

# Towards an understanding of walking groups as a health promoting intervention

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## Abstract

Low levels of physical activity are a major cause of disease burden. This presents a serious health challenge. Despite the benefits of physical activity being widely promoted, inactivity remains pernicious. This is compounded by physical activity interventions tending to be placed in more affluent areas and taken up by those who are more educated and in better health.

Outdoor group walks have the potential to be a useful health intervention as they increase physical activity and are cost effective. However, a more extensive understanding is needed before they can be more widely promoted. This thesis sought to address this. Using mixed methods, it assessed any health benefits from group walking. It then evaluated their potential to influence health inequity. Finally, it sought to make recommendations to more effectively promote, and recruit to, walking groups for those people in poorest health.

This thesis demonstrates the wide ranging psychological and physiological benefits from walking groups. With good adherence and virtually no adverse effects they can be safely and confidently recommended by clinicians. Their potential to increase inequity has also been demonstrated. Firstly, they may not be set up in those areas in greatest need. Secondly, the lack of a 'bottom-up' community partnership approach precludes reach into deprived communities and long term sustainability. Thirdly, without effective partnerships and promotion of walking groups by health professionals, targeted recruitment of the most inactive and those in poorest health remains problematic. Finally, promoting the social element of group-based interventions creates a barrier to those who find such expectations inhibiting; rather better to give clear tangible advice about their health promoting benefits.

Outdoor walking groups are a safe and effective health promoting intervention but they should be developed and promoted judiciously to target those who would benefit the most and avoid potentially increasing intervention based inequity.

## Table of Contents

Abstract .....	2
Index of Figures and Tables .....	6
Abbreviations .....	7
Acknowledgments.....	8
Publications and statement of authorship .....	9
Publications arising from this thesis.....	9
Statement of jointly authored publications .....	10
Chapter 1: General Introduction.....	11
1.1 Background to the thesis .....	11
1.2 Notes on terminology .....	11
1.3 What is defined as physical activity and how much should adults do?.....	11
1.4 What is physical inactivity and why does it matter? .....	12
1.5 The benefits of physical activity and reducing inactivity .....	13
1.6 Relative risks from walking .....	14
1.7 Walking and walking groups.....	14
1.8 Health inequity .....	16
1.9 Do walking group interventions have the potential to widen inequity? .....	16
1.10 How can we effectively implement a walking group intervention in communities with poor health and socio-economic indicators? .....	17
1.11 Do walking groups present barriers to recruitment to those who could benefit the most?.....	18
1.12 Thesis methods and structure .....	19
Chapter 2: Is there evidence that walking groups have health benefits? A systematic review and meta-analysis. ....	21
Abstract.....	21
Introduction .....	22
Methods .....	23
Data sources .....	23
Study selection .....	25
Data extraction .....	26
Risk of bias in individual studies and across studies within meta-analyses .....	26
Synthesis of results and statistical analysis .....	27
Results .....	27
Study characteristics.....	29
Meta-analysis .....	31
Discussion.....	35
Principal findings .....	35
Strengths and limitations.....	35
Results in context of other published reviews .....	35

Conclusions and meaning of the study for clinicians .....	37
Unanswered questions and further research .....	37
Chapter 3: A spatial equity analysis of a public health intervention: A case study of an outdoor walking group provider within local authorities in England.....	61
Pre-amble .....	61
Abstract.....	61
Introduction .....	62
Methods .....	65
Walking for Health (WfH) scheme data .....	65
Health and socio-economic measures in Local Authorities (LAs) .....	65
Statistical analysis .....	67
Results .....	67
Discussion.....	72
Strengths and limitations.....	73
Conclusions and implications of this study .....	74
Chapter 4: Promoting outdoor group walking in areas of health and socio-economic deprivation: A process evaluation of the implementation of a new community based walking group scheme .....	75
Preamble.....	75
Abstract.....	75
Introduction .....	76
Methods .....	78
Research design.....	78
Setting .....	80
Participants and interview process.....	80
Documentary evidence .....	81
Data management and analysis.....	81
Findings .....	82
The context of the programme.....	82
Mechanisms for implementing the programme .....	82
Discussion.....	89
Strengths and limitations of our study .....	92
Conclusion .....	92
Recommendations .....	93
Chapter 5: Walking groups in socioeconomically deprived communities: A qualitative study using photo elicitation.....	94
Preamble.....	94
Abstract.....	94
Introduction .....	95
Methods .....	97

Setting and participants .....	97
Photo-elicitation process and interview framework.....	98
Data management and analysis.....	99
Findings .....	100
Places of everyday walking.....	100
Expectations from joining a walking group .....	103
Motivators to maintaining membership of the walking group scheme.....	104
The social aspect of the group.....	107
Discussion.....	109
Strengths and limitations.....	112
Conclusions and implications for practice.....	113
Chapter 6: Discussion and conclusions .....	114
Chapter overview .....	114
Summary of principal findings .....	115
The context of the findings and their implications for promoting walking groups as a health intervention.....	119
Reflections on the methods used in the thesis .....	123
Strengths and limitations.....	125
Suggestions for future research .....	127
Concluding comments.....	131
Appendices.....	132
Appendix I: Systematic review protocol .....	132
Appendix II: Research governance, participant information and consent.....	139
(Photo-elicitation study).....	139
Appendix III: Questioning framework for qualitative study in Great Yarmouth.....	151
Appendix IV Research governance, study information and consent .....	153
(Process evaluation study) .....	153
Appendix V Questioning framework for 'Walking champion' qualitative study.....	159
References .....	166

## Index of Figures and Tables

Figure 1: Overview of research methods used in the thesis .....	19
Figure 2: Systematic review search syntax for electronic databases .....	25
Figure 3: Systematic review flowchart .....	28
Figure 4: Example funnel plot (systolic blood pressure) .....	33
Figure 5: Key functions of a process evaluation. Taken from: Process evaluation of complex interventions, UK MRC guidance. Moore et al., (2014) .....	79
Figure 6: Recommendations to maximise the implementation and impact of walking groups in deprived communities .....	93
Table 1: Systematic review inclusion and exclusion criteria .....	24
Table 2: Systematic review summary results for all 42 studies .....	38
Table 3: Systematic review risk of bias for included studies .....	29
Table 4: Summary meta-analysis results: difference between baseline and end of intervention .....	32
Table 5: Meta-analysis full results .....	57
Table 6: WfH analysis. Variables generated to describe health and socio-economic measures within each local authority .....	66
Table 7: WfH analysis. Difference in health and socio-economic measures between local authorities (LA) with and without the provision .....	69
Table 8: WfH analysis. Health and socio-economic measures for each quintile of intervention in local authorities (LA) with the intervention .....	71
Table 9: Images captured by participants .....	100
Table 10: Timeline of the PhD thesis .....	124

## Abbreviations

BP	Blood pressure
BMI	Body mass index
CHD	Coronary heart disease
COPD	Chronic obstructive pulmonary disease
DoH	Department of Health
GP	General practitioner (family doctor)
LA	Local authority
NHS	National Health Service
NICE	National Institute for Health and Care Excellence
PA	Physical activity
PHE	Public Health England
UK	United Kingdom
WfH	The Walking for Health organisation
WHO	World Health Organisation

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## Publications and statement of authorship

### Publications arising from this thesis

Hanson, S., Jones, A. (2015) Is there evidence that walking groups have health benefits? A systematic review and meta-analysis, *British Journal of Sports Medicine* 49. pp. 710-715

This publication can be found at: <http://bjsm.bmj.com/content/early/2014/12/19/bjsports-2014-094157.long>

Hanson, S., Jones, A. (2015) A spatial equity analysis of a public health intervention: A case study of an outdoor walking group provider within local authorities in England. *International Journal for Equity in Health*, 14, 106.

This publication can be found at: <http://www.equityhealthj.com/content/14/1/106>

Hanson, S., Guell, C., & Jones, A. (2016). Walking groups in socioeconomically deprived communities: A qualitative study using photo elicitation. *Health and Place* 39. pp. 26-33

This publication can be found at:

<http://www.sciencedirect.com/science/article/pii/S1353829216000290>

## Statement of jointly authored publications

The research reported is my own original work which was carried out in collaboration with others as follows:

**Chapter 1:** Written by Sarah Hanson

**Chapter 2:** Sarah Hanson was the lead author of a paper published as:

Hanson, S., & Jones, A. (2015). Is there evidence that walking groups have health benefits? A systematic review and meta-analysis. *British Journal of Sports Medicine*, 49, 710-715.

Sarah Hanson and Andy Jones designed the protocol and the search strategy which was executed by Sarah Hanson. Sarah Hanson screened the initial results and extracted the data from the primary studies. Sarah Hanson drafted the original manuscript which was critically reviewed by Andy Jones.

**Chapter 3:** Sarah Hanson was the lead author of a paper published as:

Hanson, S., & Jones, A. (2015). A spatial equity analysis of a public health intervention: a case study of an outdoor walking group provider within local authorities in England. *International Journal for Equity in Health*, 14, 106.

Sarah Hanson and Andy Jones designed the study. Sarah Hanson extracted and analysed the data. Sarah Hanson drafted the original manuscript which was critically reviewed by Andy Jones.

**Chapter 4:** Sarah Hanson was the lead author on a paper which will be submitted as:

Promoting outdoor group walking in areas of health and socio-economic deprivation: A process evaluation of the implementation of a new community based walking group scheme.

Sarah Hanson and Andy Jones designed the study. Sarah Hanson conducted all interviews and led the analysis. Sarah Hanson drafted the original manuscript which was critically reviewed by Jane Cross and Andy Jones.

**Chapter 5:** Sarah Hanson was the lead author of a paper which was published as:

Hanson, S., Guell, C., & Jones, A. (2016). Walking groups in socioeconomically deprived communities: A qualitative study using photo elicitation. *Health and Place* 39. pp. 26-33

Sarah Hanson, Cornelia Guell and Andy Jones designed the study. Sarah Hanson conducted all interviews and led the analysis. Sarah Hanson drafted the original manuscript which was critically reviewed by Cornelia Guell and Andy Jones.

**Chapter 6:** Written by Sarah Hanson

# Chapter 1: General Introduction

## 1.1 Background to the thesis

Physical inactivity is a major cause of worldwide disease burden and early mortality (Lee et al., 2012). In contrast physical activity positively impacts health (Reiner et al., 2013, Friedenreich et al., 2010). Despite this, many people are not active enough to benefit their health. The burden of such preventable disease falls on those who are of poor socio-economic status. It is also a paradox that interventions to promote good health and prevent disease tend not to be taken up by people who have the greatest health need. One way to increase physical activity is through the use of outdoor walking groups. They are cheap, cost effective and require no special training or equipment and therefore have the potential to have wide appeal. However, there are some gaps in our understanding that need to be addressed before walking groups can be more widely promoted. Firstly, the health benefits and any side effects have not been assessed. Secondly, we do not know if walking groups have the potential to widen health inequity. Thirdly, there is a lack of understanding as to the best ways to set up, promote and recruit to walking groups for those people who might benefit the most. This study seeks to address this with four original research studies.

## 1.2 Notes on terminology:

The terms group walks, health walks and walking groups are used interchangeably throughout the text. Although walking groups may occur indoors, this thesis is restricted to outdoor group walks, whether this be urban or rural. A group in this case refers to more than two or more people on a walk led by a walk leader.

The terms 'health inequity' and 'health inequality' are both used in this text as considered most appropriate. Health inequity describes the unnecessary and avoidable inequalities in health between different groups of people. These inequities arise from inequalities within and between societies and are considered unfair and unjust (Whitehead, 1992, Marmot et al., 2010, World Health Organization, 2015b).

## 1.3 What is defined as physical activity and how much should adults do?

As defined by the World Health Organisation (WHO) physical activity includes:

*Leisure time physical activity (for example, walking, dancing, gardening, hiking, swimming), transportation (for example, walking or cycling), occupational (i.e. work), household chores, play, games, sports or planned exercise, in the context of daily, family, and community activities. It is recommended that adults aged 18–64 should do at least 150 minutes of moderate-intensity aerobic physical activity throughout the week or do at least 75 minutes of vigorous-intensity aerobic*

*physical activity throughout the week or an equivalent combination of moderate and vigorous-intensity activity. Aerobic activity should be performed in bouts of at least 10 minutes duration. For additional health benefits, adults should increase their moderate-intensity aerobic physical activity to 300 minutes per week, or engage in 150 minutes of vigorous-intensity aerobic physical activity per week, or an equivalent combination of moderate and vigorous-intensity activity. Muscle-strengthening activities should be done involving major muscle groups on 2 or more days a week.*

World Health Organization (2015a)

The UK Chief Medical Officers guidelines align with this, suggesting that adults should:

*Aim to be active daily. Over a week, activity should add up to at least 150 minutes of moderate intensity activity in bouts of 10 minutes or more – one way to approach this is to do 30 minutes on at least 5 days a week. Alternatively, comparable benefits can be achieved through 75 minutes of vigorous intensity activity spread across the week or combinations of moderate and vigorous intensity activity. Adults should also undertake physical activity to improve muscle strength on at least two days a week. All adults should minimise the amount of time spent being sedentary (sitting) for extended periods.*

Department of Health (2011)

#### 1.4 What is physical inactivity and why does it matter?

Physical inactivity is defined as less than 30 minutes of moderate intensity physical activity per week (Department of Health, 2011). In 2013 in England 12.5 million adults were inactive (Sport England, 2013a). Current trends indicate that by 2030 the average British person will use only 25% more energy than if they had spent the day in bed (Ng and Popkin, 2012, Nike, 2012). Inactivity makes a major contribution to early mortality. It has been estimated that inactivity causes 6% of the worldwide burden of disease from coronary heart disease (CHD), 7% of type 2 diabetes and 10% of breast and colon cancers (Lee et al., 2012). For the United Kingdom, these figures are even higher, for example, 13% of type 2 diabetes; 18.7% and 17.9% of colon and breast cancers respectively and 16.9% of premature all-cause mortality are estimated to be caused by inactivity (Lee et al., 2012).

Physical inactivity is one of the main risk factors for CHD which is one of the major causes of premature death in England and associated with 34% of all deaths (National Institute for Health and Care Excellence, 2010). In fact, the effects of physical inactivity have a similar effect on life expectancy as the well-recognised risk factors of smoking and

obesity (Lee et al., 2012). There are economic, as well as human costs to inactivity. The recent 'Start Active, Stay Active' report starkly lays out the financial burden of inactivity (Department of Health, 2011, p. 14). The estimated direct cost of physical inactivity to the NHS across the UK is £1.06 billion. This is based upon five conditions specifically linked to inactivity: coronary heart disease, stroke, diabetes, colorectal cancer and breast cancer. This figure represents a conservative estimate, since it excludes the costs of other diseases and health issues, such as osteoporosis and falls, which affect many older people (Allender et al., 2007).

### 1.5 The benefits of physical activity and reducing inactivity

In contrast to the effects of inactivity on health and mortality, regular physical activity positively impacts health. It is more than fifty years since Jerry Morris and colleagues published their landmark paper showing the link between physical activity at work and CHD, with men in physically active jobs (e.g. postmen and bus conductors) less likely to die from cardiac infarction than office clerks and bus drivers (Morris and Crawford, 1958, Blair and Morris, 2009). Since then, physical activity has been shown to have wide ranging long term health and wellbeing benefits across all socio-economic and ethnic groups and sexes (Das and Horton, 2012). It potentially offers similar effects to some drug interventions in terms of mortality benefits, and has been suggested as an alternative or adjunct to conventional drug therapy (Naci and Ioannidis, 2013). In England it is estimated that if everyone met government physical activity guidelines 37,000 deaths could be prevented (Public Health England, 2013a). Using 15 longitudinal studies with at least five years of follow-up, Reiner et al. (2013) found evidence that physical activity could help in the prevention of both non-communicable and age related disease. Older adults who are physically active have a 30 – 50% lower risk of developing functional and cognitive limitations. As these are contributing factors to a reduction in independent living, physical activity in this age group could delay the need for care in older adults (Potter et al., 2011, Sofi et al., 2011). As the population lives longer, the benefits of physical activity to health in later life could therefore substantially reduce the burden on health and social care services.

The largest gains to health in the reduction of chronic disease would come from the inactive becoming active by doing even a little exercise (Department of Health, 2011). There are 326 local authorities in England. A recent report suggested that inactivity is costing each of these £18 million per 100,000 people per year and that reducing inactivity by just 1% per year over a five year period would save local authorities £1.2bn (UK Active, 2014). Globally, if inactivity decreased by 10% more than 533,000 deaths could be averted each year (Lee et al., 2012). Recent research has shown that the greatest gains to population health could come from inactive individuals becoming moderately

active by undertaking exercise equivalent to just 20 minutes of brisk walking each day, conferring a reduced risk of premature death of between 16-30% (Ekelund et al., 2015).

However, despite widely available government campaigns such as Change4life (NHS choices, 2013) to promote physically active lifestyles, few are active enough to be of benefit to general health. In England, for example, in 2013- 2014 29% of adults undertook less than 30 minutes of moderate physical activity per week and a further 16% were insufficiently active to benefit their health (Sport England, 2013b). About 8% do not even walk continuously for five minutes over four weeks (Farrell et al., 2013).

## 1.6 Relative risks from walking

For clinicians and health trainers promoting health it is important to understand the balance of risk to benefit from involvement with physical activity interventions. A randomised controlled trial of an unsupervised home-based walking programme with male participants with cardiovascular disease, or with multiple risk factors for cardiovascular disease, found low incidence of adverse events (Goodrich et al., 2007). The adverse events described were one serious event with a participant experiencing symptoms of dizziness and breathlessness following a walk which was subsequently attributed to atrial fibrillation that resulted in a brief hospitalization for observation but resumed the walking programme. The other adverse symptoms were non-serious and related to minor musculoskeletal complaints (cramping and muscle soreness); skin problems (one participant with blisters and another with rashes from wearing an accelerometer belt) and low back pain aggravated by a walk. The authors concluded that chronically diseased individuals can start a walking programme with low risk of serious physical activity related adverse events (Goodrich et al., 2007). A more recent study evaluated the risks from air pollution to walkers and cyclists and concluded that the benefits of active travel outweighed the harm caused by air pollution in all but the most extreme air pollution concentrations (Tainio et al., 2016).

## 1.7 Walking and walking groups

Almost twenty years ago Jerry Morris and Adrienne Hardman were espousing the wide ranging beneficial effects of walking: that it was a natural activity with no special skills or equipment; the main option for sedentary populations and accessible to all but the most severely disabled (Morris and Hardman, 1997).

*Any amount of walking, and at any pace, expends energy. Hence the potential, long term, of walking for weight control. Dynamic aerobic exercise, as in walking, enhances a multitude of bodily processes that are inherent in skeletal muscle activity, including the metabolism of high density lipoproteins and insulin/ glucose*

*dynamics. Walking is also the most common weight-bearing activity, and there are indications at all ages of an increase in related bone strength.*

Morris and Hardman (1997, p. 307)

Walking at a pace of 3-5m/hour (5-8 km/hour) expends sufficient energy to be classified as moderate intensity (Ainsworth et al., 2011). Recent systematic reviews and meta-analyses have shown walking to have various health benefits including positive effects on fitness, weight and resting blood pressure (Murphy et al., 2007); blood pressure control (Lee et al., 2010); weight loss (Richardson et al., 2008); depression (Robertson et al., 2012) and cardiovascular disease risk disease prevention (Hamer and Chida, 2008).

Whilst for most people walking expends enough energy to be considered 'moderate intensity' activity, for those individuals who are particularly unfit, walking at a pace of 3mph can achieve activity that is actually of vigorous intensity thus conferring associated health gains (Kelly et al., 2011). Walking is therefore a sensible starting point for people overcoming inactivity (Murtagh et al., 2002). The simplicity of walking without high costs also makes it one of the best ways to achieve recommended daily amounts of physical activity (ACSM, 2011). One way to engage people with walking is through direct interventions such as walking groups (Public Health England, 2014a, Lamb et al., 2002). Walking groups are typically short walks of under an hour in the natural environment, run by trained lay people. Examples are, 'Walking for Health' (Walking for Health, 2015) in England, 'Paths for all' in Scotland (Paths for All, 2014) and 'Heart Foundation Walking' in Australia (Heart Foundation Walking, 2014). Walking group schemes are a widely recommended way of increasing physical activity and have been shown to be effective at the population level (National Institute for Health and Care Excellence, 2012b, Centers for Disease Control and Prevention, 2012, Public Health England, 2014b).

Group walking has the potential to address some of the well-known determinants of physical activity that present barriers to involvement. These include cost, as group walking incurs relatively low cost to the participant beyond comfortable footwear. Further, group walks can be easily accessible in local neighbourhoods in both urban and rural areas, walking with others could promote confidence in engaging in activity, and the structure of a group set-up may motivate regular involvement.

Group walking is a potentially attractive physical activity intervention that has particular potential to engage those who are interested in the outdoors, whether for leisure or as a health intervention, and has been found to be cost effective in increasing physical activity (Gusi et al., 2008). A systematic review Ogilvie et al. (2007) concluded that people could be encouraged to walk more if interventions were tailored to their needs and targeted at the most sedentary or at those most motivated to change and that group based approaches, such as the social support of walking groups, are one method of delivering

this. In a more recent review, walking groups were found to be efficacious at increasing physical activity, particularly when targeted at older adults (Kassavou et al., 2013).

However, the benefits to health from increasing physical activity are greater than simply increasing fitness levels, and the wider health benefits of walking groups had not been quantified. This forms **research question one** and is addressed and presented in **Chapter 2: Is there evidence that walking groups have health benefits? A systematic review and meta-analysis**. The aim of this review was to understand whether there was evidence that outdoor walking groups show health benefits and therefore could be recommended by clinicians as a health intervention.

## 1.8 Health inequity

The term health inequity describes the unnecessary and avoidable inequalities in health between different groups of people. These inequities arise from inequalities within and between societies and are considered both unfair and unjust (Whitehead, 1992, World Health Organization, 2015b). Many health interventions focus on unhealthy behaviours which are a key contributor to non-communicable disease mortality and disease burden. Such diseases are largely preventable but are disproportionately prevalent in poor and disadvantaged communities, with evidence that this disparity is increasing (Buck and Frosini, 2012, World Health Organization, 2008). Additionally, there is a concern that many interventions designed to improve health may not be reaching the most disadvantaged, as was recognised by the UK Government following the publication of the 'Wanless Report' of 2004 (Wanless D, 2004). It has been observed that there is often a disparity whereby uptake and provision of preventative interventions is socially patterned and are more likely to be successful amongst the more affluent, a process which has been coined the 'inverse prevention law' (Acheson, 1998). This also applies to physical activity interventions.

Physical inactivity is also known to be socially patterned whereby those in most need make least use of physical activity interventions (Farrell et al., 2014, World Health Organization, 2008, Gidlow et al., 2006). For example, recruitment strategies to walking interventions have been found to result in the uptake of mostly white, well-educated, middle aged women with poorest uptake for men in community settings (Foster et al., 2011).

## 1.9 Do walking group interventions have the potential to widen inequity?

The systematic review and meta-analysis presented in Chapter 2 found that outdoor walking groups have multiple health benefits (Hanson and Jones, 2015a). However, this review also noted that there was a lack of socio-economic information, which raises the concern that they may be utilised by better-off groups of people and have the potential to increase health inequity. 'Walking for Health' (WfH) is England's largest network of lay-led



health group walks with 70,000 regular walkers, 10,000 volunteer walk leaders and approximately 3,000 free short walks weekly in the natural environment (Walking for Health, 2013). Using national data for England on the geographical provision of health walks this case study sought to answer **research question two. Do walking groups operate in those places with the greatest health need and therefore have the potential to influence inequity? The findings of this study are presented in Chapter 3.**

### 1.10 How can we effectively implement a walking group intervention in communities with poor health and socio-economic indicators?

The systematic review and meta-analysis presented in Chapter 2 provided evidence of the health benefits of group walking (Hanson and Jones, 2015a). However, walking group interventions could create health equity issues. This is a concern. Firstly, as with other health promoting interventions, they may be more attractive to those that need them least (Foster et al., 2011). Secondly, as presented in Chapter 3, they might not be set up in areas that have the poorest health and socio-economic indicators (Hanson and Jones, 2015b). Without reaching into communities with the poorest health and socio-economic indicators there is a concern that walking groups, alongside other health promoting interventions, could potentially add to widening health inequity (White et al., 2009).

Community-centred approaches are viewed as central to the National Health Service (NHS) plan to change the way that health services are delivered (Public Health England, 2015a). One tenet on this is utilising volunteers to support and organise activities around health and wellbeing in their communities (Public Health England, 2015a). Such volunteers are non-professional i.e. lay people and receive some training and support to undertake activities, such as health promotion. **Research study three** evaluated the process of implementing a new community walking group scheme organised within areas of health and socio-economic deprivation in Norwich, England. **The aim was to identify the essential elements that facilitated the implementation, impact and sustainability of the scheme and those that represented barriers. Secondly to produce a set of recommendations based on the learnings from this on how to best implement physical activity interventions in deprived communities to maximise their impact. This study is presented in Chapter 4.**

## 1.11 Do walking groups present barriers to recruitment to those who could benefit the most?

The success of walking group recruitment is often judged by the number of participants rather than the presence of those who would stand to benefit the most (Matthews et al., 2012). As easily recruited participants tend to be those who already walk, recruiters continue to be challenged about how to persuade those who do not walk to walk often. Walking purely for recreation purposes is the most popular form of physical activity across all socioeconomic groups in England, but those of the highest social class are nearly twice as likely to partake in recreational walking compared to those in the lowest (46% compared with 25%) (Fox and Rickards, 2004). There is therefore a need to identify approaches that reflect the needs and expectations of 'hard to reach' groups, such as the most deprived, to improve the delivery of walking interventions (Foster et al., 2011). Without understanding individual needs and participants' life situations, there is a potential for barriers to be created for those who are in the greatest health need (Matthews et al., 2012). The aim of **research study four** was to **better understand barriers and non-participation in walking groups for particular social groups** and thus how they can be more effectively promoted to target people who would stand to benefit most. This study worked with a newly formed walking group in an area of social and health deprivation with participants who had multiple health problems. It explored a targeted approach to recruitment to group health walks as participants had been referred by their family doctor under the UK national exercise referral scheme (ERS) (National Institute for Health and Care Excellence, 2014a). All had multiple health problems that could benefit from walking group participation. **The findings from this study are presented in Chapter 5.**

**Chapter 6** summarises the principle findings from each study and offers some thoughts about future research to build on this thesis.

## 1.12 Thesis methods and structure

Both quantitative and qualitative methods were used to address the research questions that together form this thesis. This is pictorially shown as four jigsaw pieces to represent the contribution of each part. See Figure 1.

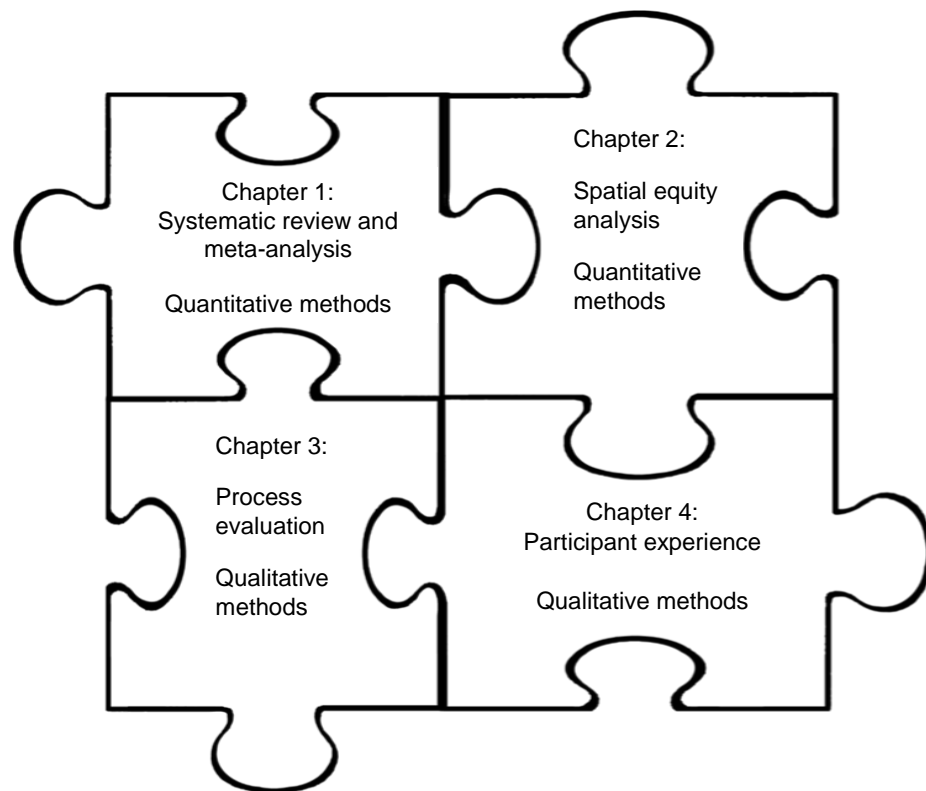


Figure 1: Overview of research methods used in the thesis

A mixed methods approach was considered appropriate. The central premise of mixed methods is that the use of qualitative and quantitative approaches in combination provides a better understanding of the research questions than either approach alone (Creswell and Clark, 2007). This thesis is a series of independent studies, asking different research questions; using different methods and reported separately. In combination the learning from each study complements each other and builds evidence to increase our understanding of walking groups as a health promoting intervention. The method for each study is separately explained within each chapter.

This thesis is presented as a series of four original research studies. They have either been published or are under review at the time of completion of this thesis. This is outlined in the publications and statement of authorship section. Each study builds on the other and together they add to our understanding of group walking as a health promoting intervention. Each is presented as a separate chapter with a pre-ambule at the beginning of Chapters 3, 4 and 5 to contextualise the findings of each study to its preceding chapter and within the thesis as a whole.

Chapter 2: This study assesses the health benefits of outdoor walking groups. This review used systematic review with multiple meta-analysis methods to examine the differences in commonly used physiological, psychological and well-being outcomes between baseline and the end of group walking interventions. It also assessed whether there are any adverse side-effects from participating in a walking group.

Chapter 3: There is a concern that health interventions may not be provided in areas with poor health and socio-economic indicators and therefore may not be available to those who need them most. This study used a case study approach using data from the largest provider of health walks in England. This study examined the provision of health walks in each of the 326 local authorities in England against a range of health and socio-economic indicators. It aimed to understand whether walking groups have the potential to influence health inequity.

Chapter 4: This study worked with a walking scheme in the city of Norwich in England as it set up a new walking group provision in areas with poor health and socio-economic indicators. This study used a qualitative approach with stakeholders and volunteer walk leaders organised around the key functions of a process evaluation. It aimed to add to our understanding of how to effectively implement walking group interventions, especially in deprived communities.

Chapter 5: In addition to health interventions not being organised in areas with health needs there is also a concern that they might not attract those people who would stand to benefit the most. This study used a qualitative approach with participants in a new walking group operating in an area with poor health and socio-economic indicators. It aimed to better understand barriers and non-participation in walking groups and thus how they can be more effectively promoted, particularly in deprived neighbourhoods.

Chapter 6: This chapter summarises the principal findings and concludes the thesis. It also reflects on the methods used. It contextualises the findings within the wider literature with implications for practice and recommendations for future research.

## Chapter 2: Is there evidence that walking groups have health benefits? A systematic review and meta-analysis.

### Abstract

Despite walking groups being popular and with recent evidence that they increase physical activity, the wider health benefits have not been quantified. Using systematic review and meta-analysis methods this review was undertaken to assess the health benefits of outdoor walking groups examining differences in commonly used physiological, psychological and well-being outcomes between baseline and end of the walking group intervention. The data sources used were seven electronic databases, clinical trial registers, grey literature, and reference lists in English language up to November 2013. To be eligible for inclusion the participants in the studies were adults; the intervention was an outdoor walking group and the outcomes had to be directly attributable to the walking intervention. Forty-two studies were identified involving 1,843 participants. Meta-analysis showed statistically significant reductions in mean difference for systolic blood pressure -3.72mmHg (-5.28 to -2.17) and diastolic blood pressure -3.14mmHg (-4.15 to -2.13); resting heart rate -2.88bpm (-4.13 to -1.64); body fat -1.31% (-2.10 to -0.52), body mass index -0.71kg/m<sup>2</sup> (-1.19 to -0.23), total cholesterol -0.11mmol/L (-0.22 to -0.01) and statistically significant mean increases in VO<sub>2</sub> max of 2.66 ml/kg/min (1.67 to 3.65), the SF-36 (physical functioning) score 6.02 (0.51 to 11.53) and a 6 minute walk time of 79.6 metres (53.37, 105.84). A standardised mean difference showed a reduction in depression scores with an effect size of -0.67 (-0.97 to -0.38). The evidence was less clear for other outcomes such as waist circumference fasting glucose, SF36 (mental health) and serum lipids such as HDL. There were no notable adverse side effects reported in any of the studies. The conclusion from this review is that outdoor walking groups are effective and safe with good adherence and wide ranging health benefits. This review provides clinicians with evidence of a further effective option to recommend to those patients who would benefit from increasing moderate physical activity. Outdoor walking groups could therefore be a promising intervention as an adjunct to other healthcare or as a proactive health-promoting activity.

## Introduction

Regular physical activity positively impacts health potentially offering similar effects to some drug interventions in terms of mortality benefits. It has even been suggested as an alternative or adjunct to conventional drug therapy (Naci and Ioannidis, 2013). Walking at a pace of 3-5m/hour (5-8 km/hour) expends sufficient energy to be classified as moderate intensity (Department of Health, 2011) It is also an easy and accessible way of meeting physical activity recommendations (Morris and Hardman, 1997). Systematic reviews and meta-analyses have shown walking to have various health benefits including positive effects on fitness, weight and resting blood pressure (Murphy et al., 2007); blood pressure control (Lee et al., 2010); weight loss (Richardson et al., 2008); depression (Robertson et al., 2012) and cardiovascular disease risk disease prevention (Hamer and Chida, 2008).

Despite evidence and government campaigns such as Change4life (NHS choices, 2013) to promote physically active lifestyles, few are active enough to be of benefit to general health. In England for example, 29% of adults do less than 30 minutes of moderate physical activity per week (Sport England, 2013b) and about 8% do not even walk continuously for five minutes over four weeks (Farrell et al., 2013). The impact of interventions in primary care to reduce inactivity appears limited. Simple advice to be more active has only moderate yet short-term effects and an effective way of increasing physical activity and improving associated health indicators whilst also making the most efficient use of doctors' resources has yet to be determined (Pavey et al., 2011, Hillsdon et al., 2002, Orrow et al., 2012).

One way to promote and sustain walking behaviours at the population level may be through the provision of outdoor walking groups (Lamb et al., 2002). Walking groups are typically short walks of under an hour in the natural environment, run by trained lay people. An example of such is 'Walking for Health', a scheme originally set up by an Oxford General Practitioner in 2000. It is England's largest network of lay-led health group walks with 70,000 regular walkers, 10,000 volunteer walk leaders and approximately 3,000 short walks offered every week (Walking for Health, 2015). Group walking is a potentially attractive physical activity intervention that has particular potential to engage those who are interested in the outdoors, whether for leisure or as a health intervention and has been found to be cost effective in increasing physical activity (Gusi et al., 2008). Additionally, the dynamics and social cohesion of walking groups may have supportive effects that encourage and sustain adherence and positive attitudes towards physical activity (Kwak et al., 2006) as well as companionship and a shared experience of wellness (Doughty, 2013). A systematic review in 2007 concluded that people could be encouraged to walk more if interventions were tailored to their needs and targeted at the most sedentary and that group based approaches, such as the social support of walking

groups, are one method of delivering this (Ogilvie et al., 2007). In a more recent review, walking groups were found to be efficacious at increasing physical activity, particularly when targeted at older adults (Kassavou et al., 2013). However, it remains that the benefits to health from increasing physical activity are greater than increasing fitness levels, yet no review to date has attempted to quantify the wider health benefits of walking groups. Hence this review has been undertaken to understand whether there is evidence that outdoor walking groups show wider health benefits as an intervention and therefore could be recommended by clinicians.

## Methods

This systematic review followed requirements of the NHS National Institute of Health Research Centre for Reviews and Dissemination (University of York: Centre for reviews and dissemination, 2013) and the PRISMA statement for reporting studies that evaluate healthcare interventions (Liberati et al., 2009, Moher et al., 2009). Methods of the analysis and inclusion criteria were specified in advance and documented in a protocol registered as CRD42013006397 (University of York: Centre for reviews and dissemination, 2013). The protocol can be found in Appendix I: Systematic review protocol and is available online at: <http://www.crd.york.ac.uk/prospero/>.

