difference	95% CI Lower	95% CI Upper
Walking°	Baseline	818±837	1.34	0.267	Mid – Baseline	48	-398	496
	Mid	867±1012			End – Baseline	-191	-548	166
	End	627±774			End – Mid	-240	-580	100
Moderate°	Baseline	181±366	2.50	0.095	Mid – Baseline	282	-45	610
	Mid	463±829			End – Baseline	127	-118	373
	End	309±747			End – Mid	-154	-508	198
Vigorous	Baseline	831±1252	0.44	0.647	Mid – Baseline	200	-473	873
	Mid	1031±1943			End – Baseline	49	-584	683
	End	880±1570			End – Mid	-150	-828	527

°Mauchly's Test of Sphericity indicated the assumptions of sphericity had been violated for walking and moderate activity so the Greenhouse-Geisser correction (Epsilon=ε) was applied to these outcomes.

Table 7.23 displays median self-reported sitting times across the domains on work days and non-work days for each intervention time-point. A Friedman test revealed sitting times did not differ significantly over the intervention period in any domain of sitting on a work day for the control intervention group. On a non-work day, the Friedman test revealed sitting time for the domain of watching TV differed significantly across the measurement time-points. Post hoc analyses demonstrated sitting time whilst watching TV was significantly lower at the mid-intervention time-point relative to baseline ($p=0.043$). However, at the end of intervention measurement, sitting time whilst watching TV increased significantly relative to the mid-intervention time-point ($p=0.049$). There were no significant differences between the time-points and the sitting times reported on a non-work day for the domains of transport, at work, PC at home, other leisure and sleeping for the control intervention group.

Table 7.23: Results from a Friedman test for the control intervention group assessing differences between the reported sitting time domains on a work day and non-work day at all 3 time-points (n=51).

		Median (IQR)				
		Baseline	Mid-intervention	End of intervention	χ^2	Sig.
Work day	**Transport**	38 (49)	35 (49)	30 (59)	2.044	0.360
	Work	390 (60)	360 (90)	360 (60)	1.206	0.547
	TV	120 (83)	120 (83)	120 (124)	1.703	0.427
	PC at home	35 (83)	30 (60)	30 (60)	1.529	0.465
	Other leisure	50 (60)	40 (60)	40 (60)	1.867	0.393
	Sleep	420 (90)	420 (120)	420 (90)	7.689	0.210
Non-work day	**Transport**	30 (60)	30 (60)	30 (60)	5.675	0.059
	Work	0 (0)	0 (0)	0 (120)	3.542	0.172
	TV	180 (120)	150 (158)	180 (120)	9.425 **	0.009
	PC at home	60 (83)	60 (90)	60 (71)	1.319	0.517
	Other leisure	120 (146)	90 (168)	60 (90)	1.319	0.517
	Sleep	480 (105)	480 (90)	480 (113)	3.175	0.204

**p<0.01 significance levels

The results for the control intervention condition have demonstrated there were little intervention effects for this group. In terms of physiological measures, significant improvements (reductions) in SBP and HR were demonstrated, although SBP showed no long-term improvements and other outcome measures remained unchanged during the course of the intervention. There were no significant differences between the 3 time-points and reported MET-minutes per week for physical activity or reported sitting times on a work day. Finally, like the standard and staged intervention group participants, results for the psychological outcomes of WAI and OC showed significant negative changes at the mid-intervention assessment, which may indicate greater issues effecting the psychological wellbeing of the participants during the course of the intervention.

7.5 Discussion

7.5.1 Summary of key findings

The study described in this chapter is an investigation into evaluating a workplace health intervention that provided physical activity promotion information developed using the stage of change approach. Development of the intervention tools has been described in Chapter 6. The investigation described in this chapter applied these tools in organisations in order to evaluate any differences between groups of employees who were provided standard, tailored or no information. The results of this study are particularly important because they demonstrate that a small change in the way a physical activity promotion intervention is delivered in an organisation may have significant differences in the long-term success of the health outcomes and physical activity behaviours of employees. A total of 1,120 participants were recruited from ten work sites. Four work sites were allocated to a standard intervention condition where participants received standard physical activity promotion material. Four other work sites were allocated to a staged intervention condition where participants received tailored physical activity promotion material according to their stage of change. Two sites were allocated to a control intervention condition where participants did not receive any information.

The between group comparisons revealed no overall significant differences between the outcomes for each intervention group. Nevertheless, comparisons between baseline, mid-intervention and end of intervention data revealed the staged intervention group demonstrated improvements in all physiological measures. By the mid-intervention measurement, staged intervention participants showed significant improvements in BMI, Fat %, SBP, DBP and HR. By the end of intervention measurement, the long-term benefits of the intervention demonstrated improvements in BMI, WC, SBP and DBP, with Fat % remaining unchanged from the improvement at mid-intervention. In contrast and as predicted, the control intervention condition demonstrated poor intervention effects as only significant reductions for HR and SBP were presented by mid-intervention. However, the improvements were not maintained and SBP at the end of intervention measurement showed a significant increase back to baseline levels. The standard intervention participants did experience some long-term benefits from participating in the intervention, which were reduced WC and DBP at the end of intervention compared to baseline. There were no other significant differences between the physiological measures for standard or control intervention groups.

Although not conclusive, the results provide some support for previous research that suggests health interventions which provide information in a tailored way are more effective (Kirk et al., 2003; Marcus & Simkin, 1993; Ogilvie et al., 2007). Using the stages of change construct of the transtheoretical model (Prochaska & DiClemente, 1983), the findings demonstrate physical activity initiatives in the workplace may be made more effective by tailoring health promotion information according to employees stage of change. Reductions in physiological health outcome measures for staged intervention participants demonstrate the opportunity available to target large numbers of individuals through organisations. The results highlight the potential for health improvements due to the preventive and treatment value of physical activity against illnesses such as: cardiovascular disease (Myers et al., 2004); coronary heart disease (Slattery et al., 1989); stroke (Duncan et al., 1998); hypertension (Whelton et al., 2002); and obesity (Jakicic, 2002).

The questionnaire data revealed that self-reported physical activity levels in terms of walking, as recorded in MET-minutes expended per week for the standard intervention condition had significantly increased by mid-intervention, and remained at this level by the end of intervention. The mean scores showed MET expenditure for walking almost doubled. For the staged intervention group, there were no significant differences, although the mean MET-minutes expended per week for walking had increased by almost 40% by the end of intervention. In the control group there were no differences in MET expenditure for walking over the period of the intervention. These results demonstrate that even though participants in all conditions were given a pedometer and informed about the step count recommendations, walking behaviour only changed with the participants who received the physical activity promotion information. Previous research has shown participants reactivity to wearing pedometers increases step counts in the short-term (Clemes, Matchett, & Wane, 2008; Clemes & Parker, 2009). Reactivity to using a pedometer has been reported to last for the first week, and individuals revert back to normal step counts by the second week (Clemes & Deans, 2012). Therefore, the findings of this longitudinal investigation demonstrate any potential reactivity to wearing pedometers is not sustained in the long-term. The likelihood of longitudinal changes appearing due to reactivity in the control intervention group disappeared as MET expenditure increases for walking was only demonstrated in the standard and staged groups.

The study found no improvements in other self-reported physical activity levels, such as MET expenditure for moderate or vigorous physical activity. Therefore, these findings appear to show that interventions focusing on walking may not have a significant secondary impact on increasing participation in other types of more intensive physical activity. However, the focus of this research was to increase incidental levels of physical activity and walking. Furthermore, the questionnaire did not assess other types of activity that individuals may not classify as moderate or vigorous (e.g. gardening, yoga, household activities, etc.). Research by Andersen et al. (1997, 1998) comparing incidental physical activity interventions with traditional structured aerobic programmes reported similar improvements in physical activity for both groups of obese women. Incidental activity has been shown to be effective in changing the behaviours of sedentary and unfit adults because of the numerous ways to incorporate daily physical activity movements (Dunn et al., 1998). The results from this study show increases in walking activity may have the potential for sustained behaviour changes, which can have significant health benefits.

In terms of measuring employees' stage of change in relation to physical activity, the research study tested differences in the distributions of employees stage constructs for participants in all intervention conditions. Both groups of participants in the standard and staged conditions demonstrated significant shifts in the distribution of their stage constructs, with less people in the precontemplative, contemplative and action stages and more people in the maintenance stages by the end of intervention. Participants in the control condition also demonstrated significant shifts in the stage distributions by the mid-intervention as more people moved from precontemplative and preparation stages to action and maintenance changes. However, the changes in the control group were only short-term and by the end of intervention the stage construct distributions returned back to the same as baseline.

At the beginning of the intervention, the largest group in all conditions was in the preparation group, which is no surprise since individuals signing up to physical activity initiatives were probably those who wanted to be more active (Conrad, 1987). The results showed the stage of change constructs only changed with the participants who received physical activity promotion information. There was not much difference between the standard and staged groups, which may mean that any type of physical activity information (not necessarily tailored) will help in changing the psychological constructs related to physical activity beliefs. However, comparing this assumption with the physiological measures means that even though these constructs may change, providing tailored information (with practical advice) could yield better results for employee health status in the long-term.

Participants in the standard or staged intervention groups showed no long-term improvements by the end of intervention in reported sitting times for any of the domains on a work day or non-work day. The only sitting time domain that demonstrated significant changes was watching TV on a non-work day for the control intervention group. Research has shown that time spent in habitual activities such as travelling to and from work and at work are more accurately recalled than time spent in less structured behaviours, such as leisure activities (Marshall et al., 2010). However, estimations between the times reported in these domains may have not changed for individual participants because their perceptions of the amount of time spent sitting in these domains may not have changed, even if their behaviours did change. Research has reported the Domain Specific Sitting Time questionnaire may not be sensitive enough to detect changes in sitting in intervention research, due to the wide variability in sitting times reported (Clemes et al., 2012). Therefore, additional research is required to validate the Domain Specific Sitting Time measurement tool's recall accuracy for interventions and compare the findings to other more objective measures of sedentary behaviours. Furthermore, increases in physical activity and walking were the main focus of this intervention, with a secondary focus to reduce sitting time and sedentary behaviours. Research suggests that interventions must be targeted specifically at sedentary and sitting behaviours and not general physical activity to ultimately reduce sitting times (Chau et al., 2010). Therefore, the intervention materials in this research may not have been focused enough to impact sitting or sedentary behaviours.

With regards to the psychological health outcomes and job attitudes of participants, as measured by the WAI, GHQ-12, JS, OC, JM and ITQ, the findings indicated several inconsistencies, especially when compared to the physiological measures. Research has shown increases in physical activity has a preventative and beneficial effect on psychological health disorders such as depression (Paffenbarger et al., 1994) and anxiety (Petruzzello et al., 1991), with the results likened to be the same as psychotherapeutic interventions (Mutrie, 2000). However, the results of this study demonstrated negative changes by the mid-intervention measurement for self-reported WAI and OC results, which were consistent for all three intervention conditions. Furthermore, there were no significant improvements in the measures of psychological distress as measured by the GHQ-12, and other psychological results related to job and organisational attitudes provided varied and inconsistent results. All three intervention conditions showed deteriorations in the outcomes measuring psychological wellbeing.

One explanation for these inconsistent psychological results is that the outcome measures chosen were not appropriate for this type of intervention research. Generally, improvements in physical activity and sedentary behaviour will see changes in the physiological health of individuals (Bouchard et al., 1995). The physiological measures selected in this research are common with typical health outcome measurements. However, there are no consistent tools for measuring changes in psychological health as a result of a physical activity or sedentary behaviour interventions. The researcher selected these psychological outcomes due to a combination of their reliability, validity, outputs related to organisations and past experience. Nevertheless, they may have been inappropriate to measure effects from a physical activity promotion intervention. However, the WAI has been demonstrated to be a valid and reliable instrument (Ilmarinen, 2007) and the GHQ-12 is a robust indicator of psychological distress or psychiatric morbidity (Goldberg et al., 1997). Therefore, it is appropriate to assume these measures were suitable to be selected to indicate differences in the psychological wellbeing of employees throughout the intervention.

Another explanation for these inconsistent psychological results is maturation effects or socially desirable responses that may have influenced participants answers to the questionnaire during the follow-up measurement time-points (Paulhus, 2002). The questionnaire took a considerable amount of time to complete and participants may have attempted to finish it faster at the mid-intervention and end of intervention time-points. Furthermore, participants' familiarity with the questions increased over the follow-up periods during the course of the intervention, which may have made individuals respond faster and increase the potential for inaccurate responses.

The researcher is not convinced that these results do not mean that previous research findings demonstrating the psychological benefits of physical activity are invalid. The only consistent outcome for all three intervention groups were that there was a deterioration in the psychological wellbeing of employees. This demonstrates a larger organisational issue that may have been connected to all employees, which could have affected the psychological outcomes for the intervention research. It may be reasonable to assume that since the data were collected during the height of the volatile economic climate, participants experienced negative psychological wellbeing due to factors such as job insecurity, government austerity measures and reduced disposable income. There is little research investigating the impact of the challenging economic climate on the psychological wellbeing and organisational job attitudes of employees. Therefore, even though the physiological measures indicated somewhat positive intervention effects, psychological outcomes may have been affected by external factors.

7.5.2 Strengths, limitations and suggestions for future research

The principle strength of this study was the research design because it included three independent intervention conditions and longitudinal repeated measures data collected at three time-points. Consequently, the research had the advantage of evaluating an intervention by assessing the changes between different conditions, including the use of a control group. Research with individuals in social settings makes it impossible to conduct randomised control trials, which are regarded as the gold standard in the hierarchy of research designs (Concato et al., 2000). Nevertheless, the research method undertaken in this study offered a pragmatic approach to conducting investigations with multiple and distinct intervention conditions. Another significant strength of the research design was the tailoring in the staged condition, which was conducted at an individual level. The intervention material was designed to be simplistic and easy to administer. Therefore, individuals were given tailored information based on whether they were classified as precontemplative or contemplative/preparation. This simplistic methodology provides future interventions with a practical approach that may be implemented in organisations by occupational health departments.

The investigation was conducted by an independent group of researchers not affiliated with the organisations involved. This offered advantages to employees because they may have been more willing to participate knowing the data was confidential, information was objective and any outcomes would not directly affect their job roles or any associated life insurance plans. Participants benefitted from receiving a health screening from trained researchers, which included a number of important health outcomes. Each health screening assessment provided participants with a regular health check over a period of a year. Therefore, employees were being offered a free health check with free information, advice and materials to help them lead healthier lives. This service was provided in the style of an independent consultation and employees welcomed the opportunity to participate in this type of initiative. The individual consultations were an unanticipated component of the research and not part of the original design. Initially, the method involved providing participants with a double-sided A4 sheet explaining all the numbers on their copy of the results sheet following the assessment. However, it quickly became apparent that there needed to be a detailed explanation of the assessment and the implications of the results. This meant every participant was receiving some form of tailored feedback during these consultations, whether they were in the standard, staged or control intervention group. These consultations may have had an impact on the strength of the associations being interpreted from the results. In fact, return rates for the control group (i.e. 26.0% by the end of intervention versus 22.9% for standard and 18.9% for staged intervention groups) were the highest indicating good engagement in the research, even though differences were non-existent due to the nature of this intervention group. Future research should employ strategies that enable the consultation feedback to deliver information according to participants' intervention conditions. Therefore, if an individual is part of the staged intervention group, feedback during the consultation is tailored according to their stage of change.

Another strength of this research study was that multiple trained researchers collected the data. This offered participants the opportunity to be provided information from multiple sources, and be assessed by the same-sex researcher for measures that were less comfortable (i.e. waist circumference). However, the potential impact of multiple testers and the possibility of inter-observer error in subjectively measuring morphometric population comparisons must be noted here. In order to overcome this potential problem, the researchers would undergo re-training before each set of measurement time-points so that all measurements were being collected accurately. Where possible during the mid-intervention and end of intervention health screenings, the same researcher who assessed the participant in the baseline/recruitment health screening would try to measure the participant again. However, this was not always possible and therefore inter-observer error would have been introduced.

Generally, individuals who participate in health promotion interventions are those who are sufficiently healthy already. Health initiatives often fail to engage the groups who need it most or motivate individuals who would not normally participate in these types of initiatives (Conrad, 1987). However, the mean BMI of participants was 26.8 kg/m^2 indicating the average sample were in the overweight category. In terms of the stage of change construct, the results indicated that there were very few numbers of employees in the precontemplative stage. The majority of the participants in all conditions were classified as being in the contemplative and preparation stages at all the health screening assessments. This is likely to be because the employees who joined the intervention programme were those who wanted to be more physically active and were therefore thinking about making a change or had made changes already.

The results demonstrated those participants who did not return after baseline had higher fat percentages and resting heart rate readings at baseline compared to those who returned for all three health screening assessments. It would be reasonable to assume the returning participants were those who were healthy or those who expected to see positive improvements, and individuals who did not return may have had little changes or even deteriorations in their health status. Comparisons of the baseline measurements between participants also demonstrated individuals who fully complied in all three health screening assessments reported higher vigorous physical activity (MET-minutes per week) compared to the participants who did not return following the baseline measurement.

Email contact with individuals at the time of the revisits encouraged all employees who originally signed up to return. It was made clear the researchers wanted people to return whether they felt their results were positive, neutral or negative. A number of participants who did return also stated their colleagues did not return because they did not want to complete the questionnaire, even though they wanted a health screening assessment. After completing the lengthy questionnaire at baseline, it acted as a deterrent to some individuals knowing they had to complete it again as part of the outcome measures. Furthermore, taking time out from their working day to complete the questionnaire and attend a health screening during work time may have been an unrealistic expectation for some employees.

There was a higher than anticipated level of attrition in this study by the mid-intervention (33.2%) and the end of intervention (22.0%) time-point. A limitation of conducting longitudinal research with organisations is that employees may leave their jobs during the period of the study. Research undertaken during the middle of the financial crisis in the UK also meant participating companies were going through significant organisational change. These changes affected the research as organisations downsized their workforce and made a number of the participants' redundant. Some participants also moved work sites, which made contacting them problematic. Although this research grouped intervention conditions together, each work site essentially had distinctive issues and therefore the research approach had to be pragmatic and work around problems as they developed. Site specific issues are discussed in Appendix 7.8. Organisations declined to provide staff turnover rates specific to each work site and due to ethical requirements, it was not possible to individually name non-returners to identify whether they were still working with the company. Nevertheless, working with organisations provided this investigation with the opportunity to sample large numbers of participants and deliver separate intervention conditions using work sites that were geographically independent.

There is scope for future longitudinal research to generate more powerful organisational intervention results by attempting to understand the reasons for attrition. Categorising the differences between individuals who genuinely did not return and those who did not return because they left the organisation will immediately provide a better understanding of the success of an intervention. Furthermore, if individuals who genuinely did not return can be identified, attempts could be made to investigate the reasons why they did not return. The return rates indicated the biggest level of attrition was between the recruitment/baseline and mid-intervention period. Participants who returned for the mid-intervention health assessment were more likely to return for the final assessment. Therefore, another implication of this finding for future longitudinal studies with multiple follow-up time-points, is to focus on encouraging and motivating participants to return for the second measurement time-point, which could increase the likelihood of them returning for future time-points.

Another limitation of this research was that there was no follow-up analysis after the intervention was completed. Work site physical activity interventions have been shown to have low rates of follow-ups over a long-term period (Dishman et al., 1998). However, two follow-up time-points at six months and twelve months after the end of the intervention were collected by the Working Late researchers to investigate the potential impact of the intervention on participant outcome measures after the intervention was completed. The follow-up data was not within the remit of this thesis. The aim of this research was to investigate the longitudinal results during the course of the intervention period.

Physical activity data and sedentary time could have been collected using more valid and reliable objective measures such as accelerometers and inclinometers rather than via self-report. The pedometers were used as a motivational tool and not as an outcome measure. The data from the pedometers could have been formally recorded so that comparisons could be made between the intervention conditions. However, due to the numbers of participants involved in the research, the unrealistic request of asking participants to wear a device for twelve months and due to the potential costs involved with using accelerometers, they were deemed unsuitable for this research study. Future research investigations may wish to use accelerometers to collect data at specific intervals during the year (e.g. for a week post/pre health screening assessments) or provide accelerometers to a subset of the sample. Pedometer data for some of the participants has been recorded on the Working Late intervention website, with over 60,000 step count entries made over the course of the intervention period. Future research studies may wish to analyse this data and investigate differences between the intervention conditions and step counts over the course of the initiative.

There were no specific comparisons between job types and this important limitation must be highlighted. There were a variety of the different kinds of work and employment types involved at each site. The general categories of employees recruited into the various research phases have been described in Appendix 7.8. However, the intervention results may have provided more information if job types were included in the analyses. For example, the results could have been compared between employees who worked in physically active jobs roles to office based or call centre workers who spent large amounts of time in sedentary positions. Future research studies may wish to categorise results according to job types and analyse potential significant differences.

The longitudinal nature of the intervention meant that data was collected over many seasons, which could have had an impact on participants' physical activity levels during periods in between the health screening assessments. Data were collected over a staggered period of time because all ten sites could not be visited at the same time. Once the baseline data collection period was over, preparation for the mid-intervention visit began and this timescale was the same for the end of intervention visit. This staggered approach meant seasonal variations were not possible to be explored. Although seasonal effects and variations were not the focus of this research study, future investigations may wish to include this as part of the analyses.

The majority of participants in this study were from eight work sites that were part of a large private sector telecommunications organisation. A small number of participants (13%) were from a medium sized public sector local authority organisation. Therefore, caution must be taken when generalising these finding to other sectors or organisation types. Future investigations may wish to employ samples from several different organisational groups, which may provide a clearer impact of the results from the organisational interventions. Nevertheless, comparisons between the longitudinal results for the public and private sector revealed no significant differences between the intervention results. Moreover, the work sites were geographically dispersed across the UK and the sample size reflects the large number of the population sampled. Attempts were also made to sample from additional organisations that withdrew before the baseline health assessments. Gaining participation from the public and private sector, including both medium and large organisations demonstrates the flexible nature of the intervention and its applicability in different organisations, sizes and sectors.

Participating in this research investigation required a significant level of commitment by the organisations and the employees. The researcher is grateful to the organisations that remained steadfast in their support throughout the intervention period, even during the unpredictable economic climate.

7.5.3 Conclusions

The aims of the present study were to implement an organisational based physical activity intervention and evaluate differences between delivering standard or tailored health promotion information. The results demonstrate that providing employees with tailored physical activity information may provide long-term, sustainable improvements in their physiological health outcomes compared to standard or no information. These results extend the literature available on the benefits of exercise behaviour (Marcus & Simkin, 1993; Titze et al., 2001), into physical activity interventions in the workplace. Furthermore, these results also extend the literature available for the stages of change construct of the transtheoretical model, which has already been applied to a wide variety of contexts and problem behaviours (Andersen & Keller, 2002; Gambling & Long, 2006; Marshall & Biddle, 2001; Povey et al., 1999; Whysall et al., 2006; 2007) to include occupational health related physical activity interventions in the workplace. The results indicate the psychological impact from physical activity interventions may have been affected by external factors and additional research is required to examine the potential impact of the challenging economic climate on the psychological wellbeing and organisational job attitudes of employees. This chapter has explored the quantitative outcome measures from the interventions; the next chapter explores the actual experiences of participants using qualitative research methods.

Chapter 8

Qualitative process evaluation of employee experiences

8.1 Introduction

This chapter details the results of a qualitative investigation and an evaluation component of the intervention. Interventions are complex and often involve numerous levels to deliver such as physiological, psychological and social components (Young et al., 2008). Outputs from intervention research investigations usually demonstrate the quantitative results of the intervention and neglect the factors related to the intervention process itself. Process evaluations provide feedback on the key elements of any intervention (Devine et al., 2012). Even though the results of the intervention in Chapter 7 provided feedback for both physiological measures and psychological outcomes, a qualitative evaluation from the employees who actually participated in the intervention offers additional depth to interpret the findings. The results in this chapter may also provide evidence to understand whether organisations or occupational health departments should consider implementing this type of intervention for their workforce. Results from the thematic analysis are described and the key findings from this qualitative research phase are discussed.

8.2 Research design and aims

The aim of this phase of the research was to obtain qualitative data from participants who were involved in the organisational physical activity intervention. In order to achieve the research objectives, a semi-structured qualitative research design was employed which included individual participant interviews. A qualitative approach was selected because it allowed for an additional component to assess the success of the activity intervention. Short interviews were chosen to try and briefly understand what employees gained from participating in the intervention and how it may have impacted their lives at work and at home. Therefore, this research phase sought to operate as an evaluation study. In particular, the research objectives were to:

1) Evaluate if the information gained in the health screening assessments had any impact on participants behaviour
2) Explore employee experiences of using a pedometer
3) Identify any changes to participants day-to-day working activities and their family life at home as a direct result of participating in the intervention
4) Explore potential physiological and psychological effects employees may have experienced
5) Understand employee experiences of the physical activity themes and intervention schedule
6) Identify what would support continued participation in the activity initiative

8.3 Method

8.3.1 Interview schedule development

To develop the semi-structured interview schedule, the aims of the intervention research were first outlined to ensure the questions reflected evaluating these factors, which helped to identify topics of discussion and the types of questions that should be included. The first draft of the interview schedule was reviewed by three academics experienced in qualitative research. These reviewers were selected because they were familiar with the intervention study described in Chapter 7. The interview schedule was assessed for question phrasing and structure and a number of minor revisions were made in response to the verbal feedback received. The semi-structured interview schedule was not piloted because the questions were broad and the researcher felt comfortable they covered all aspects of the intervention. The final version of the interview schedule comprised twenty-one questions, which can be viewed in Appendix 8.1.

8.3.2 Sampling

This phase of the research aimed to recruit employees who participated in the workplace activity intervention described in Chapter 7. Participants recruited for the interviews included workers who were allocated to the standard (n=34) and staged (n=22) intervention groups. The research employed a convenience sampling technique for the interviews and the employees self-selected themselves to participate.

8.3.3 Procedure

Participants were recruited via an additional question that was added to the introduction of the questionnaire during the data collection period of the mid-intervention health screening assessments. This question asked participants if they were interested in taking part in a short interview to discuss the activity intervention and any impact the intervention may have had on their lives. This was a compulsory question that all participants had to answer before they began the questionnaire which collected their psychological outcomes and self-report data. In total, 195 individuals responded to the invitation whilst completing the questionnaire at the mid-intervention period and fifty-six were selected to participate in an interview. Participants were selected based on the timing of the end of intervention revisits so that interviews could be conducted in person, whether the participant was from a site where the intervention was delivered (because those in the control group were not part of any specific intervention and therefore would have limited feedback) and the availability of participants themselves. The researcher was confident that data saturation would be reached after fifty interviews.

Before each interview discussion commenced, the participants were verbally briefed about the nature of the research and informed the discussions would be audio recorded for transcription and analysis. Participants were advised the interviews would last approximately fifteen-minutes and were reassured that any data used would be confidential and they would not be identified individually. All employees were requested to provide verbal consent to participate in the interview. Three interviewers who had previous experience in qualitative research and who were involved in the data collection process during the intervention conducted the interviews. No incentive was offered to the participants. The interviews took place during the end of intervention health screening assessments. Interviews were conducted either in person during the periods of the health screening assessment revisits or over the telephone. The timing of any future revisits and the availability and logistical constraints of both the interviewer and interviewee determined this.

8.3.4 Data management and analysis

The audio-recorded interviews were transcribed verbatim and were analysed using thematic analysis by the sorting of material into emergent themes using the method previously described in Chapter 4 (Section 4.3.4). Following the coding of the interview data by the first researcher, a second researcher also trained in qualitative data analysis conducted the inter-rater reliability test described in Chapter 4. The second researcher coded the raw data in similar themes to the first analysis and the two sets of data analysis were compared. In total, a set of five key overall themes emerged from these analyses exploring: the recruitment and health screening process; learning points from the intervention; impact on health related behaviours; individual developments; and feedback related to the intervention themes.

8.4 Results

8.4.1 Participant characteristics

Fifty-six individual short interviews were conducted with participants where the workplace intervention was delivered. Forty participants were males and 16 participants were females. Table 8.1 displays the sample characteristics from the participants and their corresponding site locations. There were no interviews conducted with participants at the Gipping or Glasgow sites. The age of the sample was between 28–61 years old. Table 8.2 highlights the themes and sub-themes extracted from the interviews.

Table 8.1: Interviewee characteristics according to the site locations.

	Males	Females	Total per site
Edinburgh	2	1	3
Grafton	2	3	5
Ipswich	25	5	30
Liverpool	-	2	2
London	11	4	15
Newcastle	-	1	1
Total	**40**	**16**	**56**

Table 8.2: Themes extracted from the process evaluation with employees.

Themes	Summary of themes	
Intervention recruitment	Reason for attending	• Objective measure of health status • Wanted to be healthier • Free health screening and pedometer
	Feedback from health screening	• Professional and comprehensive measures • Body composition analyser outputs commended
Intervention education	• Increased awareness of lack of physical activity • Informing the benefits of regular walking • Pedometers are useful to motivate individuals to be more active	
Impact on health related behaviours	• Greater awareness of sedentary and sitting time accumulated at work • Behavioural changes to increase incidental activities • Social benefits due to improved communication and team based challenges at work • Increase in vigorous activities/changes in diet • Family involvement in physical activity	
Individual developments	• Employees felt healthier as they lost weight • Fitness levels increased • Participants reported feeling more relaxed • Organisational changes impacted on employee stress	
Intervention feedback	• Embed themed poster information in emails • Make the information accessible via the website • Improve input method for step counts on the website and provide more detailed options with a variety of outputs	

8.4.2 Theme 1: Intervention recruitment

All employees were asked what attracted them to participate in the intervention. Some stated they were relatively active already and simply wanted to receive an objective measurement of their health outcomes compared to the general population. Other participants reported that they knew they were unhealthy, unfit or overweight but wanted to change this, so health screenings over a period of time provided them with an opportunity to measure where they were at the beginning and assess if any improvements had been made in the future:

> *"I knew I was desperately out of shape when I started... So when this came along I thought it would be pretty good to actually see what stage I am at and what difference something slightly more organised will make because I was very, very out of shape."*

Some employees reported that they had existing health issues and were aware they needed to change their behaviours and be more active. Others discussed a history of ill-health conditions that were common in their family, which they wanted to defend against:

> *"Around 6 months before [the health screening] I had a general check up at the doctor and 1 of the things that came back was that my cholesterol was a bit on the high side. I have got a family history of heart problems – my mother died at an early age and my brother died when he was 51… I wasn't really exercising much, I do not really do sport."*

Participants stated the low impact nature of walking was attractive as this meant employees with low fitness levels were able to join, compared to any strenuous gym based exercise initiatives. Some of the male respondents reported the free health screening provided them with an opportunity to have a health check and get physical activity advice which they would not have visited their GP for. Finally, the offer of a free pedometer was also reported as an attractive component to the recruitment strategy for this research project:

> *"I will be honest with you, it was the opportunity to have a free health check because I don't tend to go to the doctors at all so it was a good chance to do that plus I quite like walking because it is a kind of not too strenuous activity and I can combine it with lots of other activities as well."*

> *"It just seemed like a really good opportunity to get free blood pressure tests…and the free pedometer appealed and I am one of those who stuck it out I am still wearing it today."*

Participants discussed the process of the actual health screenings and their experiences with the data collection procedures. Employees reported they felt comfortable during the collection of the physiological measures and that all the results were clearly explained to them. Generally, the feedback from the employees was that the health screenings were more detailed and comprehensive than they had expected:

> *"They [researchers] helped me understand exactly what the measurements meant, because it is one thing just telling me your BMI is this much without telling me what it means in real terms…It gives you the basics about where you are, what you can improve, what might be an issue. So it was a nice sensible level of information."*

Feedback with regards to the output of the body composition analyser was extremely positive, with some participants reporting their surprise at the variety and quality of information it provided:

> *"It was quite relaxing and also quite interesting…When he did the hydration bit where you walk around with your socks off and stuff, that was the extra part really, it was something I did not expect, I did not think you could measure that kind of*

thing…I thought, wow! That was a life changer for me as well because I have been drinking more water."

8.4.3 Theme 2: Intervention education

The interviewees discussed the large amounts of information available explaining the beneficial impact of regular physical activity and exercise on health. With this in mind, participants reported the intervention did not really provide them with any significant new information about the health effects of physical activity. However, the intervention did highlight the amount of activity individuals were doing:

> *"I suppose it highlighted to me that I do not really do enough exercise but…I have never really been a sporty person and I have never gone out and played sport."*

> *"What it has done has made me a bit more conscious about being active and doing more walking…I was getting 5,000 steps a day but now I am getting off two stops earlier at the train and walking in and I make a point of going out at lunch time rather than staying at my desk. So I have got my numbers up to about 9,000 now."*

However, there were participants who had concerns about their health status raised during the health screenings because abnormal levels of blood pressure were discovered. These participants reported the impact it had on their lives as they learned about their health condition:

> *"The blood pressure, I have got to be honest, and I think just because it was so extreme. I just generally thought some days you are feeling a bit, you know, under pressure and stressed. And I never really thought it would affect my blood pressure, so that was quite a shock to be honest but an understandable shock, because with the way my life was at the time I thought maybe that was an extra factor. So yeah I mean that was interesting for me even though it was not what I wanted to hear. I did have to go on blood pressure tablets eventually."*

Employees were encouraged not to focus simply on body weight, but consider other physiological measures as indicators of their health and fitness, such as fat percentage and resting heart rate. Participants reported the intervention demonstrated how effective walking was for their health, and some participants were really surprised to experience genuine health benefits from regular walking:

> *"There were one or two things you do provide that the health centres and hospitals do not. Things like the proportion of fat and muscle so that was quite useful because one of the things I found was that I had put on weight but I have actually lost fat and gained muscle, so the walking is having some effect."*

When discussing the impact of the pedometers, participants described how the pedometer increased their awareness of walking activity and step count levels. Some participants were surprised at the number of daily steps they were accumulating:

> *"I think without the pedometer, there would be no focus whatsoever because you just would not have any means of measuring what is going on."*

> *"I did not realise how low my physical activity was during some days, particularly when I am working really hard, I would just be sitting at a desk and doing very few steps."*

In addition to increasing their awareness, participants reported the pedometer was an excellent motivator that encouraged them to increase their step counts whenever possible. Furthermore, having 10,000 steps per day to aim for provided employees with an actual target they could focus on trying to achieve. Participants provided numerous examples of how the pedometer influenced their activity building behaviours during the day:

"I think the pedometer…does at least make me feel guilty if I look at it at the end of the day and find that I have done less than 10,000 in a day. It has got me pacing up and down the house for 10 minutes or so to pick up 100 on there."

"When I made a bit more effort in the day time then it [step count] would be fairly high, almost double the number of steps…it [pedometer] was a great encouragement to make you go out and perhaps take a walk at lunchtime."

8.4.4 Theme 3: Impact on health related behaviours

Participants discussed the effects of the intervention on any health related behaviours and they reported several changes at work and at home. One of the major outcomes reported was the impact on sitting time at work. Participants stated they began to notice the large amounts of sitting time that was being accumulated at work. This realisation led to changes in physical activity behaviours during work time:

"I am much more aware of sitting time and if I was working at home I was finding that I was perhaps only doing 1,500 or 2,000 steps a day – so what I will do is I will take a break at lunch time and I will just take a walk around the block, and do basically the equivalent of what I would have done if I had been in the office."

"What I noticed was the routine I had did not allow time for enough walking so I had to change a few things. Like I actually get to work earlier now because I live quite far away and there is no option for walking to work. So I get to work half an hour earlier and go for a 15 minute walk before I start and then a little walk at lunch time."

Many participants reported the intervention made them more aware of the value of incidental physical activity opportunities such as stair climbing. Moreover, the daily step count recommendations acted as a target for them to reach, which focused their thoughts on doing more walking:

"I am more likely to walk a bit further to the loo or something like that, rather than go to the closest one so you know, it has made me more aware of actually you have got to walk so many steps in a day. You get this mental image that 10,000 steps is something you should be aiming for in a day so the encouragement is there to try and reach that target."

Interviewees also discussed the positive social impact of the intervention at work because in some teams where there were a number of employees participating, individuals started to compare daily step count figures and introduced a more competitive element between themselves. Furthermore, one example provided by a participating line manager highlighted improved team communication:

"If I am working at a call centre, instead of finding a desk and sitting down and answering my emails and using the phone, I will actually just walk round the site so I get to speak to people face to face which I think is a better way to communicate with people anyway. And then I am more visual, I am more available, I am more approachable to my members."

Some participants mentioned that the intervention increased other leisure-time physical activity behaviours, such as cycling and running. Others suggested they did not feel a need to participate in additional vigorous type activities because walking was already having a beneficial impact on their health:

"I feel like I do not have to go do energetic physical exercise. I do not feel like I ought to go for a run, because I am walking…because actually I do not particularly enjoy running."

Most participants reported the intervention did not have a major impact on their nutrition because they did not smoke, their alcohol intake was reasonable and they felt their diet was sensible. A few participants reported becoming more aware of the poor aspects of their diet and implementing changes that they thought would benefit them:

"I have stopped eating things like cakes and chocolate, and I did not eat many crisps before but I do not eat any now, I have really just replaced them…I have completely stopped eating chocolate, and I have replaced it with fruit, so that is where the main changes have taken place."

In terms of home life, several participants reported the intervention had a significant impact on the activity levels of other family members, such as spouses and children, who would regularly join the participant for a walk:

"My wife is now keen to try and join me…we try to do an evening walk, so we will go out for about a mile and a half every evening for a nice long walk. We find that relaxing between us, a chance to chat, away from the home environment anything is good."

Participants even reported investing in additional pedometers for their family members so that step counts could be recorded together and everybody had something to motivate them:

"I bought my husband one [pedometer], and my mother one, and my husband and I are like in competition now! And my mother was finding she was not doing very many steps…but then one day she wore it to a Well Woman clinic at the local GP surgery, and she walked there and she walked back, and she got 7,000 steps, and when she told them what she was doing she got a big pat on the back and told to keep going!"

8.4.5 Theme 4: Individual developments

Participants reported experiencing clear physiological improvements after losing significant amounts of weight during the intervention period:

"Over the last 6 months I have been ramping up the steps that I do and I am becoming more consistent, so more consistently [achieving] the 10,000 a day…What has happened is I have also lost half a stone in weight…I was putting on about half a pound to a pound a month, my weight was actually creeping up so the fact that it is creeping slowly down is more of an impact than it appears to be."

"Well I really feel it and those who also know me say that I look much fitter than I used to be a few months ago…and they are quite surprised by it and when they ask I just say its walking…Because I lost 6kg in the last 6 months so yes I really feel different."

As well as improvements in weight and body shape, participants discussed how the increase in walking made them feel healthier and fitter:

"My knees used to play up a lot, I used to get a lot more cramp on my calves and it felt like there was no movement in my joints. But it feels like they are a lot more flexible now. My knee joints feel like I can walk and walk and keep walking. Before I used to struggle a lot, so it is helpful."

"I feel more comfortable now walking some of the distances, like last night…I walked down to the beach from my house and walked back through the woods so I was out for nearly 2 hours and felt quite good about that. Whereas maybe a year ago…I would probably have felt quite sore in the knees after doing that."

In addition to physiological benefits, some participants highlighted the psychological benefits they experienced from increasing their levels of walking. Participants reported they generally felt more relaxed and less stressed after some level of activity, and they discussed how this might have impacted their work performance:

"I feel more relaxed. I find the walk, or being out of the office, very relaxing rather than just sitting down, eating and thinking…It is quite nice when you go for a walk

because you are able to think things through…Walking at lunch time just sort of makes you feel a bit more upbeat and more mentally agile I would say, in the afternoons."

"I found myself quite down about 3 or 4 months ago and although I spoke to a counsellor I also realised that I was doing less physical activity than I had been doing so I made the effort to up the step count and things like that and that certainly made a difference, it makes a difference to how you feel physically so it makes a difference to how you feel mentally."

The majority of participants stated their mood or psychological wellbeing was often affected by work commitments and work loads. Some participants also discussed the recent organisational changes to their job roles or work allocation, which had affected their psychological wellbeing during the course of the intervention:

"At the sort of time that this came up we had a redeployment scheme in the company where we had a role that finished up…I got a new role last September and I think that has probably done more for my sort of mental wellbeing and everything than this [intervention] has."

8.4.6 Theme 5: Intervention feedback

The employees were asked for feedback about the activity themes that were included in the intervention (e.g. stair climbing, Walking Lunch, etc.), including the themed posters that were sent via email. Participants reported the themes were typical of activity promotion topics and nothing dramatically new. However, the emails acted more as reminders to inform them of the activities taking place in the work site. Furthermore, employees stated receiving the emails made them feel part of a larger programme, which encouraged them to continue:

"One of the posters I did print out and put up near our little block of desks, as a reminder for me and helps one or two around there who are taking part…it was the one that told you how many steps were related to a sedentary lifestyle, an active lifestyle."

"I do like receiving the updates, to know what is happening. It lets you know that you are still out there and you are still providing that information and support, that I am still part of a programme, so probably gives you an incentive to carry on really, so you are not forgotten so to speak."

Participants highlighted that they felt the frequency of the emails were appropriate, and they often arrived at a time when enthusiasm to continue was at a low point. Therefore, receiving an email with activity information increased motivation and inspired participants to be more active:

"I think the reminder emails are about the right frequency…I think it was good to every now and again get that little prompt that said this is a good idea because as I could have predicted that I did start to tail off in terms of what I was trying to do, then I would get another email which would prompt me to start again."

Participants discussed how useful the posters were at giving them information that would alter their behaviours. They also highlighted that there is a lot of information already available about health behaviours, so the best posters were those that contained facts and figures where each individual could compare their own lifestyles:

"I thought it was quite good where for example they explained this many steps equates to the number of calories that you get from a slice of bread and things like that, you really start thinking before you eat something. It also talked about going up and down stairs and like I said sometimes I go from the basement to the 13th floor just to burn some calories."

"The one that I did notice was one where it said that if you do less than 5,000 steps a day you are sedentary, whereas 10,000 you are active and if it is 12,000 you are very active, and I think that, you know, you think, ohh just 2,000 on top of 10,000, I could go from active to very active."

Some participants reported that they did not always open and view every poster that was emailed to them. This was because the information posters were sent as attached Portable Document Format (.pdf) files and employees did not have enough time to open and read these files. Participants suggested that if the information was embedded in the email, they were more likely to read it. Other interviewees suggested the information should have also been available on the intervention website to improve access. This would also increase the variety of content on the website:

"The way that we currently use coms inside the company is almost like a newspaper but with headlines, and then if you want the information you click through, and you actually go onto a website…What I found, is that whenever I get something, no matter where it is from, if it comes in kind of an attachment…I do not read it with as much attention."

"I think the information should be on the website…so if you had 'latest news' and 'stories of encouragement' and 'here is the latest download for posters and hints and tips' because the website does look a bit sparse."

Participants also reported that they wanted variety and more detailed outputs from the intervention website, with step count information viewable in graphs that could be edited to view weekly, monthly or even quarterly results:

"It [website] gives you your average, but over the entire period of walking so far and it would be helpful to have a 3 month rolling average, or a monthly rolling average. Because I started very low, it brings it right down…Also, if the [actual] average figure was given, those people who were below average might think, 'I will just do a bit more and then I can be average,' and then the average would go up."