## Data sources

The search used electronic databases; clinical trials registers; by scanning reference lists of articles; and from grey literature. For the electronic databases the search with specific search terms was applied in to AMED, Embase, MEDLINE (R) in process and other non-indexed citations and PsycINFO (sourced through OVID); SportDiscus and CINAHL (sourced through EBSCO) and SCOPUS with no date restriction. Databases were selected to best represent source material in health, allied health, physical activity and human science. Clinical trials registers were searched through the UK clinical trials research network study portfolio; clinicaltrials.gov and controlledtrials.com. Grey literature included reports from Natural England, Walking for Health and the National Institute for Health and Care Excellence. Additionally, reference lists from included studies and systematic reviews on exercise and walking were hand searched. The search was completed in November 2013.

Inclusion criteria were studies of outdoor walking groups involving adults with measured physiological, psychological or wellbeing outcomes. The search was restricted to papers published in English. The inclusion criteria are further detailed in Table 1.

**Table 1: Systematic review inclusion and exclusion criteria**

Inclusion	Exclusion
Adults from the age of 19	Youths and children up to and including 18
Interventions where people walk as part of a defined walking group intervention	Studies that do not involve a walking group intervention, e.g. they walk with a physiotherapist
Where the walking is group based, or where the walking is predominantly group based but participants may also walk on their own to supplement this	Participants walking only rarely in groups, or walking on their own, such as home-based or pedometer based programmes with no group walking
Walking outdoors or walking predominantly outdoors but occasionally indoors (e.g. inside tracks or shopping malls for weather reasons)	Walking indoors or predominantly indoors
Studies that compare group walking with group Nordic walking where group walking can be isolated as an intervention and the outcome directly related to group walking	Studies examining Nordic walking only
Studies with physiological, psychological or wellbeing outcomes such as blood profiles (e.g. lipids, HbA1c), cardiovascular measures (e.g. BP), psychological (e.g. Beck depression inventory), wellbeing (e.g. EQ5D)	Studies where the outcomes are solely physical activity such as step outcomes or logs of physical activity
Studies where the outcome can directly be related to the walking group intervention	Studies with a mixed intervention (e.g. walking with calcium supplements or walking combined with a health education intervention) where the outcome cannot be isolated and directly attributed to group walking
Papers and documents written in English	Papers and documents not written in English



Search terms were developed with reference to the previous systematic reviews on walking (Ogilvie et al., 2007, Kassavou et al., 2013) and key words from relevant studies. They were piloted to ensure that known studies were identified. The search syntax for the electronic databases is detailed in Figure 2. For clinical trials registers, the only search term was 'walking' within the title.

1. "walk\* program\*".af.
  2. "walk\* intervention" .af.
  3. "health walk\*".af.
  4. "nordic walk\*".af.
  5. "walk\* group\*".af.
  6. "walk\* club\*".af.
  7. "lay led walk\*".af.
  8. "community based walk\*".af.
  9. "community walk\*".af.
  10. "walk\* scheme\*".af.
  11. "walk\* for health". af.
  12. "group physical activity". af.
  13. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12
  14. remove duplicates from 13
  15. limit 14 to "all adult (19 plus years)"
  16. limit 15 to English language
- af represents all fields  
\* or \$ sign used as truncation wildcard as appropriate to each database

Figure 2: Systematic review search syntax for electronic databases

### Study selection

All studies where the outcome could be directly attributable to the group walking were included. This included studies where walking was the control group. All studies were reviewed by me, as the first reviewer, and duplicates or the clearly irrelevant, for example, walk-in centres, using Wii-fit, or studies using children or animals that had not been screened out by the database filters were excluded. A particular issue with the assessment of the studies was that the phrase 'walking group' often related to a walking arm of a study, or a group within a trial that could walk, and not a 'walking group' per se. Additionally, there was commonly little information within the abstract about the setting of the intervention, for example, treadmill or indoor circuit based interventions or home

based solo interventions with physical activity diaries and pedometers. Therefore, most studies were retrieved as full texts and scanned for intervention information to ensure that none were excluded incorrectly. Due to the generally poor description of the intervention, forty authors were contacted to confirm whether the study was an outdoor intervention and that they walked as a group. To further ensure that studies had been correctly excluded, 15% of the excluded studies were selected by random number generation and screened by the second reviewer (Professor Andy Jones). All papers were found to have been excluded correctly and therefore no further excluded studies were reviewed.

### Data extraction

A data extraction sheet was developed by both reviewers to summarise the study; the population; walking group characteristics; the intervention (volume and intensity), adherence and outcomes. This was piloted on five manuscripts and refined accordingly. Data was extracted by the first reviewer into a coding frame using Microsoft Excel, synthesised and then tabulated.

### Risk of bias in individual studies and across studies within meta-analyses

As not all studies were randomised controlled trials a tool used by Ogilvie et al. (2007) was adapted to assess risk of bias and internal validity (Deeks et al., 2003). There were nine items on a binary scale with zero representing a risk of bias present. An absence of explanation in the text was also scored zero. These were:

1. Randomisation: Was there sufficient description of a randomisation process or statistical test to show that comparability between the two groups has been adjusted for (no explanation scores scored zero)?
2. Exposure: Did the authors show that there was no evidence of a concurrent intervention which could have influenced the results (no explanation scores zero)?
3. Representativeness: Were the study samples shown to be representative of the study population?
4. Comparability: Were baseline characteristics of the intervention comparable with the control or were potential confounders at baseline appropriately adjusted for in analysis?
5. Attrition: Were numbers of participants at follow-up identifiable as at least 80% of the baseline?
6. Follow-up tools: Were valid and reliable tools used to assess participant outcomes?
7. Follow up time-scale: Was the time to follow up assessment of a period no less than one month?
8. Precision of the results: Were confidence intervals or p-values given?
9. Was there evidence presented that the study was sufficiently powered at follow up assessment? (no evidence or underpowered scores zero)

*Please note that these items were decided a-priori but item 9 is not within the protocol (appendix I) due to a typographical error.*

Publication bias across studies within the meta-analysis was tested with funnel plots using standard error as the measure of study size on the vertical axis and mean difference on the horizontal (Sterne and Egger, 2001).

### Synthesis of results and statistical analysis

Data for the final studies were synthesised with results for each study recorded as change from baseline to the end of the intervention ( $\uparrow\downarrow$ ) with p values where available. Non-significant (ns) or imprecise p values, such as  $p > 0.05$  were used only when this was the only available information. No assumptions were made about walking outside the group provision. To establish the mean difference between baseline and the end of intervention for meta-analysis, baseline and end of intervention data was used with standard deviation /error and sample size. All data were continuous and a difference in means was used except for one analysis. For depression a standardised mean difference was used to account for the different outcome measurements used in the five studies that were analysed. There was no need for data to be transformed as a reduction in value indicated an improvement in health in all four outcome measures within this analysis. A fixed effects model was used for all analyses representing a more conservative measure than a random effects model (Higgins and Green, 2011). Where data were given for different sub-groups, each was input separately and combined in meta-analyses using the RevMan software package, Version 5.2 (Cochrane Collaboration, 2012). All results are presented with 95% confidence intervals. The  $I^2$  statistic was used to test for heterogeneity.  $I^2$  values of 30-60% and 50-90% were taken to represent moderate and substantial heterogeneity respectively (Higgins and Green, 2011).

### Results

The initial database search yielded 5,145 citations. In addition, the other supplementary sources produced a further 60 studies. Of these 5,205 studies, 4,627 were removed as duplicates or as clearly irrelevant after reviewing titles. The abstracts of 578 articles were screened and any that did not provide enough information were retrieved for full text evaluation. A total of 150 papers were read as full texts to be assessed for eligibility. The remaining 46 articles were put forward for review and independent assessment by the second reviewer. From this, 10 papers were discussed between the two reviewers. Three studies were excluded due to a lack of information despite repeated attempts to contact authors as both reviewers lacked confidence that the intervention was group based and outdoors. One was excluded on further discussion between the reviewers due to the walking being primarily self-directed. In total, 42 studies met the inclusion criteria and were eligible to be included in the synthesis. Walking groups were used as a control in seven of the studies. The review flowchart is detailed in Figure 3.

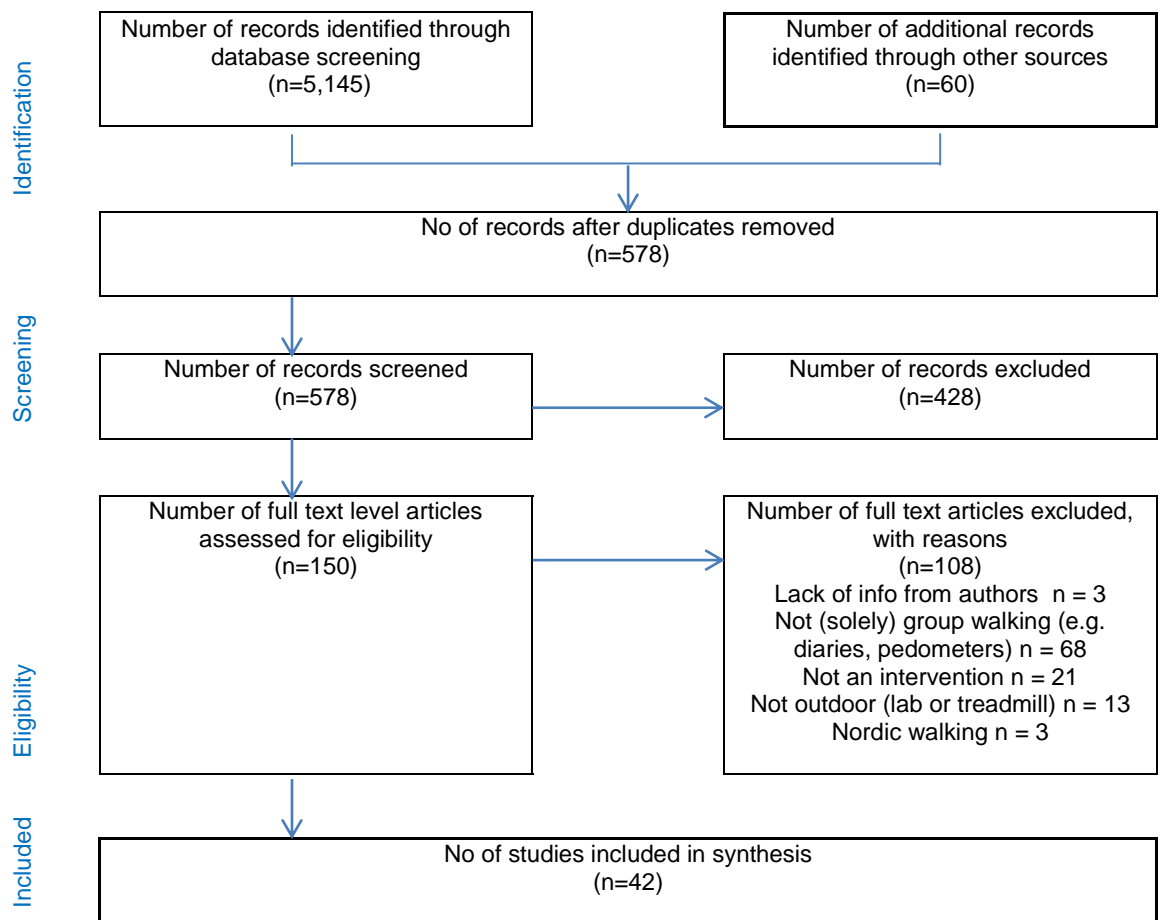


Figure 3: Systematic review flowchart

The characteristics and synthesised results from all 42 studies are detailed in Table 2 which can be found at the end of this chapter.

All 42 studies were assessed for risk of bias. This is presented in Table 3. Risks are presented on a binary scale with zero representing risk of bias present. No study was excluded due to a low quality score. Assessments of quality were made by the first reviewer and 20% of the studies were chosen by random number generation and checked by the second reviewer. An inter-rater reliability analysis using the Kappa statistic was performed to determine consistency among raters and found to be Kappa 0.66 ( $p < 0.001$ ) representing substantial agreement.

**Table 3: Risk of bias for included studies**

Author	Study type	Risk of bias items (zero represents risk of bias present)									Total Score
		1	2	3	4	5	6	7	8	9	
Armstrong	RCT	1	0	1	1	1	1	1	0	1	7
Bjersing	RCT	1	0	1	1	1	1	1	1	0	7
Brandon	RCT	0	1	1	1	1	1	1	1	1	8
Brosseau	RCT	1	0	1	1	0	1	1	1	0	6
Cox	RCT	1	1	1	1	1	1	1	1	1	9
Duncan	RCT	0	1	1	1	1	1	1	1	0	7
Fisher	RCT	1	0	1	1	0	1	1	1	0	6
Gusi	RCT	1	0	1	1	1	1	1	1	1	8
Hamdorf	RCT	1	1	1	1	0	1	1	1	0	7
Hinkleman	RCT	0	1	1	1	0	1	1	1	0	6
Isaacs	RCT	1	1	1	1	1	1	1	1	1	9
Kamijo	RCT	0	1	1	1	1	1	1	1	0	7
Kayo	RCT	1	0	1	1	0	1	1	1	1	7
Legrand	RCT	0	0	1	1	1	1	1	1	0	6
Mannerkorpi	RCT	1	1	1	1	0	1	1	1	1	8
Moore-Harrison	RCT	0	0	1	1	1	1	1	1	0	6
Morrison	RCT	0	0	1	1	1	1	1	1	0	6
Negri	RCT	1	0	1	1	0	1	1	1	0	6
Palmer	RCT	0	1	1	1	1	1	1	0	0	6
Reuter	RCT	1	1	1	1	1	1	1	1	1	9
Rooks	RCT	1	1	1	1	1	1	1	1	0	8
van Uffelen	RCT	1	0	1	1	1	1	1	1	0	7
Callahan	Pre-post	0	0	1	1	1	1	1	1	0	6
Dalocchio	Pre-post	0	0	1	1	1	1	1	1	0	6
Fantin	Pre-post	0	0	1	1	1	1	1	1	1	7
Figard-Fabre	Pre-post	0	1	1	1	1	1	1	1	0	7
Gelecek	Pre-post	0	1	1	1	1	1	1	0	0	6
Holmberg	Pre-post	0	0	1	1	0	1	1	1	0	5
Moss	Pre-post	0	0	1	1	1	1	1	0	0	5
O'Halloran	Pre-post	0	0	1	1	1	1	1	0	0	5
O'Hara	Pre-post	0	0	1	0	1	1	1	0	0	4
Cavanaugh	CT	0	1	1	1	1	1	1	1	0	7
Fritz	CT	0	0	1	0	1	1	1	1	0	5
Park	CT	0	1	1	1	0	1	1	1	0	6
Roberts	CT	0	1	1	1	1	1	1	0	0	6
Silverthorn	CT	0	1	1	1	1	1	1	0	0	6
Song	CT	1	0	1	1	1	1	1	1	1	8
Takahashi	CT	0	1	0	1	1	1	1	1	0	6
Thomas	CT	0	0	1	1	1	0	1	0	0	4
Cyarto	Quasi-experimental	0	1	1	1	1	1	1	1	0	7
McDevitt	Quasi-experimental	0	0	1	1	1	1	1	1	0	6
Ng	Cohort study	0	0	1	0	1	1	1	0	0	4

Notes: 1.Randomisation, 2.Exposure, 3. Representativeness, 4. Comparability, 5.Attrition, 6.Follow-up tools, 7.Follow-uptime-scale, 8.Precision of the result, 9.Statistical power.

RCT, randomised controlled trial. CT, controlled trial. Greyscale indicates studies included in meta-analysis

### Study characteristics

Although there was no date restriction on the search, 74% of the articles were studies in the last 10 years suggesting the more recent interest in walking groups, with no papers prior to 1988 meeting the inclusion criteria. Studies were located in 14 different countries but predominantly in the USA (n=15). A total of 1,843 participants walked in outdoor

walking groups with at least 1,488 hours of provision (3 studies did not give enough information from which to calculate dosage) and a total of 74,023 hours of participant walking time. Walking groups were used with participants with a broad range of health conditions; arthritis (Brosseau et al., 2012, Callahan et al., 2011); dementia and cognitive impairment (Holmberg, 1997, Thomas et al., 2006, Van Uffelen et al., 2007); diabetes (Fritz et al., 2006, Negri et al., 2010, O'Halloran, 2007); fibromyalgia (Bjersing et al., 2012, Kayo et al., 2012, Mannerkorpi et al., 2010); obesity and overweight (Brandon and Elliott-Lloyd, 2006, Figard-Fabre et al., 2011, Hinkleman and Nieman, 1993, Moss, 2009, O'Hara et al., 2000); mental health issues (Armstrong and Edwards, 2004, Dallochio et al., 2010, Legrand and Mille, 2009, McDevitt et al., 2005, Ng et al., 2007b) and Parkinson's disease (Reuter et al., 2011) with 64 different tools used to test outcomes.

In terms of participants, 76% were women whilst 43% of the studies were for women only; there were no studies for men only. The grand mean age was 58 years with 15 studies specifically aimed at older participants. There was sub-analysis in four studies; ethnicity, (Brandon and Elliott-Lloyd, 2006) intensity (Duncan et al., 1991, Legrand and Mille, 2009) and gender (Moss, 2009). Two studies were of people with learning disabilities living in care facilities; one obese adults with Prader-Willi syndrome, (Silverthorn and Hornak, 1993) and the second the coronary heart disease risk of adults with learning disabilities (Moss, 2009). Eleven studies described the ethnicity of the participants and 13 studies provided some socio-economic information. Brandon and Elliott-Lloyd (2006) compared the response between African American women, and the O'Hara et al. (2000) study was specifically for African American women. Otherwise there was no evaluation of effect for different ethnicities.

Interventions were varied, in both volume and intensity, ranging from 168 to 8580 minutes of walking over a period of three weeks to one year, with intensity ranging from self-selected and low to brisk walking and high intensity intervals. Moore-Harrison et al. (2008) specifically targeted those of low socioeconomic profile and Isaacs et al. (2007) provide sub-analysis of uptake of walking group intervention by socio-economic status. Where supervision was described it was by professionals, such as physiotherapists, possibly as the interventions were part of clinical trials. Where described, provision was in rural locations in six of the studies and urban for 15. Adherence and adverse effects are described in 76% of the papers. Mean adherence (where stated) was 75%. One study notes that adherence was lower for those without access to private transport (Isaacs et al., 2007). For adverse effects, one study described one fall with a brief absence from the walking programme (Cyarto et al., 2008) one a calf injury (Dallochio et al., 2010) and one, a study with participants with Parkinson's disease, describes one participant experiencing exercise-induced hypotension after intense uphill walking in hot weather and four falls on roots and wet ground (Reuter et al., 2011). Otherwise either authors

state that there were no injuries, or there is no reference to adverse effects. This is against a back drop of over 74,000 participant hours. Attrition was less clearly described but in one study there was a participant withdrawal as they were overweight and self-conscious (Armstrong and Edwards, 2004); one author states that travel to the walking club may have affected attrition (Brosseau et al., 2012) and one describes the different attrition rates between African-American and white walkers (Brandon and Elliott-Lloyd, 2006).

### Meta-analysis

Common outcome measures enabled meta-analysis of 17 frequently used outcome measures, summarised in Table 4 and presented in full in Table 5 (at the end of this chapter)

**Table 4: Summary meta-analysis results: difference between baseline and end of intervention**

Outcome measure	n	Effect	95% Confidence intervals	Heterogeneity	Test for overall effect
Systolic BP (mmHg)	440	-3.72	(-5.28, -2.17)	Chi <sup>2</sup> = 12.02, df = 12 (P = 0.44); I <sup>2</sup> = 0%	Z = 4.70 (P < 0.001)
Diastolic BP (mmHg)	440	-3.14	(-4.15, -2.13)	Chi <sup>2</sup> = 23.16, df = 12 (P = 0.03); I <sup>2</sup> = 48%	Z = 6.09 (P < 0.001)
Resting HR (beats per minute)	252	-2.88	(-4.13, -1.64)	Chi <sup>2</sup> = 2.96, df = 7 (P = 0.89); I <sup>2</sup> = 0%	Z = 4.53 (P < 0.001)
Body fat (%)	328	-1.31	(-2.10, -0.52)	Chi <sup>2</sup> = 4.00, df = 6 (P = 0.68); I <sup>2</sup> = 0%	Z = 3.25 (P = 0.001)
Body mass index (kg/m <sup>2</sup> )	451	-0.71	(-1.19, -0.23)	Chi <sup>2</sup> = 5.52, df = 11 (P = 0.90); I <sup>2</sup> = 0%	Z = 2.92 (P = 0.003)
Total cholesterol (mmol/L)	271	-0.11	(-0.22, -0.01)	Chi <sup>2</sup> = 12.58, df = 9 (P = 0.18); I <sup>2</sup> = 28%	Z = 2.13 (P = 0.03)
VO <sub>2</sub> max (ml/kg/min)	166	2.66	(1.67, 3.65)	Chi <sup>2</sup> = 9.67, df = 6 (P = 0.14); I <sup>2</sup> = 38%	Z = 5.28 (P < 0.001)
SF36 score (physical functioning) (points)	68	6.02	(0.51, 11.53)	Chi <sup>2</sup> = 0.26, df = 1 (P = 0.61); I <sup>2</sup> = 0%	Z = 2.14 (P = 0.03)
6 minute walk time(metres)	65	79.6	(53.37, 105.84)	Chi <sup>2</sup> = 0.71, df = 1 (P = 0.40); I <sup>2</sup> = 0%	Z = 5.95 (P = < 0.001)
Depression score*(effect size)	101	-0.67	(-0.97, -0.38)	Chi <sup>2</sup> = 24.14, df = 4 (P = < 0.001); I <sup>2</sup> = 83%	Z = 4.44 (P = < 0.001)
Waist circumference (cm)	35	-3.55	(-8.08, 0.98)	Chi <sup>2</sup> = 0.52, df = 1 (P = 0.47); I <sup>2</sup> = 0%	Z = 1.54 (P = 0.12)
HbA1C (%)	66	-0.11	(-0.25, 0.03)	Chi <sup>2</sup> = 1.17, df = 3 (P = 0.76); I <sup>2</sup> = 0%	Z = 1.53 (P = 0.13)
Fasting glucose (mmol/L)	85	-0.09	(-0.28, 0.11)	Chi <sup>2</sup> = 3.33, df = 4 (P = 0.50); I <sup>2</sup> = 0%	Z = 0.87 (P = 0.38)
Low density lipids (mmol/L)	268	-0.05	(-0.16, 0.06)	Chi <sup>2</sup> = 8.83, df = 9 (P = 0.45); I <sup>2</sup> = 0%	Z = 0.93 (P = 0.35)
High density lipids (mmol/L)	251	0.01	(-0.04, 0.07)	Chi <sup>2</sup> = 8.04, df = 8 (P = 0.43); I <sup>2</sup> = 0%	Z = 0.45 (P = 0.65)
Triglycerides (mmol/L)	271	-0.05	(-0.12, 0.03)	Chi <sup>2</sup> = 13.39, df = 9 (P = 0.15); I <sup>2</sup> = 33%	Z = 1.25 (P = 0.21)
SF36 score (mental health index) (points)	68	2.70	(-2.09, 7.48)	Chi <sup>2</sup> = 0.18, df = 1 (P = 0.67); I <sup>2</sup> = 0%	Z = 1.10 (P = 0.27)

\* Note: all analyses fixed effects model and mean difference except depression score (effect is standardized mean difference)



Statistically significant improvements from baseline to end of intervention were identified for participants in the intervention groups for systolic and diastolic blood pressure, resting heart rate, body fat, body mass index, total cholesterol,  $VO_2$ max, quality of life for physical functioning, 6 minute walk time, and depression. For depression, a standardized mean difference of -0.67 (-0.97 to -0.38) represents a statistically significant moderate effect (Higgins and Green, 2011). For other outcomes, the effects were not statistically significant. There was zero heterogeneity in twelve of the analyses with four having an  $I^2$  between 28 -48%. The depression score had an  $I^2$  of 83% suggesting a high level of heterogeneity between the studies. Using funnel plots, all studies were visually symmetrical with a narrow spread at the top of the funnel indicating precision with results close to the pooled estimate and without bias towards smaller studies. See Figure 4.

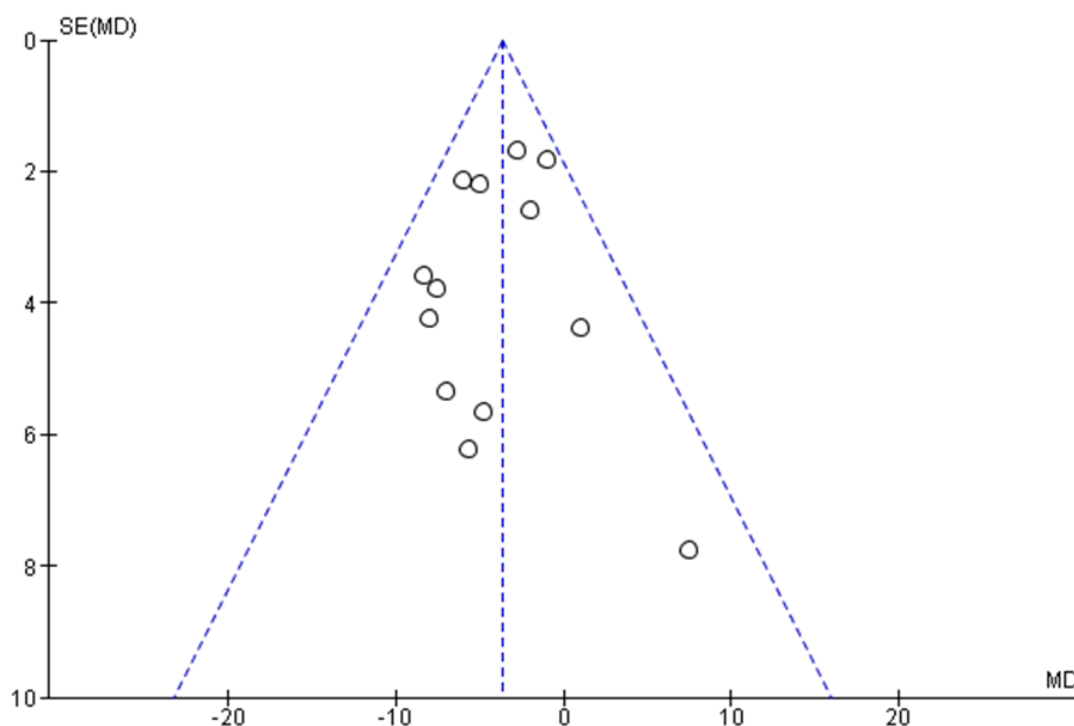


Figure 4: Example funnel plot (systolic blood pressure)

In order to test if the impact of the group walking was greater in those with clearly defined morbidity, a sub analysis was completed for the conditions of being overweight or obese ( $BMI \geq 25$ ), Type II diabetes (as defined by the authors) and depression (as defined by authors). For depression and BMI this strengthened the results. By only including those defined as depressed (Armstrong and Edwards, 2004, Gusi et al., 2008, Legrand and Mille, 2009) the effect size became large -0.76 (-1.12 to -0.41). However, it should be noted that this increased heterogeneity to 90% and with a sample size of 72 participants. By only including those with a  $BMI \geq 25$  (Brandon and Elliott-Lloyd, 2006, Cox et al., 2006, Fantin et al., 2012, Figard-Fabre et al., 2011, Fritz et al., 2006, Isaacs et al., 2007, Moss,

2009, Negri et al., 2010, Gusi et al., 2008) the mean difference increased to -0.75 (-1.26 to -0.24). Heterogeneity for the nine studies remained at 0% with a sample size  $n = 402$ . For HbA1C and fasting glucose, only including those with type II diabetes (Fritz et al., 2006, Negri et al., 2010) the mean differences remained statistically non-significant -0.16 (-0.40 to 0.08) (heterogeneity 0%,  $n = 38$ ) and -0.57 (-1.58 to 0.43) (heterogeneity 0%,  $n = 38$ ) respectively. The small number of studies in these sub-analysis and the substantial heterogeneity in the result for depression means that these findings should be interpreted with caution.

## Discussion

### Principal findings

This systematic review and meta-analysis provides evidence that outdoor walking groups have health benefits over and above making people more physically active. Statistically significant improvements were found in a range of widely used measures of health; systolic and diastolic blood pressure, resting heart rate, body fat, body mass index, total cholesterol,  $VO_2$ max, depression, six-minute walk time, and quality of life for physical functioning. This is despite the fact that the majority of the interventions (75%) were below international moderate activity guidelines which may account for some of the effect sizes being small. Walking groups appear an acceptable intervention to participants with high levels of adherence and a low risk of serious adverse effects.

### Strengths and limitations

The strength of this review is that it has comprehensively sought out walking group studies. It has extensively analysed 42 different studies with 1,843 participants involved in over 74,000 participant hours of group walking. It has also extracted information for 17 meta-analyses to provide evidence of health benefits and within these was generally zero or low heterogeneity. Limitations of the study are that only manuscripts published in English were sought and it is acknowledged that this represents a potential for selection bias. Additionally the populations in the included studies are very different with many small studies. The lack of information on walking dose in many of the studies meant that it was not possible to undertake an analysis of dose-responses. Finally our study used a numerical rating scale for risk of bias, other alternatives such as domain based approaches could have been employed (see O'Connor et al. (2015)) and may have led to different conclusions.

### Results in context of other published reviews

Kassavou et al. (2013) found that walking groups increase physical activity. The results from this study extend these findings by providing evidence of the wide-ranging health benefits of group walking.

Clinicians and therapists may however be asked whether walking in groups has similar health benefits than walking per se or the use of a pedometer, a widely used method of increasing walking. To explore this, the results of the meta-analysis within this study were compared firstly with meta-analyses of walking and then with pedometers.

In terms of depression, Robertson et al. (Robertson et al., 2012) in their meta-analysis of walking using a fixed effects model, found a standardised mean effect size of -0.86 (-1.12 to -0.61), comparable to the effect size of -0.67 (-0.97 to -0.38) in this review of group walking. In terms of cardiovascular health, a systematic review by Murphy et al. (Murphy et

al., 2007) of walking using a random effects model found statistically significant reductions in body fat, BMI, and diastolic blood pressure and increases in  $VO_{2max}$ . The effects were however of a smaller magnitude than those found in this study; a reduction of diastolic blood pressure of 1.54mmHg from walking compared to 3.14mmHg in group walking; a reduction in BMI of 0.2 kg/m<sup>2</sup> compared to 0.7 kg/m<sup>2</sup>; and a reduction of body fat of 0.63% from walking compared to a reduction of 1.31% in group walking. In addition, Murphy et al. did not find a statistically significant reduction in systolic blood pressure (-1.06 mmHg, p 0.316) from walking in contrast to the significant reduction in systolic blood pressure (-3.72 mmHg p < 0.001) found from group walking in this review. Murphy et al. (Murphy et al., 2007) stated a relative reduction of 0.8% in systolic and 2% diastolic blood pressure. This is comparable to a previous meta-analysis of walking and resting blood pressure (Kelley et al., 2001) which found a 2% reduction in both systolic and diastolic from walking. In comparison, this review of group walking found reductions of 3% in systolic 5% in diastolic blood pressure representing a greater reduction than those from walking alone. The importance of this difference becomes significant when viewed against findings that a 2mmHg in diastolic blood pressure can reduce coronary heart disease risk by 6% and stroke and trans-ischaemic attacks by 15% (Cook et al., 1995). Further evidence of the importance of this reduction comes from a meta-analysis of prospective studies which suggested that a persistent reduction in average blood pressure by widely practicable methods could avoid large absolute numbers of premature deaths and disabling strokes and a reduction of only 2mmHg in systolic blood pressure could reduce stroke mortality by 10% and mortality from vascular causes in a middle aged population by 7% (Lewington et al., 2002). Outdoor walking groups could be an example of such a practicable method. The second part of this further analysis compared the results from this systematic review of group walking to a systematic review and meta-analysis of pedometers to increase physical activity and improve health outcomes (Bravata et al., 2007). Again walking groups were found to have comparable and greater results to those from pedometers in reductions in BMI, systolic and diastolic blood pressure and total cholesterol. This was particularly significant for diastolic blood pressure with the use of pedometers showing a reduction of -0.3 mmHg (-0.02 to -0.46) compared to walking groups -3.14mmHg (-4.15 to -2.13). It should be noted that the two comparator systematic reviews included outdoor group walking as well as other methods (indoors and solo) in their meta-analysis; within the systematic review of pedometers some of the participants may have walked within a workplace group and additionally people who walk in groups invariably walk by themselves too. Therefore this further analysis is not a straightforward comparison of non-group versus group methods but this comparison has provided some evidence that group walking may have benefits to health at least equal to walking with pedometers and walking per se.

## Conclusions and meaning of the study for clinicians

This systematic review with meta-analysis has found that outdoor walking groups have wide-ranging health benefits. With low levels of attrition, high levels of adherence and virtually no adverse effects this study suggests that walking groups could be a practicable intervention, acceptable to patients as a line of treatment with a potential for both physiological and psychological health benefits. It may provide clinicians with evidence of a further effective option to recommend to those patients who would benefit from increasing moderate physical activity.

## Unanswered questions and further research

One study evaluated the results based on three different walk speeds (Duncan et al., 1991). Otherwise, there were insufficient studies meeting moderate activity guidelines from which to conduct a sub-analysis and suggest any tentative conclusions about effectiveness of walking groups and time or intensity. It may be that effect sizes could be improved by increasing volume and intensity and this important question remains unanswered. A lack of socio-economic information prevented analysis of the distribution and effects between different social groups confirming concerns raised by Ogilvie et al. that such targeted interventions may be preferentially utilised by better-off groups (Tudor Hart, 1971) and may thereby increase health inequalities (Marmot et al., 2010). The issue of equity could be addressed in future research. Additionally, the majority of the studies in this analysis were with people with diagnosed health conditions or cardiovascular disease risk factors therefore the potential benefit of walking groups in maintaining good health in healthy populations is not known. Nevertheless, this review has shown that there are wide-ranging health benefits from outdoor walking groups and these appear not to be counterbalanced by an increase in injuries or other adverse side-effects.