8.5 Discussion

8.5.1 Summary of key findings

The study described in this chapter is a process evaluation of the physical activity workplace intervention that was implemented and tested in the previous chapter. This qualitative study revealed a number of factors that were important to the employees and are summarised in Table 8.2. The purpose of this process evaluation was to identify aspects of the intervention that participants may have found useful and effective to change their behaviours that future health interventions may wish to consider as part of their methods and procedures. One of the biggest outcomes from this research is to know that the workplace is an effective location to consider implementing health interventions, because large numbers of people can be targeted efficiently (Kerr et al., 2001a). Furthermore, as the results have shown throughout this thesis and as previous research has described (Clemes et al., 2012; Healy et al., 2007; Miller & Brown, 2004), work is now a major contributor to an individuals accumulation of sedentary behaviour and one of the biggest reasons for inactive lifestyles. Therefore, public health policymakers and health professionals may wish to consider the use of the workplace as a primary tool in the fight to combat the health problems caused by sedentary job roles and increased sitting times.

One of the key findings was the results from the health screening assessments had a significant impact on participants' lifestyle and activity behaviours. Even before any intervention material was delivered, the baseline health screening assessment provided participants with feedback about their health status. The results demonstrated the health screenings provided outputs that really motivated employees to change their behaviours. This is an important finding because intervention studies often discuss the process of the intervention and assume any outputs were a result of the intervention itself. In this research, the health screening assessments were data collection methods for the researcher at the various time-points. However, participants in the control intervention group also provided data through health screenings, and the results presented in Chapter 7 did not demonstrate many positive changes in this group. This demonstrates that despite what participants have reported about the health screenings in this process evaluation, the actual physical activity intervention and promotion materials may have made the difference between the intervention groups. Nevertheless, the health screening assessments could be a good motivational tool to provide the initial stimulus for behaviour change, whereas the actual intervention and associated materials can provide the information required for action.

The results demonstrate that even though there is a plethora of information available about physical activity and its related health benefits, employees were still surprised to experience such significant health benefits from simply increasing their walking levels. Walking is an activity that is accessible to most people and provides a low level of risk to individuals (Hootman, 2007). The biggest impact of actual behaviours from this intervention was an increase in incidental type activity behaviours. The idea of the intervention was not to stimulate people into vigorous or gym based activities. Rather, it was to encourage employees to think about the time they spent being sedentary and to break this time up with more physical activity. Even though some employees increased activities such as running and cycling, most individuals focused on increasing walking activities and reducing sedentary time. Therefore, focusing on the incidental accumulation of walking behaviours allows for a more sustainable lifestyle change that may be more effective in the long-term. Furthermore, interventions that promote walking require no training and no special equipment, which means the distribution of information material can safely target large numbers of people.

The results from this process evaluation demonstrate the intervention increased participants awareness of the amount of time they spent in sedentary behaviours at work. The findings also support the use of activity monitors such as pedometers as motivators of physical activity. Participants suggested that even though they spent large amounts of time in sedentary behaviours, the fact that they were being inactive was not an obvious thought. Job roles and work processes were reportedly demanding, and individuals needed to be shown their levels of inactivity in order to stimulate a need for change. Previous research has demonstrated pedometers are useful motivational tools (Bravata et al., 2007; Clemes & Parker, 2009). The findings from this study suggest that given the target recommendation of 10,000 steps per day, the pedometers provided a way for individuals to measure their step counts and motivated them to reach those targets. Therefore, these results provide support for research which concludes pedometers have the potential to increase daily physical activity levels when individuals are provided with specific targets to work towards (Glazener et al., 2004).

The present study has provided an insight into the important features of an activity intervention. For example, a website is a great option for employees to engage in the intervention as long as it is utilised well. Online (e.g. Internet, Intranet, email, etc.) interventions are more cost effective than print (newsletter) when targeting large numbers of people (Dunn et al., 1998) and have also been shown to be just as effective (Marshall et al., 2003). However, information available via these electronic methods should be valuable and offer participants detailed feedback, with options to select a variety of different materials.

The results demonstrated that individuals who were already concerned about their health or were healthy already were the employees who were attracted to participate. As previous research has reported (Conrad, 1987), workplace physical activity programmes fail to engage the groups who need it most. Furthermore, this was also reflected in the nature of the intervention sample when allocation to the stage of change constructs was conducted in Chapter 7, where most participants were in the contemplative and preparation stages, and few were in the precontemplation stage. For those who did join the programme, they reported the level of information received was of a high quality and good variety, which was important to obtain their interest at the beginning.

The intervention demonstrated knock-on effects in other areas of the employees' lives outside of their working behaviours or environment. For example, some participants made changes to their nutrition and diet even though the focus of the intervention was only physical activity. The results presented also support research that discusses the social benefits of physical activity (Eyler et al., 1999; Giles-Corti & Donovan, 2002; McNeill et al., 2006), because individuals involved their spouses and families in activity behaviours outside of work hours, and employees improved communication with colleagues and even challenged colleagues with regards to daily step counts. Future interventions may wish to adopt a more diverse lifestyle intervention programme (Titze et al., 2001), which also includes a staged approach to delivering nutritional advice (Patrick et al., 1994; Proper et al., 2003).

Activity focused interventions in the workplace can have a positive impact on employees individual developments and psychological wellbeing. The results from this process evaluation demonstrated that a number of employees did experience improvements in subjective wellbeing, mood and emotion (Fox, 1999). During work time, breaks that included time for walking resulted in participants feeling more relaxed and in some occasions helped to solve work related problems. Therefore, acute bouts of exercise even from walking may attenuate stress related blood pressure responses (Hamer et al., 2006) and help to improve mood and creativity (Steinberg et al., 1997). The findings in this process evaluation also provide support for the interpretations regarding the psychological outcomes that were described in the previous chapter. Employees reported that during the course of the intervention, organisational changes, redeployment uncertainties and increased work demands were major sources of stress that affected the psychological wellbeing of participants. It is possible the intervention may have lessened the adverse effects from any organisational stressors. Therefore, future interventions may wish to add health information based on promoting psychological wellbeing as an intervention component, or even collect data that investigated organisational changes to understand the results comprehensively.

8.5.2 Strengths, limitations and suggestions for future research

The major strength of this phase of the research was that it provided an opportunity for an in-depth investigation into the experiences of employees who participated in the intervention research. Intervention studies often conduct research, interpret results and report findings as evaluations. However, these studies rarely conduct any additional evaluations of the processes to enhance the overall interpretation of the investigation. Therefore, this chapter allowed the researcher to appreciate the barriers and facilitators to the Walking Works Wonders programme and the potential ideas to consider when designing future workplace activity interventions.

The limitations of health intervention research being able to attract individuals who really need to change their health related behaviours has already been discussed (Conrad, 1987). In terms of these interviews, it is reasonable to assume employees who nominated themselves to participate were those who were fully engaged with the research and saw positive health improvements during the course of the intervention. Participants who saw little or no improvements may have not requested to participate in an interview. Furthermore, the interviews were only carried out with individuals who returned for the additional health screening assessments, as this was part of the recruitment process for this phase of the research. As indicated in Chapter 7, there was a high level of attrition by the mid-intervention measurements. Therefore, conducting more interviews with a selection of participants that included individuals who had different results and those who did not return may have provided a more comprehensive evaluation of the intervention that would be more generalisable. Getting qualitative feedback from participants who did not return may have added a useful component to this evaluation and help to design effective interventions that combat high levels of attrition.

An element of the recruitment for these interviews included interviewers selecting participants based on a number of criteria that were described in Section 8.3.3. Therefore, there was scope for researcher bias to affect the selection of participants. For example, interviewers may have selected participants who had performed well and had favourable results so that the intervention feedback was positive. However, the selection process was based on the location and availability of participants. Moreover, the interviewers did not search any individual results before the interviews so were unaware of specific results.

The interviews were offered to all participants in the standard and staged intervention groups. They were not offered to participants in the control group because they did not receive intervention material to gain feedback from. However, it may have been interesting to see if the health screening assessments had any impact on participants lifestyle or behaviours and compare differences between the intervention groups. Future research may wish to adopt this method in order to provide a clearer impact of the results. In addition, feedback from both the standard and staged intervention groups was not separated because the intervention schedule and material they received was essentially the same. The researcher could have analysed responses according to the intervention groups to investigate any intervention differences between these groups. However, the only difference between the groups was the original activity promotion leaflet delivered to each participant at the beginning of the intervention, which was tailored according to their stage of change in relation to physical activity.

Participants and interviewers focused on physiological measures and not the questionnaire component of the health screening assessments. Since this was an important component of the data collection process, the interview schedule could have focused a question towards gaining feedback on this element of the process. Furthermore, these interviews were only conducted with participating employees. Additional interviews with employee managers may have provided an insight into the organisational impacts of the intervention. Psychological outcomes in Chapter 7 that were related to the organisation were not as positive as originally hypothesised. Therefore, interviews with line managers may have revealed any organisational level changes that could have affected the intervention results. Future process evaluations may wish to employ samples from line managers and other stakeholders, which may provide additional information to assess the quality of the intervention and its results.

8.5.3 Conclusions

The aim of this phase of the research was to conduct a process evaluation and analyse qualitative feedback from participants to understand the key elements of the physical activity intervention. The workplace is an ideal arena for delivering health education materials because of the amount of time people spend at work. The present study has provided an insight into aspects that employees find useful when participating in activity interventions and the impact on their lifestyles. Employees reported an increased awareness of sedentary time, proactive monitoring of activity using pedometers and behavioural changes to accumulate more steps and increase walking levels. Participants also reported improved physiological and psychological health outcomes, changes in dietary behaviour and family involvement in physical activity. The study has highlighted areas that future health or physical activity focused interventions may wish to consider incorporating. These results extend the literature to demonstrate the importance of public health policymakers partnering with occupational health services, to promote the health of workers through interventions that focus on increasing walking activities and reducing sedentary behaviours at work.

Chapter 9

Discussion

9.1 Introduction

The focus of this thesis was to explore the impact of tailoring physical activity promotion intervention material and to examine whether this was more effective than standard information. In addition, the research aimed to understand occupational health practices and employee experiences of work site initiatives, in order to promote advances in delivering effective workplace interventions. Therefore, this research adopted a mixed methods approach to investigate the issues and used the findings to develop, implement and evaluate a physical activity initiative that was tested in a number of work sites. A summary of the findings from each research study is presented at the end of each chapter throughout the thesis. This chapter consolidates the key findings from all the research phases and explores recommendations in relation to the overall research aims described in Chapter 1 and the key literature discussed in Chapter 2.

9.2 Summary of key findings

By the end of the intervention, the staged condition participants showed significant improvements in BMI fat percentage, waist circumference, blood pressure (diastolic and systolic) and resting heart rate. The standard intervention group also demonstrated some improvements in the physiological measures, such as reduced waist circumference, reduced diastolic blood pressure and increases in self-reported walking activity. Finally, as predicted, the control intervention participants demonstrated the least changes in physiological measures over the course of the intervention. For example, improvements in systolic blood pressure were recorded at mid-intervention, although this returned back to baseline measures by the end of the intervention. However, group comparisons revealed there were no significant differences between the intervention conditions. Although the group comparisons were inconclusive, the individual intervention group results provide some support for previous research that suggests health interventions which provide tailored information can be more effective than standard information (Kirk et al., 2003; Marcus & Simkin, 1993; Ogilvie et al., 2007).

The staged intervention participants demonstrated the biggest reductions in BMI, fat percentage, waist circumference and blood pressure readings between the baseline and the end of intervention measurement in comparison to the standard and control conditions. Research has shown reductions in BMI can reduce the risks of developing type 2 diabetes (Helmrich et al., 1991; Manson et al., 1992). Moreover, reductions in body fat percentage has been related to reductions in obesity and cardiovascular disease mortality (Hu et al., 2003a; Lee et al., 1999). The standard intervention participants also demonstrated some significant improvements in physiological measures, particularly for reduced waist circumference and diastolic blood pressure. Therefore, interventions that promote walking in the workplace can influence employees to be more active resulting in beneficial health effects (Murphy et al., 2006).

The literature reviewed in Chapter 2 discussed the benefits physical activity focused interventions in the workplace can have on employees psychological wellbeing. Research has shown these benefits to psychological wellbeing have also had a positive impact on organisational and business outcomes, such as reduced absenteeism and increased productivity and morale (BHFNC, 2009). However, in contrast to these findings, all three intervention conditions showed deteriorations in the psychological wellbeing and organisational outcomes. The potential reasons for these unexpected findings have been considered in Chapter 7. The researcher concluded that since all intervention groups experienced some deterioration in these measures, especially reductions in work ability and organisational commitment, and higher intentions to quit the organisation, a larger organisational level issue could have affected the psychological wellbeing of employees. The process evaluation allowed additional investigation into these unexpected results, which revealed that organisational changes and job insecurity was having an impact on employee wellbeing. Furthermore, the results from this process evaluation demonstrated that a number of employees reported experiencing improvements in subjective wellbeing, mood and emotion (Fox, 1999). Therefore, it could well be that the intervention actually reduced the negative impact of the organisational changes on wellbeing, even though significant deteriorations were recorded.

The research has highlighted the lack of standardisation within activity promotion intervention research, in terms of assessing psychological wellbeing in general, but also within occupational health promotion research and assessing specific psychological outcomes related to the organisation. Occupational health professionals require reliable and validated measures to assess the impact of any health related interventions on employees' psychological wellbeing and feelings towards to the organisation. This will enable health professionals to evaluate the effectiveness of interventions and provide relevant feedback to the organisations. In Chapter 4, the occupational health advisors reported that health interventions, including physical activity promotion interventions do not provide a directly observable impact on the organisation's bottom-line/profits. Therefore, by being able to measure factors that affect work ability, job satisfaction and organisational commitment, organisations may be able to evaluate the impact of an intervention through these indirect factors that could ultimately change organisational performance.

Questions to identify an individual's stage of change have been used successfully in previous research (Kirk et al., 2010; Marcus, Rossi, Selby, Niaura, & Abrams, 1992; Plotnikoff et al., 2007). As discussed in Chapter 2, the arbitrary time periods that are used to define individuals into the different constructs of the stages of change model have received particular criticism (Bandura, 1998). Moreover, the development of the intervention material in Chapter 6 demonstrated the challenges associated with categorising existing physical activity information based on these arbitrary time-points. Physical activity is different to other health related behaviours (e.g. smoking) because of the different types, intensities and amounts of activity behaviours that can contribute towards an individual meeting the physical activity guidelines. These factors complicate the nature of trying to define activity behaviours into particular stage of change constructs, because the criterion suggested for action is that individuals must achieve a certain level of change that is sufficient to reduce the risks for disease (Prochaska et al., 1992). If a smoker knows the benefits of quitting and cuts down their smoking behaviour, but are still smoking and plan to quit within the next month, they will most likely be classed as being in the preparation stage because the current level of smoking is still having an adverse impact on their health. Similarly, individuals who become more active, but are not active enough to meet the physical activity guidelines could be considered as not doing enough to be in the action stage because they are not meeting the recommendations. However, some physical activity is better than none and even small behaviour changes could have a beneficial impact on health related outcomes and therefore, these individuals could equally be classed as being in the action stage. The results from this research suggest that in the context of occupational physical activity interventions, it may be more appropriate to consider employees as either not thinking about changing their behaviours (precontemplation) or recognising the need for change and considering being more active (contemplation/preparation). This division makes it easier not only to classify individuals, but it also makes staged-focused interventions practical to apply in the workplace.

The results from the coding exercise (Chapter 6) promoted development of tailored activity promotion leaflets, which were designed for the precontemplative or contemplative/preparation individuals. The precontemplative leaflets were based on providing information on the risks of inactivity to try and get these employees thinking about taking some action because they needed to for the benefit of their health. Since precontemplative employees do not have any intention to change their behaviour, there would be little advantage in providing practical activity advice. In contrast, the contemplative/preparation leaflet included practical tips, advice and information for increasing activity and walking behaviours. For employees identified in the action and maintenance stage of change constructs, they were also provided with the contemplative/preparation leaflet because they had already made changes to their activity levels and this practical advice may help provide additional motivation to sustain or increase current activity behaviours.

The baseline intervention data revealed that the majority of participants recruited were classified as being in the contemplation/preparation stages. Therefore, most individuals who joined the intervention were those who had a desire to change their physical activity levels. This is a common issue reported with health related interventions in the workplace because activity programmes fail to engage the groups who need it most (Conrad, 1987). However, since the research was based on self-selecting participants, we do not know what stage of change construct (i.e. in relation to physical activity) employees who did not participate in the intervention were in. The qualitative elements of the exploratory research (Chapters 4–5) indicated that health screenings could be a useful strategy to help recruit large proportions of employees. Other ideas suggested were removing the focus from physical activity and targeting other topics (e.g. promoting green travel, local history walks, etc.). The process evaluation in Chapter 7 confirmed the free health-check was an important component that encouraged employees to participate and motivated them to change behaviours. Health assessments also provided individuals with individually tailored feedback. The opportunity for tailoring intervention components to each individual through health screenings should be explored in the future. Further research is also required to understand the potential strategies that could be implemented in order to successfully recruit individuals who are in the precontemplative stage, and therefore those that really need to be targeted and educated about the importance of physical activity.

With regards to exploring the views from employees about activity interventions using the questionnaire (Chapter 3), the common barriers to performing physical activity identified were employees feeling too tired after work and not having enough free time. The focus groups in Chapter 5 also revealed that employees thought activity needed to be vigorous to have a beneficial impact on their health. In addition, employees reported they did not have much information on performing incidental activities at work. Therefore, these finding were complemented by the qualitative results from the process evaluation, because employees reported their surprise at experiencing such significant health benefits from simply increasing walking levels during the course of the intervention. Walking is an activity that is accessible to most people and as described in Chapter 2, it provides a low level of injury risk to individuals with the potential for significant health benefits (Hootman, 2007). In terms of the workplace, physical activity interventions were reported to be more appropriate for employees in the service sector, in comparison to employees in the manufacturing sector because of the high levels of inactivity and potential for reducing sedentary behaviours in office based workers. Incidental activity initiatives were reported to be unlikely to work in large manufacturing factories due to physically active job roles and the constraints for employees to move away from their work stations.

The research has been valuable for investigating self-reported data on the amount of time employees spent sitting in different domains of behaviours. Most importantly, the output from the various research phases has consistently demonstrated that over half of the time reportedly spent sitting on a work day was accumulated at work. The cross-sectional sitting times reported were similar for employees in Chapters 3 and 7, which reinforce the reliability of the Domain Specific Sitting Time questionnaire. These findings also confirm that the workplace is a major contributor to sitting time behaviours (Sherwood & Jeffery, 2000). However, organisational sector also had an impact on the daily sitting time accumulation for individuals. Employees working in the retail sector and local government reported significantly lower sitting times than those employed in the telecoms or service industry sectors. Therefore, it seems appropriate to assume from these findings that interventions focused on reducing sitting time or increasing walking and incidental activity should be targeted to the service and telecoms sectors, rather than manufacturing or retail sectors. The manufacturing and retail sectors often provide employees with opportunities for physical activity during the work day and these employees may benefit from other health related interventions. Moreover, the highest proportions of employees in the intervention phase were from the telecoms sectors and the recruitment numbers indicate these employees have a desire for participating in this type of intervention.

The focus of this intervention was to promote physical activity and walking behaviours. Self-reported sitting time was included as an outcome measure because research now suggests time spent in sedentary behaviours represents a unique aspect of human behaviour independent of physical activity levels. Therefore, it is important to measure all types of physical activity and sedentary behaviour in a range of contexts (Owen, Healy, Matthews, & Dunstan, 2010). The intervention demonstrated little effects for the times reported sitting. Interventions that are aimed at reducing sitting time and sedentary activity may need to target these behaviours specifically, rather than relying on promoting general physical activity. Since prolonged sitting time has been shown to be a risk factor for all cause mortality independent of physical activity, it is important that interventions focus on reducing time spent sitting (Van der Ploeg, Chey, Korda, Banks, & Bauman, 2012). Additional research is also required to understand and develop reliable recording tools that assess sedentary behaviour, either objectively or using self-report measures.

The qualitative investigations emphasised the success of any health initiative depended on the knowledge and attitudes across the employees, line managers, occupational health representatives and directors within the organisation. Organisational culture appeared to be the underlying issue that contributed to many of the themes that impacted occupational health service delivery and the success of health interventions (Andersen et al., 2006). It is vital to consult these various stakeholders to understand what kinds of interventions will be most appropriate (Wong et al., 1998). The intervention schedule that was developed was based on the feedback from Chapters 3, 4, 5 and additional discussions with colleagues experienced in delivering health interventions. Therefore, the recommendation from the intervention schedule is to consult relevant stakeholders to gather information that could inform the design of an effective workplace intervention. In addition to organisational culture, a change in employee culture and perception that activity does not need to be intense gym based exercise for it to provide benefits to ones health is important. Therefore, employees may benefit from being informed about incidental activities and desk based exercises, which might provide sustainable long-term increases in physical activity at work.

9.3 Original contribution and implications for policy

The stage of change model has been widely used in a number of health related initiatives, including interventions to promote physical activity. In this thesis, the practical application of the model was simplified to provide an approach that could be effectively implemented in organisations. The research therefore provided an original insight into delivering activity promotion information tailored according to whether individuals wanted to be more active or were not thinking about being more active. The results from the intervention provide an approach that could potentially increase the effectiveness of occupational activity promotion interventions. The advantages of using organisations to target large proportions of the population with health related interventions have already been identified. The participation figures throughout the phases of this research demonstrate there is a real opportunity for health promotion specialists to collaborate with organisations and occupational health service providers in order to promote physical activity in the workplace (Kerr et al., 2001a).

Another contribution of this research is derived through the detailed exploration of the experiences of relevant stakeholders using the mixed methods approach. This research highlighted key factors that make an organisational intervention successful, which were included at various stages of the development, implementation and evaluation of the interventions. One of the biggest problems already discussed was that occupational physical activity programmes are poorly attended because the initiatives often do not meet the individual needs of employees (Wong et al., 1998). The outputs from this research confirm consultations with the workforce to gather the opinions of employees and what they would like implemented will help to design initiatives that are relevant to the population. In addition, consultation with organisational stakeholders and occupational health may provide information on what initiatives would most likely benefit organisations (e.g. reviewing data on sickness absence). Furthermore, the process evaluation demonstrates feedback from participants during the course or at the end of an intervention can provide recommendations that could facilitate in improving interventions.

The exploratory questionnaire (Chapter 3) demonstrated that the majority of the sample did not meet the guideline recommendations for physical activity. Of the individuals who reported regularly engaging in physical activity, only a quarter actually met the guidelines. Self-reported physical activity was measured against the physical activity guidelines (UK Department of Health, 2004) that were recommended before the update in 2011 (UK Department of Health, 2011). Chapter 2 has already discussed the challenges the new guidelines bring with regards to measuring individual activity levels against the recommendations, since a variety of different types of activities are suggested. In terms of the impact for policy and practice, the results from this research demonstrate that physical activity promotion information and guidance materials could be edited to provide information based on an individuals stage of change in relation to physical activity. For example, the design of the guidance materials used to communicate the latest activity recommendations could be separated to provide information focused on the health risks of inactivity, the health benefits and practical tips for increasing physical activities. Therefore, individuals in the precontemplation stage could benefit from information about the health risks whereas individuals in the contemplation/preparation stages may benefit from the practical advice.

The sitting time data reported throughout this thesis is particularly timely because of the current focus on sedentary behaviour. This research adds to the mounting evidence that states individuals spend large proportions of their time in sedentary behaviours and a significant amount of time spent sitting is accumulated at work. As outlined in Chapter 2, sitting time is now becoming a major public health concern because increased sitting time has been associated with increased risk of risk of weight gain and obesity, metabolic syndrome, type 2 diabetes, cancer and mortality from all causes and cardiovascular disease (Gierach et al., 2009; Hamilton et al., 2007; Hu et al., 2003a; Katzmarzyk et al., 2009; Van Uffelen et al., 2010). Therefore, the physical activity guidelines are correct to include recommendations to reduce time spent in sedentary behaviours (UK Department of Health, 2011). In addition, the outputs from this research also suggest health professionals may wish to develop interventions that specifically target reducing sitting behaviours in the workplace.

9.4 Strengths and limitations of the research

The relevant strengths and weaknesses of each research phase have already been discussed in detail at the end of each chapter. The research was cross disciplinary, using behaviour change theories from psychology to understand and change physical activity related behaviours in the workplace. A major strength of this research was the adoption of mixed methods using complementary quantitative (e.g. questionnaires, physiological measures, etc.) and qualitative (e.g. interviews, focus groups, etc.) data collection techniques. Moreover, the research obtained data from a range of perspectives throughout the various research phases, which included employees, occupational health professionals and line managers. The research included workers from a variety of different types of organisations, both large and medium in the private and public sectors. This provided the opportunity to compare analyses between organisational types and sectors, and it also demonstrated the applicability of the intervention and various data collection methods to a wide range of organisations.

In terms of the intervention design, another strength of this research was the inclusion of a control group, which, as hypothesised, demonstrated almost no long-term physiological intervention effects unlike the standard and staged intervention groups. The use of a control group provides additional support for the conclusions derived from the comparisons between intervention groups. Furthermore, the longitudinal nature of the intervention and multiple follow-up time-points during the course of the intervention provides additional reliability to interpreting the long-term impact of the initiative and associated materials. However, this research did not conduct any follow-up analysis of the outcome measures after the intervention was completed. Follow-up investigations after support for an intervention has been removed are important to understand if behaviour changes during the course of an intervention have been maintained (Gilson et al., 2010).

A limitation of this research is the inability to draw direct casual inferences from the data, although this is a common problem for social sciences research conducted outside of laboratory conditions. For example, the cross-sectional design of the exploratory questionnaire was unable to provide interpretations for the potential effects of physical activity or occupational health outcomes on employees self-reported work ability. However, the purpose of the questionnaire was not to examine the relationship between the variables, but provide descriptive results about occupational health experiences and physical activity behaviours. More importantly, the results from the intervention research did not provide evidence that confirms the improvements in physiological measures for the staged intervention group were a direct result of the intervention, because participants' self-reported sitting times and physical activity data were inconclusive. However, self-report data collected via questionnaires are likely to be affected by a number of influences that could potentially impact participant responses (Spector, 1994). Therefore, future research interventions may wish to include objective measures of physical activity and sedentary behaviour to compare the results with the objective physiological measures.

Limitations related to the sampling strategy of the research phases also need to be considered. Participants in all research phases were self-selecting, which introduces potential self-selection bias/errors and questions the generalisability of the research findings. For example, employees who opted to complete the exploratory questionnaire or participate in focus groups discussing their occupational health experiences may have volunteered because they had particular praise or criticisms about health related services within their organisations. In addition, those who were recruited in the intervention may have participated because physical activity was already of interest to them or they had already made a decision to be more active. Attrition during the intervention period was higher than expected, and those who fully complied and returned for the mid-intervention and end of intervention health screening assessments were included in the longitudinal analyses. One could assume those who returned selected themselves to continue in the intervention because they were expecting to see positive changes at the measurement time-points. Therefore, these issues related to self-selecting participants may have skewed the results. It is difficult to ascertain whether the data were skewed in any particular way or whether the attrition was higher amongst workers with no health related improvements. However, the results from the intervention demonstrated positive and negative intervention results that were different for each intervention group, which indicates that returners were not simply the healthiest or most improved participants.

There are currently no standard measures to assess the psychological or occupational impact of any physical activity intervention as there are for measuring physical activity (e.g. IPAQ, accelerometers, etc.) or physiological outcomes (e.g. BMI, fat percentage, blood pressure, etc.). The psychological outcomes related to the individuals and organisations, such as the WAI, GHQ-12 and various job attitude measures that were used to explore the effects of the intervention, were selected based on their reliability and validity to provide outputs that would be important to demonstrating the effectiveness of an intervention to organisations. However, the research was carried out at a time of extreme uncertainty with respect to the economy, unemployment and government austerity cuts, which the researcher predicted potentially impacted the psychological outcomes of the intervention. Future research investigations may wish to validate standardised self-report measures that investigate the potential psychological outcomes of physical activity interventions for the individual and the organisation. The UK Health and Safety Executive recommend employers to assess the characteristics and culture of the organisation using the Management Standards Indicator Tool to identify potential sources of stress for their employees (Bond, Flaxman, & Loivette, 2006; Cousins et al., 2004; MacKay, Cousins, Kelly, Lee, & McCaig, 2004; Mellor et al., 2011). This tool provides feedback on several organisational areas such as work demands, job roles, colleague relationships, management support, organisational change, and calculates overall organisational wellbeing scores. Therefore, this tool could potentially be used in research aiming to validate standard psychological outcomes, because it may be able to evaluate the psychological impact of a workplace intervention (Kazi & Haslam, in press).

9.5 Recommendations for future research

Specific recommendations based on the findings from each research phase have already been discussed in detail at the end of each chapter. Whilst the results from the intervention are encouraging, additional research is required to validate the findings and to test the practical delivery of the intervention and associated materials in other populations, particularly with other organisational sectors and even with employees in small organisations. Furthermore, monitoring outcome measures over an extended period following the completion of the intervention would demonstrate the long-term impact of the intervention. Results from this type of investigation can provide additional knowledge that will contribute to designing more effective interventions. For example, it may be that six months after the completion of the intervention, behaviour for the staged intervention group participants reverted back to levels before the intervention. If this was the case, it may mean that the intervention would need to continue for longer or develop additional promotion materials with the specific aims of maintaining behaviour change.

The exploratory information presented in Chapters 3, 4 and 5 provided a valuable insight into the experiences of employees and occupational health professionals using questionnaires, interviews and focus groups. Chapters 6, 7 and 8 presented information on developing, implementing and evaluating an organisational intervention with data collected using content analysis, questionnaires, physiological assessments and interviews. Therefore, these research studies demonstrate mixed methods approaches can provide an interesting way to understand physical activity behaviours and health related experiences. Future research studies may wish to include strategies to explore these issues using a multidisciplinary approach as well as mixing methods.

The research described in this thesis demonstrated that it is possible to recruit large samples by engaging organisations to participate in research investigations. Therefore, it is recommended that future population based health related interventions target initiatives in the workplace because of the potential for involving substantial numbers of people in employment. Recruitment rates from the organisations in this research were exceptionally high, which demonstrates the enthusiasm of employees and particular appeal for participating in interventions promoting physical activity. However, in order to achieve a notable effect on employees health related outcomes, it is important that researchers and practitioners develop strategies to combat the level of attrition observed in this research.

The simplified application of the stages of change model demonstrates potential for the approach to be applied to other occupational health related issues. For example, sitting time and sedentary behaviour has already been highlighted as an independent risk factor for several ill-health conditions. The results from sitting times reported in Chapters 3 and 7 demonstrate the significant amounts of sitting time being accumulated at work. Therefore, future research may wish to consider the stage of change model in targeting information based on sitting time at work. Furthermore, since stress has been confirmed as the most common cause of work related sickness absence in the UK (CIPD, 2011), organisations may also benefit from the application of this type of intervention model for stress, as it could consider individual cognitions and perceptions related to potential stressors.

Further research is required to develop reliable and valid measures that assess the psychological impact of health interventions for employees, including the potential impact for the organisation. By being able to measure issues that impact work ability, job satisfaction and organisational commitment, organisations may be able to evaluate the results of an intervention through indirect factors that could ultimately affect organisational performance. Additional investigations could also be conducted to monitor rates of psychological wellbeing within a sample over a long-term period (e.g. during the period of recovery from the recession) and potentially compare the datasets to psychological outcomes collected before or during the economic crisis. One of the organisational changes that affected employee wellbeing was the threat of redundancy due to organisations downsizing. Research has shown that this type of change can have a negative impact on organisational outcomes such as absenteeism (Vahtera, Kivimäki, & Pentti, 1997). Therefore, in addition to developing standardised psychological outcomes, future organisational interventions may wish to evaluate the impact by using objective business measures such as sickness absence figures and performance outputs.

Finally, pedometers were used as motivational tools in this research, however there are now more comprehensive motion sensors designed for the general public (e.g. Fitbit Flex, Nike FuelBand, Technogym MyWellness Key, etc.), which have associated web based feedback and smartphone applications offering additional information. These devices could also be tested as motivators or even validated as physical activity monitors in future interventions.

9.6 Conclusions

Increasing physical activity has been recommended as one of the single most effective modifiable behaviours which can lead to a multitude of health benefits protecting against various chronic illnesses (Warburton et al., 2006). The stage of change model provides a practical framework for guiding the change processes of behaviours (Whysall et al, 2006; 2007) and has been applied successfully to physical activity interventions (Jordan et al., 2002; Kirk et al., 2004; Titze et al., 2001). This research has demonstrated the practical application of the stages of change model to an organisational intervention providing tailored physical activity promotion information to employees. Findings from this research also demonstrate the large amounts of time employees spend in sitting behaviours at work. Future occupational health activity interventions may wish to include specifically promoting reducing sitting time in the workplace. Furthermore, occupational health promotion activities that focus on physical activity and sitting time could be encouraged by the UK Health and Safety Executive, in the way they have promoted other workplace health issues (e.g. stress and musculoskeletal disorders). The encouraging results demonstrated in this research provide support for the implementation of the stage of change model to promote physical activity at work. Furthermore, these results suggest there is potential for this type of tailored intervention to be extended to other occupational health initiatives in the workplace.

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Appendix 3.1: The exploratory questionnaire

Working Late: strategies to manage and improve employee health across the life course

Working late is a new study being carried out by Loughborough University's Work and Health Research Centre. The project aims to help ensure that all individuals are able to maintain their ability to work by facilitating healthier working lives.

This survey asks a number of questions about your current job role, wellbeing and your feelings towards work. We would also like to ask about your access to and experience of occupational health services, and your current physical activity levels to see how we can tailor future occupational health services.

The questionnaire takes approximately 25 minutes to complete. Please read each question carefully before answering. There are no right or wrong answers, so please answer freely and honestly as we are interested in your own experiences and opinions.

All information provided will only be held by Loughborough University, used for the purposes of this research and will conform to the requirements of the Data Protection Act 1998. Your information will be stored against a reference number, and not your name, to ensure complete anonymity. We will not share individual responses with your employer, and all summary information will not be shared in anyway that could be used to reveal your identity.

The survey findings will be used to help develop a range of workplace physical activity interventions aimed at improving the health and wellbeing of all employees.

If you have any questions about this survey, please contact:
Mr Aadil Kazi A.Kazi@lboro.ac.uk 01509 228484

Please sign below to show that you consent to take part in this survey.

Signed Date

Thank you for your time and effort.

SECTION 1: ABOUT YOU

As already stated, the following questions are **anonymous**; answers will **not** be used to identify individuals. We would like to ask some background information about you. This information is very useful as it will help us look for patterns within and between organisations.

Please tick or write the answer that best applies to you in the space provided.

1.1 Gender: ☐ Male ☐ Female

1.2 Date of Birth (DD/MM/YY) ________________

1.3 What is your marital status?

☐ Single ☐ Married
☐ Cohabiting ☐ Separated
☐ Divorced ☐ Widowed

1.4 Ethnicity (please tick only one)

a) White
- British ☐
- Irish ☐
- Any other White background ☐

b) Mixed
- White and Black Caribbean ☐
- White and Black African ☐
- White and Asian ☐
- Any other Mixed background ☐

c) Asian or Asian British
- Indian ☐
- Pakistani ☐
- Bangladeshi ☐
- Chinese ☐
- Any other Asian background ☐

d) Black or Black British
- Caribbean ☐
- African ☐
- Any other Black background ☐

e) Any other ethnic background, please specify: ____

f) Ethnic background not known ☐

1.5 Height (please indicate measurement used e.g. feet, inches, meters) ____________________

1.6 Weight (please indicate measurement used e.g. stones, pounds, kilos) ____________________

1.7 What is the highest educational qualification you hold?

☐ CSE or equivalent / GCSE (Grades D – G)
☐ O-level or equivalent / GCSE (Grades A – C)
☐ AS/A-level or equivalent
☐ Degree or equivalent
☐ Post-graduate degree or equivalent
☐ Vocational qualifications
☐ No formal qualifications
☐ Other (please specify):

____

SECTION 2: ORGANISATIONAL INFORMATION

For this section we are interested in the type of work that you currently do. The following questions relate to your current employment and job role.

2.1 Name of employer?

____

2.2 What is the name of the department or group that you work in?

____

2.3 What is your job title? ______________________________

a) If you are married or cohabiting, what is your partners' occupation/job title?

____

2.4 Is your job:

☐ Permanent Full-time ☐ Permanent Part-time
☐ Permanent Job-share ☐ Fixed-term/temporary contract

2.5 How many hours do you work in a typical week __________ hours

2.6 How long have you worked for this organisation? ________years ________months

2.7 How long have you worked in this current job role? ________years ________months

2.8 What type of organisation do you work for? (please tick only one)

☐ Banking ☐ Computing & I.T ☐ Construction ☐ Education
☐ Engineering ☐ Financial ☐ Health & Social Work ☐ Hospitality
☐ Local Government ☐ Manufacturing ☐ Public Defence ☐ Retail
☐ Transport ☐ Energy & Utilities ☐ Other (please state): ______________

SECTION 3: OCCUPATIONAL HEALTH

For this section we are interested in learning about the role of occupational health within your organisation, and whether you have been involved in any health promotion at work.

3.1 Is your Occupational Health department located:

☐ On-site
☐ On another site
☐ Outsourced company
☐ Other (please state): ____________________

☐ Don't know if there is an Occupational Health department (go to question 3.7)
☐ Don't have an Occupational Health department (go to question 3.7)

3.2 How many times have you been in contact with the Occupational Health department since working for your current organisation?

_________ time(s) (If you have had no contact, go to question 3.7)

3.3 Who instigated this contact:

☐ Occupational Health personnel
☐ Your manager
☐ Your GP
☐ Your own idea
☐ Other (please state): ____________________

3.4 Please indicate reasons/services that have brought you into contact with Occupational Health services: (tick as many that apply)

☐ Pre-employment health screening
☐ Additional workplace health screening
☐ Accident/incident assessment and advice
☐ Sickness absence monitoring
☐ Counselling
☐ Stress management
☐ Physical activity initiatives
☐ Back care and pain management
☐ Night worker health
☐ Work related illness/disease
☐ Pregnancy
☐ Disability
☐ Other (please describe) ____________________

____

3.5 How would you rate your overall experience with the Occupational Health department? (Please tick only one)

☐ Poor ☐ Satisfactory ☐ Good ☐ Excellent

Please explain why you answered in this way? ____________________

____

3.6 To what extent do you agree with the following statements? Please tick the relevant box for each statement	Strongly disagree	Disagree	Neither	Slightly agree	Strongly agree	Don't know/ N/A
a) The Occupational Health services within my organisation are easily accessible	☐	☐	☐	☐	☐	☐
b) I know how to access the Occupational Health department	☐	☐	☐	☐	☐	☐
c) I am well informed about the services the Occupational Health department provide	☐	☐	☐	☐	☐	☐
d) It is clear for what reasons you can make an appointment with the Occupational Health department	☐	☐	☐	☐	☐	☐
e) If I get a work-related health complaint, I would make an appointment with Occupational Health	☐	☐	☐	☐	☐	☐
f) I can count on a confidential consultation by the Occupational Health department	☐	☐	☐	☐	☐	☐
g) The Occupational Health services have benefitted my health	☐	☐	☐	☐	☐	☐
h) The Occupational Health services have benefitted my work performance	☐	☐	☐	☐	☐	☐
i) The Occupational Health team have led to improvements in my working situation	☐	☐	☐	☐	☐	☐
j) I am very satisfied with the Occupational Health provisions/services within this organisation	☐	☐	☐	☐	☐	☐
k) I would advise other colleagues to use the Occupational Health services available	☐	☐	☐	☐	☐	☐
l) My manager is well informed of the Occupational Health services available within the organisation	☐	☐	☐	☐	☐	☐
m) Health and Safety is given high priority in the organisation	☐	☐	☐	☐	☐	☐

3.7 Is your organisation currently promoting any particular health initiative(s), or has done within the past 12 months? (For example, smoking cessation, diet advice, physical activity programmes, blood pressure checks, stress management etc.)

☐ Yes ☐ No (go to question 3.11)
☐ Don't know/not sure

a) If yes, please describe:____________________________________

____

____

3.8 Are you participating/did you participate in this initiative?

☐ Yes (go to question 3.9) ☐ No

a) If no, please explain why: ____________________________________

____

(Now go to question 3.11)

3.9 What is/was good about the health initiative(s)?___________________________________

3.10 What could be improved about the health initiative(s)?

3.11 Are there any Occupational Health services/initiatives that you would like to see introduced? (For example, smoking cessation, diet advice, physical activity programmes, blood pressure checks, stress management, etc.). **Please describe:**

SECTION 4: LIFESTYLE INFORMATION

For this section we are interested in information about your current lifestyle and your current physical activity levels in your **leisure time**.

4.1 Are you a smoker? ☐ Yes ☐ No

a) If yes, how many cigarettes per day? ________ cigarettes per day

4.2 If no, have you smoked in the past? ☐ Yes ☐ No

a) If yes, how long ago did you quit? ________ years ________ months

4.3 On average, how many units of alcohol do you drink per week? (1 unit = half a pint of beer/lager, 1 small glass of wine or 1 measure of spirit)

________ units per week

4.4 Do you engage in physical activity/exercise during your leisure time on a regular basis?

☐ Yes ☐ No (go to question 4.9)

4.5 What type of physical activity/exercise do you typically engage in? (e.g. walking, cycling, swimming, gym, aerobics, etc.)

____

4.6 Please tick the typical length of your physical activity/exercise per session:

☐ Less than 15 minutes ☐ 15 – 29 minutes
☐ 30 – 60 minutes ☐ Over 60 minutes

4.7 How many sessions do you usually do in a week? ________ sessions

4.8 How many sessions cause sweating and/or shortness of breath?

☐ All sessions ☐ Half or more than half of sessions
☐ Less than half of sessions ☐ No sessions

4.9 Are you satisfied with the amount of physical activity/exercise you do?

☐ Yes ☐ No

4.10 Do you want to reduce the amount of physical activity/exercise you do?

☐ Yes (go to question 4.12) ☐ No

4.11 Are you planning to increase the amount of physical activity/exercise you do?

☐ Yes ☐ No (go to question 4.12)

a) If yes, are you planning to increase the amount of physical activity/exercise you do within the next 6 months?

☐ Yes ☐ No (go to question 4.12)

b) If yes, are you planning to increase the amount of physical activity/exercise you do within the next month?