**Table 2: Systematic review summary results for all 42 studies**

Studies in <b>bold</b> and <u>underlined</u> indicates included in meta-analysis									
Lead author	Study aim	Description of the participants Mean age (SD)	Socio-economic (SE) and Ethnicity (E) information Country	Description of the environment, provision and group size	n = study (walking arm of the study)	Type of walking	Intervention (as stated or based on average session time)	Minutes in the study per person Adherence (where stated)	Results. i) Given at the end of the intervention. Difference from baseline. ii) p-values given as stated
<b><u>Armstrong and Edwards (2004)</u></b>	A 12 week RCT to investigate the effects of a pram walking versus a social support group	Had given birth in the past 12 months. Edinburgh postnatal depression scale of $\geq 12$  30	SE: Education and family income information E: not stated Australia	Flat walking path (NB prams) at an area on the Gold Coast. Group size 9. Also encouraged to walk once a week independently	19 (9)	Moderate intensity (60-75% of predicted HR).	40 mins. 2 times a week for 12 weeks	960  75%	EPDS↓ (time p <0 .001) VO <sub>2</sub> max ↑(time p > 0 .05)
Bjersing et al. (2012)	Effects of 15-week moderate- to high-intensity aerobic exercise (Nordic walking) on the level of serum bioactive IGF-1 in women with fibromyalgia. Low-intensity aerobic exercise (walking) was the control group.	Women with FM aged 20-60 with an interest in exercising outdoors for 15 weeks  52	Not stated Sweden	Outdoors walking together under the leadership of a physiotherapist. Group size 23	49 (23)	Low intensity walking	43 mins. 2 times a week for 15 weeks	1290	Pain threshold ↓ (p 0.031) Pain ↓ (p 0.067) 6MWT ↑ (p 0.183) IGF-1 ↓ (p 0.148) IGFBP3 ↓ (p 0.881)  Please see text for sub-group analysis of cerebrospinal markers  (N.B. walking was the control group)

**Table 2: Systematic review summary results for all 42 studies**

<p><b><u>Brandon and Elliott-Lloyd (2006)</u></b></p>	<p>Evaluate body composition and blood pressure responses to a 16-week dose of brisk walking in sedentary and obese African American and White women</p>	<p>Sedentary women 35</p>	<p>SE: not stated E: African American and white USA</p>	<p>Faculty of an urban university and from local government agencies. Outside on courses measured for distance before the study. On rainy days subjects walked on an indoor track or treadmill. Groups of various sizes.</p>	<p>52 (28)</p>	<p>16 weeks has been shown to be of sufficient length to provide for significant weight loss. Encouraged to walk briskly at 3.5mph</p>	<p>50 mins. 3 times a week for 16 weeks to achieve 3 miles.</p>	<p>2400  AA 86% White 90%</p>	<p>African American (AA) and White: Weight: AA ↓( p 0 .543) White ↓( p 0 .001) Body fat: AA↓( p 0 .164) White ↓( p 0 .001) Trunk fat: AA↓( p 0 .024) White ↓( p 0 .001) Leg fat: AA ↓( p 0 .807) White ↓( p 0 .010) BMI: AA↓( p 0 .214) White ↓( p 0 .001) Waist to height ratio AA↓( p 0 .138) White ↓( p 0 .000) SBP: AA ↓( p 0 .001) White↓( p 0 .000) DBP: AA↓( p 0 .001) White↓( p 0 .000) VO<sub>2</sub>max : AA↑( p 0 .000) W ↑( p 0 .000)  (results for AA and white combined in meta-analysis)</p>
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**Table 2: Systematic review summary results for all 42 studies**

<p><b><u>Brosseau et al. (2012)</u></b></p>	<p>Effect of a proven effective walking programme based on the Ottawa Panel clinical practice guidelines implemented through a knowledge translation intervention</p>	<p>Participants with a confirmed diagnosis of mild to moderate unilateral or bilateral osteoarthritis</p> <p>63.9 (± 10.3)</p>	<p>SE: Level of education given E: White 87.3%, black 1.3%, Hispanic 2.5%, Asian 6.3%, Canada</p>	<p>Two walking sites in Ottawa, Ontario and one in Gatineau, Quebec. 71 participants who walked in supervised walking programme but the number in the group not described</p>	<p>222 (71)</p>	<p>Ottawa panel evidence based clinical practice guidelines for individuals with osteo-arthritis</p>	<p>55 mins. 3 times a week for 52 weeks</p>	<p>8580 58%</p>	<p>The author gives p-values for walking group versus control. The control group was self-directed using a guidance pamphlet and pedometer and self-recorded</p> <p><b>SF-36:</b> Physical Functioning ↑ (p 0.250) Role physical ↑ (p 0.909) Pain index ↑ (p 0.581) General health perception ↓ (p 0.223) Vitality ↑ (0.856) Social functioning ↓ (0.266) Role emotional ↑ (0.949) Mental Health Index ↑ (0.735) Health transition item ↓ (0.821) Standardised physical component ↑ (p0.804) Standardized mental component ↑ (p 0.595)</p> <p><b>AIMS 2:</b> Health perception ↓ (0.420) Arthritis impact ↓ (0.431) Physical component ↓ (0.554) Affect component ↓ (0.937) Symptoms component ↓ (0.523) Social interaction component ↓ (0.081) Role component ↓ (0.536)</p> <p><b>WOMAC :</b> Pain ↓ (0.572) Stiffness ↓ (0.125) Physical function ↓ (0.672) Total WOMAC score ↓ (0.612)</p> <p>6 minute walk test ↑ (0.063) Gait speed ↓ (0.535) Timed up and go ↓ (0.770)</p> <p>There are also 18 month results given in the paper (all of which have non-significant p values of walking group v control)</p>
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**Table 2: Systematic review summary results for all 42 studies**

Callahan et al. (2011)	Effects of a 6-week walking program for adults with arthritis, Walk With Ease (WWE), delivered in 2 formats, instructor-led group or self-directed	Self-reported joint pain, stiffness, or any type of doctor-diagnosed arthritis. Recruited from urban and rural settings  70.7 (±9.8)	SE: Education information E: 26% African American 71% white USA - North Carolina	Instructor led group ranged in size from 2 or 3 to 19 participants with most in the range of 5-12 people. Adherence 92.7% versus 83.3% for the self-directed. Participants self-selected the intervention group	462 (192)	Walk with ease (WWE), 6 week community based walking group programme for adults with arthritis	60 mins. 3 times a week for 6 weeks	1080  92.7% versus 83.3% for self -directed	Performance based physical measures: Lower extremity strength, (1 chair and 3 chair stands) in seconds ↓ (improved) (p < 0.01) Standing balance/turning ability ) in seconds ↓ (improved) (p < 0.01) Balance ) in seconds ↓ (improved) (p < 0.01) Functional mobility: Normal walking speed ↑ (p < 0.01), fast walking speed ↑ (p < .01) Endurance, 2 minute step test ↓ ns Self-reported: HAQ ↓ (improved) (p < 0.01) VAS (pain, fatigue, stiffness) ↓ (improved) (p < 0.01) Pain arthritis self-efficacy ↑ (p < 0.01) Symptom arthritis self-efficacy ↑ (p < 0.05) Rheumatology attitudes index ↓ (improved) (p < 0.05) Self-efficacy for physical activity ↑ ns
Cavanaugh and Cann (1988)	Evaluate whether brisk walking stops bone loss in post-menopausal women	Recruited via a letter sent to employees at a local university. Post-menopausal 5.6 ± 1.6 years  55.4 (±1.7)	SE: employment info. given E: not stated USA	Grassy outdoor soccer field. As protocol time increased was also done on city sidewalks. During inclement weather or periods of extreme heat walking was done in building hallways. All of the group (8) met as a group every Monday Wednesday and Friday at noon for 52 weeks	17 (8)	Moderate exercise regime. 60% of target heart rate. Increased time progressively	Average 26 mins. 3 times a week for 52 weeks	4056  73%	Pre exercise heart rate: ↓(p<0.01) Body fat index ↓ Post exercise heart rate: no change Bone loss over 1 year was no different to control.  Absolute values (and SD) not given within published study therefore unable to include heart rate data in meta-analysis

**Table 2: Systematic review summary results for all 42 studies**

<b><u>Cox et al. (2006)</u></b>	Evaluate 6 months of supervised moderate swimming or walking on blood pressure in previously sedentary, normotensive older women.	Women aged 50-70 recruited from media advertising. Sedentary, non-smokers  55.45 (±4.93)	Not stated Australia	Continuous walk around ovals and parks with a research assistant with a degree in sports science. Usually 4-6 (varied from 2-10)	116 (60)	50% of HRreserve and progressed to 60-70% of HRreserve at 8 weeks.	45 mins. 3 times a week for 24 weeks	3240  74.3%	Weight ↓ ns BMI ↓ns Triceps skinfold ↑ns Arm muscle girth ↓ns Urinary sodium excretion ↑ns Urinary calcium excretion ↑ns Systolic BP ↓ns Diastolic BP ↓ns Heart rate ↓( p < 0.001) VO <sub>2</sub> max ↑( p < 0.001 )  Final values not given within published study for BP and therefore unable to include results within meta-analysis (N.B. walking is the control)
Cyarro et al. (2008)	Evaluate and compare resistance training programmes and a group walking programme (control) in improving the functional performance of older adults	Older adults living in retirement villages aged 65-96 years  78.8 (±6.4)	SE: Level of education stated E: 98% Caucasian Australia	Some hills on the route. Had a leader. Group size 48	167 (48)	Walking at a self-selected pace	30 mins 2 times a week for 20 weeks	1200  53%	Chair stand ↑ns Arm curl ↑ns 2 minute step test ↑ns Sit and reach ↓ (p < .05) Back scratch ↑ns Up and go ↓ns  (N.B. walking is the control)
<b><u>Dalocchio et al. (2010)</u></b>	A pilot study to evaluate the effects of regular low-medium intensity exercise on sedentary patients with psychogenic movement disorders	Patients with psychogenic movement disorders. Women  33 (±8.79)	Not stated Italy	As a group at a country track. Supervised by the lead investigator. Individually if unable to attend group session. Group size 13	13 (13)	Low-moderate intensity walking	Average of 20 mins. 3 times a week for 12 weeks	720	PMDRS ↓ (p 0.014) PMDRS function ↓ (p 0.043) BAI ↓ (p 0.034) HDS ↓ (p 0.028) BMI ↓ (p 0.026) VO <sub>2</sub> max ↑( p 0.023 ) Life gratification ↑

**Table 2: Systematic review summary results for all 42 studies**

<p><b><u>Duncan et al. (1991)</u></b></p>	<p>Whether the quantity and quality of walking necessary to decrease the risk of CVD among women differed substantially from that required to improve cardiorespiratory fitness.</p>	<p>Women through advertising. Sedentary, randomly selected. 20-40 years of age</p>	<p>SE: Not stated E: 81% white, 17% black and 2% Hispanic USA</p>	<p>Tartan-surfaced 1.6km track. Supervision of an exercise physiologist. Group size 12-18</p>	<p>102 (43)</p>	<p>Aerobic walkers (8.0km/hr), Brisk walkers (6.4km/hr) and Strollers (4.8km/hr).</p>	<p>60 mins. 5 times a week for 24 weeks</p>	<p>7200 85% +</p>	<p>BP: Strollers ↓ns / Brisk no change / Aerobic walkers no change Total cholesterol: Strollers ↓ns / Brisk ↓ns / Aerobic walkers ↑ns LDL: Strollers ↓ns / Brisk ↓(p&lt;0.05) / Aerobic walkers ↑ns HDL: Strollers ↑(p&lt;0.05)/ Brisk ↑ns/ Aerobic walkers↑ (p&lt;0.05) Triglycerides: Strollers ↓ns / Brisk No change/ Aerobic walkers↑ ns Cholesterol and HDL ratio: Strollers ↓(p&lt;0.05) / Brisk ↓ns / Aerobic walkers ↓ns Body fat: all groups ↓ns VO<sub>2</sub>max ↑ all groups Strollers ( p &lt;0 .05 ) /Brisk walkers ( p &lt;0 .001 ) Aerobic walkers ( p &lt;0 .001 )  (Results combined in the REVMAN programme for meta-analysis)</p>
<p><b><u>Fantin et al. (2012)</u></b></p>	<p>The effect of a moderate (60-min exercise sessions of walking twice per week— approximately 7–8METs per week), 6-month aerobic exercise program on cardiovascular risk factors and pulse wave velocity in a group of apparently healthy elderly women with and without hypertension.</p>	<p>Women living in the community, aged 60-80.  68.19 (±5.72)</p>	<p>Not stated Italy</p>	<p>Outside and supervised by a qualified physical education instructor. Group size not stated.</p>	<p>21 (21)</p>	<p>Brisk walking i.e. moderate physical activity. 7-8 METs/week Increased intensity over time to 75% max heart frequency.</p>	<p>60 mins. 2 times a week for 24 weeks</p>	<p>2880</p>	<p>Weight ↑ (p 0.33) BMI ↓ (p 0.81) Waist (circumference) ↓ (p 0.01) SAD ↓ (p 0.04) FM ↓ (p 0.32) FFM ↓ (p 0.33) Glucose ↑ (p 0.30) HbA1C↓ (p 0.15) Total chol ↓ (p 0.64) HDL chol. ↑ (p 0.20) LDL chol ↑ (p 0.92) TG↓ (p 0.02) HR ↓ (p 0.09) SBP ↓ (p 0.31) DBP ↓ (p 0.33) MAP ↓ (p 0.6) PWVcr ↓ (p 0.75) PWVcf ↓ (p 0.02)  All participants, normotensive and hypertensive.</p>

**Table 2: Systematic review summary results for all 42 studies**

									(see text for sub-analysis of normo- and hypertensive)
<b><u>Figard-Fabre et al. (2011)</u></b>	The effects of a 12 week Nordic interval training programme to those of a walking programme.	Obese middle aged women  Age not stated	Not stated Italy	Outside and supervised in groups of 12-15 (confirmed by email).	23 (11)	Comfortable walking pace and intervals of higher intensity at maximal walking speed	Average 44 minutes. 3 times a week for 12 weeks	1584  81%	Body Mass ↓(p 0.045) BMI ↓(p 0.060) Skinfold thickness ↓(p 0.020) Body fat ↓(p 0.011) HR↑( p 0.048) SBP ↓(p 0.085) DBP↓(p <0.001)
Fisher and Li (2004)	The effects of a neighbourhood walking programme on quality of life of older adults.	Aged over 65, sedentary.  74.03 (± 6.3)	SE: Education and income information E: Black or other. 85% white USA	Leader led walking group in their neighbourhood (28 neighbourhoods for walking). Walking included winter and fall for some groups. Walk leaders recruited locally and paid. Groups of approx. 10 per neighbourhood with 2 walk leaders.	582 (280)	Leisurely but purposeful walk	Average 45 mins 3 times a week for 6 months	3510  74%	SF12: mental and physical scores ↑ (p < 0.001) Life satisfaction scores ↑ (p< 0 .001)  Absolute values (and SD) not given within published study and therefore unable to include results within QoL meta-analysis

**Table 2: Systematic review summary results for all 42 studies**

<b><u>Fritz et al. (2006)</u></b>	The effects on metabolic control and cardiovascular risk factors in type 2 diabetes after a period of a low intensity exercise walking programme (walking) feasible to most patients and to the resources of a primary health centre.	Patients with type 2 diabetes from primary care practices suburban communities outside Stockholm.  60 (±7.3)	Not stated Sweden	Walking groups were provided 4 times a week, short distances from the patients' homes. At other times, self-recorded. Typical group size was 10-12. Walks were taken in a rural area, along a "path of health" with no steep elevations. An assistant nurse joined the group during each walk.	52 (26)	Low intensity exercise. Brisk walking. To increase their exercise by 45 min of brisk walking, three times weekly, during 4 months.	45 mins. 3 times a week for 16 weeks	2160  65% achieved 80%	Results based on n=17 that achieved 80% of prescribed increased activity SBP ↓(p<0.05) DBP ↓(p<0.05) BMI ↓(p<0.05) HbA1c ↓ ns Fasting glucose no change Fasting insulin ↓ns HOMA2-IR no change ns Total chol ↓( p< 0.05) HDL cholesterol ↑(p<0.05) LDL cholesterol ↓(p<0.05) Triglycerides ↓ns VO <sub>2 max</sub> no change (in L/min)  (See text for analysis of those who did not alter activity levels)
<b><u>Gelecek et al. (2006)</u></b>	To examine the effects of a 6-week brisk walking training on plasma homocysteine levels and lipid profiles in sedentary young subjects.	Healthy physiotherapy students.  20 (±2.1)	SE: University students E: Not stated Turkey	Walked in large garden on their campus in 3 groups of: 10, 10 and 9 according to their aerobic capacity determined by sub-maximal cycling test. Supervised by a physiotherapist.	29 (29)	Brisk walking programme with a speed of 6.4 km/hr	40 mins. 3 times a week for 6 weeks	720	Body mass ↓(p > 0.05) SBP ↓(p > 0.05) DBP ↓(p > 0.05) Resting HR ↓( p <0 .05) Homocysteine ↑(p > 0.05) TG ↓(p > 0.05) Total -cholesterol ↓( p <0 .05) HDL-c ↓(p > 0.05) LDL-c ↓( p <0 .05)
<b><u>Gusi et al. (2008)</u></b>	To assess the cost utility of adding a supervised walking programme to the standard "best primary care" for overweight, moderately obese, or moderately depressed elderly women.	Aged 60 and over, moderately depressed or overweight.  74 (±6)	SE: Education and income E: Not stated Spain	Public park or forest tracks with qualified exercise leaders. Socialising encouraged.	107 (51)	A pragmatic intervention that could be replicated in a large population	50 mins. 3 times a week for 24 weeks	3,600  86%	BMI ↓(p 0.003) Geriatric depression scale ↓(p 0.001) Anxiety (state trait anxiety inventory) ↓( p< 0.001) Anxiety/depression EQ5D ↓(p 0.009)

**Table 2: Systematic review summary results for all 42 studies**

<b><u>Hamdorf and Penhall (1999)</u></b>	The effect of progressive walking programme on healthy women in their 9th decade for evidence of the benefits of exercise.	Recruited through local advertising.  82.4	Not stated Australia	Outdoors Group size 18. Experienced fitness instructors	38 (18)	Low frequency, moderate-intensity, progressive training programme. Target 40-60% of HRR (100bpm)	20 mins. 2 times a week for 26 weeks	1040  89.5%	Resting heart rate ↓( p 0 .029) Exercise heart rate↓( p 0 .002) SBP ↑ ns DBP ↓ns Habitual activity profile and morale: (p values compared to control) MCA and NII↑(improved) (p>0.001) PGMS↑(improved) (p 0.002)
<b><u>Hinkleman and Nieman (1993)</u></b>	The effects of a walking program on body composition and serum lipids and lipoproteins in overweight women	Recruited from the local community, female aged 24-45 and 10-40% overweight.  36 (±1.6)	Not stated USA	On a measured course near the research testing facility. Supervised. Sessions offered morning and evening. Supervised by an exercise instructor. 2 groups provided for 18 people	36 (18)	Brisk walking at 62± 2% VO <sub>2</sub> max. 10 second pulse rates or heart monitors used.	45 mins. 5 times a week for 15 weeks	3375  100%	Body fat ↓ns Fat weight ↓ns Lean weight ↑ns Triglycerides ↑ns Cholesterol ↓ns LDL -C ↑ns TC/HDL ↓ns
Holmberg (1997)	Evaluation of a clinical intervention designed to decrease unsafe wandering and reduce interpersonal tension on a dementia unit.	From a specialised dementia unit with quite significant cognitive impairment.  84.6	Not stated USA	Following the evening meal (6pm) participants walked away from the unit, through public areas of the facility (or outside, weather permitting). Walk leaders were lay community volunteers (2 or 3 per group). Groups size average of 10.	11 (11)	Dementia based rather than physical activity rationale.	90 mins. (including rest stops) Number of times in a week not stated. The intervention lasted for 52 weeks	Unable to state from the data given	Measured counts of aggression in a one year period of those who had been involved in the walking group versus no intervention. ↓30%

**Table 2: Systematic review summary results for all 42 studies**

<p><b><u>Isaacs et al. (2007)</u></b></p>	<p>The effectiveness and cost-effectiveness of a leisure centre-based exercise programme, a community walking programme and advice on physical activity and local exercise facilities in patients referred for exercise by their GPs</p>	<p>GP referred. 40-74, not physically active and with at least one cardio-vascular risk factor.</p> <p>56.9 (±8.5)</p>	<p>SE: Education level, employment status and socio-economic classification given. E: 76% white and 14.3% Asian England</p>	<p>12 different locations (parks and open spaces), 7 days a week with 20 classes to choose from. Started at 9.30 and ran throughout the day until 7.30pm During the winter the evening classes took place under floodlights. Walking classes graded but were free to choose. Trained instructors. 40-50 in each 10 week cohort which facilitated social support and exercise partners.</p>	<p>949 (311) (161 randomised to assessment)</p>	<p>60-80% of max. – slightly breathless</p>	<p>60 mins. 2 times a week for 10 weeks</p>	<p>1200 62% attended less than 50% 38% attended more than 50% Adherence much higher in those with access to private transport</p>	<p>Changes at 10 weeks: ITT Weight↓ ns BMI ↓ ns % body fat↓ (p &lt; .001) Waist-hip ratio no change Resting pulse ↓ ns SBP ↓ ( p &lt; .001) DBP ↓ ( p 0 .06) IKES ↑ ns LEP↑(p &lt;0 .05) LEP power to weight↑(p &lt;0 .01) Shoulder abduction↑(p &lt;0 .05) Cholesterol↓ (p 0.057) HDL↓ ns Cholesterol/HDL↓ ns LDL↓ ns Triglycerides↓ ns</p> <p>Please see text for sub-set analysis – 50% randomised to assessment at end of intervention, other time periods and for those on medication.</p> <p>Meta-analysis used absolute data from those participants re-randomised (50%) to assessment at 10 weeks. HADS score not included as completed at 6 months rather than end of intervention.</p>
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**Table 2: Systematic review summary results for all 42 studies**

Kamijo et al. (2007)	Effects of a 12-week Walking Program on Cognitive Function in Older Adults	Older adults, right handed, sedentary.  71.1 (±1.3)	Not stated Japan	They walked together on the sidewalk that faces the general road with trained exercise personnel. Group size 14.	26 (14)	Pace: fairly light to somewhat hard	40 mins. 2 times a week for 12 weeks	960  85%	Reaction time no change Error rate no change Neuro electric measures: P3 amplitude (congruent and incongruent condition): Fz ↑ns C3↑ns Cz↑ns C4↑ns Pz↓ns P3 Latency(congruent and incongruent condition): Fz ↓ns C3↓ns Cz↓ns C4↓ns Pz↓ns
Kayo et al. (2012)	To compare the effectiveness of muscle-strengthening exercises and a walking programme in reducing pain and self-reported physical function in patients with fibromyalgia.	Women with fibromyalgia aged between 30- 55.  47.7 (±5.3)	SE: schooling E: not stated Brazil	Outdoors or indoors in a gymnasium, depending on the weather. Supervised by a physical therapist. Walking duration and intensity increased over the 16 weeks. Group size not stated but attended the exercise program in small groups, enabling proper supervision.	90 (30)	ACSM principles for developing cardio-vascular and muscular fitness and flexibility.	60 mins. 3 times a week for 16 weeks	2880	Pain (VAS) ↓ns FIQ ↓(p < 0 .001) between baseline and week 8. Otherwise ns. SF-36: (NB. Higher score indicates better health outcome) bodily pain score ↑ (p < 0.01); general health and vitality ↑ (p < 0.05); physical functioning and mental health ↑ (p < 0.05) Use of medication: 46.7% restarted medication (80% in the control group)  SF-36 values not given for end of intervention therefore unable to include in QoL meta-analysis
<b><u>Legrand and Mille (2009)</u></b>	The anti-depressant effects of two group-based walking programmes (which differed in frequency but not weekly volume) among French	Women, with mild depressive, symptoms, inactive and between 60-74yrs.  66.8 (±2.5)	Not stated France	Outdoors on a fitness loop of 2/3 of a mile, located in a 1000 acre natural area park. Driven to the site and supervised by the study investigator. 6 in each group.	12 (12)	Participants identified their own walk pace (slow, medium, brisk)	60 mins a week (either as one session or 3-5 sessions equating to 60 minutes ) for 4 weeks	240  Above 75%	Geriatric depression scale: Once a week ↓(p < .05) 3-5 times a week ↓(p < .03)  (Please see text for qualitative statements and themes from participants)



**Table 2: Systematic review summary results for all 42 studies**

	older women with sub-syndromal depression.								
Mannerkorpi et al. (2010)	The effects of moderate-to-high intensity Nordic walking (NW) on functional capacity and pain in fibromyalgia (FM). Low intensity walking is the control	Women aged 20-60 years with fibromyalgia, recruited through advertising.  50 (±7.6)	SE: Education and work status E: Not stated Sweden	Parks and forests with flat areas and small hills under the supervision of a physiotherapist. Group size 33	67 (33)	Low-intensity walking ranging from 9 (very light) to 11 (fairly light) on the Borg scale.	20 mins. Once a week for 15 weeks	300  50%	6 minute walk test ↑ (p 0 .105) Exercise HR ↓ (p 0.079) FIQ pain ↓ (p 0.065) Exercise heart rate ↓ (p 0.079) FIQ physical ↑ (p 0 .929) FIQ total ↑ (p 0 .374) MFI: General fatigue ↓ (p 0.972) Physical fatigue ↓ (p 0.280) Reduced activity ↓ (p 0.194) Reduced motivation ↑ (p 0 .287) Mental fatigue ↓ (p 0.461)  (NB. walking is control)
McDevitt et al. (2005)	To evaluate a 12 week moderate intensity walking programme for sedentary adult outpatients with serious and persistent mental illness.	Adults with serious and persistent mental illness who were enrolled in a psychosocial rehabilitation programme. Volunteers.	SE: not stated E: 60% African American, 27% white, 13% Hispanic USA	Group size 15. No other information.  41.1 (±12.1)	15 (15)	60-79% of HR max	Average 25 mins. 2 or 3 times a week for 12 weeks	750  76%	SF12 – no change Vigor-activity ↑ (p 0 .05) Mood ↓ (improved) (p 0.027) Psychosocial functioning ↑ (p 0 .028)

**Table 2: Systematic review summary results for all 42 studies**

<p><b><u>Moore-Harrison et al. (2008)</u></b></p>	<p>To describe the population in terms of risk for disability and compare the effects of a walking programme and nutritional education (control) on risk modification and functional performance in lower socioeconomic older adults</p>	<p>26 community dwelling adults aged over 60.  68.6 (±7.6)</p>	<p>SE: mainly low socio-economic (38% below poverty level). Income (2008) given. Education stated. E: 41.7% African American USA</p>	<p>A cityscape walking path in Athens, Georgia USA. Group size 12</p>	<p>26 (12)</p>	<p>60-75% of HR max and Borg scale of 12-14</p>	<p>30 mins. 3 times a week for 16 weeks</p>	<p>1440  88.5%</p>	<p>(p value relates to walking v control at 16 weeks) CS – PFP scores: CS-PFP10 total score ↑(p &lt;0 .05) Upper body strength ↑(p &lt;0 .05) Upper body flexibility ↑(p &lt;0 .05) Lower body strength ↑(p &lt;0 .05) Balance &amp; co-ordination ↑(p &lt;0 .05) Endurance ↑(p &lt;0 .05)  SF-36: Physical Functioning ↑(p 0 .14) Role physical ↑ ns Pain index ↑ ns General health ↑ ns Vitality ↑ ns Social functioning no change ns Role emotional ↑ ns Mental Health ↑ ns</p>
<p><b><u>Morrison et al. (2009)</u></b></p>	<p>The effect of an 8-week program of either soft-sand or firm-surface walking on lower limb muscle strength, submaximal fitness, and blood lipid profile in women 60–75 years of age.</p>	<p>Women aged 60-75 and relatively inactive. Randomly assigned.  65.5 (± 3.7)</p>	<p>Not stated Australia</p>	<p>Participants in the sand-walking group walked on the soft sand at a local beach, well away from the water's edge. The firm-surface-walking group walked on footpaths at the same (beach) locations. Supervised for the 8 weeks by the same person. 19 in each group.</p>	<p>38 (19)</p>	<p>Self- selected speed. Exercise intensity was 74%</p>	<p>Average 33 mins. 3 times a week for 8 weeks</p>	<p>792  83% achieved 64% attendance</p>	<p>Firm surface only. Weight ↑ns SBP ↓ns DBP ↓ns Total chol ↓(p &lt; .05) Triglycerides ↓(p &lt; .05) HDL ns LDL ↓ (p &lt; .05) Coronary risk ratio ↓ (p &lt; .05) Glucose ↓ns Strength (kg of force): Knee flexion ↑ns Knee extension ↑ns Knee total ↑ns Hip flexion ↑(p &lt; .05) Hip extension ↑(p &lt; .05) Hip abduction ↑(p &lt; .05) Hip total ↑(p &lt; .05) Total strength ↑(p &lt; .05)  (Please see text for sand walking results).</p>

**Table 2: Systematic review summary results for all 42 studies**

									Results given are for the 38 who attended 64% or more of the sessions. Meta-analysis used firm surface only results
<b><u>Moss (2009)</u></b>	To determine the coronary heart disease (CHD) risk profile of adults with intellectual disabilities residing in a care facility and to determine the effect of a physical activity intervention on the CHD risk profile of the residents.	Men and women with intellectual disabilities residing in a care facility and to determine the effect of a PA intervention on the CHD risk profile of the residents. BMI 29.  39.2 (± 8.9)	Not stated – NB living in a care facility South Africa	400m circular route on the residing grounds with a level walking surface. All 100 walked together with 10 supervisors (post graduate students). 100 walked together	100 (100)	Not stated	Average 25 mins. 3 times a week for 12 weeks	900  47%	Body Mass Men ↓ns / women ↑ns BMI Men ↓ns / women ↓ns WHR Men ↑ns / women ↓ns Body fat ↓ (p < .05) (men and women) SBP Men ↓ns / women ↓ns DBP Men ↓ns / women ↓ns PWC Men ↑(p < .05) / women ↑ns
<b><u>Negri et al. (2010)</u></b>	The feasibility and effectiveness of an intervention based on the organisation of supervised walking groups	Type II diabetic for 2 years, physically inactive, aged 50-75, A1C 6.5-9.9% Gender not stated.  65.7 (±4.9)	Not stated Italy	A city park supervised by an exercise specialist who encouraged each participant. Walking groups were composed according to walking speed. Max. 20 participants in the group.	60 (39)	Low to moderate physical activity intended to achieve an energy expenditure of 10 MET h/week. Groups organised according to walking speed.	45 mins. 3 times a week for 16 weeks	2160  47%	Participants who attended at least 60% of the supervised walking sessions (n= 21): HbA1C ↓ (p < .05) Total cholesterol ↓ (p < .05) 6 min walk time ↑ (p < .001) Body weight ↓ns BMI ↓ns HbA1C ↓ (p < .001) Total cholesterol ↓ns Glucose ↓ (p < .05 compared to control) HDL cholesterol ↑ns LDL cholesterol ↓ns Triglyceride ↓ns SBP ↑ns DBP ↓ns  Changes to anti-diabetic medication: (compared to control) Dose decreased or discontinued 33% v 5% (p 0.05)

**Table 2: Systematic review summary results for all 42 studies**

									Dose increased /No change to regimen ns
Ng et al. (2007a)	A pilot study investigating the effectiveness of an adjunctive walking programme in the acute treatment of bipolar disease (2007)	Private inpatient psychiatric unit.  45.6 ( $\pm 16.1$ )	Not stated Australia	Walks provided on weekday mornings. Even terrain in the vicinity of the hospital which consisted of suburban streets on flat grounds. Group size 6-8.	49 (35)	Not stated	Walks offered for 40 mins. 5 times a week. Length of stay in days $19.3 \pm 14$ .	Cannot assess dosage from data given.	Results are for those that reliably attended. Walking is adjunct to treatment. Illness severity at discharge in the walking intervention: CGI-S $\downarrow$ ns CGI-I $\downarrow$ ns Total DASS $\downarrow$ (p 0 .005) DASS depression $\downarrow$ (p 0 .048) DASS anxiety $\downarrow$ (p 0 .002) DASS stress $\downarrow$ (p 0 .01)  (retrospective and no data for depression scale meta-analysis)
Ng et al. (2007b)	Effects of a walking program in the psychiatric in-patient treatment setting: a cohort study (2007)								
O'Halloran (2007)	Effects of group walking on mood change in sedentary people with type 2 diabetes.	Sedentary people with type II diabetes.  54 ( $\pm 4.7$ )	Not stated Australia	Three groups available at different locations in metropolitan Melbourne. Group size varied from 6-11.	24 (24)	Moderate level of exertion. Borg scale 10-12	Average 28 mins. Once a week for 6 weeks	168	SEES Positive well-being $\uparrow$ (p > 0.001) Psychological distress $\downarrow$ (p 0.355) Fatigue $\uparrow$ (p 0.061)
O'Hara et al. (2000)	Effects of a walking programme on reducing blood pressure and on increasing health promoting behaviours.	Church based – mid-western African-American. Volunteered. Average BMI $34.2(\pm 5.2)$  41.8 ( $\pm 7$ )	SE: Not stated E: African American USA	Group size 14.	14 (14)	Progressive aerobic walking programme (aim 40-75% age adjusted HRmax). Borg scale 12-15	Average 45 mins. 3 times a week for 10 weeks	1350  80%	SBP $\downarrow$ DBP $\downarrow$ (No baseline values or p values given. Insufficient data within published study to include in meta-analysis )

**Table 2: Systematic review summary results for all 42 studies**

<b>Palmer (1995)</b>	Effects of a walking program on attributional style, depression, and self-esteem in women.	Non-exercising, premenopausal female volunteers aged 29-50 recruited through advertising.  37.4	Not stated USA	Met in a university coliseum. Supervised. Group size 16.	27 (16)	60-70% of maximum heart rate (220-age) by carotid pulse	Average of 33 mins. Once a week for 8 weeks	264	SBP ↓ns DBP ↓ns Pulse ↓ns Attributional style: negative events no change positive events ↑ns CES depression ↓ns Rosenberg self-esteem↑ (p<0.05) VO <sub>2</sub> max↑ (unable to include VO <sub>2</sub> max into meta-analysis due to limited data)
<b>Park et al. (2013)</b>	Effects of a low-volume walking programme and vitamin E supplementation on oxidative damage and health-related variables in healthy older adults.	Healthy older adults recruited from the local community.  71.9 (±1.9)	Not stated Japan	Outdoors, supervised by experienced assistants. Walked in the morning. Group size 7.	38 (7)	Low volume walking programme of < 150 minutes per week. 48% HR reserve.	44 mins. 2 times a week for 12 weeks	1056	Results from control group (i.e. no vitamin E supplementation) Body mass ↑ (p 0.020) BMI ↑(p 0.024) Waist circumference ↑(p 0.603) SBP ↑(p 0.265) DBP ↑(p 0.737) Triacylglycerol ↑ (p 0.109) TC↑ (p 0.001) HDL-C ↑ (p 0.081) LDL-C ↑ (p 0.004) Glucose ↑ (p 0.992) Insulin ↑ (p 0.021) HbA1c ↓ (p 0.001) C-peptide ↑(p 0.001) sE-selectin ↑(p 0.001) sVCAM-1 ↑(p 0.019) plasma TBARS ↓ (p 0.038)  (This is a sub-set of the Takahashi et al study and therefore only outcomes not included in Takahashi included in meta-analysis)

**Table 2: Systematic review summary results for all 42 studies**

Reuter et al. (2011)	Effects of a flexibility and relaxation programme, walking, and Nordic walking on Parkinson specific disability and health related quality of life.	Mild to moderate Parkinson's disease with no history of falls. 63 (±3.1)	Not stated Germany	One session a week included walking uphill to improve muscle strength. Their partners were also offered 6 training sessions. Group size 30. Supervised by physiotherapists.	90 (30)	Not stated	70 mins. 3 times a week for 24 weeks	5040 90%	UPDRS sum score ↓ (improved) (p < .05) UPDRS motor score ↓ (improved) (p < .05) Pain (VAS) ↓ (p < .05) PDQ39 ↓ (improved quality of life) (p < .001)
Roberts (1990)	Effects of walking on reaction and movement times among elders	Recruited from seven senior citizen centres. 71.8 (±1.3)	Not stated USA	Indoors during poor weather. Implemented in the fall. Group size 6-10	60 (31)	60-70% of age-adjusted maximum HR. increased distance from 0.9 to 1.9 miles	30 mins. 3 times a week for 6 weeks	540 70%	Simple reaction time: ↓ns Choice reaction time: ↓ns Simple movement time: ↓ns Choice movement time: ↓ns
Rooks et al. (1997)	To examine the potential neuromotor benefits of walking in community dwelling older adults	Recruited from a suburban community centre. 79.2 (±4.3)	SE: not stated E: Caucasian USA	Outside in a large parking area, along a wooded path or in a gymnasium depending on the weather. Walked together. Group size 9.	18 (11)	Self-paced	Average 37 mins. Three times a week for 16 weeks	1776 92%	Balance: One-legged stand eyes open ↑(p 0.02) One-legged stand eyes closed ↑(p 0.05) Tandem walk ↓( p< 0 .01) Mis-steps ↓( p 0 .05) Reaction times: Lower extremity ↓( p 0 .36) Upper extremity ↓( p<0 .96) Knee extension strength: Left ↑(p 0.51). Right ↑(p 0.045) Stair climb ↓(p<0.02)
<b><u>Siverthorn and Hornak (1993)</u></b>	Effects of exercise on aerobic capacity and body composition in adults with Prader-Willi syndrome	Adults with Prader-Willi syndrome from two group homes in USA. 25	Not stated – in residential home USA	A level riverbank trail. Group size 6.	11 (6)	Progressively increased pace - 20-23 mins per km, progressed to 13.5-16.5 mins per km	115 mins. 2-4 times a week for 24 weeks.	8280	Body weight ↓(p<0.016) Biceps skin fold ↓(p<0.023) Triceps skinfold ↓ns Resting HR ↓(< p 0 .05) VO <sub>2</sub> max ↑(< p 0 .05)

**Table 2: Systematic review summary results for all 42 studies**

<b><u>Song et al. (2013)</u></b>	To compare the effects of Nordic walking programme to those of a normal walking programme on the body composition, muscle strength and lipid profile of women who are over 65 years of age	Women over 65 68.2 (±2.5)	SE: Level of schooling given E: not stated South Korea	A park with a 400 metre track in a metropolitan city. Gym used during inclement weather. Run by person who majored in PE. Intervention ran from February to May. Group size 21	67 (21)	Progressed from 11-16 on the Borg scale	60 mins. 3 times a week for 12 weeks	2160	Weight↓ (p 0 .002) BMI ↓ (p .257) Total body water ↑ (p 0.626) Skeletal body mass ↑ (p <0.001) Percent body fat ↓ (p 0.005) Grip strength ↑ (< 0.001) Sit to stand (no of times) ↑ (p < 0.001) Arm curls (number of times) ↑ (p < 0.001) Total Cholesterol ↓ (p 0 .011) Triglyceride ↓ (p 0 .062) HDL Cholesterol ↑ (p 0.890) LDL Cholesterol ↑ (p 0.860) (Walking is the control group)
<b><u>Takahashi et al. (2013)</u></b>	To examine the effects of a low-volume exercise-training program (100 min/week) on oxidative stress and leukocyte activation marker levels in older adults.	Older adults from the local community. Gender not stated 67.8 (±1.3)	Not stated Japan	In the local community supervised by trainers in the morning (9-10 am) between March and May 2011. The environment was fairly flat road but some parts of road were uphill (but nothing very difficult to walk for older adults). Group size 14	28 (14)	Low volume exercise training under the 150 mins. Per week as recommended by the WHO	50 mins. 2 times per week for 12 weeks	1200	Body mass ↓ (p < 0 .01) BMI ↓ (p < 0 .01) Waist circumference ↓ (p < 0 .01) SBP ↓ (p < 0 .01) DBP ↓ (p < 0 .01) AOPP ↓(p 0 .014) SOD ↑ (p 0 .619) CAT↓ (p 0.106) GPX ↑ (p 0.242) TRX ↑ ( p 0.444) TNF-α ↑ (p 0.144) IL-1β ↓ (p 0.864) IL-10 ↓ (p 0.094) MPO ↓ (p 0 .101) Calprotectin ↑ (p 0.129) CD66b ↓ (p 0 .001) CD62L ↑ (p < .05)
Thomas et al. (2006)	The effect of a Supervised walking programme on wandering among residents with dementia	Nursing home residents selected by the nursing staff with dementia and a 'wanderer'.  Ranged from 71-89	Not stated USA	The walking environment included other units in the facility, social areas and the outdoor grounds which comprised sidewalks and seated areas surrounding the facility.	13 (13)	Not stated. Residential in a nursing home	30-40 minutes. Frequency not stated. The study was for 3 weeks	Unable to assess from the data.	General wandering decreased, especially in those in early to middle stages of dementia.