☐ Yes ☐ No

4.12 Please estimate how much time you spend sitting in each of the following activities on a typical working day and a typical non-working day (weekend day or day off)

	Work Day		Non-Work Day	
	Hours	Mins	Hours	Mins
a) For transport (e.g. in car, bus, train etc.)				
b) At work (e.g. sitting at a desk or using a computer)				
c) Watching TV				
d) Using a computer at home (e.g. email, games, information, chatting)				
e) Other leisure activities (e.g. socialising, cinema etc., but not including TV or computer use)				
f) Sleeping at night (or trying to sleep)				

4.13 How often do you usually participate in the following activities:	Never/ rarely	Occasionally	Most of the time	Whenever possible	Not applicable
g) Climb the stairs instead of using the lift or the escalator	☐	☐	☐	☐	☐
h) Park your vehicle away from your destination so you have to walk further	☐	☐	☐	☐	☐
i) Walk or cycle to destinations that are within a 5 minute drive from where you live, rather than drive	☐	☐	☐	☐	☐
j) Get off the bus stop early to add a walk	☐	☐	☐	☐	☐
k) Walk to talk to a colleague instead of using e-mail or the telephone	☐	☐	☐	☐	☐
l) Move about whilst talking on the telephone	☐	☐	☐	☐	☐

4.14 Have you ever worn a pedometer? (a pedometer is a small device used to measure your daily step count and is usually worn on your waistband)

☐ Yes ☐ No

4.15 To what extent do you agree with the following statements?

	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
a) I do not have enough free time to exercise	☐	☐	☐	☐	☐
b) I do not feel safe enough to exercise in my local area	☐	☐	☐	☐	☐
c) I do not like to get hot and sweaty	☐	☐	☐	☐	☐
d) There are not enough available leisure/exercise facilities in my local area	☐	☐	☐	☐	☐
e) I do not have enough will power to keep exercising regularly	☐	☐	☐	☐	☐
f) I do not think that my health and wellbeing will benefit from exercise/being more physically active	☐	☐	☐	☐	☐
g) I worry about how I will look when I exercise in public	☐	☐	☐	☐	☐
h) I do not enjoy exercising	☐	☐	☐	☐	☐
i) I would exercise more if friends/family were willing to exercise with me	☐	☐	☐	☐	☐
j) I can not afford to exercise at the leisure/exercise facilities in my local area	☐	☐	☐	☐	☐
k) I would be more physically active if I knew what the most appropriate exercise/activities for me were	☐	☐	☐	☐	☐
l) My health problems prevent me from exercising	☐	☐	☐	☐	☐
m) I worry about injuring myself or getting sore from exercising	☐	☐	☐	☐	☐
n) I worry that I won't be able to maintain any increases in my physically activity levels	☐	☐	☐	☐	☐
o) Lack of transport limits my exercise options	☐	☐	☐	☐	☐
p) I feel too tired after work to be active	☐	☐	☐	☐	☐
q) Physical activity takes too much time away from other commitments like work, family, etc.	☐	☐	☐	☐	☐

SECTION 5: PHYSICAL ACTIVITY AT WORK

For this section we are interested in how physically active you are at work.

5.1 How far do you travel to work?

☐ Under 1 mile ☐ 1-5 miles ☐ 6-10 miles
☐ 11-19 miles ☐ 20 miles or more

5.2 How do you normally travel to and from work? (please tick only one)

☐ Public transport ☐ Car ☐ Cycle
☐ Walk ☐ Work at home ☐ Other (please state): ______________

5.3 Do you know of any physical activity provisions/supplies that are currently available in your workplace? (e.g. subsidised gym membership, onsite facilities, etc.)

☐ Yes ☐ No (go to question 5.8) ☐ There are no provisions at work

a) If yes, please describe ____

____

5.4 If the following physical activity initiatives were offered at work, how likely would you be to take part or use them?

	Extremely likely	Fairly likely	Undecided/ don't know	Fairly unlikely	Extremely unlikely	Already available
a) Talks and presentations on physical activity by health professionals	☐	☐	☐	☐	☐	☐
b) Access to weekly physical activity messages via e-mail and/or bulletin boards	☐	☐	☐	☐	☐	☐
c) On-site taster activity sessions run by health professionals	☐	☐	☐	☐	☐	☐
d) Health and fitness assessments	☐	☐	☐	☐	☐	☐
e) A lunchtime activity group (e.g. walking, cycle, swimming, etc)	☐	☐	☐	☐	☐	☐
f) Sport or activity clubs (e.g. walking, football, badminton, etc)	☐	☐	☐	☐	☐	☐
g) On-site activity classes (e.g. yoga, aerobics, etc)	☐	☐	☐	☐	☐	☐
h) On-site facilities (e.g. treadmill, bicycle, rowing machine)	☐	☐	☐	☐	☐	☐
i) Team based activity challenges	☐	☐	☐	☐	☐	☐
j) Flexible working hours to allow for physical activity before, during and after work	☐	☐	☐	☐	☐	☐
k) A company bicycle pool for use during lunch breaks and/ or for making short journeys to meetings	☐	☐	☐	☐	☐	☐

SECTION 6: WORK ABILITY

Work ability is your capability to manage your work demands and perform all of your work duties.

6.1 Current work ability compared with the lifetime best

Assume that your work ability at its best has a value of 10 points. Please circle the points would you give your current work ability? (0 means that you cannot currently work at all)

completely unable to work — **work ability at its best**

0 1 2 3 4 5 6 7 8 9 10

6.2 Work ability in relation to the demands of the job

a) How do you rate your current work ability with respect to the physical demands of your work?

- very good ☐
- rather good ☐
- moderate ☐
- rather poor ☐
- very poor ☐

b) How do you rate your current work ability with respect to the mental demands of your work?

- very good ☐
- rather good ☐
- moderate ☐
- rather poor ☐
- very poor ☐

6.3 Number of conditions diagnosed by a physician

In the following list, mark your conditions, diseases or injuries. Also indicate **whether a physician has diagnosed** or treated these diseases. For each disease, therefore, there can be no response or either a physician's diagnosis or own opinion marked.

a) Injury from accident

		YES: own opinion	YES: physician's diagnosis
1	back	☐	☐
2	arm/hand	☐	☐
3	leg/foot	☐	☐
4	other part of body, where and what kind of injury? …………………………………..	☐	☐

b) Musculoskeletal disease

		YES: own opinion	YES: physician's diagnosis
1	disorder of the upper back or cervical spine, repeated instances of pain	☐	☐
2	disorder of the lower back, repeated instances of pain	☐	☐
3	(sciatica) pain radiating from the back into the leg	☐	☐
4	musculoskeletal disorder affecting the limbs (hands, feet), repeated instances of pain	☐	☐
5	rheumatoid arthritis	☐	☐
6	other musculoskeletal disorder, what?..................... …………………………………...	☐	☐

c) Cardiovascular disease

		YES: own opinion	YES: physician's diagnosis
1	hypertension high blood pressure)	☐	☐
2	coronary heart disease, chest pains during exercise (angina pectoris)	☐	☐
3	coronary thrombosis, myocardial infarction	☐	☐
4	cardiac insufficiency	☐	☐
5	other cardiovascular disease , what?..................... …………………………………...	☐	☐

		YES own opinion	YES physician's diagnosis

d) Respiratory disease

		own opinion	physician's diagnosis
1	repeated infections of the respiratory tract (also tonsillitis, acute sinusitis, acute bronchitis)		
2	chronic bronchitis		
3	chronic sinusitis		
4	bronchial asthma		
5	emphysema		
6	pulmonary tuberculosis		
7	other respiratory disease , what?..................................		

e) Mental disorder

		own opinion	physician's diagnosis
1	mental disease or severe mental health problem (for example, severe depression, mental disturbance)		
2	slight mental disorder or problem (for example, slight depression, tension, anxiety, insomnia)		

f) Neurological and sensory disease

		own opinion	physician's diagnosis
1	problems or injury to hearing		
2	visual disease or injury (other than refractive error)		
3	neurological disease (for example stroke, neuralgia, migraine, epilepsy)		
4	other neurological or sensory disease, what? ……………………………….		

g) Digestive disease

		own opinion	physician's diagnosis
1	gall stones or disease		
2	liver or pancreatic disease		
3	gastric or duodenal ulcer		
4	gastritis or duodenal irritation		
5	colonic irritation, colitis		
6	other digestive disease, what?..................................		

h) Genitourinary disease

		own opinion	physician's diagnosis
1	urinary tract infection		
2	kidney disease		
3	genitals disease (for example fallopian tube infection in women or prostatic infection in men		
4	other genitourinary disease, what?.................................		

i) Skin disease

		own opinion	physician's diagnosis
1	allergic rash, eczema		
2	other rash, what? ………………………………..		
3	other skin disease, what?		

j) Tumour

		own opinion	physician's diagnosis
1	benign tumour		
2	malignant tumour (cancer), where?................................		

k) Endocrine and metabolic

		own opinion	physician's diagnosis
1	obesity		
2	diabetes		
3	goitre or others thyroid disease		
4	other endocrine or metabolic disease, what?.....................		

l) Blood diseases

		own opinion	physician's diagnosis
1	anaemia		
2	other blood disorder, what?		

m) Birth defects

		own opinion	physician's diagnosis
1	birth defect, what? ………….		

n) Other disorder or disease

		own opinion	physician's diagnosis
1	what? ………………………..		

6.4 Is your illness or injury a hindrance to you current job? (tick more than one alternative if needed)

☐ There is no hindrance/I have no diseases
☐ I am able to do my job, but it causes some symptoms
☐ I must sometimes slow down my work pace or change my work methods
☐ I must often slow down my work pace or change my work methods
☐ Because of my disease, I feel I am able to do only part-time work
☐ In my opinion, I am entirely unable to work

6.5 How many whole days have you been off work because of a health problem (disease or health care or for examination) during the past year (12 months)?

☐ None at all ☐ At the most 9 days ☐ 10 – 24 days
☐ 25 – 99 days ☐ 100 – 365 days

6.6 Own prognosis of work ability two years from now?

☐ Unlikely ☐ Not Certain ☐ Relatively Certain

6.7 Mental Resources	**Often**	**Rather Often**	**Some times**	**Rather Seldom**	**Never**
a) Have you recently been able to enjoy your regular daily activities?	☐	☐	☐	☐	☐
b) Have you recently been active and alert?	☐	☐	☐	☐	☐
c) Have you recently felt yourself to be full of hope for the future?	☐	☐	☐	☐	☐

SECTION 7: ABOUT YOU

Over the past 4 weeks, to what extent have been able to do the following?	More so than usual	Same as usual	Less than usual	Much less than usual
a) Have you been able to concentrate on whatever you are doing?	☐	☐	☐	☐
b) Have you felt that you were playing a useful part in things?	☐	☐	☐	☐
c) Have you felt capable of making decisions about things?	☐	☐	☐	☐
d) Have you been able to enjoy your normal day-to-day activities?	☐	☐	☐	☐
e) Have you been able to face up to your problems?	☐	☐	☐	☐
f) Have you been feeling reasonably happy, all things considered?	☐	☐	☐	☐

	Not at all	No more than usual	Rather more than usual	Much more than usual
g) Have you lost much sleep over worry?	☐	☐	☐	☐
h) Have you felt constantly under strain?	☐	☐	☐	☐
i) Have you felt that you couldn't overcome your difficulties?	☐	☐	☐	☐
j) Have you been feeling unhappy and depressed?	☐	☐	☐	☐
k) Have you been losing self-confidence in yourself?	☐	☐	☐	☐
l) Have you been thinking of yourself as a worthless person?	☐	☐	☐	☐

SECTION 8: YOUR FEELINGS ABOUT WORK

To what extent do you agree with the following statements?	Strongly disagree	Disagree	Slightly disagree	Neither	Slightly agree	Agree	Strongly agree
a) All in all, I am satisfied with my job	☐	☐	☐	☐	☐	☐	☐
b) In general, I don't like my job	☐	☐	☐	☐	☐	☐	☐
c) In general, I like working here	☐	☐	☐	☐	☐	☐	☐
d) I am quite proud to be able to tell people who it is I work for	☐	☐	☐	☐	☐	☐	☐
e) I sometimes feel like leaving this employment for good	☐	☐	☐	☐	☐	☐	☐
f) I'm not willing to put myself out just to help the organisation	☐	☐	☐	☐	☐	☐	☐
g) Even if the firm were not doing too well financially, I would be reluctant to change to another employer	☐	☐	☐	☐	☐	☐	☐
h) I feel myself to be part of the organisation	☐	☐	☐	☐	☐	☐	☐
i) In my work I like to feel I am making some effort, not just for myself but for the organisation as well	☐	☐	☐	☐	☐	☐	☐
j) The offer of a bit more money with another employer would not seriously make me think of changing my job	☐	☐	☐	☐	☐	☐	☐
k) I would not recommend a close friend to join our staff	☐	☐	☐	☐	☐	☐	☐
l) To know that my own work had made a contribution to the good of the organisation would please me	☐	☐	☐	☐	☐	☐	☐
m) I feel a sense of personal satisfaction when I do this job well	☐	☐	☐	☐	☐	☐	☐
n) My opinion of myself goes down when I do this job badly	☐	☐	☐	☐	☐	☐	☐
o) I take pride in doing my job as well as I can	☐	☐	☐	☐	☐	☐	☐
p) I feel unhappy when my work is not up to my usual standard	☐	☐	☐	☐	☐	☐	☐
q) I like to look back on the day's work with a sense of a job well done	☐	☐	☐	☐	☐	☐	☐
r) I try to think of easy ways of doing my job effectively	☐	☐	☐	☐	☐	☐	☐
s) I often think about quitting	☐	☐	☐	☐	☐	☐	☐
t) I will probably look for a new job in the next year	☐	☐	☐	☐	☐	☐	☐
	Not at all	Unlikely	Slightly unlikely	Neither	Slightly likely	Likely	Extremely likely
u) How likely is it that you will actively look for a new job in the next year?	☐	☐	☐	☐	☐	☐	☐

Appendix 3.2: Supplementary guide to the questionnaire

Working Late: strategies to manage and improve employee health across the life course

Guide to Survey Contents

The employee survey contains items specifically devised for this survey and other items taken from pre-existing measures that are widely used in research of this type. This document provides a brief overview of the survey and the items.

Section 1 – About You: This section asks for relevant demographic information of the employees, which are important for looking at particular trends or patterns in the results.

Section 2 – Organisational Information: As above this section asks for relevant information about the employees job role and organisation.

Section 3 – Occupational Health: This sections asks questions about the current occupation health provision available to employees which will also gauge how aware the employees are of the occupational health provisions. This section also asks what health initiatives have been available to the employees at work and their opinions of them.

Section 4 – Lifestyle Information: This asks important information about the healthy behaviours of the employees with the main focus on how much physical activity they engage in. This also looks at barriers to exercise and levels of sedentary behaviour.

Section 5 – Physical Activity at Work: This section examines how physical activity differs as a function of job role. This also looks at what physical activity provisions are currently provided to employees and what activities they might participate in.

Section 6 – Work Ability: This section is the Work Ability Index (WAI), which was developed by researchers in the Finnish Institute of Occupational Health and is now being used worldwide. The WAI examines the ability of a worker to perform their job in relation to the demands of the job, individual health conditions and mental resources. The WAI gives an overall score to current work ability levels.

Section 7 – Your Wellbeing: This is the General Health Questionnaire which is a widely used measure to assess levels of general psychological wellbeing.

Section 8 – Your Feelings about Work: This section contains a number of widely used established measures to assess employee attitudes to their work and organisation, which are:

1. Job satisfaction
2. Organisational commitment
3. Job motivation
4. Intention to quit

Appendix 4.1: Occupational health stakeholder interview schedule

Thank you for agreeing to take part in this interview. The aim of this interview is to identify effective current and future Occupational Health: practices, initiatives, purposeful activities to promote and support an extended working life. The interview will last for approximately 1 hour and asks a number of questions about your job role, occupational health strategies currently within the organisation, and a wish list for future practices. There are no right or wrong answers, so please speak freely and honestly as we are interested in your own opinions and experiences. With your permission, the interview will be recorded digitally. Any personal or sensitive material that could potentially identify you or your organisation will be removed. Is this OK?

****All questions in italics are interviewer prompts or for reference ONLY****

Section A: Background information

1) What is your job title?
2) Would you briefly explain your background to working in OH? (*# of years working?)*
3) How long have you worked for your organisation?
4) Can you tell me about your OH department/services offered?
    - *Referrals, case management, health test assessments, drug or alcohol surveys, fitness for work, health surveillance, and life style and wellbeing initiatives*
5) What are some of the common tasks and typical cases you deal with on a daily basis?

Section B: General occupational health feedback

1) How may OH professionals work in your department?
2) Approximately, how many employees are there in your organisation?
3) How accessible is your OH department/services? *(On-site? Outsourced?)*
    - *How many sites do you work with/are responsible for?*
    - *If on-site, is it full time or certain hours a week? If off site, by appointment request?*
4) How are employees made aware of the OH department and its services?
5) Are managers given training/information on how they can use your services?
6) How does the OH department promote itself/services?
7) How do you communicate between the different stakeholders?
    - *Managers, employees, doctors, HR? What works? What do you find less helpful?*
8) Do employees actively request your services?

9) Do managers actively request your services for their employees?

10) What do you think the employees opinions are of your OH department/services?

11) What do you think the managers opinions are of your OH department/services?

12) How is the OH department assessed for effectiveness by the organisation?

- *Employee satisfaction, absenteeism/turnover, productivity, cost efficiency?*

Section C: Absence management approach

1) Do you know how your absence statistics compare to other organisations?

2) What are the common health complaints reported by the workers?

3) How do you manage absenteeism and facilitate return to work?

Section D: Health promotion initiatives

- *For relevant Q's ask what is best/least effective, what could be done differently? How was it delivered?*

1) How important is health promotion in your organisation?

2) Are you currently promoting any health initiatives or have done in the past? Describe?

3) What methods do you use to get managers/HR to support new health initiatives?

4) What methods do you use to get employees to participate in new health initiatives?

5) What health promotion initiatives would you like to see used more in the future?

Section E: Physical activity interventions

1) How physically active are employee roles in your organisations?

2) How important is the promotion of physical activity in your organisations?

3) What types of activity initiatives do you see being successful in the workplace?

4) What are the barriers to introducing new physical activity practices?

5) What are the barriers for these practices becoming lifelong practices?

6) What is the best method of introducing activity initiatives in your organisation?

Is there anything else you would like to say before I switch off the recording? Are there any areas you feel are important that we have not covered or given enough importance too?

Appendix 4.2: Occupational health stakeholder focus group schedule

Thank you for agreeing to take part in this focus group. The aim of this discussion is to identify effective current and future Occupational Health: practices, initiatives, purposeful activities to promote and support an extended working life. There are no right or wrong answers, so please speak freely and honestly as we are interested in your own opinions and experiences. We are keen to understand what works and what needs improving so that we can develop guidance for occupational health services that support the employee. With your permission, the interview will be recorded digitally. Finally, any information that is used in feedback reports or academic papers will be presented anonymously. Any personal or sensitive material that could potentially identify you or your organisation will be removed. Is this OK?

****All questions in italics are interviewer prompts or for reference ONLY****

Section A: Previous experiences

1) Please describe any previous experiences you have had with health initiatives
    - *What was good? What could have been improved?*
2) Please discuss your past experiences in relation to physical activity interventions you may have been involved in currently/previously
    - *Relate back to answers in question 1 if activity initiatives have been described.*

Section B: Future interventions

1) What physical activity initiatives would you like to see available in you work place?
2) How would you change employees' activity levels to make physical activity a life-long practice?
3) Is a workplace physical activity intervention likely to have long-term impact on employee health?
4) Based on your experience, what do you think is a sensible duration to promote an intervention?
5) What impact has the economic climate had on the health services within your organisation?
6) Do different groups in the workplace need to be targeted differently? *(Age, gender, ethnicity)*

7) How can the use of arts/media be used to promote an intervention – can you suggest any new/innovative/creative methods of presenting the information?

Section C: Physical activity interventions

Think about the following specific physical activity interventions that you could possibly introduce in the organisations you work with. Think about your past experiences and previous initiatives you may have been involved in and answer the questions in relation to these activities:

a) Active commuting – *e.g. cycling/walking groups*
b) Exercise at work (individual/team based) – *e.g. cycling/walking groups, light fitness classes*
c) Incidental activity – *e.g. encourage stopping emails for certain hours of the work day using the stairs instead of lifts*
d) Pedometer based activities (individual/team based) – *e.g. walking activities and monitoring*

- *Ask the questions for each individual intervention to not confuse responses*

1) Practicality and feasibility of the intervention in the workplace?
2) Practicality and feasibility of the intervention in different work sectors?
3) Requirements, provisions and investment needed by employers/employees *(Workplace champions)*
4) The barriers, limitations and facilitators to the intervention
5) What are the best methods to get managerial support for the interventions? *(Issues of time away from work/conflict with work needs)*
6) Employee engagement/buy-in/motivation *(Challenges, pledges, prize draws)*

Is there anything else you would like to say before I switch off the recording? Are there any areas you feel are important that we have not covered or given enough importance too?

Appendix 5.1: Employee focus group schedule

Thank you for agreeing to take part in this focus group. The aim of this discussion is to identify effective current and future health: practices, initiatives, purposeful activities to promote and support an extended working life. The discussion will last for approximately 1 hour and asks a number of questions about your job experiences with health initiatives and a wish list for future practices. There are no right or wrong answers, so please speak freely and honestly as we are interested in your own opinions and experiences. We are keen to understand what works and what needs improving so that we can develop guidance for health services that support the employee. With your permission, the interview will be recorded digitally. Finally, any information that is used in feedback reports or academic papers will be presented anonymously. Any personal or sensitive material that could potentially identify you or your organisation will be removed. Is this OK?

****All questions in italics are interviewer prompts or for reference ONLY****

Section A: Previous experiences

1) Please describe any previous experiences you have had with physical activity initiatives…*What was good? What could be improved?*

Section B: Physical activity interventions

Think about the following specific physical activity interventions that you could possibly introduce in the organisations you work with. Think about your past experiences and previous initiatives you may have been involved in and answer the questions in relation to these activities:

e) Active commuting – *e.g. cycling/walking groups*
f) Exercise at work (individual/team based) – *e.g. cycling/walking groups, light fitness classes*
g) Incidental activity – *e.g. encourage stopping emails for certain hours of the work day using the stairs instead of lifts*
h) Pedometer based activities (individual/team based) – *e.g. walking activities and monitoring*
    - *Ask the questions for each individual intervention to not confuse responses*

7) Practicality and feasibility of the intervention in the workplace?
8) Practicality and feasibility of the intervention in different work sectors?
9) Requirements, provisions and investment needed by employers/employees *(Workplace champions)*
10) The barriers, limitations and facilitators to the intervention
11) What are the best methods to get managerial support for the interventions? *(Issues of time away from work/conflict with work needs)*
12) Employee engagement/buy-in/motivation *(Challenges, pledges, prize draws)*

Section C: Additional discussion points:

- *For reference if time available*

8) What physical activity initiatives would you like to see available in you work place?
9) What impact has the economic climate had on the health services within your organisation?
10) Do different groups in the workplace need to be targeted differently? *(Age, gender, ethnicity)*
11) How can the use of arts/media be used to promote an intervention – can you suggest any new/innovative/creative methods of presenting the information?

Is there anything else you would like to say before I switch off the recording? Are there any areas you feel are important that we have not covered or given enough importance too?

Appendix 6.1: Leaflet to target contemplative/preparation employees in staged group

How to get YOUR 30 minutes

Turn off the TV
You can fit in a 30 min walk by missing one TV show, especially if it's a rerun.

Walk while you talk
Move around while on the phone, that's what a mobile phone is for.

Active travel
Walk or cycle where possible, or get off the bus one stop early to add a short walk...or walk to the next stop.

Park further away
Add a walk when at work, at home, when going to the movies or shopping by parking at the other end of the car park.

Use the stairs
It usually takes the same amount of time to take the stairs as it does waiting for a lift.

Walk short journeys
When travelling short distances and the weather is nice, walk the journey rather than taking your car.

Breaks at work
Use your breaks to take a walk outside or around the building. Your **30 minutes** does not have to be accumulated in one single walk, it can be split into 2 or 3 shorter walks.

Don't email it
Instead of sending an email to a colleague in the same building, why don't you go and see them? You will probably get a faster response.

Tips to get YOU started

It is not always easy to fit physical activity into our busy lives. Many jobs involve long periods of inactivity, so **why not create opportunities to be more active during work time?**

It's easier than you may think—it isn't necessary to spend your lunch time at the gym!

Employees who participate in healthy workplace initiatives have reported greater **job satisfaction**, **motivation** and improved **rapport** with colleagues.

Calories burnt being INACTIVE or ACTIVE			
5 min call sitting	5	5 min call standing	25
Send email to colleague on next floor	5	Walk to a colleague on next floor	30
Taking lift up 3 levels	5	Climb stairs up 3 levels	15
Park next to entrance	5	Park 5m away	30
30 min office meeting	30	30 min walking meeting	180
Eat a packed lunch	10	Walk 10 min to a shop	60

If you can not walk 10,000 steps, increase your step count gradually every day. Start with short 5 minute walks and build up as you feel yourself get **fitter**, **faster** and more **confident.**

If you walked 6,000 steps when you started but after 2 weeks are walking 8,000 steps, you know you are making **good progress.**

DID YOU KNOW?
30 minutes only represents 2% of your day?

Visit the **British Heart Foundation Health at Work** website for more ideas, tips and resources on how to be more active at work:
www.bhf.org.uk/thinkfit

British Heart Foundation

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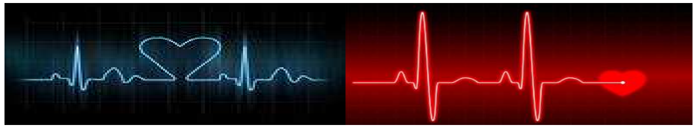
Working Late:
Physical Activity across the Lifespan

Walking Works Wonders

Health benefits associated with PHYSICAL ACTIVITY

1) The **more exercise** you do, the **stronger** and more **efficient** the heart becomes so it can pump more blood with each beat. Being active **reduces** the risk of developing **coronary heart disease** by 50%, or having a **stroke** by 25%.

2) Activity can **reduce high blood pressure** in **75%** of existing cases, and the likelihood of developing it in the first place.



3) Regular physical activity is crucial to **preventing obesity** and in helping people to **lose weight**. Activity encourages the body to **use up excess** stored fat.

4) Helps prevent and aid in the management of **type 2 diabetes** as it promotes optimal blood glucose levels.

5) Physical activity **improves balance** and **muscle strength**, which **reduces** the **risk of falling**. Simple weight-bearing activities like stair climbing and walking will **strengthen** your **bones** and reduce the risk of fracture

DID YOU KNOW?
Only about 35% of men and 25% of women in England are physically active enough to benefit their health, but 80% of people think they are sufficiently active?

6) Improves your **cholesterol** levels.

7) Maintains a **healthy back** and strong posture, helping to speed up recovery from **low back pain**.

8) Reduces the likelihood of some **cancers** (e.g. bowel and breast).

What should YOU be doing?

The recommended amount of physical activity is **30 minutes** of **moderate intensity** activity **on 5 or more days per week**. Moderate physical activity means you get **warm** and **mildly out of breath**, it does not have to be intense.

An excellent example of a moderate intensity activity is brisk walking. Other examples are: gardening, housework, skipping and gentle cycling.

DID YOU KNOW?
Most people put on weight due to eating more calories than they burn - an excess of 100 calories per day will put on 4.5 kg in a year. Walking 2000 steps (1 mile) per day will offset this calorie excess.

How do YOU measure up?

Have you ever measured your daily step count?

A **pedometer** is a small device used to measure your daily step count, and if recorded can be used to track your progress.

How to wear: clip the pedometer on the waistband of your trousers, jeans, skirt or belt about midway between your side and belly button in line with your hip. Reset it everyday and record how many steps you take.

Walking Works Wonders!

- Walking is an **easy** and **natural** method of activity that can fit into any schedule. The best news is almost everyone can do it, anywhere and at any time, for **free!** It's ideal for building exercise into your everyday life.

- You do not need any special clothing, equipment or training.

- Consider having an **'activity buddy'** (colleague, friend, neighbour) and setting up an active walking group of your own?

"Walking helps me feel connected to nature, to my community and to myself. It clears my mind, helps relieve stress and just feels GREAT!"
Joanne, 56

Research has shown walking can **improve mood** and **self-esteem** helping to **relieve tension** and the symptoms of **stress** and **anxiety**. This will leave you feeling **confident**, **revitalised** and **relaxed**.

Walking with friends and colleagues offers an opportunity for **social contact** and to explore the local surroundings . A brisk walk in the fresh air at lunchtime can also **improve** your **concentration** and **performance**.

Appendix 6.2: Leaflet to target precontemplative employees in staged group

So...What's stopping YOU?

"I don't have the time"
Plan some walking time into each day, even for a few minutes such as during a break, waiting for the kettle to boil, waiting for dinner to cook, etc. Walk during your usual schedule and take the stairs instead of the lift.

"I'm getting too old"
Research has shown increasing your activity in middle age actually increases your lifespan to the same level as active people. You are never too young or too old to start walking and being more active - you will feel the benefits.

DID YOU KNOW?
Most people put on weight due to eating more calories than they burn - an excess of 100 calories per day will put on 4.5 kg in a year. Walking 2000 steps (1 mile) per day will offset this

"I might injure myself"
Active people fall ill less often and recover more quickly when they do get ill. Start slowly and at your own pace, with activities like walking it is unlikely that you will get injured. Unless you are seriously unfit, after a short while you should be able to comfortably walk 1 mile in 30 minutes.

"I'm too tired"
Once you begin being more active, you will have more energy and feel less tired.

Ideas to get YOU thinking

A simple activity like **walking** will be a great benefit to your health. **Just try it**.

Instead of... ✗	Do this... ✓
Using the lift or escalators	Use the stairs
Driving to work	Walk/ cycle where possible, or get off the bus one stop early to add a walk
Working through lunch	Take a walk outside or around the building
Sending an email to someone on the same site	Walk over and talk to the person
Sitting down all day	Use your breaks to stroll around the building or stand up during meetings

DID YOU KNOW?
30 minutes only represents 2% of your day?

Vary your activities: remember to change your walks to keep them fun. We have focused on walking, but there are many other activities you can try.

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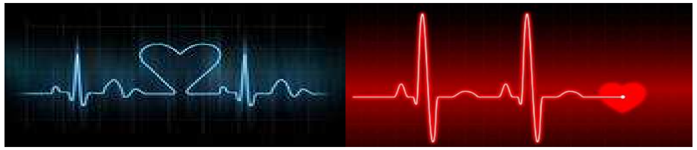
Working Late:
Physical Activity
across the Lifespan

Walking Works Wonders

Health RISKS associated with PHYSICAL INACTIVITY

1) One of the major causes of **coronary heart disease** and **stroke** in Britain. People who are **inactive** have **twice the risk** of developing coronary heart disease compared with active people. **Regular activity** slows down the narrowing of the arteries to the heart and brain that occurs with age.

2) Increases the likelihood of developing **high blood pressure.** It is estimated that activity can help reduce high blood pressure in 75% of existing cases.



3) Can cause **excess weight gain** which could result in being **overweight** or **obese** leading to further health risks.

4) Increases the probability of developing some **cancers** (e.g. bowel, pancreatic). Research has shown inactivity to be associated with up to **14% of bowel cancer** cases and **11% of breast cancer** cases.

5) Can lead to **weak muscles** and **joint problems** due to lack of use, causing problems such as **arthritis** and **lower back pain.**

6) Increases the risk of developing **type 2 diabetes** as your ability to maintain normal blood glucose levels is reduced.

7) Increases the risk of **osteoporosis** which is an unpleasant and often **painful thinning** of the bones. Most **hip fractures** are caused by this.

However, you can reduce these risks by taking part in regular physical activity.

What should YOU be doing?

The recommended amount of physical activity is **30 minutes** of **moderate intensity** activity **on 5 or more days per week**. Moderate physical activity means you get **warm** and **mildly out of breath**, it does not have to be intense.

An excellent example of a moderate intensity activity is brisk walking. Other examples are: gardening, housework, skipping and gentle cycling.

How do YOU measure up?

Have you ever measured your daily step count?

A **pedometer** is a small device used to measure your daily step count, and if recorded can be used to track your progress.

How to wear: clip the pedometer on the waistband of your trousers, jeans, skirt or belt about midway between your side and belly button in line with your hip. Reset it everyday and record how many steps you take.

DID YOU KNOW?
Only about 35% of men and 25% of women in England are physically active enough to benefit their health, but 80% of people think they are sufficiently active?

Walking Works Wonders!

Kathy is 53 and has been **gaining weight** over the last five years and she is now unhappy with her size.

Kathy has been experiencing **pain** in her **lower back** and her doctor advised her to **exercise** more or warned that she may become seriously **obese** which could make her back problems worse.

DID YOU KNOW?
Burning 500-1000 calories per week (6-12 miles walking for an average weight person) can increase your lifespan by 20-30% compared to inactive people.

Kathy did not really want to be told she needed to exercise for her **health**, but decided to make **some small changes** by **getting up**, **stretching** and **walking** around the office during her break times for 5 minutes.

She really **enjoyed** this and **gradually increased** her walking time to include lunch times and after work. After a few months of **regular walking**, Kathy noticed a significant difference in her **weight** and **posture** and felt that her **back pain** was also reducing.

After getting a few work colleagues involved, she now runs **regular 30 min lunch-time walks** at her workplace encouraging other colleagues to take part.

Appendix 6.3: Leaflet for all employees in the standard group

Ideas to get YOU thinking

Do not confuse activity with formal exercise; you can be active without ever slipping into lycra or joining a gym.

Park further away … Add a walk when at work, at home, when going to the movies or shopping by parking at the other end of the car park.

"I don't have the time"… Plan some walking time into each day, even for a few minutes such as during a break, waiting for the kettle to boil, waiting for dinner to cook, etc. Walk during your usual schedule and take the stairs instead of the lift.

Breaks at work … Use your breaks to take a walk outside or around the building. Your **30 minutes** does not have to be accumulated in one single walk, it can be split into 2 or 3 shorter walks.

Don't email it … Instead of sending an email to a colleague in the same building, why don't you go and see them? You will probably get a faster response.

Active travel … Walk or cycle where possible, or get off the bus one stop early to add a short walk...or walk to the next stop.

Tips to get YOU started

If you can not walk 10,000 steps, increase your step count gradually every day. Start with short 5 minute walks and build up as you feel yourself get **fitter**, **faster** and more **confident**.

If you walked 6,000 steps when you started but after 2 weeks are walking 8,000 steps, you know you are making **good progress**.

Practical tips:
Wear comfortable shoes or trainers.
Several thin layers of loose fitting, comfortable clothing are better than one thick layer. Wear gloves and a hat if it is cold.
Take some water.
A snack to keep you going always livens up a walk. Make it a healthy one!
A small backpack is easier to carry than a carrier bag.
It is important to warm up and cool down properly. Simple stretching exercises will help you warm up.
Adopt a good walking posture.
Pay attention to your heart rate and breathing.
For best results, walk fast without exerting yourself too much. You should be able to hold a conversation whilst you are walking - the 'talk test'.
Track your progress by logging your steps, mileage, or time walked.

Vary your activities: remember to change your walks to keep them fun. We have focused on walking, but there are many other activities you can try.

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Working Late: Physical Activity across the Lifespan

Walking Works Wonders

What should YOU be doing?

The recommended amount of physical activity is **30 minutes** of **moderate intensity** activity **on 5 or more days per week**.

Moderate physical activity means you get **warm** and **mildly out of breath**, it does not have to be intense.

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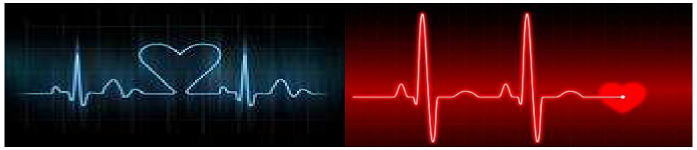
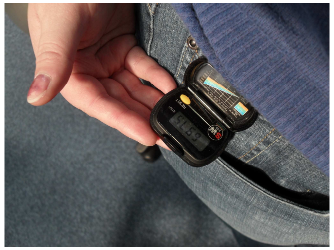


How do YOU measure up?

Have you ever measured your daily step count?

A **pedometer** is a small device used to measure your daily step count, and if recorded can be used to track your progress.



How to wear: clip the pedometer on the waistband of your trousers, jeans, skirt or belt about midway between your side and belly button in line with your hip.

Reset it everyday and record how many steps you take.

Walking Works Wonders!

- Walking is an **easy** and **natural** method of activity that can fit into any schedule. You do not need any special clothing, equipment or training.
- The best news is almost everyone can do it, anywhere and at any time, for **free!** It's ideal for building exercise into your everyday life.

- Your **30 minutes** or **10,000 steps** does not have to be accumulated in one single walk, it can be split into 2 or 3 shorter walks. **Every step counts.**

Walking Groups

Find out whether there is a walking group near you. **Ramblers** provide information on local walks and local groups: **www.ramblers.org.uk**

Activity at work

Visit the **British Heart Foundation Health at Work** website for more ideas, tips and resources on how to be more active at work: **www.bhf.org.uk/thinkfit**

Change4Life

Join Change4Life to get helpful information, games, tools, tips and a free welcome pack: **www.nhs.uk/change4life**

Make the pledge to walk

Visit **Walking Works** and join thousands of workers who have signed up to feel greener, healthier and happier: **www.walkingworks.org.uk**

Need more support?

Walk England (**www.walkengland.org.uk**) and **Walking for Health** (**www.whi.org.uk**) have even more information about walking routes, support and encouragement to get active.

Appendix 6.4: Scaled down version of the leaflets to accompany Walking Lunch

What is Walking Lunch all about?

Walking Lunch is an easy and enjoyable way to improve your fitness and get out and about whilst at work.

Step 1

This pocket map will help you and your colleagues find your way as you explore new destinations in your local area.

It's up to you where you go. Use the large notice-board map in your office to pick a spot, or get out and explore.

Step 2

When you reach somewhere, be it a great little coffee shop, beautiful patch of green or intriguing art gallery use your camera or phone to take a picture.

Make a note of your step count.

Step 3

Back in the office, connect your camera or phone via bluetooth or usb to the Polaroid mini-printer. In 60 seconds your photo will be printed onto sticky back paper.

Step 4

Fix your photograph to the back of a corresponding coloured tag:

- Parks & Picnic Spots
- Cafes & Restaurants
- Commute & Walk
- Places of Interest

Write on the back where you got to and how many steps it took to get there before pinning the tag onto the large notice-board map so that others can visit the same spot.

Fancy a challenge?

Try setting personal or office goals. We have listed some of our favourite ideas below but feel free to make up your own competitions or challenges for the whole office to participate in.

- The perfect picnic spot
- Outstanding outdoor drinks
- Most beautiful photograph
- Longest walk within an hour
- Hidden gems

Notes

Notes

Notes

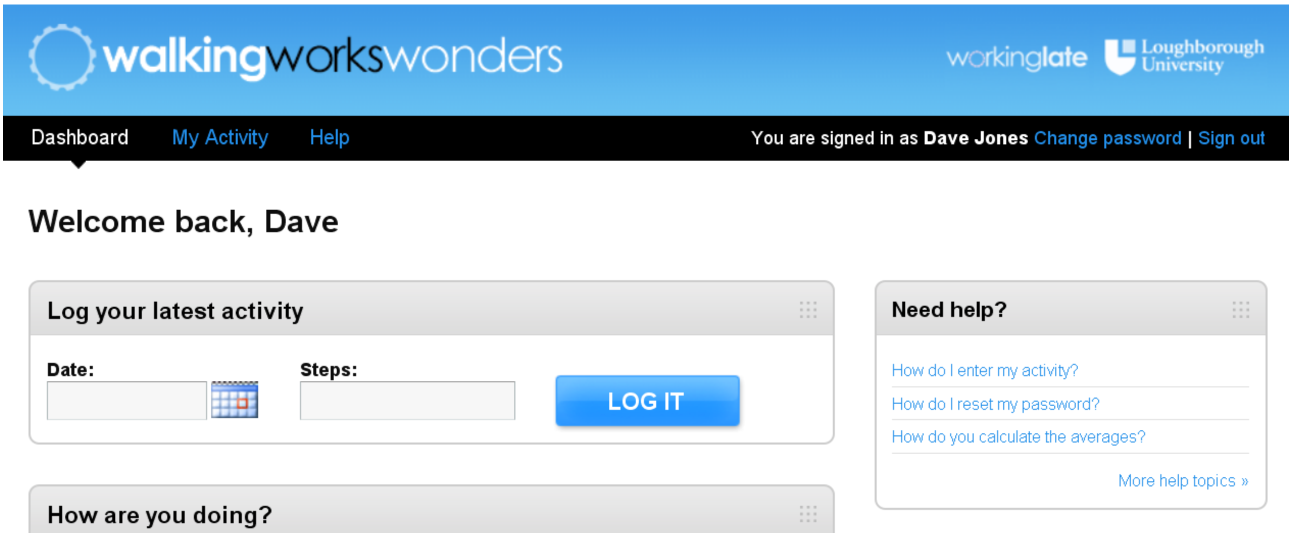

Pentonville
Hoxton
St Pancras
FINSBURY
SHOREDITCH
Clerkenwell
St Luke's
Bloomsbury
Spitalfields
Gray's Inn
Holborn
Barbican
Lincoln's Inn Fields
St Giles
Whitechapel
Middle Temple
Inner Temple
Strand
LONDON
River Thames
King's Reach
South Bank
The Borough
LAMBETH

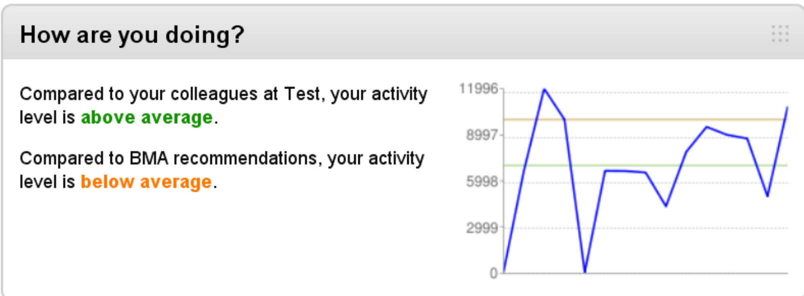
Appendix 6.5: Additional promotion leaflets for the activity themes

walking works wonders

Don't forget to record your step count!

www.walkingworkswonders.com





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Walking Works Wonders

Guide to your step count

2000 steps =

- 1 mile*
- 100 calories*
- A 20 minute walk*
- 1 slice of white bread*

Target: 10,000 steps per day

Set your <u>personal goals</u> to try and increase your step count by 10% each week

If you are already achieving 10,000 steps per day, try to increase your walking pace or add in a further 1,000 steps

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*Approximate figures based on average person. Figures will vary depending on height, weight, pace and stride length.

walking works wonders

What does my step count say about my lifestyle?

Steps per day	Lifestyle
Less than 5,000	Sedentary
5,000 – 7,499	Low Activity Level
7.500 – 9,999	Moderately Active
More than 10,000	Active
More than 12,000	Highly Active

STAND while talking on the telephone

Use resources FURTHER away from you such as the bin, toilet & printer

Need some more steps? Why not try...

Walk around inside THIS building during a break

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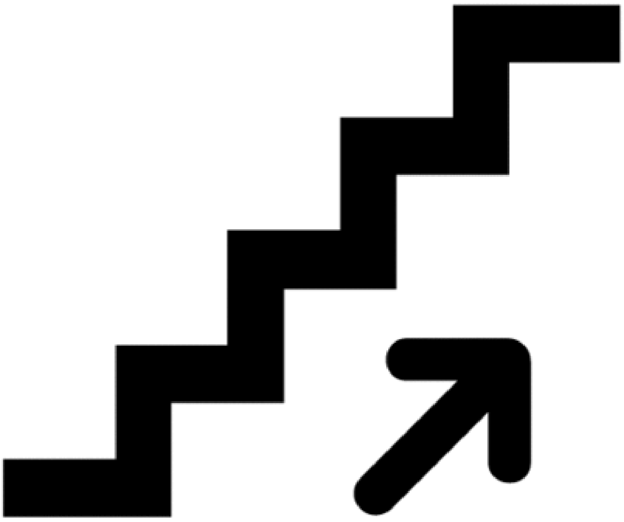
In a hurry? Need to boost step counts?
Why not take the stairs?



Burn between 5 and 10 calories per minute when stair climbing*

Regular stair climbing provides **daily** exercise
Regular stair climbing is **free** exercise
Regular stair climbing may help **lower** cholesterol

Five floors too much? Why not climb up two floors and use the elevator for the rest.