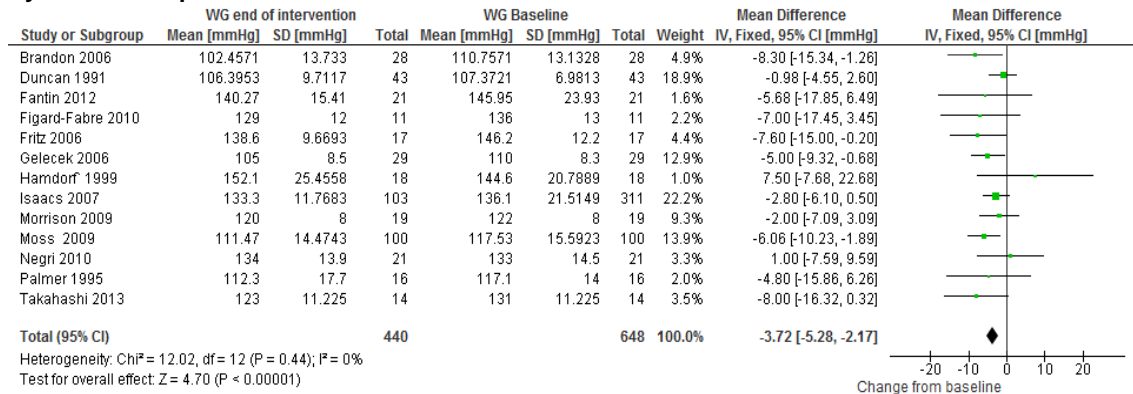
**Table 2: Systematic review summary results for all 42 studies**

				Reminiscence was used. Late morning walks. A group of 6 and a group of 7.					
van Uffelen et al. (2008)	The effects of aerobic exercise or vitamin B supplementation on cognitive function in older adults with mild cognitive impairment (2008)	Community-dwelling adults aged 70–80 with mild cognitive impairment recruited via a publicity campaign in a Dutch town.	SE: Level of education stated E: not stated Netherlands	In municipal parks near the subjects' own neighbourhood. Eight classes were started in four districts. 4 trained walking instructors were hired for the study. Group size 9-18	152 (77)	Designed to improve aerobic fitness. Moderate intensity (three METs)	60 mins. 2 times a week for 52 weeks	6240 63%	Walking programme v placebo  MMSE ↓ (men) no change in women ns AVLT 1–5 (words) ↓ (men and women) AVLT 6 (words) ↓ (men and women) SCWT-A task 1 ↑ (men) ↓ (women) both SCWT-A task 2 ↓ (men and women) SCWT-A task 3 ↓ (men and women) DSST (symbols) no change (men) and ↑ (women) VFT (words) ↑ (men and women) Difference between baseline and 12 months D-QoL sumscore no change D-QoL aesthetics ↑ ns D-QoL belonging no change D-QoL negative effect ↑ ns D-QoL positive effect no change D-QoL self-esteem ↑ ns SF12 – mental component summary ↑ ns SF12 – physical component summary ↑ ns
Van Uffelen et al. (2007)	The effects of walking and vitamin B supplementation on quality of life in community dwelling adults with mild cognitive impairment (2007)	75 (±2.7)							
van Uffelen et al. (2009)	Feasibility and effectiveness of a walking program for community dwelling older adults with mild cognitive impairment (2009)								

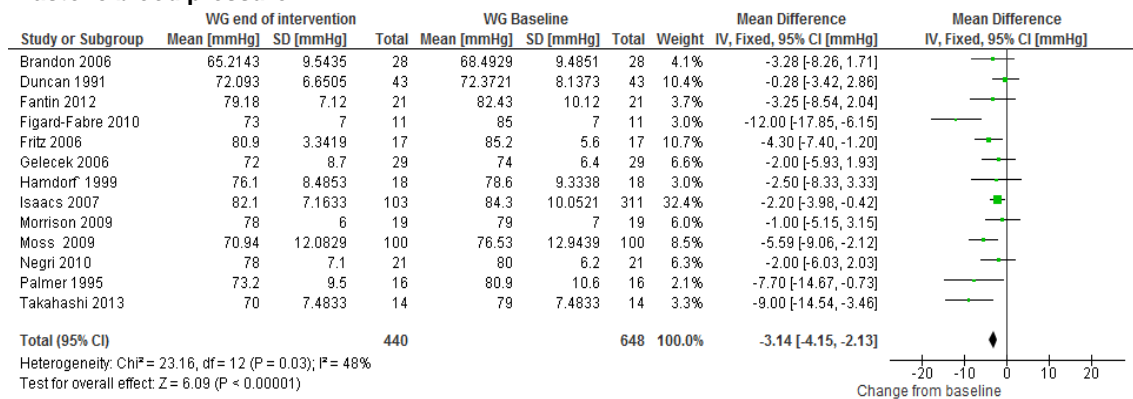


**Table 5: Meta-analysis full results**

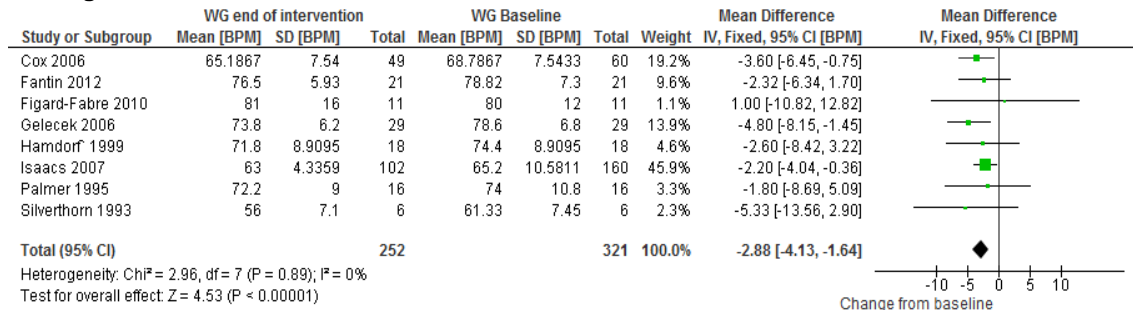
**Systolic blood pressure**



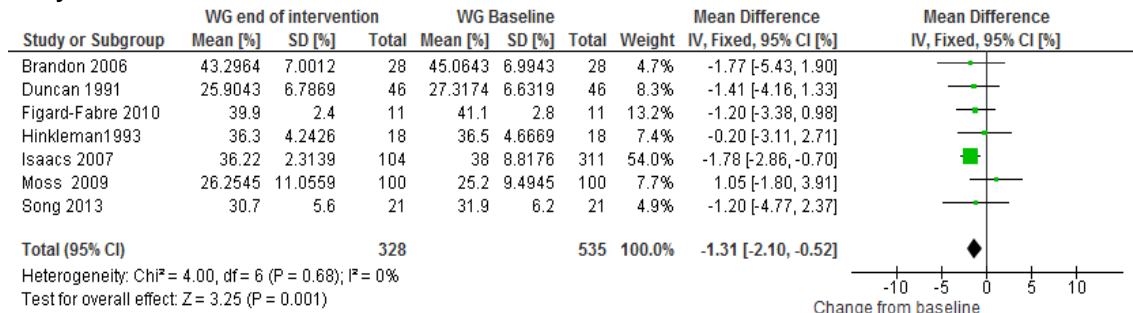
**Diastolic blood pressure**



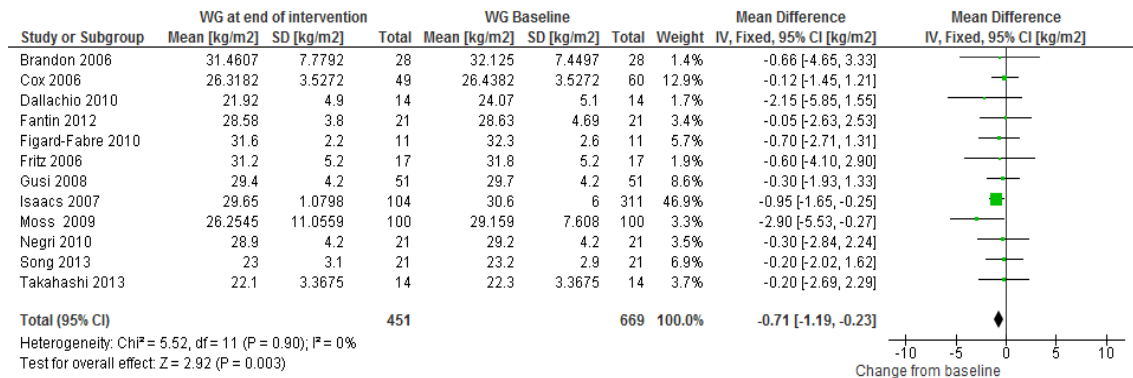
**Resting heart rate**



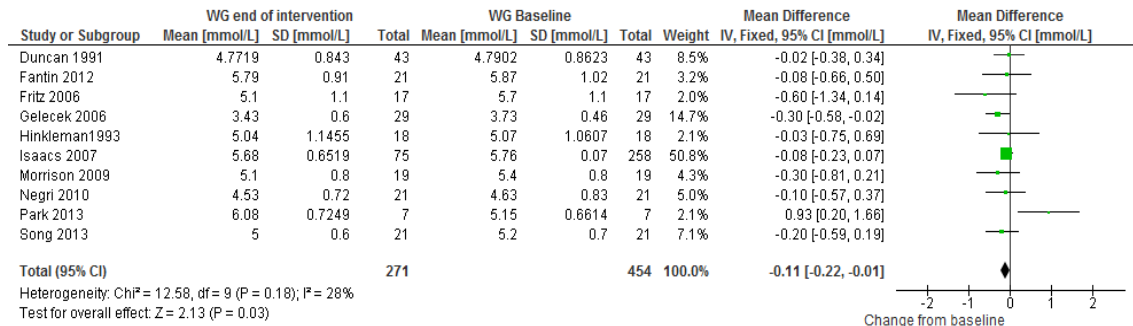
**Body fat**



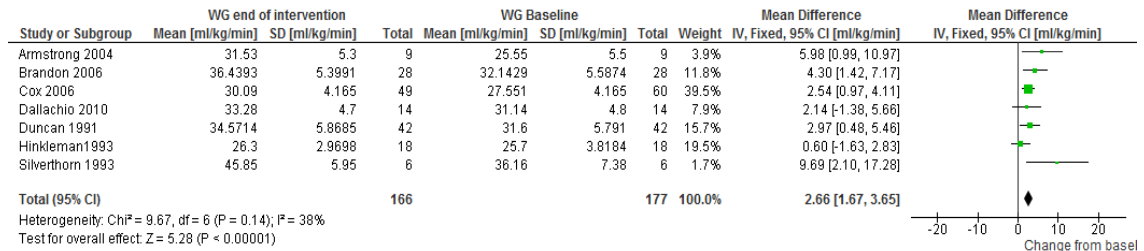
## BMI



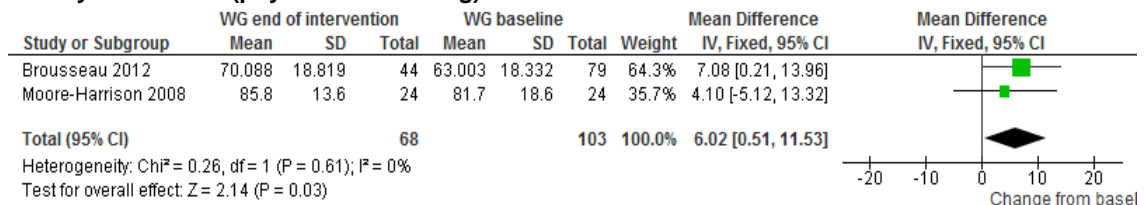
## Total cholesterol



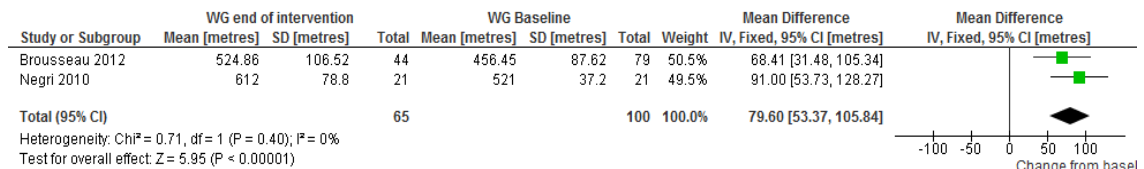
## VO2 max.



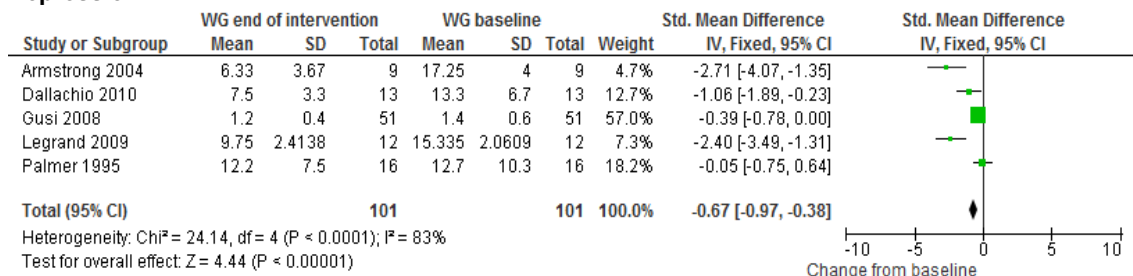
## Quality of life SF36 (physical functioning)



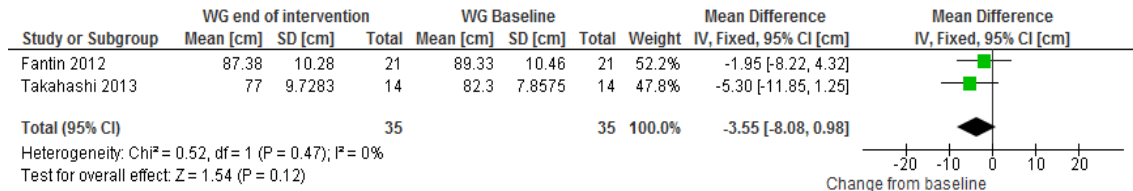
## 6 minute walk test



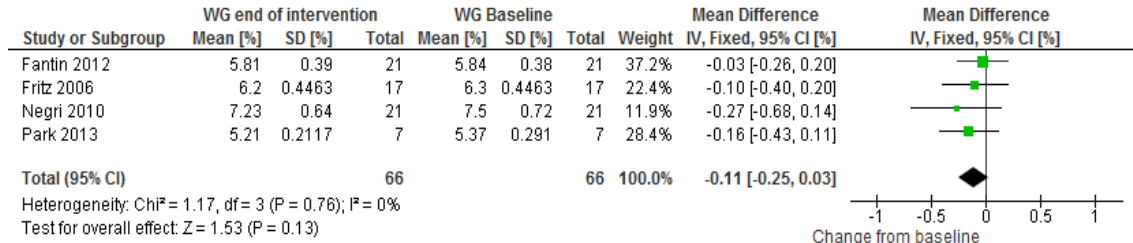
## Depression



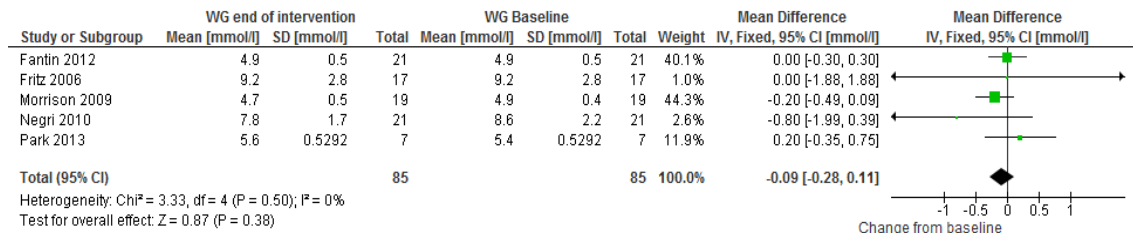
## Waist circumference



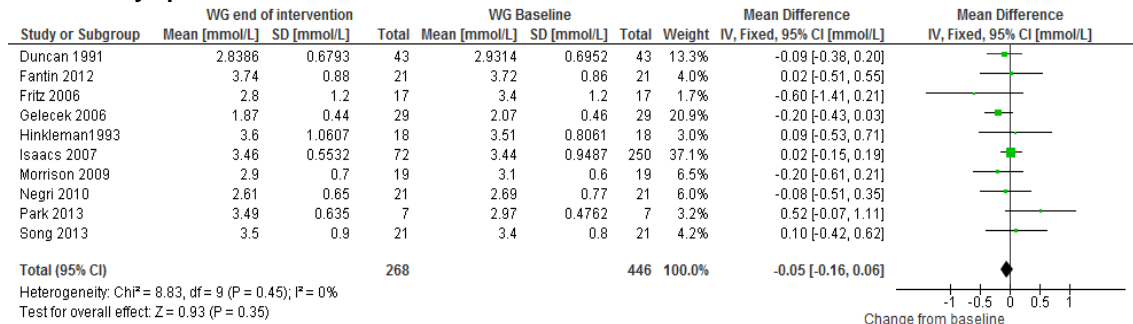
## HbA1C



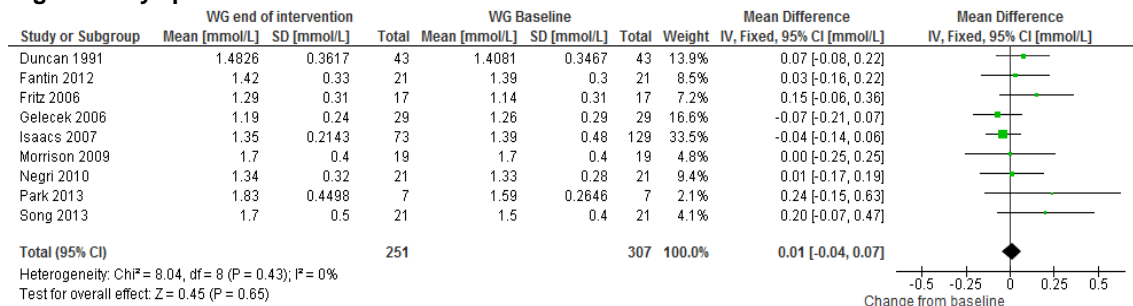
## Glucose



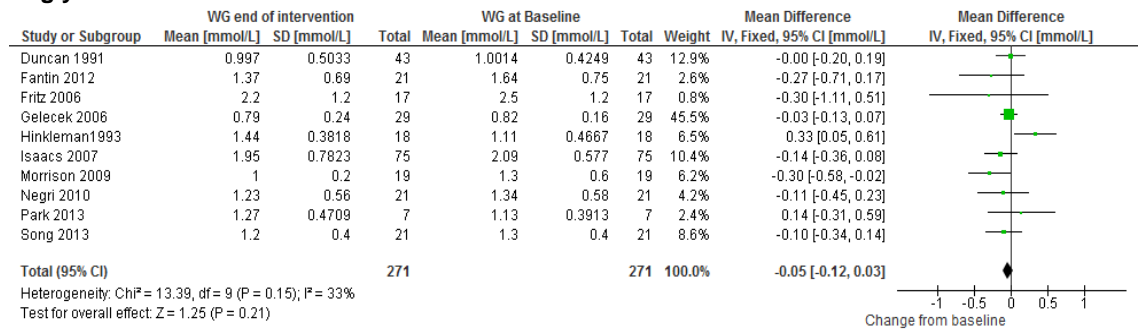
## Low density lipids



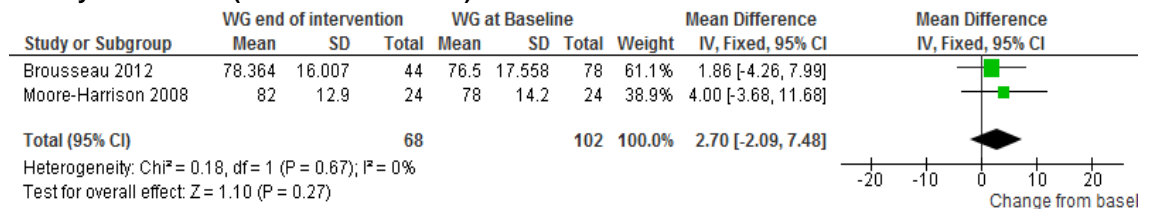
## High density lipids



## Triglycerides



## Quality of life SF36 (mental health index)



## Chapter 3: A spatial equity analysis of a public health intervention: A case study of an outdoor walking group provider within local authorities in England

### Pre-amble

The systematic review and meta-analysis presented in chapter two found that outdoor group walking can confer multiple health benefits. However, the studies included in the review generally had a lack of socioeconomic information about the participants or the characteristics of the area where the intervention was placed. Chapters three, four and five therefore evaluate the potential of walking groups to influence health inequity. This chapter addresses the concern about where walking groups are placed and therefore how available they are.

There is a concern that health promoting interventions may not be available to those who live in more deprived areas which gives the potential to widen inequity. Using one large, national walking group provider in England as a case study this study will investigate where group walks were organised against a range of health and socio-economic measures. The aim is to establish whether walking groups operate in those places with the greatest health need and therefore whether they have the potential to influence inequity.

### Abstract

If an intervention is not well spatially targeted, appropriate levels of uptake, efficacy, long-term compliance and improved health outcomes are unlikely to be attained. Effective health interventions should seek to achieve not only absolute improvements in health but also to reduce inequity. There is often a disparity whereby preventative interventions are more likely to be successful amongst the more affluent, a process which has been coined the 'inverse prevention law'. Physical inactivity is known to be socially patterned and disproportionately prevalent in disadvantaged communities yet there is a lack of clear evidence on which interventions have the potential to influence inequity.

Walking groups have been found to have multiple health benefits and increase physical activity. In England the major facilitator is a not for profit organisation which has 70,000 regular walkers and is lay led with 10,000 volunteers. The aim of this study was to evaluate the extent to which walking groups operated in those places with the greatest health need and whether consequently the scheme has the potential to influence health inequity.

The work used a spatial approach whereby geographical variations in walking group provision within the 326 local authorities in England (mean population 163,410) were linked to health and socio-economic measures of population need.

Generally, greater need was not associated with higher provision of the walking group intervention. Although the magnitude of differences was small, provision of the intervention tended to be poorest in those local authorities with the greatest health need, as measured by our indicators. Without targeting those areas with greater health and socio-economic need, there is a concern that walking groups may not be set up in areas that need them most. There is therefore a potential that this intervention could, albeit in a small way, widen inequity between local authorities. However small-scale and well-intentioned, interventions need to be evaluated for their potential impact on inequity.

## Introduction

The term health inequity describes the unnecessary and avoidable inequalities in health between different groups of people. These inequities arise from inequalities within and between societies and are considered unfair and unjust (Whitehead, 1992, World Health Organization, 2015b). There are important social and economic costs to society from health inequity, as well as it being a matter of social justice (Marmot et al., 2010, Wilkinson and Pickett, 2010, Whitehead, 1992).

Inequity in health is a problem in all developed countries (WHO Europe, 2005). In the United Kingdom (UK), the 'Black Report' of 1980 was the first to detail the extent of which ill-health and death were unequally distributed (Department of Health and Social Security, 1980). These inequalities were not due solely to failings in the National Health Service (NHS) but to many other social determinants of health. Furthermore, there was evidence that these inequalities were widening (Townsend et al., 1992). This trend continues to the present day with an estimate of between 1.3 and 2.5 million extra years of life lost each year in England due to health inequalities (Marmot et al., 2010).

Determinants of poor health extend beyond individual characteristics into environmental settings, such as workplaces and neighbourhoods (residential settings), so that where you live matters (Cummins, 2010). Importantly, differences across neighbourhoods are not in themselves natural; rather they result from specific policies, or the absence of policies (Diez-Roux, 2007). Therefore, targeting spatial inequalities within neighbourhoods is an attractive target for interventions (Diez Roux and Mair, 2010). However, there is a concern that many interventions designed to improve health may not be reaching the most disadvantaged, as was recognised by the UK Government following the publication of the 'Wanless Report' of 2004 (Wanless D, 2004). It has been observed that there is often a disparity whereby uptake and provision of preventative interventions is socially patterned and are more likely to be successful amongst the more affluent, a process which has been

coined the 'inverse prevention law' (Acheson, 1998). Indeed some researchers have pointed to evidence of an 'inverse equity hypothesis' whereby, in the absence of effort to promote equity, new health interventions will first be adopted by the wealthy, but as coverage increases poorer individuals will make faster gains and initial inequity would eventually be reduced (Victora et al., 2000). Others have shown evidence of cumulative inequity, expressed as 'the staircase effect', whereby cumulative disadvantage at different stages of interventions acts to decrease the effectiveness of any potential benefits (Tugwell et al., 2006). There is also some evidence that those interventions that rely on voluntary behaviour change, as opposed to statutory regulation, can have a particularly negative impact on health equity because they will tend to be adopted by those with the least need (White et al., 2009, Lorenc et al., 2013).

Many population health interventions focus on unhealthy behaviours which are a key contributor to non-communicable disease mortality and disease burden. Such diseases are largely preventable but are disproportionately prevalent in poor and disadvantaged communities, with evidence that this disparity is increasing (Buck and Frosini, 2012, World Health Organization, 2008).

Physical activity is known to have wide ranging long term health benefits across all socio-economic and ethnic groups and sexes (Hallal et al., 2012, Reiner et al., 2013). A key component to unhealthy behaviour is physical inactivity, which has been estimated to be associated with 9% of premature deaths worldwide (Lee et al., 2012). Physical inactivity has been estimated to cost the English NHS £1.06 billion per year in direct costs, with lost productivity an estimated £6.5 billion per year (National Institute for Health and Care Excellence, 2012a). For example, it is one of the major risk factors for cardiovascular disease; one of the major causes of premature death in England and associated with 34% of all deaths (National Institute for Health and Care Excellence, 2010). It is of concern that it has been shown that a higher prevalence of leisure-time or moderate–vigorous intensity physical activity is found in the most educated (Gidlow et al., 2006). Further, economically disadvantaged and vulnerable groups are less likely to engage with physical activity interventions (Hillsdon et al., 2008). Accessibility of physical activity interventions may be one of several environmental factors that influence individuals' physical activity behaviours (Diez-Roux et al., 2007). An evaluation of physical activity interventions in Europe found that very few of the analysed policies included specific measures to increase participation of economically disadvantaged population groups (Daugbjerg et al., 2009). There is therefore a risk that interventions to increase physical activity could increase health inequity, representing a major challenge to public health professionals.

Outdoor walking group schemes are widely recommended as a way of increasing physical activity and have been shown to be effective at the population level (National Institute for

Health and Care Excellence, 2012b, Centers for Disease Control and Prevention, 2012, Public Health England, 2014b). A recent systematic review found them to have numerous health benefits with virtually no adverse effects (Hanson and Jones, 2015a). They are also efficacious at increasing physical activity, particularly when targeted at older adults (Kassavou et al., 2013). Furthermore, group based physical activity interventions aimed at adults have previously been found to be effective in socio-economically disadvantaged communities (Cleland et al., 2012).

In England the major facilitator of group walking schemes is the national 'Walking for Health' (WfH) programme (Walking for Health, 2015). The concept of group health walks in England was introduced locally by an Oxfordshire General Practitioner in 1995, developing into a national scheme in 2000. It is run by two charities. WfH is England's largest network of lay-led health group walks with 70,000 regular walkers, 10,000 volunteer walk leaders and approximately 3,000 free short walks weekly in the natural environment. The stated aims are to 'provide a local, low cost, fun, social method of becoming active' with those at highest risk of inactivity being particularly targeted (Walking for Health, 2015).

The scheme is organised centrally with salaried co-ordinators but it is primarily a community delivered intervention, funded locally through partnership arrangements. The group walks are delivered by volunteers. Volunteers receive one day of standardised training and then lead walks in their own community. Information on how to set up or add to existing schemes is given on the scheme's website and it is open to members of the public to apply to do this. There are requirements for accreditation and for using the scheme branding. This includes that all walk leaders receive training and that the walks are free and regular and should be no longer than 90 minutes in length, with at least one shorter walk of a maximum of 30 minutes per month. Information is also given on the scheme website about how to apply for local funding from sources such as local authorities and NHS commissioners. The scheme therefore presents a case-study opportunity to evaluate the extent to which such an intervention that is nationally organised but delivered locally on a voluntary basis operates in those places with the greatest health need and has the potential to influence inequity.

This work takes a spatial approach, whereby geographical variations in walking group provision in England are linked and then compared to variations in a range of measures of population need. Taking such an approach is appropriate as it has been argued that the achievement of spatial equity is the first step in a process towards reducing health inequity; if an intervention is not well spatially targeted, appropriate levels of uptake, efficacy, long-term compliance, and the accomplishment of improved health outcomes are unlikely to be attained (Dalton et al., 2013).



## Methods

### Walking for Health (WfH) scheme data

To evaluate the extent to which WfH operates in those places with the greatest need it was firstly necessary to identify where WfH walks were provided. England is organised administratively into 326 local authorities (LAs) with a mean population of 163,410 (Office for National Statistics, 2014). This is the administrative area that the WfH scheme uses to collate its data and therefore local authorities were used as the spatial units for this analysis. For the purposes of this research the intervention is defined as the operation of a group walk. Each local WfH scheme records these walks onto a national database. The measure of provision therefore was the number of group walks recorded on the national database within each of the 326 local authorities in England over a 12 month period. Data was extracted in September 2014 for walks registered between the 1<sup>st</sup> April 2013 to 31<sup>st</sup> March 2014, the period for which most recent complete information was available.

### Health and socio-economic measures in Local Authorities (LAs)

A set of variables were generated to describe the level of health and socio-economic need for the provision of physical activity interventions within each local authority. Two sets of indicators were generated. Firstly, data was chosen to represent direct health need. This included behavioural measures such as physical inactivity. Secondly, as it is widely recognised that some socio-demographic groups can be disadvantaged in health programmes, demographic indicators were chosen that represent these socio-economic factors. The Public Health Observatory Handbook of Health Inequalities was used to provide guidance on the selection of appropriate measures (Carr-Hill et al., 2005).

The full list of variables representing need are listed in Table 6. All data was derived from routinely available national datasets. The data used to generate the variables was obtained from the Office for National Statistics which provides information on the age and socio-economic makeup of the population via the national census of population as well as general health (UK Data Service, 2013), from Public Health England and the Public Health Observatories for health and health care data (APHO, 2013) and from the Active People Survey for recreational physical activity data (Sport England, 2013a).

**Table 6: WfH analysis. Variables generated to describe health and socio-economic measures within each local authority**

	Description of the variable and the unit it is expressed in
<b>1. Measure of health need</b>	
Aged above 65 <sup>1</sup> .	Persons aged above 65 years of age as a percentage of the total population.
Physically inactive < 30 minutes per week <sup>2</sup> .	Percentage of all adults (aged 16 and over) participating in sport and/or undertaking some form of physical activity at moderate intensity (or higher) in 10 minute blocks. Includes recreational walking and walking for active travel.
Mortality <sup>3</sup> .	All cause standardised mortality ratios (SMR). SMR is based on an England standard of 100. Greater than 100 is greater than national average.
Inequality in life expectancy (For male and females) <sup>4</sup> .	Slope index of inequality (SII) for life expectancy at birth using Index of Multiple Deprivation data (2010) and mortality data for 2006-10. Hypothetical difference in life expectancy within a district expressed in years.
Limiting long term illness or disability which limits daily activity or work <sup>1</sup> . Self-rated health <sup>1</sup>	Percentage of people with day to day activities limited. Self-rated. A percentage of the total number of respondents to the question.
Chronic and poorly managed diseases: Chronic obstructive pulmonary disease (COPD) and Coronary heart disease (CHD) <sup>5</sup> .	Emergency admissions for COPD and Emergency admissions for CHD. Standardized admission ratio 100 is the England benchmark.
Excess weight Body Mass Index (BMI)≥25kg/m <sup>2</sup> <sup>2</sup> .	Self-reported height and weight information Adults, 16 years and over. Uses Health Survey for England methodology for adjusting for inaccuracy in self-reporting. A percentage estimate of the prevalence of excess weight.
<b>2. Socio-economic measures</b>	
Socio-economically disadvantaged adults <sup>6</sup> .	English Index of Multiple Deprivation (IMD) 2010. Population weighted average of the combined scores for the lower super output areas in a local authority. Lower is less disadvantage.
Income deprivation amongst adults <sup>7</sup> .	Income domain from IMD 2010. Percentage of the total population living in low income families (out of work and low income dependent on means dependent benefits).
Socio-economic disadvantage in older people <sup>8</sup> .	Income Deprivation Affecting Older People (IDAOP) Percentage of adults aged 60 or over living in pension credit households as a percentage of all adults aged 60 or over.
Pensioners living alone <sup>1</sup> .	People aged 65 or over living alone as a percentage of all adults aged 65 or over.
Black and Minority Ethnic (BME) adults <sup>1</sup> .	Non-white as a percentage of the total adult population

<sup>1</sup> Census 2011 Available at: <http://www.ons.gov.uk/ons/guide-method/census/2011/index.html>

<sup>2</sup> Active People Survey (data collected between January 2012 and January 2013) commissioned by Sport England Available at: [http://archive.sportengland.org/research/active\\_people\\_survey.aspx](http://archive.sportengland.org/research/active_people_survey.aspx)

<sup>3</sup> Office for National statistics 2012 Available at: <http://www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcn%3A77-314473>

<sup>4</sup> Public Health England 2013 Available at: <http://www.apho.org.uk/default.aspx?RID=110504>

<sup>5</sup> Hospital episode statistics from Public Health England. Admissions from April 2006 to March 2011 Available at: <http://www.yhpho.org.uk/default.aspx?RID=8494>

<sup>6</sup> Social Disadvantage Research Centre at the Department of Social Policy and Social work at the University of Oxford. Commissioned by the Department for Communities and local government March 2011 Available at: <https://www.gov.uk/government/statistics/english-indices-of-deprivation-2010>

<sup>7</sup> Public Health England Commissioned by the Department for Communities and local government Available at: <http://www.apho.org.uk/resource/item.aspx?RID=97316>

<sup>8</sup> Social Disadvantage Research Centre at the Department of Social Policy and Social work at the University of Oxford. Commissioned by the Department for Communities and local government March 2011 Available at: <http://www.apho.org.uk/resource/item.aspx?RID=97318>

## Statistical analysis

Initial data extraction showed there was no evidence of group walk provision in 128 of the 326 LAs; a large percentage (39.2%). Firstly, any differences in the health and socio-economic measures between those LAs with the provision and those without it needed to be determined. For each of these measures, the differences in mean values were compared in those LAs with walks and those without. Analysis of variance was used to test the difference in means with an odds ratio computed using binary logistic regression. The second component of this analysis examined those LAs where there was evidence of the group walks. The aim of this was to determine whether the number of walks recorded in these LAs was associated with the health and socio-economic measures. In order to do this, the mean number of group walks over the study period was classified into quintiles representing least to most group walks. Trends in the mean values of the variables across quintiles were examined using a test for linear trend by means of polynomial contrast. The threshold for statistical significance was  $p = 0.05$ . SPSS Version 22 was used for all analysis (SPSS, 2009).