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*Approximate figures based on average person. Figures will vary depending on height, weight, pace and stride length.

walking works wonders

As the weather improves, think about introducing a short walk into your daily work routine.

Your walk does not have to be really long!
For your heart to benefit from the activity you do, your walk needs to be continuous for at least 10 minutes. Therefore, this can then be perfect for a short break!

Fancy a bit of fresh air?

Fed up of sitting in traffic?

The **National Walk to Work Week** is from **9-13 May 2011**. This is an ideal time to give walking to work a go!

Take a look at the Walking Works campaign: **www.walkingworks.org.uk** and make your pledge today

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Walking Works Wonders

Think about your journey to work...

How far away do you live from work?
Is there any way you could add in some EXTRA physical activity?

---

1 MILE

20 min walk
or
5 min cycle

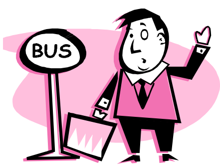
3 MILES

45 min fast walk
or
15 min cycle

---

6 MILES

30 min cycle
or
25 min bus trip and
10 min walk



10 MILES+

Incorporate a brisk walk to your journey
Car: park further away
or
Bus: get off the bus a couple of stops earlier

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Walking Works Wonders

Instead of having a 'working lunch' have a

Walking Lunch

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Do you know somewhere green to go and each your lunch?

Somewhere free to park your car?

A nice café a short walk away?

A nice local walk?

SHARE IT WITH YOUR OFFICE!

Take a picture.

Print it off, stick it to a tag.

Then pin it on the map!

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Appendix 7.1: The outcome measures questionnaire for the intervention

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Walking Works Wonders questionnaire

www.walkingworkswonders.com

Working late is a study being carried out by Loughborough University's Work and Health Research Centre. The project aims to promote the health, wellbeing and quality of working life of all employees.

This questionnaire asks a number of questions about your current job role, activity, wellbeing and your feelings towards work. As an employee taking part in our **Walking Works Wonders** activity initiatives, the purpose of this questionnaire is to periodically measure your progress. This information will be used along with your physiological measurements (weight, body fat, blood pressure, heart rate, etc.) and the record from your pedometer which we hope you will be regularly updating at: www.walkingworkswonders.com

The questionnaire takes approximately 20 minutes to complete. Please read each question carefully before answering. There are no right or wrong answers, so please respond freely and honestly as we are interested in your own experiences and opinions. If you have more than one job, please complete the questionnaire in relation to your job where your employer is participating in the Walking Works Wonders initiative.

Information provided will be held only by Loughborough University, used for the purposes of this research and will conform to the requirements of the Data Protection Act 1998. Your information will be stored against a reference number, not your name, to ensure complete anonymity. We will not share individual responses with your employer, and summary information will not be shared in anyway that could be used to reveal your identity.

If you have any questions about this survey, please contact:

Mr Aadil Kazi [A.Kazi@lboro.ac.uk] 01509 228484

I understand that I am under no obligation to take part in the study. I understand that I have the right to withdraw from this study at any stage for any reason. I understand that all the information I provide will be treated in strict confidence and will be kept anonymously.

Please tick to show that you agree to participate in this research: ☐

SECTION 1: ABOUT YOU

Please note that we are asking you to provide your name so that we can track your progress over the course of the **Walking Works Wonders** initiative. All your responses will be kept strictly confidential to the researchers and we will not share any individual responses with your employer. Your responses will be stored electronically against an identification number and not your name.

Name ________________________________

Please enter your email address so that we can provide you with access to log into the **www.walkingworkswonders.com** website. You will then be able to record your pedometer data and get feedback on your step count data. Only employees from participating organisations will be allowed access to the site.

Email Address ____

As stated, the following questions are anonymous; answers will not be used to identify individuals. We would first like to ask some background information about you. This information is very useful as it will help us look for patterns within and between organisations.

Please tick or write the answer that best applies to you in the space provided.

1.8 Gender: ☐ Male ☐ Female

1.9 Age: ________ years

1.10 What is your marital status? ☐ Single ☐ Married ☐ Cohabiting ☐ Separated ☐ Divorced ☐ Widowed ☐ Civil Partnership

1.11 Ethnicity (please tick only one)

a) White
- British ☐
- Irish ☐
- Any other White background ☐

b) Mixed
- White and Black Caribbean ☐
- White and Black African ☐
- White and Asian ☐
- Any other Mixed background ☐

c) Asian or Asian British
- Indian ☐
- Pakistani ☐
- Bangladeshi ☐
- Chinese ☐
- Any other Asian background ☐

d) Black or Black British
- Caribbean ☐
- African ☐
- Any other Black background ☐

e) Any other ethnic background, please specify: ________________________________

f) Ethnic background not known ☐

1.12 What is the highest educational qualification you hold?

☐ CSE or equivalent / GCSE (Grades D – G)
☐ O-level or equivalent / GCSE (Grades A – C)
☐ AS/A-level or equivalent
☐ Degree or equivalent
☐ Post-graduate degree or equivalent
☐ Vocational qualifications (e.g. BTEC, NVQ)
☐ No formal qualifications
☐ Other (please specify):

SECTION 2: ORGANISATIONAL INFORMATION

The following questions relate to your current employment and job role. This is so we can look at how wellbeing differs across different job roles and work sectors. If you have more than one job, please complete the questionnaire in relation to your job where your employer is participating in the Walking Works Wonders initiative.

2.9 Name of employer? ____

2.10 What is the name of the department or group that you work in?

____

2.11 What is your job title? ____

b) If you are married or cohabiting, what is your partners' occupation / job title?

____

2.12 Is your job:

- ☐ Permanent Full-time
- ☐ Permanent Part-time
- ☐ Permanent Job-share
- ☐ Fixed-term/temporary contract

2.13 How many hours does your employer expect you to work in a typical 7-day week?
If it varies, estimate the average ________hours

2.14 About how many hours altogether did you work in the past 4 weeks (28 days)?
(For example, 40 hours per week for 4 weeks = 160 hours; 35 hours per week for 4 weeks = 140 hours.) **Round to the nearest hour.** ________hours

2.15 How long have you worked for this organisation? ________years ________months

2.16 How long have you worked in this current job role? ________years ________months

2.17 What type of organisation do you work for? (please tick only one)

- ☐ Banking
- ☐ Computing & I.T
- ☐ Construction
- ☐ Education
- ☐ Energy & Utilities
- ☐ Engineering
- ☐ Financial
- ☐ Health & Social Work
- ☐ Hospitality
- ☐ Local Government
- ☐ Manufacturing
- ☐ Public Defence
- ☐ Retail
- ☐ Telecoms
- ☐ Transport

☐ Other (please state): ____

2.18 What is your annual income from your job, before taxes?

- ☐ £5,000 - £9,999
- ☐ £10,000 - £14,999
- ☐ £15,000 - £19,999
- ☐ £20,000 - £24,999
- ☐ £30,000 - £34,999
- ☐ £35,000 - £39,999
- ☐ £40,000 - £44,999
- ☐ £45,000 - £49,999
- ☐ £55,000 - £59,999
- ☐ £60,000 - £64,999
- ☐ £65,000 - £69,999
- ☐ £70,000 – £74,999

SECTION 3: LIFESTYLE INFORMATION

For this section we are interested in information about your lifestyle and your current physical activity levels. This will allow us to look at what types of physical activity people typically engage in.

3.1 Are you a smoker? ☐ Yes ☐ No

b) If yes, how many cigarettes do you smoke per day? _______cigarettes per day

3.2 If no, have you smoked in the past? ☐ Yes ☐ No

b) If yes, how long ago did you quit? _______years _______months

3.3 During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, digging, aerobics, or fast bicycling?
Vigorous physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

_______**days per week** ☐ No vigorous physical activities (go to question 3.4)

a) How much time did you usually spend doing **vigorous** physical activities on one of those days?

_______hours per day _______minutes per day

3.4 During the last 7 days, on how many days did you do moderate physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis?
Moderate activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time. **Do not include walking**.

_______**days per week** ☐ No moderate physical activities (go to question 3.5)

a) How much time did you usually spend doing **moderate** physical activities on one of those days?

_______hours per day _______minutes per day

3.5 During the last 7 days, on how many days did you walk for at least 10 minutes at a time?

_______**days per week** ☐ No walking (go to question 3.6)

a) How much time did you usually spend **walking** on one of those days?

_______hours per day _______minutes per day

3.6 Are you satisfied with the amount of physical activity/exercise you do?

☐ Yes ☐ No

3.7 Are you planning to increase the amount of physical activity/exercise you do?

☐ Yes ☐ No (go to question 3.8)

c) If yes, are you planning to increase the amount of physical activity/exercise you do within the next 6 months?

☐ Yes ☐ No (go to question 3.8)

d) If yes, are you planning to increase the amount of physical activity/exercise you do within the next month?

☐ Yes ☐ No (go to question 3.8)

3.8 Have you recently increased your levels of physical activity/exercise?

☐ Yes ☐ No (go to question 3.9)

a) If yes, did you make this change… ☐ within the last 6 months
☐ more than 6 months ago

3.9 Have you ever worn a pedometer? (a pedometer is a small device used to measure your daily step count and is usually worn on your waistband)

☐ Yes ☐ No

3.10 Please estimate how much time you spend <u>sitting</u> in each of the following activities on a typical <u>working</u> day and a typical <u>non-working</u> day (weekend day or day off)

	Work Day		**Non-Work Day**	
	Hours	**Mins**	**Hours**	**Mins**
m) While travelling to and from places				
n) While at work				
o) While watching television				
p) While using a computer at home				
q) In your leisure time NOT including television (e.g. visiting friends, movies, dining out, etc.)				
a) Sleeping at night (or trying to sleep)				

3.11 How often do you usually participate in the following activities:	**Never/rarely**	**Occasionally**	**Most of the time**	**All of the time**	**Not applicable**
a) Climb the stairs instead of using the lift or the escalator	☐	☐	☐	☐	☐
b) Park your vehicle away from your destination so you have to walk further	☐	☐	☐	☐	☐
c) Walk or cycle to destinations that are within a 5 minute drive from where you live, rather than drive	☐	☐	☐	☐	☐
d) Get off the bus stop early to add a walk	☐	☐	☐	☐	☐
e) Walk to talk to a colleague instead of using e-mail or the telephone	☐	☐	☐	☐	☐
f) Move about whilst talking on the telephone	☐	☐	☐	☐	☐

SECTION 4: PHYSICAL ACTIVITY AT WORK

For this section we are interested in how physically active you are at work. This will allow us to look at how physical activity differs across different job roles, work sectors and organisations.

4.1 How far do you travel to work?

☐ Under 1 mile ☐ 6-10 miles ☐ 20 miles or more
☐ 1-5 miles ☐ 11-19 miles

4.2 How do you normally travel to and from work? (please tick only one)

☐ Car (driver or passenger) ☐ Motorbike ☐ Walk
☐ Cycle ☐ Public transport (e.g. bus, train) ☐ Work at home
☐ Other (please state):________________________________

4.3 In a usual week, do you perform any <u>standing</u> activities while at work?

☐ Yes ☐ No

a) If yes, for how many hours on a typical workday?
_______hours _______minutes per day

4.4 In a usual week, do you perform any <u>walking</u> activities while at work?

☐ Yes ☐ No

a) If yes, for how many hours on a typical workday?
_______hours _______minutes per day

4.5 In a usual week, do you perform any <u>heavy labour</u> activities while at work?

☐ Yes ☐ No

b) If yes, for how many hours on a typical workday?
_______hours _______minutes per day

SECTION 5: WORK ABILITY

Work ability is your capability to manage your work demands and perform all of your work duties. These questions aim to explore how your overall health affects your work ability.

5.1 Are the demands of your work primarily;

☐ Mental ☐ Physical ☐ Both mental and physical

5.2 Current work ability compared with the lifetime best

Assume that your work ability at its best has a value of 10 points. Please circle the points you would give your current work ability (over the past 4 weeks) (1 means that you cannot currently work at all).

	1	2	3	4	5	6	7	8	9	10
completely unable to work										work ability at its best

5.3 Work ability in relation to the demands of the job

a. How do you rate your current work ability with respect to the physical demands of your work?

Very poor	Rather poor	Moderate	Rather good	Very good
☐	☐	☐	☐	☐

b. How do you rate your current work ability with respect to the mental demands of your work?

Very poor	Rather poor	Moderate	Rather good	Very good
☐	☐	☐	☐	☐

5.4 Estimated work impairment due to diseases

Do you have an illness or injury that is a hindrance to you current job? (Please tick only one)

☐ In my opinion, I am entirely unable to work
☐ Because of my disease, I feel I am able to do only part-time work
☐ I must **often** slow down my work pace or change my work methods
☐ I must **sometimes** slow down my work pace or change my work methods
☐ I am able to do my job, but it causes some symptoms
☐ There is no hindrance/**I have no diseases**

5.5 In the past year (12 months), how many whole days have you been off work because of a health problem (disease or health care or for health examination)?

______________days

5.6 In the past 4 weeks (28 days), how many whole days have you been off work because of a health problem (disease or health care or for health examination)?

______________days

5.7 In the past year (12 months), how many whole days have you gone to work despite feeling that you should have taken sick leave due to your state of health?

______________days

5.8 In the past 4 weeks (28 days), how many days did you come in early, go home late, or work on your day off? (please enter a whole number only)

______________days

5.9 Own prognosis of work ability two years from now

Do you believe that, from the standpoint of your health, you will be able to do your current job two years from now?

☐ Unlikely ☐ Not Certain ☐ Relatively Certain

5.10 Number of current health conditions. In the following list, please mark your current conditions, diseases or injuries that have been **diagnosed** by a physician.

		Yes	No
a)	**Injury from accident** If yes, please describe ……………………………………………………………………	☐	☐
b)	**Musculoskeletal disease** (e.g. back pain, upper or lower back disorders, sciatica) If yes, please describe ……………………………………………………………………	☐	☐
c)	**Cardiovascular disease** (e.g. high blood pressure, heart disease, heart attack) If yes, please describe ……………………………………………………………………	☐	☐
d)	**Respiratory disease** (e.g. chronic bronchitis, chronic sinusitis, asthma) If yes, please describe ……………………………………………………………………	☐	☐
e)	**Mental disorder** (e.g. depression, tension, anxiety, insomnia, mental disturbance) If yes, please describe ……………………………………………………………………	☐	☐
f)	**Neurological and sensory disease** (e.g. migraine, epilepsy, hearing/visual) If yes, please describe ……………………………………………………………………	☐	☐
g)	**Digestive disease** (e.g. gall stones, liver/pancreatic disease, gastric ulcer) If yes, please describe ……………………………………………………………………	☐	☐
h)	**Genitourinary disease** (e.g. urinary tract infection, fallopian tube/prostatic infection) If yes, please describe ……………………………………………………………………	☐	☐
i)	**Skin disease** (e.g. allergic rash, eczema) If yes, please describe ……………………………………………………………………	☐	☐
j)	**Tumour** (e.g. benign tumour, malignant tumour/cancer) If yes, please describe ……………………………………………………………………	☐	☐
k)	**Endocrine and metabolic diseases** (e.g. obesity, diabetes, thyroid disease) If yes, please describe ……………………………………………………………………	☐	☐
l)	**Blood diseases** (e.g. anaemia) If yes, please describe ……………………………………………………………………	☐	☐
m)	**Birth defects** If yes, please describe ……………………………………………………………………	☐	☐
n)	**Other disorder or disease** (not previously mentioned) If yes, please describe ……………………………………………………………………	☐	☐

5.11 Mental Resources	**Never**	**Rather Seldom**	**Some times**	**Rather Often**	**Often**
d) Have you recently been able to enjoy your regular daily activities?	☐	☐	☐	☐	☐
e) Have you recently been active and alert?	☐	☐	☐	☐	☐
f) Have you recently felt yourself to be full of hope for the future?	☐	☐	☐	☐	☐

5.12 On a scale from 0 to 10 where 0 is the worst job performance anyone could have at your job and 10 is the performance of a top worker, how would you rate (please circle):

	worst performance … top performance
a) The usual performance of most workers in a job similar to yours?	**0 1 2 3 4 5 6 7 8 9 10**
b) Your usual job performance over the past year or two?	**0 1 2 3 4 5 6 7 8 9 10**
c) Your overall job performance on the days you worked during the past 4 weeks (28 days)**?**	**0 1 2 3 4 5 6 7 8 9 10**

SECTION 6: YOUR WELLBEING

Over the past 4 weeks, to what extent have you been able to do the following?	More so than usual	Same as usual	Less than usual	Much less than usual
1) Have you been able to concentrate on whatever you are doing?	☐	☐	☐	☐
2) Have you felt that you were playing a useful part in things?	☐	☐	☐	☐
3) Have you felt capable of making decisions about things?	☐	☐	☐	☐
4) Have you been able to enjoy your normal day-to-day activities?	☐	☐	☐	☐
5) Have you been able to face up to your problems?	☐	☐	☐	☐
6) Have you been feeling reasonably happy, all things considered?	☐	☐	☐	☐

	Not at all	No more than usual	Rather more than usual	Much more than usual
7) Have you lost much sleep over worry?	☐	☐	☐	☐
8) Have you felt constantly under strain?	☐	☐	☐	☐
9) Have you felt that you couldn't overcome your difficulties?	☐	☐	☐	☐
10) Have you been feeling unhappy and depressed?	☐	☐	☐	☐
11) Have you been losing self-confidence in yourself?	☐	☐	☐	☐
12) Have you been thinking of yourself as a worthless person?	☐	☐	☐	☐

SECTION 7: YOUR FEELINGS ABOUT WORK

To what extent do you agree with the following statements?	Strongly disagree	Disagree	Slightly disagree	Neither	Slightly agree	Agree	Strongly agree
1) All in all, I am satisfied with my job	☐	☐	☐	☐	☐	☐	☐
2) In general, I don't like my job	☐	☐	☐	☐	☐	☐	☐
3) In general, I like working here	☐	☐	☐	☐	☐	☐	☐
4) I am quite proud to be able to tell people who it is I work for	☐	☐	☐	☐	☐	☐	☐
5) I sometimes feel like leaving this employment for good	☐	☐	☐	☐	☐	☐	☐
6) I'm not willing to put myself out just to help the organisation	☐	☐	☐	☐	☐	☐	☐

	To what extent do you agree with the following statements?	Strongly disagree	Disagree	Slightly disagree	Neither	Slightly agree	Agree	Strongly agree
7)	Even if the firm were not doing too well financially, I would be reluctant to change to another employer	☐	☐	☐	☐	☐	☐	☐
8)	I feel myself to be part of the organisation	☐	☐	☐	☐	☐	☐	☐
9)	In my work I like to feel I am making some effort, not just for myself but for the organisation as well	☐	☐	☐	☐	☐	☐	☐
10)	The offer of a bit more money with another employer would not seriously make me think of changing my job	☐	☐	☐	☐	☐	☐	☐
11)	I would not recommend a close friend to join our staff	☐	☐	☐	☐	☐	☐	☐
12)	To know that my own work had made a contribution to the good of the organisation would please me	☐	☐	☐	☐	☐	☐	☐
13)	I feel a sense of personal satisfaction when I do this job well	☐	☐	☐	☐	☐	☐	☐
14)	My opinion of myself goes down when I do this job badly	☐	☐	☐	☐	☐	☐	☐
15)	I take pride in doing my job as well as I can	☐	☐	☐	☐	☐	☐	☐
16)	I feel unhappy when my work is not up to my usual standard	☐	☐	☐	☐	☐	☐	☐
17)	I like to look back on the day's work with a sense of a job well done	☐	☐	☐	☐	☐	☐	☐
18)	I try to think of easy ways of doing my job effectively	☐	☐	☐	☐	☐	☐	☐
19)	I often think about quitting	☐	☐	☐	☐	☐	☐	☐
20)	I will probably look for a new job in the next year	☐	☐	☐	☐	☐	☐	☐
		Not at all	Unlikely	Slightly unlikely	Neither	Slightly likely	Likely	Extremely likely
21)	How likely is it that you will actively look for a new job in the next year?	☐	☐	☐	☐	☐	☐	☐

Thank you for taking the time to complete this questionnaire. All the information provided will be valuable in helping to evaluate the Walking Works Wonders activity initiatives.

Appendix 7.2: Health screening questionnaire

Screening Questionnaire

Please complete this screening questionnaire to confirm that it is appropriate for you to participate. It includes some health questions:

It is important that volunteers participating in this study are currently in good health and have no significant medical problems. This is to ensure (i) your own continuing wellbeing and (ii) to avoid the possibility of individual issues confounding study outcomes.

At present, do you have any health problem for which you are:			
a)	On medication, prescribed or otherwise	Yes ☐	No ☐
b)	Attending your general practitioner	Yes ☐	No ☐
Have you ever had any of the following:			
a)	Asthma	Yes ☐	No ☐
b)	Heart problems	Yes ☐	No ☐
c)	Problems with bones, joints or muscles	Yes ☐	No ☐
d)	Disturbance of balance/coordination	Yes ☐	No ☐
e)	Numbness in hands or feet	Yes ☐	No ☐
Are you currently dieting, for any reason?		Yes ☐	No ☐
Do you have a heart pacemaker fitted?		Yes ☐	No ☐
In the last 3 months have you:			
a)	Experienced weight loss	Yes ☐	No ☐
b)	Given up smoking	Yes ☐	No ☐
c)	Recovered from a major illness	Yes ☐	No ☐
d)	Experienced a major life event (e.g. bereavement)	Yes ☐	No ☐
Has any, otherwise healthy, member of your family under the age of 35 years died suddenly during or soon after exercise?		Yes ☐	No ☐

For female participants:		
Are your periods normal/regular? **Or**	Yes ☐	No ☐
Are you passing through/have passed through the menopause	Yes ☐	No ☐
Could you be pregnant?	Yes ☐	No ☐
Have you given birth within the last 3 months?	Yes ☐	No ☐
Are you currently breast feeding, or have you done so within the last 3 months?	Yes ☐	No ☐

Appendix 7.3: GP information letters

Loughborough University

Work and Health Research Centre
School of Sport, Exercise & Health Sciences
Loughborough University
Leicestershire, LE11 3TU

RE: REFERRAL DUE TO HIGH BLOOD PRESSURE **Referral date:**

Name of patient: ____________________________ **Date of Birth:** ____/____/____

Gender: M / F **Organisation:**

Dear Sir or Madam,

The above named patient is interested in taking part in a workplace health promotion initiative being carried out by the Work and Health Research Centre, Loughborough University (please see the attached information sheet). This initiative encourages participants to increase their levels of walking activity.