## Results

Based on the information extracted from the national database, between April 2013 and March 2014 the WfH scheme provided 58,525 walks in England with 48,277 unique registered walkers with 856,239 attendances at the walks. The population of walkers was of an older age group; 81% were aged above 55 years of age and 48% above 65. There was evidence of the WfH intervention operating in 198 of the 326 (61%) of the local authorities. Where the group walks operated, the median was 225 group walks per year. This ranged from < 10 (6 LAs) to 2037 (1 LA) group walks in the year. The interquartile range was from 83 to 408 group walks.

The difference in the health and socio-economic measures between those local authorities with no evidence of the WfH intervention and those with it is described in Table 7. In general, those local authorities with no evidence of WfH provision were more likely to have greater need, as measured by the health and socio-economic indicators, with statistically significant differences for 10 of the 15 measures. There was WfH provision in those LAs with districts with greater populations aged above 65 and with limiting long term illness. Otherwise there was a greater odds of no provision in those LAs with greater socio-economic and health need as represented by our health and socio-economic measures. The size for these differences were however modest with odds ratios relatively close to unity. Table 8 shows trends in the level of walk provision across the health and socio-economic measures for those LAs within which at least some walk provision was present. Generally, poorer health and socio-economic measures in LAs was not

associated with a trend of higher walk provision, except for the measure of the percentage of older people resident in the LA. There was some evidence that provision was greater in areas with more limiting long term illness or disability and poorer self-rated health but trends did not reach statistical significance. For all other indicators, provision was generally poorer in areas of greater need, although trends only reached statistical significance for the measures of pensioners living alone and emergency admissions for COPD, and the magnitude of differences in mean values between the LAs with the most and least number of walks were again small.

**Table 7: WfH analysis. Difference in health and socio-economic measures between local authorities (LA) with and without the provision**

(n= local authority)	Unit	LA No provision n=128 Mean value (95% CI)	LA Provision n=198 Mean value (95% CI)	p-value <sup>1</sup>	Odds Ratio <sup>2</sup> (95% CI)
<b>1. Measure of health need</b>					
Above age 65	%	16.22 (15.52 to 16.92)	18.22 (17.67 to 18.77)	< 0.001	1.14 (1.07 to 1.2)
Physically inactive	%	28.06 (27.19 to 28.93)	27.69 (27.14 to 28.23)	0.45	0.980 (0.93 to 1.03)
Standardised mortality ratio	Ratio	98.67 (96.14 to 101.2)	96.78 (95.05 to 98.97)	0.21	0.99 (0.97 to 1.01)
Inequality in life expectancy SII (males)	Years	8.06 (7.54 to 8.58)	7.34 (6.98 to 7.97)	0.04	0.924 (0.86 to 0.99)
Inequality in life expectancy SII (females)	Years	5.59 (5.15 to 6.03)	5.35 (5.0 to 5.7)	0.40	0.962 (0.88 to 1.05)
Limiting long term illness or disability	%	17.08 (16.51 to 17.65)	18.03 (17.6 to 18.5)	0.01	1.101 (1.02 to 1.18)
Bad and very bad health	%	5.25 (5.00 to 5.50)	5.28 ( 5.09 to 5.46)	0.87	1.013 (0.86 to 1.19)
Chronic and poorly managed disease COPD	Ratio	102.16 (94.33 to 109.98)	88.03 (82.91 to 93.16)	0.002	0.991 (0.986 to 0.997)
Chronic and poorly managed disease CHD	Ratio	100.40 (96.10 to 104.72)	95.12 (92.17 to 98.07)	0.04	0.990 (0.98 to 1.00)
Excess weight (BMI ≥ 25kg/m <sup>2</sup> )	%	64.27 (63.31 to 65.23)	64.30 (63.59 to 65.02)	0.95	1.001 (0.96 to 1.04)

**Table 7 (Continued): WfH analysis. Difference in health and socio-economic measures between local authorities (LA) with and without the provision**

	Unit	LA No provision n=128 Mean value (95% CI)	LA Provision n=198 Mean value (95% CI)	p-value <sup>1</sup>	Odds Ratio <sup>2</sup> (95% CI)
<b>2. Socio-economic measures</b>					
Index of multiple deprivation	Average score	20.59 (18.91 to 22.26)	18.23 (17.18 to 19.27)	0.01	0.967 (0.94 to 0.99)
Income domain IMD	%	13.86 (12.75 to 14.97)	12.45 (11.78 to 13.11)	0.02	0.954 (0.92 to 0.99)
Income deprivation older people	%	18.40 (16.98 to 19.83)	16.21 (15.41 to 17.02)	0.01	0.954 (0.92 to 0.99)
Pensioners living alone	%	31.97 (31.30 to 32.64)	30.77 (30.30 to 31.24)	0.003	0.910 (0.85 to 0.97)
Non-white	%	14.78 (12.2 to 17.37)	8.02 (6.52 to 9.53)	< 0.001	0.958 (0.94 to 0.98)

Abbreviations: Slope index of inequality (SII); Chronic obstructive pulmonary disease (COPD); Coronary heart disease (CHD) Index of multiple deprivation (IMD).

1. Based on analysis of variance to test the difference in means 2. An odds ratio generated using binary logistic regression.

**Table 8: WfH analysis. Health and socio-economic measures for each quintile of intervention in local authorities (LA) with the intervention**

(n= local authority)		Group 1 LAs with least provision	Group 2	Group 3	Group 4	Group 5 LAs with most provision	Test for linear trend <sup>1</sup>
		Mean value (95% CI) n=39	Mean value (95% CI) n=40	Mean value (95% CI) n=40	Mean value (95% CI) n=40	Mean value (95% CI) n=39	p-value
<b>1. Measure of health need</b>							
Above aged 65	%	16.97 (15.43 to 18.52)	17.94 (16.72 to 19.17)	18.93 (17.74 to 20.12)	18.61 (17.52 to 19.70)	18.62 (17.42 to 19.83)	0.046
Physically inactive (< 30 minutes per week)	%	28.37 (27.07 to 29.67)	27.52 (26.28 to 28.76)	26.99 (25.86 to 28.13)	27.33 (26.19 to 28.47)	28.25 (26.86 to 29.64)	0.826
Standardized mortality ratio	Ratio	98.69 (95.11 to 102.27)	95.25 (89.36 to 101.14)	96.33 (92.75 to 99.90)	95.38 (91.93 to 98.82)	98.36 (95.75 to 100.96)	0.931
Inequality in life expectancy SII (males)	Years	7.81 (6.85 to 8.77)	7.39 (6.46 to 8.31)	6.62 (5.73 to 7.52)	8.01 (7.00 to 9.02)	7.08 (6.24 to 7.93)	0.574
Inequality in life expectancy SII (females)	Years	5.94 (5.03 to 6.84)	5.59 (4.83 to 6.35)	4.73 (3.88 to 5.57)	5.63 (4.74 to 6.52)	4.87 (4.29 to 5.44)	0.098
Limiting long term illness or disability	%	17.64 (16.58 to 18.69)	17.99 (17.02 to 18.98)	17.94 (16.91 to 18.98)	18.23 (17.29 to 19.16)	18.34 (17.32 to 19.36)	0.299
Self-rated bad health and very bad health	%	5.28 (4.88 to 5.69)	5.33 (4.89 to 5.76)	5.14 (4.64 to 5.63)	5.31 (4.90 to 5.72)	5.33 (4.92 to 5.74)	0.912
Chronic and poorly managed disease COPD	Ratio	100.91 (88.64 to 113.19)	89.73 (78.66 to 100.81)	81.11 (68.07 to 94.15)	87.04 (75.45 to 98.64)	81.52 (71.58 to 91.45)	0.024
Chronic and poorly managed disease CHD	Ratio	98.02 (91.50 to 104.53)	96.19 (89.78 to 102.60)	91.41 (84.07 to 98.74)	95.80 (90.04 to 101.56)	94.24 (86.44 to 102.04)	0.457
Excess weight (BMI ≥ 25kg/m <sup>2</sup> )	%	63.71 (62.21 to 65.21)	65.58 (63.79 to 67.37)	64.68 (63.27 to 66.10)	64.79 (63.13 to 66.46)	62.69 (60.93 to 64.46)	0.272
<b>2. Socio-economic measures</b>							
Index of multiple deprivation	Average score	19.63 (17.09 to 22.16)	18.09 (15.82 to 20.37)	16.49 (13.95 to 19.04)	18.22 (16.09 to 20.42)	18.74 (16.34 to 21.15)	0.663
Income domain IMD	%	12.99 (11.24 to 14.74)	12.44 (10.93 to 13.96)	11.37 (9.87 to 12.86)	12.56 (11.15 to 13.96)	12.90 (11.45 to 14.35)	0.980
Income deprivation older people	%	17.60 (15.32 to 19.88)	16.32 (14.32 to 18.33)	14.94 (13.19 to 16.69)	15.85 (14.38 to 17.31)	16.40 (14.79 to 18.00)	0.321
Pensioners living alone	%	31.25 (30.33 to 32.17)	31.78 (30.33 to 33.23)	30.06 (29.18 to 30.93)	30.66 (29.70 to 31.63)	30.11 (29.09 to 31.12)	0.044
Non-white	%	11.26 (6.35 to 16.18)	7.84 (5.49 to 10.20)	7.19 (3.74 to 10.65)	7.13 (4.00 to 10.25)	6.75 (3.89 to 9.61)	0.073

<sup>1</sup> Polynomial contrast for linear trend

## Discussion

The magnitude of differences in this case study were small, but the findings showed that the number of the group walks provided was generally lowest in those local authorities with the greatest health need, as measured by our health and socio-economic indicators. The only statistically significant exception to this observation was that provision of walks was better in those LAs areas with greater numbers of older people, although not for pensioners living alone. Health walks are predominantly attended by older people and therefore the scheme could be well positioned to have a positive impact on the physical activity levels of older people, a group at particular risk of inactivity (Doyle et al., 2012). Group walks may help address the social isolation, loneliness and higher levels of deprivation that are linked with pensioners who live alone (Public Health England, 2013b). Indeed, there is evidence of an income-age gradient in physical activity with the largest differences by income occurring in those who are up to 10 years post statutory retirement age (Farrell et al., 2013). It is of concern however, that walk provision was generally poorer in areas with the greatest need measured by the other health and socio-economic indicators.

It is probably the case that the measures we used to describe each LA captured an overall health and socio-economic disadvantage in certain areas and that some of the measures we used were better at picking this up than others. As a consequence specific associations with individual measures need to be interpreted with caution. However, it is noteworthy that where there was no evidence of the walk provision being provided at all, this tended to be in those LAs with a poorer health and socio-economic profile across a wide range of measures. This is despite the fact that the organisation in this case study encourages the start-up of new schemes, and it offers information to assist those who might want to set up new group walks in their community on how to apply for local funding from sources such as local public health and the NHS. It is thus of concern that the initial impetus to instigate the scheme appears is most lacking in deprived areas rather than limitations in the provision of new walks in localities where some already present. For the scheme to operate more universally the particular barriers involved in starting walks when none are present may need to be addressed.

The intervention considered in this case study started as a small local initiative which has grown organically into a large national organisation operating in both urban and rural communities. WfH recognises that physical inactivity is an increasing challenge and that more health walks are needed to reach as many people as possible. However, previous research has cautioned that walking interventions may be preferentially taken up by better-off groups (Ogilvie et al., 2007). For example, research with one walking group



organisation found that 72% of the membership were professionals with new members attracted by 'word of mouth'. This subsequently attracted people from similar demographics – the retired, middle class and largely female (Matthews et al., 2012). Community participation is key to health promotion and to reach into those that are more disadvantaged there is a need to better mobilise the energy and resources that comes from within communities (World Health Organization, 2013). Previous research has identified involving residents in a bottom up approach with meaningful engagement and the support of volunteers as key to successful physical activity interventions (Cleland et al., 2014). Additionally, the use of lay community / lay volunteers has shown some promise in improving health amongst disadvantaged groups in general (O'Mara-Eves et al., 2013) with specific successes in mental health and lifestyle improvement (Altogether better, 2015). It might be that a model of partnership working with a community health champion approach could aid productive access into disadvantaged areas.

### Strengths and limitations

A strength of this analysis is the wide variety of datasets used to generate health and socio-economic measures within local authorities. However, as a consequence we undertook a large number of tests which raises the potential of type I statistical error associated with multiple testing. The study also benefitted from access to a large national database of standardised measures of walk provision. In common with any analysis that makes use of an organisation's database, we are vulnerable to incompleteness. Our discussion with the WfH scheme suggests there may be some missingness in the data where some schemes use their own database software which is not compatible with the central database we had access to. There is however no suggestion that this missingness is more prevalent in more disadvantaged areas. A further limitation is that our health and socio-economic measures were area based and hence did not provide any insight into the health needs of those individuals who actually attend the walks. LAs in England have a mean population of 163,410 (Office for National Statistics, 2014). Both rural and metropolitan LAs are very heterogeneous and therefore our findings for a LA cannot be taken as a proxy for more local neighbourhoods (Diez-Roux, 2007). Finally, the findings from this analysis are limited to one health intervention in one country. Caution should therefore be given to how generalizable these findings are to other settings.

## Conclusions and implications of this study

This study has shown some inequity between LAs in walking group provision. There was no evidence of higher levels of provision in areas of greatest need and walking groups also tended to operate in those areas that have better socio-economic and health indicators. The magnitude of the differences were small and on their own unlikely to meaningfully contribute to health inequity. However, if these findings were similarly replicated in other health initiatives they could act additively and lead to significant inequity in final outcomes (White et al., 2009). It has previously been cautioned that all processes in the planning and delivery of an intervention have the potential to widen inequity between groups (White et al., 2009). Our study has shown that it is possible that the way walking schemes are developed through local initiatives could create the potential to widen inequity between local authorities as they might not be set up in those communities that stand to gain the most.

## Chapter 4: Promoting outdoor group walking in areas of health and socio-economic deprivation: A process evaluation of the implementation of a new community based walking group scheme

### Preamble

This is the second study in this thesis that aims to evaluate whether walking groups have the potential to impact health inequity. Chapter three addressed the concerns about where walking groups were placed and therefore their availability to those in greatest need. It found some evidence that walking groups may not be set up in areas that need them most. This chapter therefore seeks to better understand the challenges of setting up such schemes. This study worked with a new walking scheme set up in a deprived area of Norwich, in England to evaluate the essential elements that facilitated the implementation and sustainability of the scheme and those that presented barriers.

### Abstract

Whilst walking groups have health benefits, there is a concern that they might not operate in areas that have the greatest health needs. This study examined the process of implementing a new walking group scheme in a deprived community in England with poor physical activity, health and socio-economic indicators. Documentary evidence and semi-structured interviews with stakeholders and volunteer walk leaders undertaken at the beginning and end of the funding period were analysed thematically. It was found that community centred approaches, collaborative partnerships with health and non-health organisations and ongoing sustainability issues were all factors that affected the scheme's effective implementation. The findings suggest the necessity of identifying and utilising community based assets to access those in greatest need; the key role that health professionals have in referring those in poorest health and the importance of building partnerships for long term outcomes.

## Introduction

Physical activity has wide-ranging long-term health benefits with evidence that it reduces the risk of chronic disease (Reiner et al., 2013, Friedenreich et al., 2010). Even small increases in activity could be beneficial to population health, with the largest gains coming from inactive individuals becoming moderately active by doing just 20 minutes of brisk walking each day (Ekelund et al., 2015). The simplicity of walking, with little cost, also makes it economically accessible and therefore one of the best ways to achieve recommended daily amounts of physical activity (ACSM, 2011). However, 8% of the population have been estimated to not even walk a continuous five minutes during a four week period (Farrell et al., 2013). A further concern is that physical activity interventions tend to be taken up by those who are better socially connected, more educated and live in wealthier neighbourhoods (Farrell et al., 2014, Gidlow et al., 2006).

One way to promote walking is through the use of outdoor health walking schemes, which are widely encouraged within communities (Public Health England, 2014a). Walking groups have been found to have multiple physiological and psychological health benefits and with good adherence and few side effects, could be a useful intervention for those whose health would benefit from increasing physical activity (Hanson and Jones, 2015a). However, as with other health promoting interventions, equity issues are of concern. Firstly, without effective targeting at those areas with greatest health and socio-economic need, walking groups might not be set up in communities that need them most, giving a potential for widening inequity (Hanson and Jones, 2015b). Secondly, when walking interventions are in place they tend to be taken up by white, well-educated, middle aged women, and recruitment rates are poorest for men (Foster et al., 2011). Finally, recent research with a walking group operating in an area of health and socio-economic deprivation found barriers for those very people for whom walking groups could potentially offer the greatest benefit (Hanson et al., 2016) (Presented in Chapter 5). For example, walking groups were viewed by participants as being of little purpose and there was a poor understanding of the health benefits of walking. Further, the group format itself represented a barrier by creating a general apprehension about what to wear, the fitness levels needed and an expectation of socialising with others in the group. Setting up and promoting walking groups in deprived communities therefore poses clear challenges and barriers that could inhibit uptake from those people who would stand to gain the most.

The term 'community wide' generally refers to an intervention directed either at a geographic area, such as a city or suburb, or towards a group of people who share at least one social or cultural characteristic (Baker et al., 2015). Multi-strategy community wide interventions for increasing physical activity are becoming increasingly popular and generally involve investment in infrastructure with the aim of producing long-lasting

community benefits by reducing health risk factors (Baker et al., 2015). An example would be the 'Healthy Borough Programme' in Tower Hamlets, London, which piloted and evaluated community initiatives to tackle the social and environmental causes of obesity including community led projects to tackle barriers to physical activity (Williams, 2011). 'Walk Norwich' is a community wide intervention in the City of Norwich, one of the 'Walking Cities' funded by the UK Department of Health in 2014 to encourage local journeys on foot. Cities were able to bid for funds to implement walking initiatives (Department for Transport, 2013). This funding enabled Norwich City Council to initiate a new multi-strand walking programme, involving school children, lift-share plans for people in work, and a walking group initiative with short group walks for the inactive (Norwich City Council, 2015b, Norwich City Council, 2015a). The walking group scheme recruited volunteer 'Walking Champions' whose role was to get communities walking and keep the streets safe and enjoyable (Norwich City Council, 2015a).

The Walking Champion group walking initiative in deprived communities in Norwich offers an opportunity to evaluate a new intervention using natural experiment principles (Craig et al., 2012) as an 'experiment of opportunity' (Morris, 2007). The initiative was not under the control of the researchers and this enables evaluation under 'real world' circumstances. A recent Cochrane review (Baker et al., 2015) suggested that process evaluations should be undertaken as they provide valuable information on potential barriers and facilitators and an indication of how successfully an intervention has been implemented. Process evaluation focuses on the processes used throughout the intervention and aims to understand what went well and what went wrong. It does this by examining how it is implemented; the mechanisms through which the intervention produces results and the contextual factors external to the intervention which may influence its implementation (Moore et al., 2015).

This study evaluated the process of implementing a new walking group initiative in a deprived community in England with poor physical activity, health and socio-economic indicators. It used semi-structured interviews with stakeholders responsible for the design, implementation and sustainability of the scheme and with volunteer Walking Champions who led the walks. Our aim was twofold: firstly to identify the essential elements that stakeholders perceived as facilitating the implementation, impact and sustainability of the scheme and those that represented barriers. Secondly to produce some recommendations based on the learnings from this on how to best implement physical activity interventions in deprived communities to maximise their impact.

## Methods

### Research design

This qualitative study was organised around the key functions of a process evaluation. The description of the intervention and its logic; how the delivery was implemented; the mechanisms through which the intervention produces results; the contextual factors external to the intervention which may influence its implementation and the anticipated outcomes. The model for this is shown in Figure 5.

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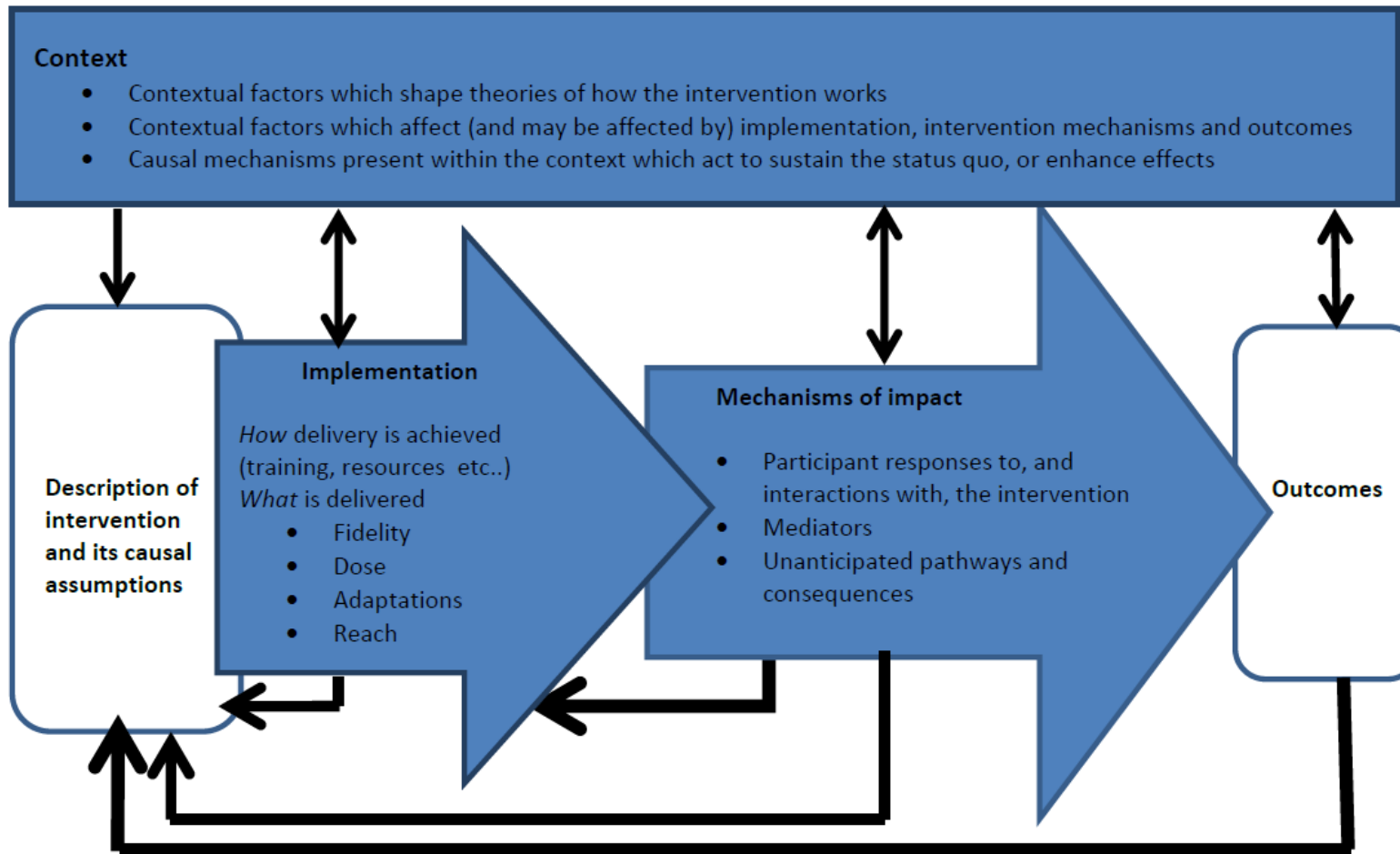


Figure 5: Key functions of a process evaluation. Taken from: Process evaluation of complex interventions, UK MRC guidance. Moore et al., (2014)

## Setting

The group walking scheme was a series of short health walks of approximately one mile in areas of multiple deprivation in Norwich and where possible connected to a cycleway developed with the original grant money (Department for Transport, 2013). The main focus was the Heartsease area with Bowthorpe and Mile Cross as examples of other neighbourhoods. All targeted areas had deprivation worse than the English average. For example, Heartsease is amongst the 40% most deprived and Bowthorpe and Mile Cross amongst the 20% most deprived neighbourhoods in England, based on the 2015 Indices of Multiple Deprivation (Department for Communities and Local Government, 2015).

The study was given a favourable ethical opinion by the ethics committee of the Faculty of Medicine and Health Sciences at the University of East Anglia in July 2014.

## Participants and interview process

There were two groups of participants in this evaluation, purposively selected. The first was key stakeholders, suggested by the scheme's organisers with a list generated at an initial meeting. An additional stakeholder was suggested during the interview process. These key stakeholders were involved in the bid writing, planning and implementation of the scheme. This included staff from Norwich City Council; the charities funded to run the scheme; from the public health department; the local clinical commissioning group (responsible for commissioning local health provision) and the Department of Health (DoH) (the funding source). Stakeholders were interviewed at the beginning of the scheme, in September - October 2014, and at the end of the funding period, in May - June 2015. In total eleven stakeholders were interviewed at the beginning and ten at the end; one participant did not respond to requests for the second interview, one was no longer involved and therefore not interviewed at the second stage and one was a new suggestion therefore only interviewed once at the second stage. There were six men and six women.

The second group of participants were volunteer walking champions; seven volunteers were interviewed at the beginning of the programme and five at the end. The difference is accounted for by volunteers leaving before the end of the programme and new volunteers joining. Of these nine participants, five were women and four were men. All participants were approached by the scheme organiser in the first instance with a general explanation of the research. Subsequent to this all participants were contacted by email or post with a letter inviting them to take part and a participant information sheet with a clear explanation that there was no obligation to participate. All participants responded and gave written informed consent.

As our concern is how the scheme is understood from the participant's perspective, individualised data was required for this research, therefore the interview was deemed the most appropriate method (Ezzy, 2002). Semi-structured interviews were used following a



topic guide developed by Sarah Hanson and Andy Jones to ensure that the processes within a process evaluation was explored (Moore et al., 2015). For the stakeholders, questions included the rationale for the scheme as contained in the funding bid; the context for how the scheme was designed; the mechanism for implementation; evaluation plans and barriers and facilitators to implementation. For the volunteers, questions were around training, personal motivations and their objectives for volunteering and their perceived role as community Walking Champions. All interviews were conducted by Sarah Hanson. Participants were aware that this study formed part of a doctoral thesis. The researcher was trained in qualitative research techniques and interview skills. Typically interviews took 45 minutes.

### Documentary evidence

In addition to data from the interviews, documentary evidence provided by Norwich City Council, including the original bid document, interim reports and the final outcomes report were also analysed (Norwich City Council, 2015b).

### Data management and analysis

All 33 interviews were digitally recorded and transcribed by Sarah Hanson. The principles of thematic analysis were used both in the development of the interview framework and in the analysis of the data with a framework approach used to manage the data (Braun and Clarke, 2006, Ritchie et al., 2013, Gale et al., 2013). This approach enabled continuous cross checking between the coding and the source of the data. Initially all stakeholder and documentary data was coded as per the methods of a process evaluation: Description (rationale) for the scheme, context, mechanism for implementation; anticipated outcomes (including evaluation plans). Volunteer transcripts were coded for community knowledge, training and motivations (why and how) for joining and sustaining involvement with the scheme. Secondly, using a more inductive approach, the initial themes were further explored and refined from which higher order themes emerged which represent the key findings of this analysis.

Analysis was led by Sarah Hanson as the main researcher and monitored by regular meetings with both Andy Jones and Jane Cross throughout the process for cross checking and interpretation of the data. Management of the data was aided using NVivo 10. The study followed the consolidated criteria for reporting qualitative research (Tong et al., 2007).

## Findings

The following represent major themes from the data. Themes are supported with illustrative quotes. Stakeholders, volunteers and interview stage is presented as SH, Vol., Int.1 or Int.2.

### The context of the programme

In bidding and receiving DoH funding, the new scheme aimed to address the health inequalities within Norwich by targeting a new programme of short group health walks at the most inactive. They did this by targeting areas identified through health mapping and local demographic information and professional knowledge.

*We looked at not just the physical activity guidelines but the NICE guidelines on walking and looked at the evidence that was out there to support walking and then also at the evidence that we have in the county for stuff that has worked well, or not so well, such (as other) health walks. (SH1: Int.1)*

### Mechanisms for implementing the programme

During the interviews three main themes were identified as mechanisms for the implementation of the scheme. They both facilitated and presented barriers. These are the walking champion role; community partnership working and sustaining the scheme beyond the funding period.

#### **The walking champions – their recruitment**

The recruitment of appropriate walking champions was viewed as key to the success of the scheme. Stakeholders were keen that their walking champions were representative of the deprived communities that they were targeting. For example:

*I would like to see them (walking champions) recruited from job centres, NEET (not in employment, education or training) young people, people out of work, children out of care, those hard to reach communities and we should recruit from there. We should support them to do the work rather than, yet again, recruiting and investing in professionals. (SH2: Int.2)*

*I think with the walking champions it is really important that it is not just the usual suspects. (SH7: Int.1)*

The previous quote appeared to reflect previous findings that membership of walking groups is primarily by professionals who tend to further recruit from the retired, middle classes and women (Matthews et al., 2012). Recruitment of walkers by 'word of mouth' was a key recruitment strategy outlined in the bid document and it was envisaged that the walking champions would promote the scheme and, 'spread the word' to enable the recruitment of walkers into the scheme (SH5: Int.1).

The walking champions were primarily recruited through newspaper publicity and also via a website (Active Norfolk, 2015). This attracted people local to the area and students in further and higher education. There were differing views on how successful this method was at both recruiting people in the targeted areas and those who would maintain a long term commitment to the scheme.

*The range of people we got was exciting. Some local people who have lived here all their lives, students who are in a relevant field and other random locals so it felt really positive. (SH6: Int.1)*

*One of the hardest steps is to get volunteers in those communities. The concern is that they get disheartened because they haven't had the people walking so we need to crack that so we can keep them. (SH8: Int.1)*

The volunteers also talked about other ways they had been recruited to the scheme.

*It was advertised somewhere. I went to the GP for an update and there was an A4 brochure about the walks in the waiting area and I thought I'd like to do that. (Vol 8: Int. 2)*

Some stakeholders expressed that they would like to have seen a more targeted approach to ensure that those recruited were from within those communities that they wished to reach.

*You find champions in the community and you tap into that. (SH3: Int. 1)*

### **The walking champions – their training and development**

The bid document stated that walking champions would be trained in motivational interviewing and would monitor the progress of participants to the scheme. They would also be offered the Royal Society for Public Health (RSPH) health and wellbeing qualification (Royal Society for Public Health, 2015). In the event, all volunteers had 'Walking for health' training to be a walk leader, delivered by a local training co-ordinator (Walking for Health, 2015). This ensures that walks are safe and well run and that walk leaders are ambassadors for walking.

*They are championing (walking)...the nudge theory behind behaviour change. (SH1: Int.1)*

However, one stakeholder had a greater expectation of the level of training they would receive.

*That walking champions are trained as health champions with RSPH, a very basic course but health champions are expected to have that and also some training*

*around behaviour change, very basic psychological stuff, it wouldn't take a lot.*  
(SH2: Int.2)

The volunteers were all positive about their training for their role in leading a group walk.

*I thought it was good grounding but again when you are done you are left on your own to progress and it is up to you what you make of it. You get a talk and a folder that outlines the health benefits of walking physically and mentally and how to behave in terms of greeting people and thanking them and inviting them to the next one. (Vol 1: Int.1)*

*It was the essential stuff, the mechanisms of the scheme, making sure you don't discourage people. (Vol 5: Int. 1)*

### **Expectations of the walking champion's role**

Subsequent to the walk leader training, there were differing expectations by the stakeholders of what the walking champions were expected to do, beyond leading a walk.

*I would like to see it being much more holistic and them being able to support on a range of issues and being able to signpost to services and to champion that work and be a motivator in that community... A much more holistic vision of health improvement and supporting people in a local area. It is not just walking. (SH 2: Int. 2)*

*There is the obvious leading walks, being trained up and being able to set up walks with local people, and leading walks but then there is the other aspect of being the advocate in the neighbourhood in terms of issues relating to streets and a champion for improving the local area in terms of walking... the ideal would be that they built up their skills to know the day to day issues of how their local streets work. (SH 12: Int. 2)*

There was also a reservation expressed about long term commitment to the role.

*Are the students going to continue as champions when they graduate? If they do I would be really chuffed but if they don't it would be wasted. (SH 5: Int.1)*

## **Walking champions as champions of their community**

Interviews with the volunteers revealed mixed success at recruitment from within the communities that were being targeted.

*Yes, I am from the (targeted community) area and do other volunteering there. (Vol 9: Int. 2)*

*Where I am doing these walks isn't my neighbourhood, no. It is an area I have known a bit in the past but if I wasn't going there to volunteer I probably wouldn't go there often myself. (Vol 3: Int. 2)*

*I think it has been good as not coming from this community originally it has given me more knowledge of the community and knowing what's going on and getting out and involved. (Vol 6: Int. 1)*

Whilst no longer living in the targeted community, one participant expressed an interesting insight into group walks.

*I think if you lived on those estates you wouldn't necessarily want to walk on them where people can see you and you'd rather travel to somewhere else. (Vol 2: Int. 2)*

A pragmatic view was also expressed by stakeholders, that whilst the walk champions might not have come from within the deprived communities, as intended, they had been valuable to the programme.

*I think our walk leaders are very similar to our walkers, probably 5 or 6 really committed volunteers. The other leaders (students) have added something too, massively, at critical times. (SH 6: Int.2)*

There was an expectation in the bid document that the walk leader training would enable the scheme to build sustainability beyond the life of the DoH funding. However, there was some reticence expressed about the sustainability of the walking champions to have this capability.

*When you have trained someone to be a walking champion, how often do they lead a group? How many duties do people do to make use of the knowledge from the training and justify the expense of the training? (SH 5: Int1)*

## **Community partnerships**

The scheme set out to work with GPs, health trainers and community engagement officers in the key deprived wards to ensure the project reached its target audience and so that health professionals referred patients onto the health walks.

### **Community partnerships with health professionals**

There was a recognition that there was still some way to go to engage with health professionals, even at the end of the scheme. The final evaluation showed 10% of walkers had been recruited via booklets left in GP surgeries and 31% by word of mouth. In fact finding a booklet in a library (14%) was more popular than a surgery.

*We need more referrals from health professionals and health trainers for the short walks; that key individuals in surgeries actually get them (walks brochure) and give them to people, otherwise we just drop them off and they go into waste paper. It is key to the short works that they are given by the health professional and that is what is missing. That is the missing link. It always has been. (SH 9: Int.2)*

One stakeholder went as far as to say, that doctors supporting the benefits of walking would be an achievement in itself.

*One of the consolation prizes would be, that success looks like more GPs understand that walking is a great way for patients to improve their health. (SH5: Int.1)*

### **Community partnerships with non-health professionals**

The scheme originally aimed to attract walkers by publicising walks through new publicity material, such as brochures, in the target areas. They also had an expectation of synergies between the schemes. For example, that the walking to schools project would have cross overs with parents joining the walks after school drop offs. When this didn't yield the participants they moved to a community hub model, working from community centres.

*The key thing is that where it has been successful it is because of a shared agenda – like St X church ... and the parish nurse was a good edition. For ongoing work we would need to refine the community walk hub model as something that we can share and approach with other people of how to set up a community based model. I think we can use the community hubs in the future for more targeted work... you have already got a partner so delivery becomes a lot easier because you don't have to find people. (SH 6: Int. 2)*

Stakeholders also articulated that the scheme had not fully utilised existing assets in the target communities and that partnership organisations didn't really understand the walking scheme.

*I think we try too hard to get people to come to us, rather than going to them and tapping in to existing communities, groups that already get together, rather than constantly re-creating new groups... A really clear audit of what was already happening so that could be built on, where success is already there, build on it rather than try to recreate it. (SH 8: Int. 2)*

*I am amazed at how many organisations already do walks, very small and don't tell anyone about it particularly very much. (SH 6: Int. 1)*

### **Sustainability of the scheme**

The programme documentation showed this to be a 15 month project with funding running from the beginning of 2014 until June 2015. £228,500 came directly from the DoH and a £12,134 equivalent for supporting the scheme by Norwich City Council. The scheme co-ordinator post cost £96,000 to co-ordinate the three different elements of the project with a £25,000 delivery budget and £37,000 assigned for the health walk element of the programme. The need to be self-sustaining at the end of the funding period and the issue of securing long term sustainability was raised by stakeholders during both sets of interviews.

*I think the legacy is important because of course you shouldn't enter into something like this unless you are sure what you want at the end of it, not that you've got it mapped out in great detail what you want out of it next but you understand that there will be lessons and what you will do with them. (SH 7: Int. 1)*

*We have to engage and empower communities right at the beginning of the project so they feel ownership, they helped to design the project... What we tend to do is write the bid, decide on our project then we engage the community. (SH1. Int. 1)*

During both sets of interviews, the sustainability of the scheme, funding and long term support was frustrating expressed by stakeholders.

*The structure within which we work, financially and politically is inherently short term and yet the benefits are long term ... the drivers and incentives are short term but everyone knows that these are long term changes that we want to initiate. (SH 7: Int. 1)*

Whilst it was acknowledged that funding for such initiatives have to ultimately self-sustain, *'Like all good projects the funding has to stop and at some point it has to self-sustain'* (SH 5: Int.1) there was much dissatisfaction about what was seen as unrealistic time frames and the management of the funding stream.

*People aren't having the chance to invest for a long enough period of time... You can't do community led health improvement over a year or even two years. Our recent evaluation of our healthy community's project was a minimum of 5 years to see real impact. (SH1: Int.2)*

The impact on future partnership working with other projects in addition to the effects this has on the community was also voiced.

*It is always such short funding and limited and that de-motivates people and prevents engagement. (SH2: Int.1)*

*There is no scaling up because there is no money or capacity to do it, particularly a scheme that is run by volunteers. To keep volunteers motivated you need to train them and give them reasons to be involved. It will need additional resource but we have the exact opposite when the resource has been withdrawn, so how do you sustain it now? (SH8: Int.2)*

There was also a feeling expressed, that in order to secure funding that the scheme needed to adapt and have a wider offer.

*It is only looking at physical activity, it's blinkered and if you are looking for additional funding we would like a broader, wider approach so we would like to see health champions who do walking but can do a whole range. To get funding from us, that would have to be the approach because with the 'every contact counts' strategy we really need to see that happen. (SH2: Int.2)*

Sustainability in terms of supporting and securing the ongoing commitment of the volunteers was also voiced.

*Support these people (the walking champions), then a year or twos time you have people with all these skills and local experience and they can take on all sorts of new tasks in the local place. (SH12: Int.2)*

*The problem is as much as you say they will run themselves after you have finished they don't. You always need some sort of paid co-ordinator. (SH1: Int.2)*



## Discussion

This study evaluated the process of implementing a new group walking scheme in an area of deprivation with poor health indicators. It has given some insight into those elements necessary to recruit people who are physically inactive. Three inter-related factors influenced the intervention's impact: community centred approaches, collaborative partnerships with health and non-health organisations and the sustainability of the scheme.

The traditional health sector, focused on sickness, is unable to respond to the many determinants of health. Therefore, collaboration and utilising resources within a community is viewed as necessary to promote population health and wellbeing (World Health Organization, 2013, World Health Organization, 2015c, HM Government, 2010). Such community-centred approaches are viewed as central to the National Health Service (NHS) plan in England. This not only changes the way that health services are delivered but also recognises that participatory approaches and empowered communities addresses the, 'marginalisation and powerlessness caused by entrenched health inequalities' (Public Health England, 2015a, p. 5). This approach includes the utilisation of community volunteers and building collaborations and partnerships, two of the factors found to have influenced the implementation of the walking group scheme.

The first of these community centred approaches is the use of community volunteer walking champions. There is a recognition that three million volunteers involved in the provision of health and social care is a huge asset to the nation's health (Public Health England, 2015a). The role of the 'expert' patient taking a greater role in assisting other patients was recognised as far back as the Wanless report (Wanless, 2004). Such lay health trainers have been used in health behaviour change to change modifiable lifestyle factors (Barton et al., 2012); in diabetes prevention (Norfolk and Norwich University NHS Foundation Trust, 2015) and as volunteers to assist in walking group programmes (Walking for Health, 2015). This approach has shown particular promise amongst disadvantaged groups. For example, the 'Altogether better' programme in Yorkshire and Humberside in England which utilises 17,000 volunteer health champions, working in primary and secondary care to transform health and well-being in their communities (Altogether better, 2015). Similarly, the Tower Hamlets project found that participating in community projects was valued by participants and additionally that improved social capital and social cohesion were further significant outcomes (Williams, 2011, p. 11). Therefore, utilising community-based assets, such as volunteers in community programmes can improve social capital and individual health in deprived communities (Buck and Gregory, 2013). However, we found little evidence that the scheme had recruited walking champions that were representative of the deprived communities which

were targeted. This may have been due to the reliance on media publicity when the scheme was launched and 'word of mouth' rather than targeting directly into the targeted communities. This is particularly pertinent as part of the Walking Champions role was to be a conduit to recruitment in their own communities.

A recent systematic review found that connecting the place of recruitment with where the intervention actually takes place might be the most efficient way of recruiting into walking interventions (Foster et al., 2011). There was no evidence of community involvement in the planning of the walking group despite evidence that an in-depth understanding of a target group's perspective and involvement in 'bottom-up' planning is important in disadvantaged communities (Cleland et al., 2014). Additionally, active recruitment methods (those initiated by the programme) rather than passive (potential participant makes the first contact with the programme), such as 'word of mouth' are most effective in engaging hard to reach groups (Matthews et al., 2012). In fact, 'word of mouth' is likely to have the potential to increase inequity in walking group membership by utilising social networks that are restricted to the socially well connected. As the scheme moved into a 'community hub' model making connections and forming partnerships in the targeted communities, the numbers of walkers increased. These partnerships and new walkers form a pool of potential volunteers for the future as the scheme progresses. As has been found in work with peer-support smoking cessation, capacity building is likely to be most effective if people are trained from their own social network within disadvantaged groups (Ford et al., 2013).

A final point on the role of volunteers was the mismatch in the expectations of what a Walking Champion might actually do. This was in part due to the involvement of two different national charities in the scheme. One was responsible for the initial setting up of the scheme; the training of the walking champion and attendance monitoring; the other with day to day management and co-ordination of the other strands of the programme. The agenda for the former is the provision of health walks and the latter campaigns for safe streets for pedestrians (Walking for Health, 2015, Living Streets, 2015). Thus whilst the Walking Champions understood their role as leading health walks, there was an expectation of a much wider remit, such as street audits, signposting to other services and a greater role as a health ambassador. With the transfer of public health into local authorities there is an expectation of service reconfiguration and for commissioned services to be less 'siloed' (House of Commons Communities and Local Government Committee, 2013). It is possible therefore that those looking to commission health services in the future will look for a wider responsibility for volunteers in championing multiple health behaviours, rather than single interventions.

The second factor that influenced the effectiveness of the implementation of the walking group scheme was collaborative partnerships with health and non-health organisations. There is an expectation in health promotion of community engagement, collaboration and partnership working with local services (Public Health England, 2015a). Additionally, physical activity interventions in disadvantaged communities are most effective when there is a mix of professional guidance, self-direction and on-going support (Cleland et al., 2012). There was some success in starting to engage with local community groups, engaging health professionals was perceived as the 'missing link' that had not been achieved to maximise the impact of the scheme. The group walk was approximately one mile, on an even surface and tailored to those in poor health and inactive. This contrasts with other health walk provision which tend to be more physically challenging than this (Walking for Health, 2015). Therefore targeted referrals to the scheme of people who are in poor health and inactive by GPs and other health professionals would be most appropriate, and would also have the greatest gain to public health (de Souto Barreto, 2015). Our findings also support the findings from the healthy borough initiative in Tower Hamlets that concluded that some of the national targets for physical activity may be too challenging for the most at risk communities (Williams, 2011). Advice may need to be reframed with tailored referrals into walking schemes with short walks, such as this one, to meet the needs of such at-risk communities.

The findings from our study demonstrate the key role that healthcare professionals have in recommending physical activity across the life course. The Health Survey for England reported that whilst only 3% of people would respond to more government advice, 28% would respond to advice from a doctor or a nurse (The NHS Information Centre, 2008). However, despite the fact that there are 185 million GP consultations every year, presenting a huge opportunity to promote physical activity, 54% of patients report not being given diet and exercise advice by primary care practitioners (Department of Health, 2008).

The third factor that affected the implementation and impact of the scheme was its sustainability. Despite the scheme being well funded there was frustration at the unrealistic timeframe and significant resources spent investigating means of future funding. This may have been avoided with staged funding over a longer time period. There was also a weariness with short-term interventions done 'to' rather than 'with' a community despite the well-acknowledged importance of sustained engagement with a community (Goodman et al., 2014). The 'hand-to-mouth' struggle for financial stability might lead to programmes focusing on numbers attending rather than who is being recruited and how (Matthews et al., 2012). There was also a concern that this affected building productive partnerships arrangement and confidence within a community in the future. These findings are consistent with a recent NHS commissioned systematic review

that found that whilst community interventions can be effective in reducing inequalities in health, there needs to be a greater emphasis on long term outcomes (O'Mara-Eves et al., 2013).

### Strengths and limitations of our study

A strength of our study is the diversity and number of stakeholders and volunteers who participated. Most were interviewed on two occasions enabling the process of the development of the scheme to be thoroughly evaluated. The scheme organisers were also very open to sharing their documentation with us. Additionally, all data were analysed using a rigorous theory based thematic analysis. There are limitations to this study. The sample was purposively selected for this study and whilst there was a repetition of themes it could not be claimed that data saturation was achieved. This may be considered a limitation. The researcher was a known volunteer with this and other walking groups. This appeared to aid rapport and a willingness to be interviewed but there is the possibility that the research was not seen as entirely neutral. The area of this study has a lower ethnic density and mix than many other local authorities in England. Future studies would benefit from exploring the experiences of implementing walking groups in communities with a more diverse ethnic constituent.

### Conclusion

Whilst walking groups have health benefits, there is a concern that they might not operate in areas that have the greatest health needs. This study explored those factors that facilitated and those that presented barriers to the implementation and long term sustainability of walking groups in a deprived community. Our recommendations from these findings to maximise their impact are summarised in Figure 6.

## Recommendations

We would recommend:

- Build relationships with health professionals to enable direct referrals into walking schemes for those who are inactive and in poorest health
- Identify and utilise community based assets ('bottom up' planning) and partnership arrangements to facilitate access to the most inactive and 'hardest to reach'
- Use a targeted approach within deprived communities to enable recruitment of volunteer health champions who better represent those communities. These in turn will likely 'pull' others from within their own social network
- Utilise group walkers to create a potential 'pool' of community based volunteer walk champions to build capacity and long term sustainability
- Establish clear expectations and build the skills and capability of volunteer walking champions to enable health behaviour change within their own social networks
- Consider funding staged over longer time scales to enable local capacity building and long term constructive partnerships

We would caution that:

- Mass media publicity may not bring forward volunteers or participants who are representative of the targeted community
- Passive recruitment methods, such as brochures and websites, potentially restricts the recruitment of the most inactive and those volunteers from more deprived communities

Figure 6: Recommendations to maximise the implementation and impact of walking groups in deprived communities

## Chapter 5: Walking groups in socioeconomically deprived communities: A qualitative study using photo elicitation.

### Preamble

Chapter four was the second study to evaluate walking groups and health equity. It evaluated the process of implementing a walking group intervention in more deprived communities. It found the key role that health professionals have in referring those in poorest health; the necessity of identifying and utilising community based assets to access those in greatest need and the importance of building partnerships for long term outcomes. This is the third and final study to evaluate the potential for walking groups to impact health inequity. It does this by examining the barriers to walking and walking group from the point of view of participants who have joined a new walking operating in an area of health and socio-economic deprivation. The aim was for the findings from this study to be used to more effectively promote walking groups to those who are in the poorest health and stand to benefit the most from increasing their physical activity.

### Abstract

Walking groups can benefit health but uptake is more likely amongst those who are socially well-situated and need them least. This study worked with a new walking group in a community in England with poor health and socio-economic indicators to understand non-participation and barriers to involvement. It used a qualitative approach. Participant generated photographs captured the physical and social environments in which they walked and these were used with semi-structured interviews to inductively explore walking group participation and the wider social context of walking. It was found that prior to joining there were low expectations of any health benefit and walking groups were not viewed as 'proper' activity. The group format and social expectations presented a barrier to joining. Having joined participants described a developing awareness of the health benefits of walking. The shared sense of achieving health goals with others sustained the group rather than socialising, per se. The findings suggest that walking group participation is a complex social practice. Promoting walking groups as a social activity for this group of people may well have been counter-productive.

## Introduction

Physical activity has wide-ranging long-term health benefits (Reiner et al., 2013). Recent research has shown that the greatest gains to population health could come from inactive individuals becoming moderately active by exercising equivalent to just 20 minutes of brisk walking each day, reducing the risk of premature death by between 16-30% (Ekelund et al., 2015). Walking is a natural and safe form of exercise (Hootman et al., 2001). For most people it expends enough energy to be considered 'moderate intensity' activity. Furthermore, for individuals who are particularly unfit, walking at a pace of 3mph can achieve activity that is of vigorous intensity and confer associated health gains (Kelly et al., 2011). Walking is therefore a sensible starting point for people overcoming inactivity (Murtagh et al., 2002). While exercise-based physical activity interventions appear to have only modest or short-lived success, promoting walking might appeal to the wider population as it does not require particular skill, equipment or a competitive nature. Walking schemes are encouraged at community level and may be used in exercise referral schemes for those who are inactive and with health conditions (National Institute for Health and Care Excellence, 2014a, Public Health England, 2014a). Group walking has the potential to engage those who are interested in the outdoors, whether for leisure or as a health intervention. As outdoor walking group participation can confer both physiological and psychological multiple health benefits, with good adherence and few side effects they are a promising intervention as an adjunct to other healthcare, or as a proactive health promoting activity (Hanson and Jones, 2015a).

However, while research shows that walking appears to be a popular form of physical activity across all socioeconomic groups in England, those of the highest social class are nearly twice as likely to partake in recreational walking compared to those in the lowest (46% compared with 25%) (Fox and Rickards, 2004). In walking interventions, uptake seems to be mainly by white, well-educated, middle aged women (Foster et al., 2011). Additionally, successful walking group recruitment is often judged by the numbers who join rather than those who would stand to benefit most (Matthews et al., 2012). As easily recruited participants tend to be those who already walk, recruiters are challenged about how to approach and persuade those who do not walk to walk often, especially in 'hard to reach' groups, such as the most deprived (Foster et al., 2011). Whilst walking groups improve health (Hanson and Jones, 2015a) they also have the potential to widen health inequality if not well targeted (Foster et al., 2011, Ogilvie et al., 2007). This presents a need to understand how the health benefits of group walks can be 'democratised' to widen participation (Green, 2009).

Walking groups can be conceptually placed within social theoretical debates of public health's focus on lifestyle behaviours. Coined as 'new public health' in the 1990s, social

scientists problematized its narrow focus on lifestyle related prevention, which places the onus and responsibility on the individual to exercise control, be healthy, and become productive citizens (Lupton, 2003). The population is handed, 'biological responsibilities [...] embodied in contemporary norms of health and practices of health education' (Rose, 2007, p. 133).

Public health agendas have somewhat shifted in recent years towards wider social and structural determinants and a growing recognition that the context of people's lives needs greater consideration to reduce 'lifestyle' disease (Cohn, 2014). The life-course is subject to a range of influences and people are not merely 'blank sheets' awaiting and receptive to health promotion messages (Baum and Fisher, 2014, p. 215). Rather than being unaware of the risk, it is more likely that constraints in people's their lives makes behaviour change difficult (Baum and Fisher, 2014). It is possible that walking groups fit into this more holistic public health agenda by providing structure and opportunities for physical activity rather than narrowly focusing on sports and exercise. For example, within public health and epidemiology, there is an increasing research field on the health benefits of green space, either as opportunities to be physically active in, or more generally as health enhancing spaces. This includes Gesler's seminal work (Gesler, 1992) and more recently, work such as Roe et al. (2013), (Gatrell, 2013) and Bowler et al. (2010).

Without understanding both individual needs and life situations, there are potential barriers created for those who have the greatest health need (Matthews et al., 2012). For walking, it appears to be particularly important to understand both the physical and social environments in which the behaviour takes place. It may be that for those people from more deprived backgrounds, rather than being a pleasurable leisure activity, walking may be their only available and affordable mode of transport. Consequently, walking may be burdensome or stressful, for example when walking with small children or in unsafe neighbourhoods (Bostock, 2001, Green, 2009). This might partway explain why in the United Kingdom, despite its past history of socialist walking clubs, rambling (walking in the countryside for pleasure) has a particularly middle class identity (Green, 2009).

Using a qualitative approach, this study worked with a newly formed walking group as part of a referral scheme in a place of social and health deprivation with participants with multiple health problems. The aim was to add to our understanding of non-participation in walking groups for particular social groups and thus how they can be more effectively promoted to target people in those communities who could benefit most. To do so this study was framed within a social practice perspective which aimed to highlight the social context of walking and walking group participation, rather than understanding it as an individualised health behaviour (Blue et al., 2014). Social practice theories have recently



been applied by sociologists to understand health behaviours as sets of activities that are shared across time and place (Blue et al., 2014). Understanding walking as a social practice, this relatively recent approach to conceptualise behaviour change suggests that we need to understand more broadly, how health practices emerge, persist or disappear as shared practices (Blue et al., 2014). Bourdieu made sense of such socially shared practices as 'habitus', which is defined as the, 'subjective but not individual system of internalized structures, schemes of perception, conception and action common to all member of the same group or class' (Bourdieu, 1977, p. 86). Habitus includes knowing the right cultural codes and what works in different contexts and settings. It also refers to the values and expectations of particular social groups and the reactions of individuals within these groups in terms of behaviour that they see as reasonable and of common sense. When joining a walking group, the individual enters a new space or field. Each field has its own rules, coined 'doxa' by Bourdieu (1977). The individual brings to the group their habitus, which others in the group will evaluate and adapt to, thus the group is socially situated and evolving.

## Methods

Semi-structured interviews were elicited using participant-produced photographs, as this method has previously been found to yield different insights and produce rich observational data (Guell and Ogilvie, 2013). The research focused on the factors that had influenced participation in a walking group and their perspective of how participation has impacted their health and wellbeing.

This study was given a favourable ethical opinion by the NHS NRES Committee South West - Exeter in June 2014. Participants were offered optional consent to their photographs being used by the research team in publications and presentations.

## Setting and participants

The walking group is operated by East Coast Community Healthcare, NHS (East Coast Community Healthcare, 2015) in Great Yarmouth in the east of England. Great Yarmouth is a seaside town with built tourist attractions. It has deprivation that is higher than average and a health profile that is generally worse than the English average. For example, 29.7% of adults in this local authority are classified as obese, against an England average of 23%. Similarly, the under 75yrs cardiovascular mortality rate is 92.6 per 100,000 compared to an England average of 78.2 (Public Health England, 2015b) . The district of Great Yarmouth has a population of approximately 97,000 inhabitants (Office for National Statistics, 2013). Socio-economically, by occupation, 51% are in classes 5-8 (lower supervisory, semi-routine, routine occupations and never worked) and it ranks in the highest decile of English districts for employment of unskilled and semi-skilled work (Office for National Statistics, 2013).

All participants were part of the UK national exercise referral scheme (National Institute for Health and Care Excellence, 2014a), referred by their family doctor to the physical activity (PA) trainer with a health need that would benefit from increasing physical activity. The scheme uses both a community gym option and outdoor walks run by the PA trainer who monitors participant's health with anthropometric measures and quality of life questionnaires recorded at baseline, 6 weeks and at the programme end. The walks were developed and risk assessed by the PA trainer as safe with variety (in surfaces e.g. beach and concrete and also gradient) and the ability to do switchbacks and wider loops for those who were more physically able. At the initial consultation with a PA trainer, both gym and walking are explained and participants make an informed choice based on their physical (dis)ability and what they consider they are most likely to adhere to. The participants in the study chose to join the walking option, walking with the group for 12 weeks, once or twice per week for 50 minutes on each occasion with 5 minute cooldown exercises at the end.

Participants had a range of both physiological and psychological health needs. One was of normal weight (BMI 24.4) and nine were overweight or obese (BMI 29.1- 48.5). There was also diagnosed chronic obstructive pulmonary disease (COPD), type II diabetes, enduring mental health problems, depression and low mood. Most had multiple health problems that were affecting their quality of life. The participants were six female and 4 male. Three were aged 40-50, six were aged 50-70 and one was aged over 70 years of age. The participants were not of professional / managerial backgrounds.

This is a small scheme and therefore all those who started health walks between July 2014 and February 2015 were approached with a letter inviting them to participate. All ten participants consented.

### Photo-elicitation process and interview framework

Participants were given a disposable camera and simple instructions to capture images to represent what is helpful and unhelpful to walking in everyday life and positive and negative experiences of belonging to a walking group. Sensible care guidance in taking photographs in public places was explained. Disposable cameras were used as they require only straightforward training without expectation to produce high quality photographs or for participants to be embarrassed by what they have produced (Guillemin and Drew, 2010). Participants were encouraged to photograph a range of images and to avoid the social conventions of taking positive images (Guillemin and Drew, 2010).

Participants returned the camera to Sarah Hanson approximately two weeks later for the photographs to be developed. Interviews were held a further two weeks later within NHS premises familiar to the participants. Individual interviews were deemed most appropriate in anticipation of the participant making reference to their personal health. The semi-

structured interviews used the photographs both for open-ended, participant driven elicitation and also as a basic interview guide. This ensured that relevant issues were covered but also enabled probing and development of issues pertinent to each individual and points the participant raised from their photographs.

At the beginning of the interview, participants spent a short time on their own familiarising themselves with their photographs, sorting them in a way that was meaningful to them. This enabled a more organised dialogue, with participants generally choosing to categorise photos as positive and negative and taking greater charge of the opening of the interview as they explained this. They then explained why they had captured their photographs and what the images represented. An additional interview guide was used to probe for further information or to elucidate areas that had not being discussed with the photographs. Two interviews were conducted as a pilot with discussion between Sarah Hanson and Cornelia Guell.

All interviews were conducted by Sarah Hanson. Participants were aware this study formed part of a doctoral thesis. The researcher was trained in qualitative research techniques and interview skills with Cornelia Guell as the qualitative supervisor. Typically interviews took 45 minutes.

#### Data management and analysis

Interviews were digitally recorded and transcribed verbatim by Sarah Hanson. Data was transcribed and analysed as it was collected and initial codes attached. Despite the small sample, during the latter interviews there was repetition of similar answers covered by the team-agreed coding scheme and saturation of emerging themes was felt to have been achieved to a satisfactory level (Ezzy, 2002). A process of funnelling transformed initial coding into categories. From this major themes were developed (Ezzy, 2002). Analysis was led by Sarah Hanson as the main researcher and monitored by regular meetings with both Cornelia Guell and Andy Jones throughout the process. This enabled cross-checking of both emerging ideas and interpretation of the data. Management of the data was aided using NVivo 10. The study followed the consolidated criteria for reporting qualitative research (Tong et al., 2007).

## Findings

Two participants were not confident in taking photographs and chose only be interviewed. All other eight participants used the cameras, collecting a total of 210 photographs. A broad breakdown of images represented is presented in Table 9.

Table 9: Images captured by participants

Images depicted (n=210)	Percentage
Manmade vistas (parks, promenades, cemetery)	30
Cars, car parks and roads	22
Countryside view (fields, dunes, seaside)	20
Walking group (people predominating)	13
Nature – represented by flora, fauna, weather	8
Home environment	5
Other	2
Total	100

The following represent major themes from the interviews and the images that participants generated. Themes are supported with illustrative quotes, with names as pseudonyms.

### Places of everyday walking

Participants were specifically asked about their walking habits in everyday life and to capture images that represented this. This is a deprived neighbourhood with a predominance of industrial features and urban spaces in need of general maintenance predominating. The majority of the photographs captured this, which was explained both positively and negatively. Roads, car parks and car parking in general were seen as negative and barriers to walking. These were viewed as being unpleasant to look at, difficult to navigate with pervasive traffic noise spoiling walking. However, these neighbourhoods also featured parks and cemeteries that participants highlighted for their positive aesthetics due to quieter spaces and attractive fauna and flora. Adding walking journey time to utilise positive spaces and avoid pavements and traffic noise was seen as desirable.

*I was walking a bit for myself into Yarmouth, through the cemetery which is a pleasant walk (referenced his photos of the cemetery) I try and avoid the traffic.*  
(Peter, aged 65-70)

Although traffic was viewed negatively, all participants made use of a car, bus or electric bike for household shopping.

Notably, the participants' physical environment also included a beach, dunes, park and promenade, which presented a local leisure opportunity for all the participants and was utilised as the location for the walking group route. It sits as an 'edgeland' to an urban

area with small seafront hotels, fairground, an industrial harbour and off-shore windfarm. Although photographs of the seafront (beach and sand dunes) also captured urban features, these were not necessarily expressed as exclusively negative. For example, when presenting a picture of the sea and beach which included an off-shore wind-farm in the distance, one participant expressed that, '*I suppose it spoils the view*' but also that it did not particularly bother her (Tracy, aged 40-45 years). Promenades with benches were viewed as helpful resting places with concrete surfacing facilitating easier walking.

Many captured images and talked about the pleasure of previous walking for leisure throughout the life-course. This included nostalgic re-visiting and photographing places that had represented enjoyable walks. This included open fields and a riverbank, which had been enjoyable prior to ill health and 'old age' or used for walking a child in a stroller.

*Well, what I used to do, ten years ago, was catch a bus-bus up, walk through, walk through Asda, walk Weaver's way to Acle, go to the pub at Acle bridge, have-have a Ploughman's, and something to drink and that, and used to go and carry on across the road, round-round by the river, pick the bus up again to Potter Heigham. (Mark, aged 60-64)*

Others valued man-created spaces, such as an allotment and a fishing lake. These were appreciated for the pleasure of the outdoors as a hobby rather than as an opportunity for physical activity.

Others viewed walking quite differently and did little walking in everyday life. They captured images that did not represent places for walking, instead illustrating experiences of 'non-walking' habits.

*I never think oh I'll get up and go out for a walk. I'll sit in unless I've got a reason to go out. I haven't been to the seafront. Before that [walking group] I hadn't been down to the seafront for years. (Robert, aged 50-55 years).*

To demonstrate this, the participant (Robert) captured an image of his home location, taken from the edge of the beach to show its very close proximity (Image i).



Image (i) Photograph of their home street taken by a participant from the edge of the beach

Another participant photographed her car, sofa and television (image ii) to explain her lack of everyday walking.

*I've got the car. What do I need to walk for? My sofa, it is very comfortable. I put my feet up, I've got my iPad, my TV, I mean what would I need to go out for? My best friend my iPad. I sat there this morning Christmas shopping on it so I haven't got to go out for a walk up the shops, I'll buy that. Yes, that's my little corner, TV, iPad, sofa. (Brenda, aged 55-60 years)*



Image (ii) The world of this participant revolved around their living room.

#### Expectations from joining a walking group

Referred by their family doctor, most participants had multiple health problems. Amongst the physiological symptoms, breathlessness was commonly mentioned as a way of judging poor health and fitness. This was illustrated by a photograph (image iii) from 'Robert' who explained that breathlessness and an inability to climb the stairs was a trigger to seeking medical advice.



Image (iii) Breathlessness on the stairs was a trigger to seek medical help

The walking group had not been actively sought out by any participant as a solution to their health problems but rather as the preferred option to a gym. For some this was an opportunity to try something new and for others it may have been regarded as the 'least worst' option.

*No I couldn't do the gym that is a stretch too far that one. (Brenda)*

*Just something different isn't it, got fed up with the gym, thought I'd do something different so I picked the walking group. (Sharon, aged 40-42)*

Despite making this choice, the walking group was generally not viewed as offering purposeful exercise prior to joining. Although health goals, such as weight loss, were set in conjunction with the trainer, none came to the scheme with high expectations that the walking group would help. Largely, the health goals were explained in general terms, such as, 'getting health back', 'feeling better' or more specifically, losing some weight. A sense of achievement from endeavouring to do something also seemed as important as any anticipated improvement.

*I thought, walking, is that really going to help that much but I thought I'd give it a go. (Tracy)*

*I thought I might be able to get something if I can walk fast and get some kind of exercise. (Robert)*

### Motivators to maintaining membership of the walking group scheme

Despite reservations prior to joining, participants continued with the scheme and attended regularly. Although there had been little expectation, they reported positive experiences. This was expressed as embodied changes such as less breathlessness, better wellbeing and enjoyment of the activity for its own sake. The walking group became a purposeful activity with multiple benefits. Health benefits were couched in examples of impact on everyday living and appeared to be the motivator for continuing with the group walks. Despite the changes experienced, surprise was expressed that a walking group had impacted their health.

The predominant physiological change was a reduction in breathlessness. Participants used this as a barometer of health improvement as well as comparing it with their previous lack of walking ability.

*After the first couple of weeks I thought this is helping because I am not breathing as heavy. I didn't feel fitter at that time but now I have been doing it a long time I am, like actually I don't get out of breath. (Tracy)*

*At the beginning I was getting a bit puffy when we walked fast but that has improved. (Carol, aged 75-80)*



*By the time we got back I was sort of, really out of breath and I really, really felt it. But now, I am walking and talking and I can see that I can walk quicker. (Liz, aged 40-45)*

In combination with reduced breathless, weight loss was another motivator for continuing with the walking group, albeit it in combination with other improved health behaviours.

*Its helping me with losing weight... my trousers now are either loose or fit properly instead of being tight. (Liz)*

Manifestations of improved well-being and psychological health were also frequently expressed and appeared to have become motivators. For example, feeling more energised and confident and also a sense of accomplishment. The use of the natural environment was seen as a facilitator in this improvement. It was viewed as, 'getting away' and also a calming experience in itself. It was seen as something to look forward to with the positive effect felt into the time after the walk.

*It's surprising, I feel a lot more energised, whether, I don't know what it is, you do exercise and you feel energised. I don't get that bit. (Liz)*

*Happier, content, more content at peace. All the above, sort of thing. (Carol)*

*It gives me a time to think, if I'm stressed it calms me down and focus and I feel better after I have done it. (Jackie)*

Flora, fauna and vistas were photographed by all and discussed during the interviews. Walking in the natural environment was what made it 'a nice walk' for some. Others expressed it more reticently, such as 'I suppose you could call it the nature side of things' (Brenda). The outdoor spaces (beach and park) used for these group walks has many urban features. However, these were not commented on negatively. The environment used was seen as a good walking experience because of the wide open spaces. This enabled participants to stride out ahead of others and personalise their walks as they saw fit.

*Out walking by the sea or in the country, it takes on a different atmosphere and focus and also you don't realise while you are taking in the scenery just how far you are walking. (Jackie, aged 60-65)*

Finally, participants felt that the walking group facilitated their walking ability, which they translated into everyday walking. Surprise was expressed about how strenuous the group

walk was, in terms of both pace and distance. This was especially noticed at the first week's attendance. They all felt they walked both further and faster due to the influence of others. They observed the speed of others and judged their improvement by comparison. The presence of a leader to set the route but then being able to individualise the walk was seen as important. Distance was increased by adding switch back routes; more difficult terrain was actively sought out by some to add challenge and pace was increased to form deliberate speed work during a group walk. The use of a leader to oversee the group but also encourage individuality was seen to directly contribute to this.

*I think when you walk in a group, you walk at a pace and you have got other people to keep pace with and instead of dawdling along and meandering around you push yourself because somebody else that can walk quicker. (Liz)*

*Yes, I've started walking faster. I used to be at the back and now I'm in the middle and I want to be right up the front. (Carl, aged 65-70)*

*I walk further with the group, walking with people is definitely better because as I say after about 20 minutes I would think I am going home now but there are other people there and if you say, I am going home now, they would think wimp. (Brenda)*

One participant specifically mentioned how he had extended the route and increased the pace and challenge to get maximum benefit.

*I did consider stopping the group because by keeping with the group, purely with the group, to a degree it wasn't pushing me enough, in my opinion, which is why I loop off, loop back and look for the harder terrain sometimes and things like that. (Peter)*

There was pleasure expressed at both re-discovering walking and also improving walking ability. This impacted on walking in everyday life, both for leisure and for transport.

*These (walking) boots I bought, 3 or 4 year ago and they've sat on a shelf 2 years. I haven't had a chance to go walking on me own... now have confidence to walk on my own. (Mark)*

*Before I started walking with the group I'd get the bus into town and the bus back whereas now sometimes I'll walk in one way and get the bus the other way or I'll walk both ways. When I first walked it, it took me 45 minutes, it now takes me 25 minutes. So that is how much fitter and quicker I've got. (Tracy)*

## The social aspect of the group

The role of the group itself and the social aspect of walking together, was experienced and articulated in complex ways by the participants. All participants joined the walking group separately and none had met before. Anxiety was expressed about joining and meeting others, and the first session was anticipated as a hurdle to be crossed. There was general relief that no-one wore fitness clothing and that others looked as they did in all 'shapes and sizes'. Generally, participants had limited financial means and did not purchase walking gear such as wet weather clothing, poles and walking shoes, as might be seen in other walking groups. As well as getting used to the exercise, participants described that they had to also get used to the group.

*When I first started I thought I'm not sure how I am going to get on with these different folk but they all seem to have got together, very much so. You walk with people and you bring something out in them as you walk. (Carol)*

Aside from some initial concerns about social interactions and possible awkwardness, some participants welcomed the opportunity for social interaction. The group enabled companionship or simply some distraction from the strain of walking.

*To meet people... I do like talking to X, yeh, makes you feel better, gets you going. (Sharon)*

*I don't go out anywhere so I get the social aspect, walking with them, talking with them while I am walking which then unconsciously I am walking faster because I am talking to somebody and I don't notice I am getting faster and speeding up. (Tracy)*

*It's helped because I am walking along talking to everybody on Tuesdays, having a laugh and that, so as I say someone to talk to. (Carl)*

Participants also realised that they could 'opt out' of the social aspect of the walking group and that walking with others did not necessarily mean socialising with them. This facility to walk separately, creating space between themselves and the group but with the presence and in sight of others was frequently expressed as an important feature of the psychological benefits of the group walks, even amongst those who enjoyed the more social aspects. Although, the person on their own is not far behind others in the group in this particular photograph (iv), one participant (Brenda) used it to express that you didn't need to be in the 'thick of the group'.



Image (iv) This participant felt “you don’t need to be in the ‘thick of the group’”

*I don’t actually get too much involved with the group, I am quite happy to walk on my own, it is also nice to know that there are people there. If I wanted to have a chat I could speed up or hang back. Together even if they are apart, you might have one on the end who is not talking to anybody but they are there. (Brenda)*

Some participants continued to regard the group aspect of the walk as the least attractive part of the format. Rather they simply saw the walking group as a functional way to exercise effectively.

*I am not very good at mixing with people, I never have been. When I go I want to do the walk and to get it done and get some exercise out of it. Not really to associate, just to get fit. (Robert)*

*The group thing is not too important to me personally. I can understand it being important for some people who are lonely and the need to socialise... but I am perhaps not the most sociable of people, I don’t know. That’s not part of the motivation for me, the motivation is keeping fit and exercising and that’s a means to an end. The fact that it is an organised activity gives me the get up and go to get up and do it. I am happy to be within the confines of the group because that gives me the motivation and the regime to work to and to attend. (Peter)*

Overall, it was noteworthy that social aspect of the group did not predominate during the interviews. However, the presence of others in a group format might have sustained

involvement, helped to form habits and stretch personal goals and therefore the group aspect was important.

*Sometimes you start off with good intentions on your own but you don't really follow through and then you don't really know if you are pushing yourself enough. (Jackie)*

*It is a regime and you've got dedicated times makes me more inclined to go the fixed regime that you have a walk at this time. (Peter)*

This could also be explained by a shared sense of purpose afforded by the group. Whilst the goals were unique to each participant, they had all joined through the same referral route with a shared understanding that the aims of the walking group were to improve health. For example, during the walks there was much sharing of health information, weight loss, medication reduction, reduced breathlessness and perceived healthy foods.

*We get on with what we've got to do, and that's get fit and healthy and that. Yeah, it's a nice sociable group. (Mark)*

*I don't think I particularly need the company as much as I need the exercise. I thought it would possibly be the social side but I don't think I particularly need that. (Brenda)*

## Discussion

This study explored expectations and experiences of participating in an outdoor walking group as part of an exercise referral scheme. Most were unfamiliar with walking groups and had low expectations of what it would do for their health and wellbeing. Participants captured images of a variety of walkable physical spaces but walking was not expressed as a form of exercise and the walking group was not expected to be purposeful exercise either. Despite prior reservations, people continued with the scheme supported by positive experiences, and reported a developing awareness of their improved health and wellbeing and some enjoyment in the activity for its own sake. Most importantly it had become a purposeful activity with health benefits. The sense of shared purpose and achievement of health goals was a more dominant aspect of the group format than socialising.