During an initial screening, a blood pressure test using the Omron 705IT has revealed a reading of ______________mmHg which is above the expected norms. In these instances we are referring patients to their GPs to seek advice as to whether they should participate in the workplace interventions. If you are happy for ________________________ to participate, please could you sign and return the attached slip to the above address.

Yours sincerely,

Professor Cheryl Haslam

- -

GP Name __________________________________

Address ____

I am happy for ________________________ to participate in the workplace health promotion initiative being carried out by the Work and Health Research Centre to increase walking activity.

Signature __________________________________ Date ____________________

Loughborough University

Work and Health Research Centre
School of Sport, Exercise & Health Sciences
Loughborough University
Leicestershire, LE11 3TU

RE: REFERRAL DUE TO HIGH RESTING HEART RATE **Referral date:**

Name of patient: ____________________________ **Date of Birth:** ____/____/____

Gender: M / F **Organisation:**

Dear Sir or Madam,

The above named patient is interested in taking part in a workplace health promotion initiative being carried out by the Work and Health Research Centre, Loughborough University (please see the attached information sheet). This initiative encourages participants to increase their levels of walking activity.

During an initial screening, a resting heart rate test using the Omron 705IT has revealed a reading of ______________BPM which is above the expected norms. In these instances we are referring patients to their GPs to seek advice as to whether they should participate in the workplace interventions. If you are happy for ________________________ to participate, please could you sign and return the attached slip to the above address.

Yours sincerely,

Professor Cheryl Haslam

GP Name _________________________________

Address ____

I am happy for ________________________ to participate in the workplace health promotion initiative being carried out by the Work and Health Research Centre to increase walking activity.

Signature Date

_________________________________ __________________

GP Information Sheet

In the UK and elsewhere in Europe, there are now twice as many workers aged 50 and over than those aged 25 years or younger. This trend looks set to continue well into the present century. The increasing age of the UK workforce presents major challenges for government, employers, occupational health services, workers and their families. A real opportunity now exists to develop solutions which support the quality of life and health of the UK workforce to enable individuals to remain in work for as long as they may need.

The Working Late project is a new study being carried out by the Work and Health Research Centre, Loughborough University. The project aims to assess the benefits of physical activity on employee health and work ability. This will explore sustainable ways in which employees can make small changes over the course of their working day that can help maintain a healthy active lifestyle.

Physical activity, such as walking, is a very important component of a healthy lifestyle and helps protect against a wide range of health problems. We have designed simple activity ideas based on walking for employees to implement into their daily routine. The programme will offer a suite of activities that they can tailor and pick to suit their needs. These will range from proactive ways to increase the amount they walk at work, to fun team based activities and challenges.

We are asking employees from a range of organisations to participate in this research. We will visit employees at their work site to take measures, track their individual progress and offer suggestions for improvements. Our suggestions will present gradual and realistic information based around walking activities. We believe that small changes will make a big difference over the course of the year. The research team will take measures at the beginning of the programme to gauge their starting point, and then at six months into the programme and at the end of the programme. Examples of the measures taken are:

- Activity levels (using a pedometer)
- Body weight and composition (using professional electronic scales)
- Waist circumference
- Blood pressure and resting heart rate
- Lifestyle and physical activity information
- Work ability and self reported general health
- Job satisfaction, morale and other attitudes to work

The workplace health promotion initiative is about encouraging walking activities, this is a moderate form of exercise and therefore carries low risks for anyone taking part as they are only being encouraged to increase everyday walking behaviours. The findings from this research will be used to assess the effectiveness of workplace physical activity initiatives in maintaining the health and wellbeing of employees.

We hope this satisfies all the information you need to make an informed decision about advising your patient to take part in this research study. If you do have any further questions, please contact the following researcher:

Aadil Kazi A.Kazi@lboro.ac.uk 01509 228484

Appendix 7.4: Recruitment poster

walking works
wonders

The Walking Works Wonders team will be in

Room: [ROOM NAME/NUMBER]

Building: [BUILDING NAME]

Date: [DATE]

Sign up online via Doodle

www.doodle.com/walkingworkswonders

Come and see us to receive your **FREE** pedometer and health screening assessment

Appendix 7.5: Informed consent form

Informed Consent Form

Investigators: Professor Cheryl Haslam, Dr Stacy Clemes, Miss Myanna Duncan, Mr Aadil Kazi

The purpose and details of this study have been explained to me. I understand that this study is designed to further scientific knowledge and that all procedures have been approved by the Loughborough University Ethical Advisory Committee.

- I have read and understood the information sheet and this consent form.
- I have had an opportunity to ask questions about my participation.
- I understand that I am under no obligation to take part in the study.
- I understand that I have the right to withdraw from this study at any stage for any reason, and that I will not be required to explain my reasons for withdrawing.
- I understand that all the information I provide will be treated in strict confidence and will be kept anonymous and confidential to the researchers.
- I understand that my age, height, weight, body composition and number of daily steps will be recorded and that they may be used anonymously in publications and presentations.

I agree to participate in this study.

Your name ____

Your signature ____

Signature of investigator ____

Date ____

******The body composition scales measure your total body water so please visit the toilet before your measurements are taken******

Appendix 7.6: Individual results feedback sheet

Date:

Time:

Walking Works Wonders

Outcome Measures

Checklist

- Screening and consent form ☐
- Questionnaire ☐
- Blood pressure/heart rate ☐
- Waist circumference ☐
- Height ☐
- Tanita scales ☐

TANITA
BODY COMPOSITION
ANALYZER
BC-418

21/SEP/2002 19:29

BODY TYPE	STANDARD
GENDER	MALE
AGE	34
HEIGHT	179 cm
WEIGHT	73.3 kg
BMI	23.9
BMR	7294 kJ
	1743 kcal
FAT%	13.1 %
FAT MASS	9.6 kg
FFM	63.7 kg
TBW	46.6 kg
DESIRABLE RANGE	
FAT%	8-20 %
FAT MASS	5.5-15.9 kg

Participant Number: ________

Height: ________ cm

Waist circumference: ________ cm

Waist/hip ratio: Waist ÷ Hip = ________

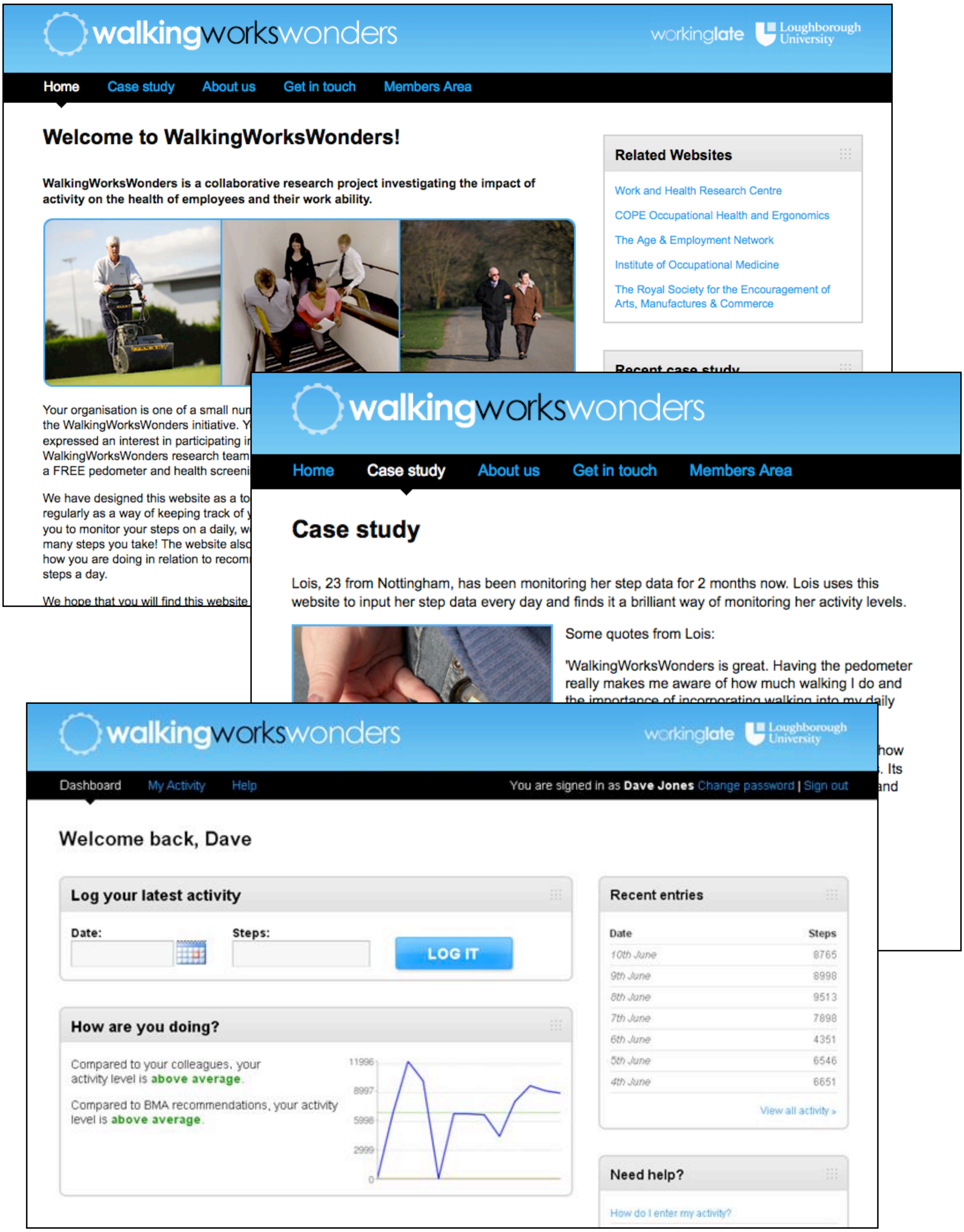
Blood pressure:	**Reading 1**	**Reading 2**	**Reading 3**
Systolic (top)	______ mmHg	______ mmHg	______ mmHg
Diastolic (bottom)	______ mmHg	______ mmHg	______ mmHg

Resting Heart Rate:	**Reading 1**	**Reading 2**	**Reading 3**
	______ bpm	______ bpm	______ bpm

www.walkingworkswonders.com

Appendix 7.7: Intervention website to record step counts

www.walkingworkswonders.com



Appendix 7.8: Considerations per site

Conducting research in organisations is challenging and researchers must be flexible to work with organisational changes that occur. This research study was undertaken during the height of the financial crisis and unstable economic period (2009–2012). Therefore, conducting research with organisations was even more challenging than usual as they considered consolidating and reducing the number of employees in their workforce. Furthermore, work processes and management agreement for the research varied in each site, even for those that were part of the same organisation. This section describes some of the experiences from each site that must be taken into consideration when understanding the return rates and intervention effects.

Site 1. Dundee

Control group intervention

This site was the most northern site in the British Isles and the job types included call centre and office based workers. At the end of intervention health assessment, the research team experienced the 165mph strong winds of Scotland's Hurricane Bawbag. Credit is due to the research team who decided to stay in Scotland and complete the period of data collection. During this time, employees who had a long commute to work were being advised to change their work hours to accommodate a safer journey to work. This storm could have had an impact on the number of participants who returned for their final health screening as the focus was on arriving and leaving work safely.

Site 2. Edinburgh

Standard group intervention

This site included office based workers in finance, HR and administrative departments. The end of intervention health assessment was held in two rooms where the research team were not as visible as the previous visits. Furthermore, during the period of the baseline and mid-intervention health assessments, the organisation had shut down a large proportion of the building and moved a number of teams to different areas onsite. Many of the participants were recruited in this site due to the visibility of the health screenings. However, it was encouraging that the number of participants who attended the end of intervention health assessment was similar to the number of participants that returned for their mid-intervention health assessment.

Site 3. Gipping

Standard group intervention

Recruitment numbers were expected to be low for several reasons that were specific to the nature of work involved on this site. Firstly, the number of employees who worked from this site was small in comparison to many of the other sites that were recruited. Secondly, the employees were responsible for a variety of maintenance and building work across the local borough. Therefore, the majority of the employees were working away from the site on contracts related to building and maintenance. Some examples of these job roles included landscape officers, refuse collectors, traffic enforcement officers and quantity surveyors. Thirdly, many of these out-of-office employees worked on early shifts, often starting at 6am and finishing at 2pm. The only opportunity these employees would get to attend a health assessment would be after work in their own time.

Site 4. Glasgow

Staged group intervention

This site included call centre employees working in a sales department. During the mid-intervention health assessment, the building looked noticeably empty and there were some floors that were completely unoccupied. After investigating this issue with the facilitator for the site, it was discovered the organisation had moved a number of staff into another building and had made large job cuts and redundancies from this site, as the organisation looked to reduce its total workforce by 10%. Furthermore, the organisation decided to lease the building to a number of external businesses. Citing confidentiality issues, the employee champion could not reveal the number of employees who had moved to the new site. There was no appropriate method for the researchers to accurately identify which participants had moved sites. The second site was half a mile away and there were no available rooms to make a last minute booking for a day of the mid-intervention heath assessments. Emails were resent requesting participants who were working in the new building to have a short walk and attend the health screenings but this did not have a significant impact. For the end of intervention health assessment, one day of testing was spent in each building. This did improve the overall return rate of participants for this site.

Glasgow building two

Site 5. Grafton

Staged group intervention

This site included public sector office type workers. At the mid-intervention data collection point the health screenings were taking place in a location that was not used or frequented by many of the employees on the site. Therefore, the visibility of the research was poor and return rates were reliant on the success of email contact. During the end of intervention health screenings, participants informed the researchers that the organisation was going through a change process where they were looking to reduce the number of employees from this site. As a result, employees were requested to reapply for their job roles and go through an interview process. During the week of the health screenings, there were still interviews in process and this may have had an impact on return rates, but also some of the outcome measures of the research programme.

Site 6. Ipswich

Standard group intervention

This site included IT technicians and there was an overwhelmingly positive response from the employees during the first health assessment in August 2010. Therefore, a second visit was conducted in October 2010 to recruit more participants into the research. The distribution of the intervention material for the second set of participants was conducted electronically using email. The baseline health assessments (recruitment visit 1 and recruitment visit 2) and mid-intervention assessment) were each held in the same room and building. The end of intervention health assessment was held in a room that was in a completely different building and located in a different area of the work site to that of the previous visits. Many of the returning participants arrived for their health assessments late and stated they did not notice the room change on the invitation emails. They first went to the original room, realised there were no assessors there, re-checked their emails and then rushed to the correct room. This must be noted as there were several (and a noticeably higher number than typical) participants who scheduled appointments for their end of intervention health assessment but did not attend. Some of these participants may have gone to the original room/building and either did not get an opportunity, or did not have sufficient time to re-check their email and come to the correct room/building. Furthermore, the researchers were not allowed to install the Walking Lunch component of the intervention (described in Chapter 6) and participants in this site did not experience the full intervention.

Site 7. Leeds

Control group intervention

This site included office based workers in finance, HR and administrative departments. The original recruitment/baseline health assessment for this site was scheduled from 29th November 2010 to 1st December 2010. However, the UK experienced heavy snow and some of the coldest nights on record at the end of November 2010. Therefore, on 29th November 2010, the first visit to this site was cancelled for safety reasons due to the risks of travelling in snow. It was rescheduled more than 2 months later to take into account the Christmas and New Year period. For the end of intervention health assessment, the employee champion for the site was out of work on maternity leave. There was no plan put in place before their departure to nominate a second employee champion for the site. An automated "out-of-office" reply provided details for another employee to contact on site for enquiries. However, with no background to the research project, this new contact responded with "*because it is not linked to project work I am not aware of this*" and provided details of a third contact. Fortunately, this third contact was a participant of the research who had also been in contact with the original employee champion. The employees at this site also appeared to be more interested and enthusiastic about participating in a health focused research programme. Therefore, even though this site was allocated to a control condition, return rates were expected to be higher than other sites where interest in the research was not as high and were allocated to other intervention conditions.

Site 8. Liverpool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Staged group intervention

Return rates for this site were predicted to be low due to several reasons. First of all, this site had the smallest number of participants recruited and would therefore yield smaller return rates. Secondly, after the first day of health screenings during the first visit, employees in this call centre experienced reluctance from their managers with taking time off to attend the health screenings. Thirdly, since it was a call centre, the researchers were expecting there to be a high level of staff turnover as per other call centre sites in the research.

The initial recruitment/baseline health assessment figure for this work site was lower compared to other work sites because the researcher did not have access to all the employees in the building. For security reasons, the employee champion for this site only made the research available to those working in the text relay department. The health assessments were located in a self-contained part of the building which could only be accessed by the employees working in this particular department. The text relay department is a call centre that handles calls from deaf, hard of hearing and speech impaired people using a text-phone to connect to people and businesses.

During the first day of testing for the recruitment/baseline health assessment, the managers permitted their employees to attend the health screenings during work time. The following day, the managers stopped allowing any more employees to attend these health screenings during work time and requested employees to use their break and/or lunch times. The managers explained they required telephone operators to remain on the phones to meet organisational service level agreements. This unanticipated policy change dramatically reduced the number of participants that could have been originally recruited. Furthermore, this policy change remained in place for the mid-intervention and end of intervention health assessments, which must be taken into account when considering the return rates.

Site 9. London

Staged group intervention

This was the organisation's head office and included office based workers – a large proportion of whom were teleworkers. There was an overwhelmingly positive response from the employees at this site during the first health assessment in July 2010. Therefore, a second visit was conducted in September 2010 to recruit more participants into the research. The distribution of the intervention material for the second set of participants was conducted electronically using email. During the recruitment for this site, there were no posters allowed to be put up inside the building. The recruitment relied upon the mass email originally sent out by the employee champion. Furthermore, the researchers were not allowed to install the Walking Lunch component of the intervention (described in Chapter 6) and therefore participants in this site did not experience the full intervention.

From all ten participating workplaces, this site was the most challenging in terms of organising the visits. For each of the three visits (recruitment/baseline, mid-intervention and end of intervention health assessment), a completely different employee champion was assigned. Each time a new contact was assigned, the research aims and methods, and the requirements from the particular site had to be explained. Furthermore, due to its nature as the headquarters for this organisation, room bookings were notoriously difficult to make, especially when trying to schedule the same room for two or three consecutive days. These factors lead to major delays in organising the health assessment visits for this site.

At the end of intervention health assessments, there were safety and security issues at this site due to the Occupy London protests, the main campsite of which was located directly opposite the building. It was not unusual to experience protestors outside the entrance to this work site. Due to the heightened level of security, it was difficult for the researchers to enter and leave the building during break times and at the beginning and end of each day of testing. Many of the employees who worked at this building were telecommuters or homeworkers, who during the strike period opted to work away from the site due to the increased levels of security. Therefore, this must be taken into account when considering the return rates.

Site 10. Newcastle

Standard group intervention

The nature of work at this site was primarily a customer service call centre. As with other call centres, the staff turnover at this site was extremely high. This was exacerbated by the fact the majority of staff at this site worked on temporary contracts employed by an external recruitment agency. Citing confidentiality issues, neither the employee champion nor the head recruiter for the recruitment agency would reveal staff turnover figures for the research period. Therefore, the poor return rates at this site were predicted to be a victim of staff turnover. Furthermore, the nature of work in a call centre is largely dictated by automatic call answering systems, meeting specific targets (e.g. Number of enquiries dealt with) and employees are usually overtly monitored by their line managers. Therefore, without the support of line managers to attend the health assessment, employees were unlikely to be allowed to simply disconnect their telephones from customer calls and attend a health assessment.

Appendix 8.1: Process evaluation interview schedule

1. Can you please tell me your age?

2. What made you attend the health screening in the first instance?

3. How did you find the process of the health screening? *(Prompt: Did you feel comfortable?)*

4. Did the information you obtain from the health screening meet your requirements? *(Prompt: Did any information surprise you? Did the information meet your expectations?)*

5. Did you find the information helpful?

6. Has the intervention taught you anything new about health and the effects of physical activity? If yes, please describe.

7. Did any of the health information make you think about changing your behaviour or lifestyle?

8. Have you found the pedometer useful?

9. Has your engagement in the health intervention had an impact on your day-to-day working life? *(Prompt: Do you use the stairs more/more aware of sitting time/change in travelling into work/walking groups with colleagues)*

10. Has your engagement in the health intervention had an impact on your family life at home? *(Prompt: Going for family walks/partner/children aware)*

11. Has the intervention changed your lifestyle with respect to physical activity? *(Prompt: Has it increased? Or decreased?)*

12. Has the intervention changed your lifestyle with respect to other health behaviours? *(Prompt: Nutrition, smoking)*

13. Do you feel any healthier since engaging in the intervention? (Prompt: In what ways? Can you give some examples?)

14. Have you noticed any changes in mental wellbeing, mood or outlook since engaging in the initiative?

15. Do you feel that your work performance has been affected since engaging in the initiative? *(Prompt: Do you feel more productive?)*

16. Have you been receiving the bi-monthly email bulletins? If so, how have you found this information?

17. Is there anything else you would find helpful to support you in continuing in the initiative? *(Prompt: More regular contact, more detailed information)*

18. Is there anything else you would like to discuss in relation to the initiative?