The health benefits of group walking were not well understood by our participants before starting the group. This replicates previous findings regarding the misconception about walking not being proper exercise (Darker et al., 2007). There is also an issue of a 'no pain, no gain' approach that fails to appreciate walking as exercise (Ekkekakis et al., 2008). This undermines group walking as a useful option to those promoting the benefits of increased physical activity. As found in previous research, our participants also believed their physical activity levels to be satisfactory (Crocker et al., 2012). On joining the

group they were surprised at how physically demanding a walking group actually was, and accordingly, how unfit they were. Additionally, there was a lack of perception of the links between a lack of exercise and chronic conditions, such as the breathlessness from obesity and poor fitness, which creates a barrier to physical activity behaviour change (Everson-Hock et al., 2013).

In terms of the social environment created by the group format, this study can add to a growing body of literature that investigates the social influences on participation in physical activity. There may be an intuitive appeal that group based interventions are attractive due to their inherent social interactions and indeed some walking groups are successfully marketed as a social way of walking and meeting people (Walking for Health, 2015). For this walking group, the activity became a shared practice, a working group, task oriented around health goals, unlike, for example, a support group where social cohesion is of primary concern (Hoddinott et al., 2010). Despite what is a modest amount of time committed together as a group and lack of prior social networks, the participants identified with others in the group around health improvement goals.

The finding of group identification around health improvement goals somewhat supports previous research which found that rather than the volume of social contact, it is the number of group identifications that supports healthier behaviour (Sani et al., 2015). It may be because identifying with the group affords a sense of structure and meaning with positive social relationships based on trust and support (Sani et al., 2015, Sani et al., 2012). This has also been found in research with people with depression, finding that group-based interventions were most effective when patients identified with the social group in question and that, 'it is not groups per se that cure depression, but rather groups with which we identify that cure depression' (Cruwys et al., 2014, p. 145). However, while our participants shared a common health goal, they did not participate in the group because of wider shared interests, for example, enjoying walking for leisure. They had entered the group as part of a referral scheme, and at best shared a dislike of the alternative referral option, joining a gym. The participants in this study were ambivalent about sociability and were not attracted by the social aspect of the group. Rather, it was seen rather as something to be navigated and there was apprehension about joining and becoming part of a group. For those who were of low mood and with enduring mental health problems apprehension of the expectations of sociability in a group format represented a significant barrier. This would support findings from a recent systematic review on barriers to participation in physical activity in older people which highlighted that social awkwardness, such as the apprehension of social situations could act as a barrier to group-based activities (Franco et al., 2015).

Six women and four men participated in this study. The reticence around sociability of the group format and the low expectations of walking was shown by both sexes. Men particularly phrased the walking in more functional terms, such as '*getting exercise done*', '*We get on with what we've got to do*' and '*the fixed regime that you have a walk at this time*'. This somewhat reflects previous findings that different strategies need to be considered to reach out and engage with men when promoting walking interventions (Brown et al., 2006).

These findings show that complex mechanisms seem to be at play when understanding walking groups; social context and influences can act both as barriers and facilitators and these might be intertwined. Having joined the group, our participants valued having time by themselves during the walk time, separate to the group. This was particularly apparent with those of low mood and enduring mental health issues who appreciated the presence of others but valued walking alone, to be free from conversation and the burden of socialising with others. It may be that walking groups such as this, organised with natural pauses, breaks into single file, and low eye contact, benefit the wellbeing of those who find social interaction difficult and they become a temporary social place which may be experienced as restorative (Doughty, 2013). This has been expressed in other walking and therapeutic landscape research as, 'walking with', a temporary enactment of companionship with supportive moments of silence without feeling socially awkward (Doughty, 2013). For those looking for physical challenge, the group aspect allowed comparison with others from which to compare their own improvement. They valued the structure of the walk but did not want to be constrained by the pace of others. Therefore, for both physical and psychological needs the group format was important but for enabling individuality within a structured format, rather than for sociability.

The exploration of walking in everyday life showed that walking was not necessarily regarded as 'normal', i.e. a common or socially acceptable activity by our participants from low socio-economic backgrounds. Walking should not be considered simply an individual or group activity, but a practice with meaning, acceptability and opportunity shared within a social group or class (Blue et al., 2014, Bourdieu, 1980). As Nettleton and Green (2014) suggested in their investigation of cycling as a social action it is both embodied by social actors and embedded in its specific social context, some practices are considered 'unthinkable' within particular social worlds. Similarly, our participants experienced the walking group as a process of learning. At first, prior to joining, being sceptical, then getting used to walking as a form of activity acceptable for people with similar social backgrounds, and finally experiencing its health benefit with their bodies. Our participants expressed as a lack of confidence in joining the group and a concern about 'what others would look like' and would wear and this presented a potential barrier to joining. As discussed by Green (2009) the social organisation and experience of walking has not

been adequately understood. Green notes that leisure walking is *embodied* because it is the goal itself, not merely getting from A to B. The meaning lies in actually experiencing the sensation of moving. This was somewhat seen in our study where the participants viewed the experience of walking with the walking group as being of purposeful activity in contrast to their views of walking in everyday life which they did not view as useful exercise. The walking group should therefore perhaps be viewed as a different social practice to walking alone.

### Strengths and limitations

A strength of this study was the use of participant generated photographs in the research process. This aided our understanding of the meaning and 'insider' experience of place, an important component of constructing health knowledge (Kearns and Joseph, 1993). By using photograph elicitation the participants were more actively engaged from the beginning of the research process and during the interview used the photographs to talk about their experiences on their own terms. Participant generated photographs can act as a way of engaging participants in research and as a communicative bridge when ideas (such as the language of physical activity) are difficult to articulate helping to connect the culturally different worlds of the researcher and the researched (Guillemin and Drew, 2010, Ward et al., 2015). They are also a useful way of aiding rapport and interaction between the researcher and the researched. There was evidence of much care in the planning and capturing of images which generated more considered responses during the interview. The participant-driven nature of the interviews and the inductive analysis enabled us to uncover unexpected findings such as the ambiguous views on the social aspect of the group.

There are limitations to this study. This was a small sample size, limited to the actual walking members who joined the new scheme. Also, the researcher was a known volunteer with the group which appeared to enable rapport and a relaxed and 'open' interview but there is the possibility that the researcher may not have been seen as completely neutral. Finally, the participants represented a very homogenous group (white English). This aided saturation in the analysis but further studies, for examples exploring experiences of people from black or minority ethnic groups should be conducted.



## Conclusions and implications for practice

This study worked with a walking group in an exercise referral scheme operating in an area of social and socioeconomic deprivation. Our findings suggest that while our participants had negative expectations of the participation in a walking group (being forced into awkward social interaction with limited tangible health benefits), it was the unexpected positive experiences that encouraged them to stay in the group.

Firstly, while health professionals could certainly provide more detailed information about walking as good or sufficient exercise and how these groups operate, it is the actual provision of such opportunities through exercise referral that seems to make the difference. Our participants reported experiencing better health after joining the group and it seemed to be this visceral feeling of improved fitness, health and wellbeing such as reduced breathlessness that motivated them to continue. It may be the case that such experiences of health would be equally placed in other walking group formats but it may be that the referral from a health professional stressed the experience of personal health gains. Secondly, the group format was sustained as a working group for purposeful physical activity with shared health goals, not due to sociability. Promoting walking groups as a social activity for this group of people may well have been counter-productive as not everyone enjoys socialising, in particular not with a group of strangers, as can be the case with referral schemes. It is noteworthy that our participants expressed that belonging to a group did not necessarily mean enforced interaction and this was important to them. Instead they chose to be social when it suited them and as a walking group developed into a working group there was a shared social acceptability of walking between people of similar social backgrounds.

We believe the findings from this study make a contribution to effective recruitment approaches that reflect the needs and expectations of 'hard to reach groups' (Foster et al., 2011). They support previous findings (Matthews et al., 2012) that targeted recruitment methods, in our case through an exercise referral scheme, are the most effective way to engage 'new' walkers' from disadvantaged groups into walking interventions. They further support the importance of health, and exercise professionals raising awareness of the benefits and low risks of walking to their patients and clients (Hanson and Jones, 2015a, Franco et al., 2015).

## Chapter 6: Discussion and conclusions

### Chapter overview

As discussed in the introduction, physical inactivity is a major contributing factor to chronic disease, disabling poor health and early mortality. Despite the benefits of an active lifestyle being promoted widely, many adults are not active enough in their daily lives to benefit their health. An additional problematic factor is that health promoting interventions tend not to be utilised by those who are in the poorest health and could benefit the most. This leads to widening health inequity.

An example of a physical activity intervention is group health walks. These have been found to increase physical activity (Kassavou et al., 2013) and are increasingly popular but a fuller understanding is needed before they are more widely promoted. This thesis set out to increase our understanding of walking groups as a health promoting intervention. It had two research aims. Firstly to establish whether there was a benefit to health from belonging to a walking group beyond increasing physical activity. Secondly to investigate whether walking groups have the potential to influence health inequity. To meet these aims, four separate studies were conducted around the following questions:

1. Is there evidence that walking groups have health benefits?
2. To what extent do walking groups operate in those places with the greatest health need?
3. What are the essential elements that facilitate and present barriers to implementing walking groups in more deprived communities?
4. What can we learn from participants about how to promote walking groups to those in poorest health in areas of health and socio-economic deprivation?

This concluding chapter has four parts.

Firstly it summarises the principal findings. Secondly, it contextualises the findings within the wider literature with implications for practice. Thirdly it reflects on the methods. Finally, there are suggestions for future research and concluding comments.

## Summary of principal findings

Chapter two set out to quantify the health benefits of walking groups for adults using systematic review and meta-analysis methods. Forty-two studies were identified that measured the difference in health outcomes between baseline and at the end of the intervention. The review found that walking groups had been used with participants with a wide range of both physiological and psychological health conditions. Walking groups appeared to predominantly feature women (76% versus 43% male). Fifteen of the 42 studies were specifically aimed at older people and the grand mean age was 58 years suggesting that walking groups are generally targeted at an older population. Where adherence and adverse effects were described (76% of the papers) mean adherence was 75% and there were no notable adverse events. The use of common outcome measures enabled meta-analysis of 17 measures. There were no negative effects and ten of the results, including both systolic and diastolic BP, BMI and depression were statistically significant. Sub-analysis of the effect for those in poor health (overweight and obese; depression and diabetes) strengthened the results for weight and depression reduction but not for glucose and HbA1C. The finding of wide-ranging benefits, both to psychological as well as to physiological health, in this thesis suggest that walking groups could be recommended as a useful intervention for those with multiple health conditions.

There were questions about walking groups that this review did not answer. The majority of interventions (75%) were below international moderate activity guidelines for time spent walking and there was little information about walk speeds. It may be that the effect sizes found in the meta-analysis could be improved by increasing time and intensity but this is only a tentative suggestion that warrants further research. Additionally, no study evaluated very short walks for those who are in particular poor health and inactive, despite the fact that this is where the greatest gains to public health are likely to lie. The majority of studies involved people with health conditions, or known risk factors therefore the potential for maintaining people in longer term good health is not known.

There was little information about the design of the walking groups from which to make any suggestions about the best way to run a group. The majority were run by qualified health professionals, presumably because they were part of research studies. Many walking groups are run by lay people, with some short training. This review found no contra-indications that would suggest that walking groups should not be run by such lay people. There was also little information about terrain or location of the walking group. Where it was described 15 of the studies were urban and six were rural, indicating that walking groups could run equally successfully in rural or urban locations.

Additionally, there was little information about those groups who are known to be harder to reach with health interventions. Only two studies were with participants with a disability.

Both were with participants with a learning disability and living in a care setting. Therefore, the potential of walking groups to be a health promoting intervention for people with a disability warrants investigation. There was also little information provided in the studies about their participants' ethnicity and socio-economic status. Two studies specifically addressed ethnicity; one compared the response of African-Americans to white people and one study was specifically for African American women, otherwise only 11 studies described the ethnicity of the participants. Two studies suggested that travel and lack of access to private transport may have affected adherence and attrition, otherwise there was no socio-economic discussion from which to draw any conclusions.

As raised in the introduction to this thesis, inequity within society in general, and healthcare and health interventions in particular, is pernicious and there is much evidence of this health gap widening (Marmot, 2015). Three studies in this thesis (Chapters 3, 4 and 5) examined the link between walking groups and their potential to influence health inequity.

Chapter three addressed the potential for walking groups to influence health inequity using a spatial approach. Physical activity is subject to social patterning whereby inactivity is disproportionately prevalent in disadvantaged communities. There is also a concern that many interventions that could improve health may not reach the most disadvantaged. Therefore without interventions being targeted to such communities there is a potential not only for a lack of health improvement but also for health inequity to widen.

The study in Chapter three sought to establish whether walking groups were an available intervention in those communities with poorer health and socio-economic indicators. It used a case study approach using data from one walking group provider in England. Provision of their group walks was evaluated against a range of indicators that profiled both health and socio-economic factors in each of the 326 local authorities in England. It found evidence of some inequity in provision. Although the differences were small, walking groups were not as available to those who lived in more disadvantaged communities compared to those that were more affluent. This suggests that this particular walking group intervention is not well spatially targeted and that a more targeted approach is needed in areas with poor health and socio-economic indicators to reach those in greatest need. Without such targeting, there is a potential that walking groups, albeit unwittingly, could add to the inequalities already present between more affluent and the most disadvantaged communities. Although this was only one case study, in one country, it does lend some weight to the caution that public health interventions need to be evaluated for their potential to influence health inequity.

Study two (Chapter 3) had found some inequity in provision between different communities. Study three (Chapter 4) therefore sought to identify those critical

components necessary when setting up new walking groups within a disadvantaged area. It used a process evaluation as this method provides useful information on those factors that influence the implementation and what went well and what was less successful. The study used qualitative methods, interviewing stakeholders and volunteer walk leaders at the beginning of the funding period and again at the end. The aim was to establish those barriers and facilitators that had influenced the implementation and sustainability of the scheme and to provide recommendations for those who might set up walking group interventions in deprived communities in the future.

This study found that three separate but inter-related factors had influenced the intervention's impact. Firstly, the importance of a community centred approach to the success of an intervention. Volunteer health champion schemes are increasingly promoted as a way of improving the health and wellbeing in more deprived communities as well as improving the social capital of the volunteers. This study found little evidence of involvement with the community in 'bottom-up' planning of the intervention. There was also little evidence that pre-existing community based assets had been audited and utilised. Furthermore, the walk leaders were not representative of the targeted deprived community. This has impact on the long term sustainability of the scheme by restricting the reach into deprived communities to social networks that are not representative of the targeted area.

The second factor found to influence the effectiveness of the scheme's implementation was collaborative partnerships with health and non-health organisations. The scheme had started to engage with community groups but there continued to be a lack of links with health professionals in primary care. Without this direct link and targeted approach to the most inactive and those in poorest health, it is likely that walking groups will continue to be populated by those who need them least. The final factor that affected the implementation and impact of the scheme was its short term funding which impacted its sustainability in the longer term.

The findings from the process evaluation enables recommendations to be made to those who may set up walking groups in more deprived communities in the future. These included the importance of building relationships with health professionals to enable direct referrals into walking schemes for those who are inactive and in poorest health; the necessity of identifying and utilising community based assets ('bottom up' planning) and a targeted approach within deprived communities to enable recruitment of volunteers who better represent those communities and finally the consideration of staged funding over longer time scales to enable local capacity building and long term constructive partnerships.

Study four (Chapter 5) sought to understand walking and walking groups from a participant's perspective using qualitative methods. Participant generated photographs were used to elicit information about their walking group participation and their wider views of walking during semi-structured interviews. It aimed to understand their perceived barriers to joining a group health walk to better understand how walking groups could be more effectively promoted within deprived communities. This study worked with a newly formed walking group that had targeted their clients through an exercise referral scheme operating in a disadvantaged area. This targeted approach meant that all the participants had multiple health problem that could benefit from increasing their physical activity levels.

This study found that the health benefits of walking in general and walking groups in particular were not viewed as 'proper' exercise among this particular group of participants. There was very little expectation that participation would be beneficial, rather tending to join because it was the, 'least-worst option'. Walking groups are often promoted as a way of socialising and meeting people. It was therefore of particular concern that the social conventions and expectations around socialising in a group presented barriers. This was especially apparent in those of low mood and with mental health problems. Having overcome the barrier of joining, participants continued with the group. They reported surprise at the health benefits, especially reduced breathlessness, weight loss and increased energy and mood. They also grew to enjoy the group for its own sake and it had become a purposeful activity to them. This appeared to be because the organisation of the walk enabled people to walk at their own pace and set their own challenges. It also enabled them to walk on their own which allowed them to 'dip in and out' of socialising as it suited them. They also identified with others in the group around achieving health goals which made the activity more socially acceptable and helped to sustain their involvement.

The findings from this study make a contribution to the literature on the effective engagement and recruitment of walkers into group health walks operating in more deprived areas. It is important to recognise that socialising with strangers is a challenge for many, especially to those with low mood. Whilst there might be intuitive appeal in promoting sociability in group health interventions, it could well be counter-productive for this group of people. Rather better, to promote group health walks as a working group formed and operating around mutual health goals. The findings from this study also support the importance of health professionals and trainers raising the multiple benefits and low risks of walking with their patients and clients.

## The context of the findings and their implications for promoting walking groups as a health intervention

The 'Start Active, Stay Active report on physical activity in the United Kingdom gives a life-course approach to physical activity with guidance for people that gives, 'options for action that fit their own lives' (Department of Health, 2011, p. 46). It showcases examples through case studies. In the section for adults aged 19-64 years it features three people; Rohan (aged 37 years) who bikes and walks; Paula (aged 22 years) who circuit trains and runs and John (aged 27 years). Not only a very limited age group but Rohan and Paula are in semi-professional jobs and John is in a wheelchair and takes up gym activities. For the older adults (aged 65+) Jim and Shirley are case studied; Jim a basketball referee and Shirley a widow with a wide social network who is now in the 'fast stream' of a led walk. These case studies represent a particular context; the socially connected; probably white British; semi-professional people living in communities with access to resources. Whilst possibly inspirational and aspirational they do not reflect or represent the very real challenge of reaching into disadvantaged communities for those who are the most sedentary; in the poorest health and who would stand to gain the most from increasing their physical activity levels by even a small amount.

This thesis has shown the wide-ranging benefits to both psychological as well as to physiological health from belonging to a walking group. This extends previous findings that group walking increases physical activity (Kassavou et al., 2013). These multiple benefits are particularly important as multiple chronic conditions are a common feature of modern medicine and multi-morbidity increases with age (Salive, 2013, Benjamin, 2010). The mean age within the systematic review (chapter 2) was 58 years of age and 81% of 'Walking for Health' walkers (Chapter 3) were aged over 55 years; and 48% over 65 years. Population growth and improved longevity are leading to increasing numbers of older people and as populations age worldwide NCD deaths are projected to rise substantially by 2030 (World Health Organization, 2011). The consequence of this is the longer years that people will live in chronic poor health and with acquired disability. Walking groups could therefore be a particularly valuable intervention for older adults and those who are at the cusp of retirement, especially as older people are at particular risk of inactivity (Doyle et al., 2012). However, these would need to be targeted effectively as there is a significant socio-economic age gradient in physical activity with the largest differences occurring in those who are up to 10 years post statutory retirement age (Farrell et al., 2013). Effectively targeted walking groups could also help address the social isolation, loneliness of pensioners who live alone and who are particularly vulnerable to higher levels of deprivation (Public Health England, 2013b).

Whilst the systematic review in this thesis has demonstrated health benefits the three other studies have shown the very real challenges of promoting and implementing walking groups to those who are in poorest health and are the most inactive.

A notable feature of unhealthy behaviours, such as physical inactivity is that they co-occur with other unhealthy behaviours (Fine et al., 2004, Spring et al., 2012). Also, the most vulnerable populations have the most concentrated multiple risk factors throughout the life course (Frohlich and Potvin, 2008). Therefore these deprived groups are the most exposed to any inequity in health promoting interventions. The importance of how this affects mortality can be seen in a European prospective investigation of cancer which found that having four compared with zero healthy lifestyle behaviours (diet, smoking, alcohol and physical activity) is associated with an all-cause mortality risk equivalent to being 12 years older (Kvaavik et al., 2010). Similar preventable deaths from multiple lifestyle factors were also found in a study of older Japanese adults (Tamakoshi et al., 2009). Physical activity interventions are particularly important as it has been suggested that they can act as a gateway behaviour i.e. to produce positive effects in other behaviours and there is evidence that this multi-change approach is viewed as acceptable and helpful by patients (Malpass et al., 2009). The findings in this thesis make a contribution to this literature by suggesting the potentially useful contribution walking groups could make to not only improving health by increasing physical activity, but by also producing positive effects in other ill-health behaviours too.

This thesis has shown the importance of involving the resources within a community in health promoting interventions in more deprived communities. This reflects previous findings of the need to reframe community-based health promotion from an 'intervention driven' perspective to a more 'people-centred' one (South, 2014) . It supports a model of partnership working with community health champions from within their own communities to facilitate targeted access into disadvantaged areas. This model of working with citizens as volunteer community health champions has already proved successful in the 'Altogether better' project in deprived areas in England whose mission is to, 'unlock the power of communities to transform lives' (Altogether better, 2015). The very real importance of such projects can be seen in a recent meta-analysis. This found that individuals in communities with strong social relationships are likely to remain alive significantly longer than similar individuals with poor social relations and that the influence of poor social relationships on mortality risk translates to approximately that of smoking (Holt-Lunstad et al., 2010). The involvement of residents in meaningful engagement and the support of volunteers has previously been found to be the key to successful physical activity interventions in deprived communities (Cleland et al., 2014). The findings in this thesis supports this and forms part of the recommendations for further research.



Public Health England recognises the importance of confident and connected communities and active citizenship. It also calls for greater research into the extent to which behaviour change is sustained, in order to strengthen the evidence base. (Public Health England, 2015a). The sustainability issues found in walking groups in this thesis also point to the need for a new model of walking group delivery that is sustained by active citizens in deprived communities. This in turn would give the opportunity for longer term evaluation of long-term behaviour change and thus add to the findings in this thesis. The creation of a 'pool' of appropriate volunteers to affect behaviour change is not without challenges however. For example, a large five year type II diabetes prevention clinical trial in Norfolk, England which used lay people to be diabetes prevention mentors and trainers. Over 6,000 potential mentors, themselves with type II diabetes, were approached with 310 (5.1%) expressing interest, 78 (25%) starting as mentors and 50 continuing to mentor (Sampson, 2015). Similarly, in a walking group programme in Norfolk, with walks run by trained lay people, of the 2,536 registered walkers in 2015, only 160 of these were active volunteers (6.3%) (Brown, 2015). Previous research has also raised the concern about the on-going struggle for financial sustainability and survival and suggested that this could explain the focus on numerical attendance, rather than recruiting those that most represent a targeted population (Matthews et al., 2012).

This thesis has shown some of the complexities surrounding effective promotion and recruitment of those who are most inactive and in poorest health. It supports previous findings that walking is misconceived as not being proper exercise and that, a 'no pain, no gain' attitude to exercise fails to appreciate the value of walking (Darker et al., 2010, Ekkekakis et al., 2008). As with previous research this thesis has also found that participants had not made the link between lack of exercise and their chronic conditions and had believed their physical activity levels to be satisfactory (Everson-Hock et al., 2013, Croker et al., 2012). This has implications for the effective promotion of walking groups and the clear information that is necessary for interventions with low socio-economic groups (Everson-Hock et al., 2013). The findings that the expectations of social interaction may create a barrier to people entering group based health interventions supports similar findings that awkwardness and apprehension could be a barrier to group based interventions for older people (Franco et al., 2015). It adds to the body of knowledge on group-based health improvement. For example, the positive effect of group identification (rather than social contact) which supports meaningful positive relationships within group interventions (Sani et al., 2015, Cruwys et al., 2014).

This thesis has also pointed to the key role that professionals play in promoting walking groups to those in the greatest health need. Without this targeted recruitment, the concern continues that walking groups continue to recruit better-off, white middle-aged women (Foster et al., 2011). However, it has also previously been found that health professionals

find physical activity advice outside their remit and expertise and are liable to make subjective judgements regarding a patient's likelihood and motivation for engaging in physical activity (Din et al., 2014). It has also been found that health professionals find it difficult to encourage physical activity if they are not physically active themselves (Din et al., 2014). This is despite the Department for Health's 'Making Every Contact Count' initiative which encourages health workers to engage in conversations on lifestyle behaviour change (National Institute for Health and Care Excellence, 2011). The findings from this thesis suggest that a better understanding is needed of the health professional's perspective on referrals to walking groups and the best mechanism to expedite this efficiently and effectively. This forms the second suggestion for further research.

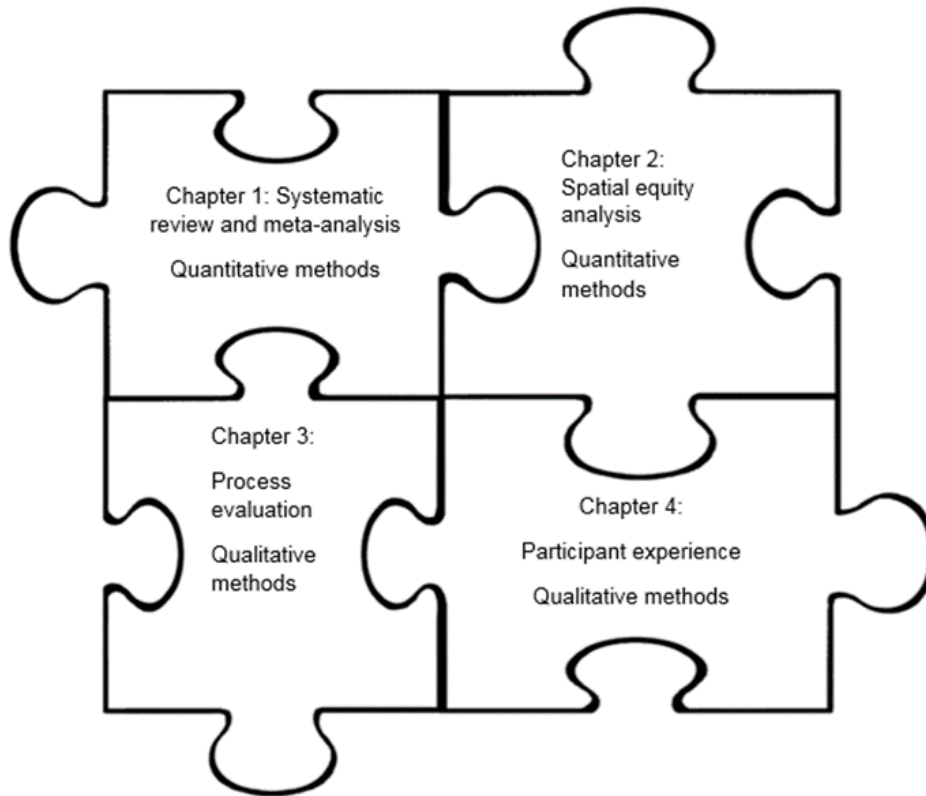
## Reflections on the methods used in the thesis

Mixed research methods have been used to address the different research questions that form this thesis. Mixed methods refers to a the intentional use of a mix of both qualitative and quantitative approaches to investigate a topic (Creswell and Clark, 2007). It is not simply the addition of qualitative data to quantitative data (Creswell, 2014). It has been argued that mixed methods is one of the three major research paradigms (quantitative and qualitative research being the others) (Johnson et al., 2007), with paradigm taken to be a set of beliefs, values and assumptions regarding the nature and conduct of research (Johnson and Onwuegbuzie, 2004). Mixed method research is considered a pragmatic approach to knowledge generation (theory and practice) that considers multiple perspective and standpoints (Johnson et al., 2007, p. 113). Its advantage is the combination of the strengths of each method to answer research questions (Creswell et al., 2011). A typical reason for using mixed methods is where the research aims to examine both outcomes as well as processes and experiences (Plano Clark, 2010). This was appropriate for this thesis in that it used:

- Quantitative systematic and meta-analysis methods to establish if walking groups improved health outcomes.
- Quantitative methods using a spatial approach to evaluate whether walking group provision operated in areas of greatest health and socio-economic need.
- Qualitative methods to examine the process of implementing a new walking group.
- Qualitative methods for a better understanding of the experiences of participants.

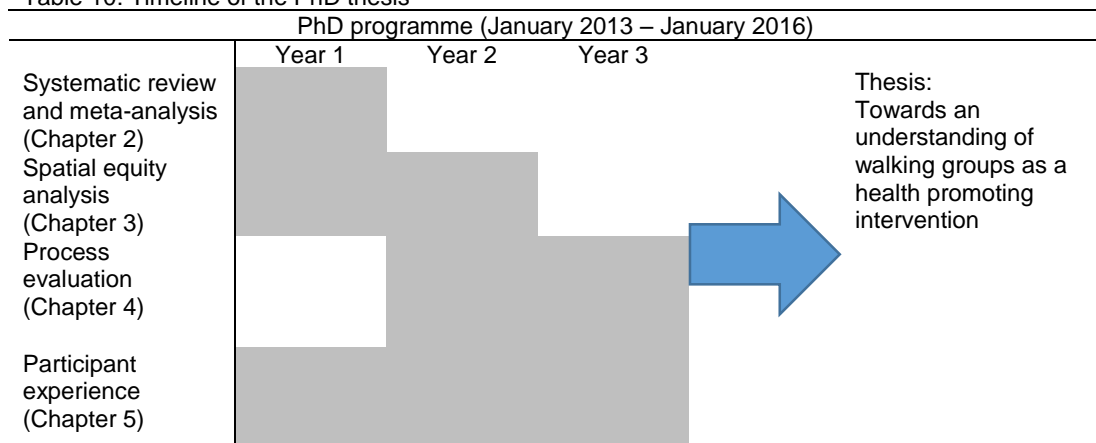
This approach has therefore enabled four separate research questions to be addressed, using a range of tools appropriate to the research aim. This has facilitated a rigorous, broader, and more complete, enquiry into both the health benefits and those factors that influence effective walking group implementation.

The figure below presented the overview of the research methods used in the thesis (introduced in the introduction).



On reflection the process of completing the thesis, it becomes apparent in hindsight that this is a rather simplistic portrayal of the research as it happened in practice. On reflection, whilst the 'jigsaw' diagrammatically represents the four different and independent studies and their contribution to the whole thesis, they were in fact conducted in parallel during the three years of the thesis programme. Table 10 below represents this in a Gantt-style chart.

Table 10: Timeline of the PhD thesis



This has meant that, in practice, whilst each study was designed separately with data collected and analysed separately there was overlap between the studies. It is important to acknowledge that the knowledge and understanding gained from each study will have influenced me, as the researcher, and therefore each subsequent study. Each study

should be thus viewed in this context. A convergent (or parallel or concurrent) design is a specific mixed methods design that intends to merge concurrent quantitative and qualitative data to address study aims from multiple perspectives (Creswell et al., 2011, Creswell, 2014). The logic of a convergent design is summarised by John Creswell.

*Quantitative results yield general trends and relationships, while qualitative results provide in-depth personal perspectives of individuals. Both are useful results and their combination adds up to not only more data, but a more complete understanding than would have been provided by each database alone.* (Creswell, 2014, p. 36)

This convergent design better reflects the integration of each separate study into the overall thesis. This design has therefore informed the broad and developed understanding of walking groups as a health promoting intervention in this thesis whilst maintaining each study as standalone piece of research in its own right.

### Strengths and limitations

The strengths and limitations of each study and the methodological approach used has been evaluated within each chapter. Additionally, the thesis overall has strengths and limitations.

The strengths of this thesis are the contribution it makes to the evidence base of effective physical activity interventions. It has also given further evidence of the potential for health promoting interventions to widen health inequity. A further strength is the evidence-based recommendations for how walking groups might be more effectively promoted in disadvantaged communities and populations. The use of a quantitative and qualitative methods has enabled multiple aspects of walking groups as a health promoting intervention to be addressed. It has enabled me to ask *if* they work and *how* they work. This strengthens the findings of this thesis.

There are limitations to this thesis. Whilst this thesis explored deprived communities as a 'hard to reach' group, it did not explore the promotion of walking groups to other 'hard to reach' groups, such as those from black and minority ethnic groups and those with disabilities. Firstly, in terms of black and ethnic minorities, both of the qualitative studies were based in Norfolk, England which has a largely white English population. The systematic review also lacked detail on ethnic minorities. This is a concern because physical activity levels are lower in most ethnic minority groups compared to the white population in England and this is particularly marked in those of South-East Asian ethnicity (Indian, Pakistani and Bangladeshi) with South Asian women contributing to their high risk of coronary heart disease (Farrell et al., 2014). Walking groups could potentially make a contribution to the health of such communities. The reasons, for example cultural

differences, attitudes and norms towards health walks were not explored in this thesis. The applicability of the findings in this thesis to people from black and minority ethnic groups are limited by this.

Whilst the qualitative study worked with participants in poor health and with poor activity levels it did not work with groups with learning or physical disabilities. There are 9.4 million disabled people in England which accounts for 18% of the population (English Federation of Disability Sport, 2015). The fact that the role of walking groups in improving the health and quality of life for such a large percentage of the population was not explored, limits the findings and applicability of this thesis.

The systematic review tended to contain studies with participants in poor health therefore this limits our understanding of their role in the maintenance of good health.

Finally, in terms of positioning, the researcher was a known volunteer with the two walking groups that were qualitatively evaluated and established a good working relationship with the Walking for Health organisation. This appeared to aid rapport and a willingness to share data but there is the possibility that it could be seen as a potential conflict of interest in the studies.

## Suggestions for future research

Promoting walking groups to widen the reach of their benefits to those who need them the most but being mindful of their potential to widen inequity forms the basis of the following suggestions.

This thesis has demonstrated the health benefits of group walking and given some insight into the way they might be developed and promoted in more deprived areas to attract the most inactive and those in poorest health. It has found two separate but inter-related themes. It is suggested that these are the main priorities for understanding the essential elements necessary for the effective promotion of walking groups in more deprived communities. Firstly the utilisation of effective community based volunteers who are representative of their community and secondly partnerships with health professionals. Without a greater understanding of these two aspects of walking group design and delivery they could continue to be designed by, and delivered in, communities that are in better health and contribute to the very real issue of widening health inequity.

Firstly, the utilisation of effective community based volunteers. The recent transfer of public health to local government gives local authorities statutory responsibility to promote public health, address health inequalities and for community engagement to adhere to legislation (National Institute for Health and Care Excellence, 2014b). A systematic review commissioned by the National Institute for Health Research suggested that public health interventions using community engagement can be effective in improving health behaviours in disadvantaged communities (O'Mara-Eves et al., 2013). This review found three theoretical models of engagement:

- Patient involvement in service development - engaging with communities so that the intervention will be more appropriate as a result of incorporating views.
- Peer /lay-delivered interventions - engaging communities and individuals that are credible in their communities to deliver interventions and behaviour change.
- Empowerment of the community – A community identifies a need and they mobilise into action (O'Mara-Eves et al., 2013, p.xv).

Walking groups, led by lay people / health champions within their community would fall within the second theoretical model of engagement. Volunteering and the use of community health champions and a 'bottom-up' approach to health promotion appears to be firmly embedded into the new health service and public health agenda (Public Health England, 2015a, National Institute for Health and Care Excellence, 2014b). Public Health England states a need to enhance the capabilities of volunteers / peer roles so that they can organise activities around health and wellbeing (Public Health England, 2015a). It also recognises that creating effective and meaningful engagement and removing barriers

is challenging (Public Health England, 2015a, p. 4). The involvement of residents from the outset in deprived communities and the use of a participatory approach is specifically recognised for increasing participation in physical activity initiatives and for wider sustainable community well-being (Cleland et al., 2014, World Health Organization, 2015c, Public Health England, 2015a). There is therefore is a very real opportunity for sustainable public health interventions to become more community centred and for individual local people to be recruited as agents of change to help build healthier communities (National Institute for Health and Care Excellence, 2014b, Naylor et al., 2013).

Volunteers represent a massive 'workforce'. The King's fund has estimated that in the health and care sector three million people currently volunteer, compared to an NHS paid workforce of 1.4 million (Naylor et al., 2013). Overall, however, more women than men volunteer and participation rates are lower in ethnic minorities and people with lower educational attainment (Naylor et al., 2013). The King's Fund research has suggested that opportunities are lost by a lack of strategic vision for the role of volunteers in their workforce but also that community volunteers need to be managed well to sustain long term goodwill (Naylor et al., 2013). It has been suggested that involving volunteers, in roles such as community health champions, from more deprived communities that may be beyond the reach of mainstream services, may be especially helpful in improving links to services and this in turn could reduce health inequalities (Naylor et al., 2013). The challenge therefore remains as how to best recruit volunteers who are representative of more marginalised groups in more deprived communities to build healthier communities and to reach social networks that are representative of that community.

Despite support for community based interventions and a recognition that volunteers can be a powerful tool for improving and maintaining health there is a need to have a much fuller understanding of what works so that aspiration can be translated into meaningful interventions. The model of engaging communities and individuals in sustainable walking group intervention design and delivery for those who are the most disadvantaged, sedentary and in poorest health needs a greater understanding to prevent community based walking programmes contributing to widening health inequity.

The second recommendation for further research is the effective promotion of walking groups by health professionals and health trainers. This thesis found that this was key to the understanding of their health benefits and their acceptability and adoption by their patients and clients.



We have some understanding of the health professional's role and perspective in referral to exercise referral schemes which are run by trained physical activity instructors (Din et al., 2014). However, many walking groups tend to run independently of this, by many different organisations, and by lay people, for example, 'Walking for Health' and 'Age UK' (Walking for Health, 2015, AgeUK, 2016). As with other lay-led health programmes, there is a lack of critical analysis of the complex interrelationships between professionals, lay workers and the communities receiving the programme (South et al., 2012).

'Every contact counts' is highly promoted by the Department of Health to improve lifestyles and reduce health inequity (National Institute for Health and Care Excellence, 2011). However, it has also the case that health professionals find physical activity advice outside their remit and expertise (Din et al., 2014). Additionally, health advice is delivered by a wide range of people in primary care with different skills. For example, doctors, nurses, physiotherapists, health-care assistants. Increasingly, GP surgeries are also using lay people as, 'community sign-posters / community navigators' (Naylor et al., 2013, p. 21). These volunteers assist and direct patients to community based support that the GP might not be aware of. For example a 'community sign-poster' scheme being piloted in Hampshire in England as part of the NHS New Care Model Vanguards (Fareham and Gosport CCG NHS, 2015). The NICE guidelines on physical activity interventions in primary care recommend that the impact and perceived value of delivery by different primary care practitioners should be researched (National Institute for Health and Care Excellence, 2013, p.17). The findings from this thesis suggest that this is needed for the effective promotion of walking groups in more deprived communities.

The findings from this thesis support the key importance of effective referrals. It has also highlighted the potential barriers to effective promotion of walking groups by health professionals. These findings suggest a need for further research to build on this. This would include the role and perspective of different health professionals; the knowledge of available walking groups to refer to and the mechanism for effective referral. A critical analysis of these barriers and the identification of effective facilitators to community based walking programmes in more deprived areas is needed is needed. This will help to ensure that those in the poorest health and the most inactive are recruited and thus prevent community based walking programmes contributing to health inequity.

In summary there are two key areas that this thesis did not address and for which we need a fuller understanding. Firstly, a model of engaging communities and individuals in sustainable walking group intervention design and delivery for those who are the most disadvantaged, inactive and in poorest health. Secondly, the role of different health professionals and the mechanism of referral into walking groups within their patient's communities. This is the essential link. Without this missing piece of information the most effective way of promoting and referring to community based walking groups to those who have the greatest health need is not known. Without these additional pieces of research, and a broader understanding, walking groups are likely to be designed, promoted and populated by those who are in better health and will continue to have the potential to widen health inequity.

## Concluding comments

Current low levels of physical activity present a major health challenge. This thesis has found that outdoor walking groups can confer multiple health benefits, both psychological as well as physiological. They also appear to be acceptable to those who participate as they have good adherence and virtually no side effects. They therefore have the potential to be a useful health intervention and clinicians, health trainers and other health professionals can confidently recommend them to their patients and clients. However, this thesis has also found that walking groups, as with other health promoting interventions, have the potential to widen inequity. Firstly, they may not be available in those areas that are more disadvantaged, creating a potential inequity in provision. Secondly, when new walking groups are set up in disadvantaged areas they may not be effectively targeted or promoted to reach those who are the most inactive and in poorest health. Finally, the benefit to health from walking in a group may not be widely understood, especially amongst those who are in greatest need.

The findings from this thesis suggest that for walking group initiatives to be effectively promoted and sustained in more deprived communities there is a need for a consideration of a new model of delivery. This would include the active promotion of their wide-ranging benefits by health professionals and the use of an asset based community delivery model that utilises people from within more deprived communities to sustain community based walking groups in the longer term.

In conclusion, it is hoped that this thesis, and the publications arising from it, makes a contribution to our knowledge on effective health promoting interventions. It has demonstrated that outdoor walking groups are a safe and effective health promoting intervention but they should be developed and promoted judiciously to target those who would benefit the most and avoid potentially increasing intervention based inequity.

## Appendices

### Appendix I: Systematic review protocol

## PROSPERO International prospective register of systematic reviews

### Review title and timescale

#### 1 Review title

Give the working title of the review. This must be in English. Ideally it should state succinctly the interventions or exposures being reviewed and the associated health or social problem being addressed in the review.

Is there evidence that outdoor walking groups have benefits other than increasing physical activity?

#### 2 Original language title

For reviews in languages other than English, this field should be used to enter the title in the language of the review. This will be displayed together with the English language title.

#### 3 Anticipated or actual start date

Give the date when the systematic review commenced, or is expected to commence.

07/05/2013

#### 4 Anticipated completion date

Give the date by which the review is expected to be completed.

31/01/2014

#### 5 Stage of review at time of this submission

Indicate the stage of progress of the review by ticking the relevant boxes. Reviews that have progressed beyond the point of completing data extraction at the time of initial registration are not eligible for inclusion in PROSPERO. This field should be updated when any amendments are made to a published record.

The review has not yet started

Review stage	Started	Completed
Preliminary searches	No	Yes
Piloting of the study selection process	No	Yes
Formal screening of search results against eligibility criteria	No	Yes
Data extraction	Yes	No
Risk of bias (quality) assessment	Yes	No
Data analysis	Yes	No

Provide any other relevant information about the stage of the review here.

This review is part of studentship for a PhD programme.

### Review team details

#### 6 Named contact

The named contact acts as the guarantor for the accuracy of the information presented in the register record.

Sarah Hanson

#### 7 Named contact email

Enter the electronic mail address of the named contact.

s.hanson@uea.ac.uk

#### 8 Named contact address

Enter the full postal address for the named contact.

Norwich Medical School Room 1.23 Queens Building University of East Anglia Norwich NR4 7TJ

#### 9 Named contact phone number

Enter the telephone number for the named contact, including international dialing code.

+44 (0)1603 - 593093

#### 10 Organisational affiliation of the review

Full title of the organisational affiliations for this review, and website address if available. This field may be completed as 'None' if the review is not affiliated to any organisation.

Norwich Medical school. University of East Anglia

Website address:

www.uea.ac.uk

#### 11 Review team members and their organisational affiliations

Give the title, first name and last name of all members of the team working directly on the review. Give the organisational affiliations of each member of the review team.

Title	First name	Last name	Affiliation
Mrs	Sarah	Hanson	Norwich Medical School. University of East Anglia
Professor	Andy	Jones	Norwich Medical School. University of East Anglia

#### 12 Funding sources/sponsors

Give details of the individuals, organizations, groups or other legal entities who take responsibility for initiating, managing, sponsoring and/or financing the review. Any unique identification numbers assigned to the review by the individuals or bodies listed should be included.

Not applicable

#### 13 Conflicts of interest

List any conditions that could lead to actual or perceived undue influence on judgements concerning the main topic investigated in the review.

Are there any actual or potential conflicts of interest?

None known

#### 14 Collaborators

Give the name, affiliation and role of any individuals or organisations who are working on the review but who are not listed as review team members.

## Review methods

### 15 Review question(s)

State the question(s) to be addressed / review objectives. Please complete a separate box for each question.

Is there evidence that outdoor walking schemes have benefits other than increasing physical activity levels?

What are the characteristics of outdoor walking schemes that show clinical benefits?

### 16 Searches

Give details of the sources to be searched, and any restrictions (e.g. language or publication period). The full search strategy is not required, but may be supplied as a link or attachment.

A range of health, allied health, physical activity and science databases: AMED EMBASE MEDLINE PsycINFO SportDiscus CINAHL SCOPUS Clinical trials registers Reference lists from included articles will be hand searched Restricted to English language No date restriction Adults only

### 17 URL to search strategy

If you have one, give the link to your search strategy here. Alternatively you can e-mail this to PROSPERO and we will store and link to it.

I give permission for this file to be made publicly available

Yes

### 18 Condition or domain being studied

Give a short description of the disease, condition or healthcare domain being studied. This could include health and wellbeing outcomes.

All health and wellbeing outcomes used by the study authors.

### 19 Participants/population

Give summary criteria for the participants or populations being studied by the review. The preferred format includes details of both inclusion and exclusion criteria.

Inclusion: Adults from the age of 18 Exclusion: Youths and children

### 20 Intervention(s), exposure(s)

Give full and clear descriptions of the nature of the interventions or the exposures to be reviewed

Inclusion: Interventions where people walk as part of a defined walking intervention Exclusion: Studies that do not involve a walking intervention Inclusion: Where the walking is group based, or where the walking is predominantly group based but participants may also walk on their own to supplement this Exclusion: Participants walking only rarely in groups, or walking on their own e.g. home-based or pedometer based programmes with no group walking Inclusion: Studies that compare group walking with group Nordic walking i.e. group walking can be isolated as an intervention and the outcome directly related to group walking Exclusion: Studies examining Nordic walking only Inclusion: Studies where the outcomes are measures of health status or well-being of participants Exclusion: Studies where the outcomes are solely physical activity e.g. step outcomes / logs of physical activity Inclusion: Studies where the outcome can directly be related to the walking intervention Exclusion: Studies with a mixed intervention (e.g. walking with calcium supplements/walking combined with a health education intervention) where the outcome cannot be isolated and directly attributed to walking

### 21 Comparator(s)/control

Where relevant, give details of the alternatives against which the main subject/topic of the review will be compared (e.g. another intervention or a non-exposed control group).

There is no comparator.

## 22 Types of study to be included initially

Give details of the study designs to be included in the review. If there are no restrictions on the types of study design eligible for inclusion, this should be stated.

There is no restriction on study design.

## 23 Context

Give summary details of the setting and other relevant characteristics which help define the inclusion or exclusion criteria.

Inclusion: Walking outdoors or walking predominantly outdoors but occasionally indoors (e.g. inside tracks or shopping malls for weather reasons). Exclusion: Indoors.

## 24 Primary outcome(s)

Give the most important outcomes.

All clinical outcomes will be included in the review. This will include physiological outcomes such as blood pressure or lipid profiles. Also included will be psychological, such as quality of life outcomes

Give information on timing and effect measures, as appropriate.

Information will be extracted at the end of the intervention (this may be as little as one month or as long as one year) where this is available.

## 25 Secondary outcomes

List any additional outcomes that will be addressed. If there are no secondary outcomes enter None.

The characteristics of effective walking groups. This may include whether a walking group, as an intervention, has particularly addressed different socio-economic groups, genders or ethnic minorities.

Give information on timing and effect measures, as appropriate.

This will be a qualitative narrative.

## 26 Data extraction, (selection and coding)

Give the procedure for selecting studies for the review and extracting data, including the number of researchers involved and how discrepancies will be resolved. List the data to be extracted.

Study selection: All abstracts will be read by the first reviewer and any that do not meet the inclusion will be excluded at this stage. Where adequate information is not provided at abstract level full texts will be evaluated. Where the author has not specified whether the walking group is in fact a walking group or a walking arm of the study, the primary reviewer will contact the author for further information. The second reviewer will review 10% of the papers as a sample to verify that papers have been excluded as per the protocol. Data to be extracted: Author name and date Clinical question addressed Description of the walking group Description of the participants Description of the environment and the provision The number of participants in the study The number of participants in the walking group part of the study The gender of the participants in the walking group Mean age of the walking group Location of the study Description of any socio-economic information Description of ethnicity of the participants The type of walking e.g. self selected, brisk Time in the intervention per week (events x time per week) Dosage of walking group activity in the research (weekly activity x length of time in the study) Results e.g BMI (p 0.257)

## 27 Risk of bias (quality) assessment

State whether and how risk of bias will be assessed, how the quality of individual studies will be assessed, and whether and how this will influence the planned synthesis.

An eight point tool has been used with 1 point allocated to each element. Randomisation Exposure (no evidence of concurrent intervention) Representativeness Comparability Attrition (over 20% would give a



zero score) Follow up tools Precision of the results. This tool will be used by the primary reviewer and the second reviewer will review 10% of the studies. Papers will be presented with their score and also a definition of high quality, medium quality and low quality. No papers will be excluded from the synthesis on quality grounds

## 28 Strategy for data synthesis

Give the planned general approach to be used, for example whether the data to be used will be aggregate or at the level of individual participants, and whether a quantitative or narrative (descriptive) synthesis is planned. Where appropriate a brief outline of analytic approach should be given.

The results will be given per study on an aggregate level. A table of results will display the extracted information. There will also be a descriptive narrative of the characteristics of walking groups where this information has been available.

## 29 Analysis of subgroups or subsets

Give any planned exploration of subgroups or subsets within the review. 'None planned' is a valid response if no subgroup analyses are planned.

None planned.

## Review general information

### 30 Type of review

Select the type of review from the drop down list.

Intervention

### 31 Language

Select the language(s) in which the review is being written and will be made available, from the drop down list. Use the control key to select more than one language.

English

Will a summary/abstract be made available in English?

Yes

### 32 Country

Select the country in which the review is being carried out from the drop down list. For multi-national collaborations select all the countries involved. Use the control key to select more than one country.

England

### 33 Other registration details

List places where the systematic review title or protocol is registered (such as with the Campbell Collaboration, or The Joanna Briggs Institute). The name of the organisation and any unique identification number assigned to the review by that organization should be included.

None

### 34 Reference and/or URL for published protocol

Give the citation for the published protocol, if there is one.

Give the link to the published protocol, if there is one. This may be to an external site or to a protocol deposited with CRD in pdf format.

I give permission for this file to be made publicly available

Yes

### **35 Dissemination plans**

Give brief details of plans for communicating essential messages from the review to the appropriate audiences.

Essential messages will be disseminated through journal publication and conference proceedings/presentations

Do you intend to publish the review on completion?

Yes

### **36 Keywords**

Give words or phrases that best describe the review. (One word per box, create a new box for each term)

Systematic review

Walking groups

Clinical outcomes

### **37 Details of any existing review of the same topic by the same authors**

Give details of earlier versions of the systematic review if an update of an existing review is being registered, including full bibliographic reference if possible.

### **38 Current review status**

Review status should be updated when the review is completed and when it is published.

Ongoing

### **39 Any additional information**

Provide any further information the review team consider relevant to the registration of the review.

### **40 Details of final report/publication(s)**

This field should be left empty until details of the completed review are available.  
Give the full citation for the final report or publication of the systematic review.

Give the URL where available.

Appendix II: Research governance, participant information and consent  
(Photo-elicitation study)



## Health Research Authority

NRES Committee South West - Exeter

Whitefriars  
Level 3  
Block B  
Lewins Mead  
Bristol  
BS1 2NT

Tel: 01173421390  
Fax: 01173420445

26 June 2014

Mrs Sarah Hanson  
Research Student  
University of East Anglia  
Queen's Building Room 0.27  
University of East Anglia  
Norwich  
NR4 7TJ

Dear Mrs Hanson

**Study title:** Evaluation of group walking in an exercise referral scheme.  
**REC reference:** 13/SW/0246  
**Amendment number:** Substantial Amendment 2  
**Amendment date:** 13 June 2014  
**IRAS project ID:** 129089

The above amendment was reviewed at the meeting of the Sub-Committee held on 23 June 2014 by the Sub-Committee in correspondence.

### Ethical opinion

The members of the Committee taking part in the review gave a favourable ethical opinion of the amendment on the basis described in the notice of amendment form and supporting documentation.

### Approved documents

The documents reviewed and approved at the meeting were:

<i>Document</i>	<i>Version</i>	<i>Date</i>
Notice of Substantial Amendment (non-CTIMP)	Substantial Amendment 2	13 June 2014
Participant consent form [Interview]	3	13 June 2014
Participant information sheet (PIS) [Interview]	3	13 June 2014
Participant information sheet (PIS) [Taking Photos]	1	13 June 2014

A Research Ethics Committee established by the Health Research Authority

Research protocol or project proposal	4	13 June 2014
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### Membership of the Committee

The members of the Committee who took part in the review are listed on the attached sheet.

### R&D approval

All investigators and research collaborators in the NHS should notify the R&D office for the relevant NHS care organisation of this amendment and check whether it affects R&D approval of the research.

### Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

We are pleased to welcome researchers and R & D staff at our NRES committee members' training days – see details at <http://www.hra.nhs.uk/hra-training/>

13/SW/0246:	Please quote this number on all correspondence
-------------	------------------------------------------------

Yours sincerely



**Dr Denise Sheehan**  
Chair

E-mail: [nrescommittee.southwest-exeter@nhs.net](mailto:nrescommittee.southwest-exeter@nhs.net)

*Enclosures:*                      *List of names and professions of members who took part in the review*

*Copy to:*                              *Mr Paul Mills, NHS Norfolk, Research and governance*  
*Susan Steel, University of East Anglia*

**NRES Committee South West - Exeter**

**Attendance at Sub-Committee of the REC meeting on 23 June 2014**

**Committee Members:**

<i>Name</i>	<i>Profession</i>	<i>Present</i>	<i>Notes</i>
Joan Ramsay	Retired Associate Director of Nursing (Women and Children) Locum Safeguarding Children Nurse	Yes	
Dr Denise Sheehan	Consultant Oncologist	Yes	

**Also in attendance:**

<i>Name</i>	<i>Position (or reason for attending)</i>
Miss Georgina Castledine	REC Assistant

Ref: 2013GC08

**Norfolk & Suffolk Primary & Community Care Research Office**

Hosted by: South Norfolk CCG

Lakeside 400

Old Chapel Way

Broadland Business Park

Thorpe St Andrew

Norwich

NR7 0WG

**Mrs Sarah Hanson**  
University of East Anglia  
Norwich Medical School  
Norwich Norfolk  
NR4 7TJ

Tel: 01603 257283

Fax: 01603 257292

4 September 2013

E-mail: [paul.mills1@nhs.net](mailto:paul.mills1@nhs.net)

<http://www.southnorfolkccg.nhs.uk/research/about-us>

Dear Mrs Sarah Hanson

**Re: 2013GC08. Evaluation of group walking in an exercise referral scheme.**

**REC Number:** 13/SW/0246

**Chief Investigator:** Mrs Sarah Hanson, University of East Anglia

**Sponsor:** University of East Anglia

Further to your submission of the above project to the Norfolk & Suffolk Primary & Community Care Research Office your project has now been reviewed and all the mandatory research governance checks have been satisfied. I am therefore pleased to inform you on behalf of **East Coast Community Healthcare CIC** that permission (R&D approval) was granted on 4<sup>th</sup> September 2013 for your study to take place at the following sites:

- East Coast Community Healthcare CIC

You may now begin your study at the above sites. **Please note also, if you wish to extend approval to any sites other than those listed above within ECCH you must apply for this through the Norfolk & Suffolk Primary & Community Care Research Office.**

Please note the following point:

- The assignment of any patient to a particular exercise program must be made by the clinical judgement of the treating clinicians and in accordance with the normal clinical practice.

Permission is granted on the basis of the information supplied in the application form, protocol and supporting documentation, if anything subsequently comes to light that would cast doubts upon, or alter in any material way, any information contained in the original application, or a later amendment application there may be implications for continued Permission.

Permission is granted on the understanding that the study is conducted in accordance with the Research Governance Framework and the terms of REC favourable opinion.

If you have any queries regarding this or any other project please contact Paul Mills, R&D Officer, at the above address. Please note, the reference number for this study is **2013GC08** and this should be quoted on all correspondence.

Yours sincerely



Clare Symms  
**Research Governance Manager, Norfolk & Suffolk Primary & Community Care Research Office**  
*Signed on behalf of East Coast Community Healthcare CIC*

cc: Sue Steel, Sponsor Representative, University of East Anglia  
Prof. Andy Jones, Academic Supervisor, University of East Anglia  
Dr Jane Cross, Academic Supervisor, University of East Anglia  
File

#### **Conditions of ECCH Permission for Research**

Please note the following conditions of Permission - it is your responsibility to ensure that these conditions are disseminated to all parties involved in this project at the above sites.

#### **You must notify the Norfolk & Suffolk Primary & Community Care Research Office of:**

- All proposed changes to this study, whether minor or substantial
- All Serious Adverse Events relevant to the above sites
- Any deviations from the protocol or protocol breaches including any urgent safety measures that are required to be taken in order to protect research participants against any immediate hazard to their health or safety
- All incidents<sup>1</sup> or complaints in relation to the research project at the above sites
- Any Sponsor or funder initiated audits, or any regulatory inspections to be conducted in relation to this study at the above sites
- The study conclusion and/or termination of the study; where smartcards have been issued, this notification must be made on a site by site basis to allow deactivation of smartcards at that site.
- All publications relating to the study

#### **Documentation:**

You are required to maintain a site file for the study at your site. This should be maintained in accordance with ICH-GCP and will include as a minimum:

- (a) Final approved protocol
- (b) Copies of REC favourable opinion, Permission letter relevant to your site, any other approvals necessary (e.g. MHRA)
- (c) Participant information sheets, consent forms, invitation letters, posters/adverts and any other documentation given to the participant

It is your responsibility to update the information held at each site with any amendments made to this documentation and all approval letters applicable to those amendments and to ensure that all essential documents held at site are maintained, stored and archived as appropriate.

#### **Scope of permission**

- Please note that the above permission applies only to research activity on ECCH staff or premises or involving ECCH Patients and/or their tissues, data or samples.

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<sup>1</sup> An incident is defined as any event or circumstance that could have, or did, lead to harm, loss or damage and includes loss of data, confidentiality breaches, harm to researchers or staff or damage to property.



## Participant Information Sheet - interview

*Exercise referral schemes may be an effective way of improving physical activity levels, both in the short term and in the longer term. Your exercise scheme organisers are keen to know how effective their scheme is at improving your physical activity levels, both in the short term and in the longer term. They are working with us at the UEA so that we see whether the scheme helps you to become more physically active. This is a student study for a PhD programme. As you have belonged to such a scheme, we are interested in your views of whether it has been effective for your health and what it is about the scheme that has made it work for you. You are invited to take part in an interview. We want to make sure that you understand the study before you agree to take part so please read this sheet; it provides answers to some of the questions that you may have about the study.*

### What is the purpose of the study?

Physical activity is important for maintaining good health, yet as a nation we generally do not do enough exercise (walking, cycling, sport, gyms etc.). Research has shown us that exercise schemes are useful in improving physical activity levels. However, we don't have a clear picture of the characteristics of an effective programme and whether people carry on with their physical activity after the input from the instructor has finished. We need to understand this better before we promote this as a public health initiative.

### Why have I been invited?

We would value your views because you have belonged to a scheme and for this research we want to gain a better understanding of your perceptions of the scheme and whether you have found it effective for you.

### Do I have to take part?

No. It is entirely up to you whether you decide to take part or not. If you decide to take part, you are still free to withdraw at any time up until the interview takes place and without giving a reason. A decision not to take part or to withdraw will not affect your care in any way.

### What happens to me if I agree to take part in this study?

The interview will last approximately an hour and will be held at your convenience, at the Ship Resources Centre in Great Yarmouth.

### What are the possible risks and disadvantages of taking part?

We do not anticipate any disadvantages to you participating in this interview, apart from the time taken to complete the interview.

#### **Will I benefit from participation in this study?**

You will not benefit directly by being involved in this research. However, your participation is of value and will increase our knowledge of exercise schemes which is of benefit to local public health.

#### **How much time will I need to spend on the study?**

The interview will take approximately one hour. We will also provide a camera and ask you to take photographs before the interview (this is detailed in a separate information sheet). This will also take some of your time.

#### **Confidentiality: Will the information be kept confidential?**

The interview will be recorded and listened to by the research team at the UEA. It is being recorded to enable me to listen to you during the interview without being distracted by taking notes. It will also enable me to listen to it again accurately after the interview. Your views will be combined with those of others who are taking part in the research and your views will not be identifiable. Your name, or anything that could identify you will not be used at any stage in the analysis of the recordings, in any write up or published findings. All data will only stay within the research team. Audio recordings will be stored in a secure location at the UEA and destroyed no later than two years after the completion of the study. We will anonymise any photographs that you take so that it will not be possible to know who took them or to recognise faces in them.

#### **What if there is a problem?**

In the unlikely event of a problem occurring, indemnity (a form of insurance cover) will be provided by the UEA.

#### **Who has reviewed the study?**

The UEA has a Research Ethics and Governance Committee which reviews all studies undertaken by UEA staff to ensure that the interests of the participants are protected. It has also been reviewed by the NRES Committee South West – Exeter. This study has had a favourable opinion.

#### **What will happen to the results of the study?**

The results may be published in scientific journals or presented at meetings. We may like to use the photographs you have taken to illustrate the research and will ask you to consent for us to use these. You can of course decline to do so. If you wish, a summary of the study results will be sent to you after the research has been completed.

#### **How to comment or complain:**

If you have any concerns or wish to complain about any aspect of this research then please use the university's complaint procedure and your initial contact is Professor Andy Jones on [a.p.jones@uea.ac.uk](mailto:a.p.jones@uea.ac.uk) or 01603 593127. If you are unhappy with this response you should contact the head of the Norwich Medical School at UEA, on 01603 593971. If you prefer to complain through East Coast Community Health your contact is the patient liaison manager, Geraldine Adams on 01502 718666.

- *Thank you for taking the time to read this information sheet.*
- *Please keep this sheet so that you can refer to it in the future.*
- *You are free to withdraw from the study at any time without reason and it will not affect your care.*



Norwich Medical School  
University of East Anglia  
Norwich  
NR4 7TJ  
Phone: 07824512500

[s.hanson@uea.ac.uk](mailto:s.hanson@uea.ac.uk)

## Consent Form - interview

*Research has shown us that exercise schemes are useful in improving physical activity levels. However, we don't have a clear picture of the characteristics of an effective programme and we need to understand this better before we promote schemes such as this one as a public health initiative.*

*As you have belonged to an exercise scheme we are interested in your views of whether you consider that belonging to a group has been effective for your health and what it is about belonging to the group that has made it work for you.*

Please initial boxes

- |                                                                                                                                                                                                                                                                                                                                 |                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| 1. I confirm that I have read and understand the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have these answered satisfactorily.                                                                                                                           | <input type="checkbox"/> |
| 2. I agree for the interview to be audio taped.                                                                                                                                                                                                                                                                                 | <input type="checkbox"/> |
| 3. I understand that relevant sections of my medical notes and data collected during the study, may be looked at by individuals from the UEA, from regulatory authorities or from the NHS trust, where it is relevant to my taking part in this research. I give permission for these individuals to have access to my records. | <input type="checkbox"/> |
| 4. I understand that I can withdraw at any stage without my care being compromised.                                                                                                                                                                                                                                             | <input type="checkbox"/> |
| 5. I agree to take part in the above study.                                                                                                                                                                                                                                                                                     | <input type="checkbox"/> |
| 6. I have a copy of the letter and participant information sheet so that I know who to contact at the UEA if I have any questions or concerns.                                                                                                                                                                                  | <input type="checkbox"/> |
| 7. OPTIONAL: I agree for the photographs that I have taken to be used by the research team at the UEA in publications and presentations so long as individual people cannot be recognised from the photographs and that I will not be identified as the photographer.                                                           | <input type="checkbox"/> |

Name (please print)

Signature

Date

.....

Please tick the box if you would like to receive details of the results of the study

[admin: Participant identifier number ..... This sheet to be kept with Justine Hopkins until the end of the study and then destroyed]

Consent form Interview (V3) 13<sup>th</sup> June 2014

## Participant Information Sheet – Taking photographs



*Thank you for your interest in being interviewed as part of my study about walking groups. Before the interview we would also like you to take some photographs and wanted you to have this sheet to refer to for extra information. You have also been given an information sheet about the interview itself.*

### **Why am I being asked to take photographs?**

We would like to have a better understanding of how your everyday life and where you live might influence your decisions about walking.

Photography is widely used in social research to give participants the opportunity to raise issues in more detail. Rather than simply asking questions at the interview about what influences you being physically active, we hope that your photographs will have captured images that represent barriers to and opportunities for you walking. We hope by doing this to get a better understanding of the influences on you walking as the photographs are entirely from your perspective.

### **What do you want me to do?**

Using the camera we have lent you, we would like you to build a set of images of what you see as being helpful and unhelpful to you in terms walking and we will use these as the basis of our discussion when we meet for the interview.

We would like you to take two sets of photographs.

Firstly we would like you take photographs of the area where you live and your daily life and routine to show what is helpful and also unhelpful to you walking in your everyday life and being physical activity in general. For the second set, we would also like you to take photographs during your time with the walking group that show what is good and not good about belonging to a walking group.

Participant information sheet – Taking photographs (V1) 13<sup>th</sup> June 2014

There is no limit to the amount of photographs you might take but if you would like a guide anything from 10-25 should give a good representation that we can base our discussion in the interview on.

### **What happens after I have taken the photographs?**

After you have taken the photographs, please give the camera back to me when we meet at the next walking group. We will then arrange a time for the interview to suit you in the next 1-2 weeks. I will develop them and give you a copy when we meet.

### **What care should I take when taking photographs?**

There are currently no legal restrictions on taking photos in public places, including photos of people in public places (House of Lords debate, 16 July 2008), but we would like you to take other people's wishes for privacy into consideration. We would ask that you use 'common sense' when taking the photographs and avoid taking photos of children and taking close-ups of people's faces.

In terms of the actual photographs we are not looking for professional or 'artistic' images it is more that we would like you to capture an image for us to discuss. For your typical photograph album you might tend to take photographs that represent happy, positive images. For this research we would encourage you to take photographs that represent positive, supportive features and also those features than inhibit walking or are more negative – please feel free to photograph 'the good, the bad and the ugly!'

### **What will happen to the photographs that I have taken?**

We may like to use the photographs in publications and presentations to illustrate the points we are making about our research findings. We will anonymise who has taken the photographs and faces will be blurred out to be unrecognisable. We will ask you to consent to this and you can choose not to do so. Any photos you provide to us will be treated confidentially and stored securely in the same way as the other research data we receive from you.

### **Do I have to take part? What if I change my mind? Who do I contact if I want to complain?**

You are under no obligation to take photographs, to be interviewed or to take part in the research. Not taking part will not affect the care you are given by the physical activity team. You can withdraw from the study at any time. If you have any concerns or wish to complain about any aspect of this research then please use the university's complaint procedure and your initial contact is Professor Andy Jones on [a.p.jones@uea.ac.uk](mailto:a.p.jones@uea.ac.uk) or 01603 593127. If you prefer to complain through East Coast Community Health your contact is the patient liaison manager, Geraldine Adams on 01502 718666.

*Thank you once again for taking part in this research. The evidence gained will enable us to better understand physical activity and health in your neighbourhood and how we promote physical activities in the future.*

Participant information sheet – Taking photographs (V1) 13<sup>th</sup> June 2014

**Questioning framework for Great Yarmouth study using photo elicitation methods**

**Objective**

To explore the reasons why people join and belong to walking groups as opposed to walking alone and thereby contribute to the evidence base on walking in a group format as a public health intervention.

**Research aims**

To understand the experience of participants in walking groups and their views on how this differs to walking alone in their neighbourhood

To explore whether walking with a group has influenced walking alone habits

To explore whether group walking has influenced other health behaviours

To give a better understanding of how to promote walking groups

1. **Explanation and clarification:** Can I check that you are still happy to consent to the interview today. Recorded so that I can listen to you properly today. I may take some notes to remind myself of something or to ask you a further question later on in the interview. Do you have any questions before we start?
2. **Stage 1 - exploration of photographs** (barriers and facilitators to walking alone and walking within a group. Explore neighbourhood barriers and facilitators to walking)

**Preamble** Thank you for taking the time to take the photos and to come to the interview today. How did you get on – any problems with taking them?  
I wondered if you could take a few minutes to have a look through them by yourself and arrange them into groups that make sense to you and then talk them through with me. When you are ready ... (Give TIME for this)

**Prompts:** Can you talk me through why you have grouped them that way? What do you see as the difference between the groups of photographs? Tell me a little more about that one? What does this image represent to you? Why did you choose to take that one?

Now that we have had a chance to talk them through and for you to think about the photos a bit more what do you think your photographs say about your walking in everyday life? What do you think they say about group walking?

Final Q about how you took the photos – did you have a method for taking the photographs? (Prompt did you carry the camera for the week and take random shots / did you have a plan for what you wanted them to show)

**3. Interview questions (may have already be covered in full or part)**

Do you remember the reasons why an exercise referral was thought to be helpful to your health?

After your initial meeting can you remember why you chose to join a WG rather than the other options?

Can you remember what you hoped to achieve? (NB explore reasons other than health)

Did you have any concerns about joining – how far were these met when you joined the WG?

Has the WG altered your everyday walking habits– If yes, can you give examples?

Is walking different to group walking to you?

How do you feel after a group walk – immediately and later?

How would you summarise what the walking group has meant to you?  
Is there anything else you would like to add that you think I haven't covered?  
Which of the photos would be most important to you to represent how you feel about group and non-group walking

---

Background information

Name

Age

Work history (in brief, to establish occupational level of physical activity)

Access to car

Type of transport and for what purpose



## Appendix IV Research governance, study information and consent (Process evaluation study)

Sarah Hanson  
Norwich Medical School  
University of East Anglia  
NR4 7TJ

Research & Enterprise Services  
West Office (Science Building)  
University of East Anglia  
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Norwich, NR4 7TJ

Telephone: +44 (0) 1603 591720  
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Web: [www.uea.ac.uk/researchandenterprise](http://www.uea.ac.uk/researchandenterprise)

28 July 2014

Dear Sarah,

**Project Title: A process evaluation of the Walking Champion initiative in Norwich.**  
**Reference: 2013/2014 - 63**

The amendments to your above proposal have been considered by the Chair of the Faculty Research Ethics Committee and we can confirm that your proposal has been approved.

Please could you ensure that any further amendments to either the protocol or documents submitted are notified to us in advance and also that any adverse events which occur during your project are reported to the Committee. Please could you also arrange to send us a report once your project is completed.

The Committee would like to wish you good luck with your project.

Yours sincerely,



Yvonne Kirkham  
Project Officer

cc Andy Jones

## Participant Information Sheet

*As you know Walking Champions is a new walking initiative aimed at encouraging more people to make local journeys with an overall goal of improving their health and mental wellbeing.*

*Norwich City Council is keen to evaluate how the scheme was implemented and is working with us at the University of East Anglia to undertake a piece of academic research to help us to understand walking schemes better.*

*As you have had involvement with the scheme, we are very interested in your views. For this, we would like to interview you on two occasions to get your viewpoint and want to make sure that you understand and are happy about the study before you agree to take part. Please read this sheet which we hope will answer to some of the questions that you may have about the study and your part in it.*

### **What is the purpose of the study?**

Walking groups may be effective in encouraging people to walk more but as yet we don't know the best way to set these up for them to be most effective in the short and longer term. By talking to people involved in the scheme we are aiming to understand these issues better.

### **Why have I been invited?**

We would value your participation because you have been involved with Walking Champions and we would like to better understand your views of the work that you have been involved with. This will help us to develop the programme for the future.

### **Do I have to take part?**

No. It is absolutely up to you whether you decide to take part or not. If you decide to take part, you are still free to drop out at any time without giving a reason.

### **What happens to me if I agree to take part in this study?**

There will be two interviews, each of which will last approximately an hour and will be held at a publicly owned building convenient to you. The first interview will be at the beginning of the scheme's implementation and the second around nine months later.

### **What are the possible risks and disadvantages of taking part?**

We do not anticipate any disadvantages to you participating in these interviews, apart from the time taken to complete them which we appreciate.

**Will I benefit from participation in this study?**

You will not benefit directly by being involved in this research. However, your participation and your views are of value and will help to increase our knowledge of walking schemes which is of benefit to local public health.

**How much time will I need to spend on the study?**

Each interview will take about one hour.

**Confidentiality: Will the information be kept confidential?**

The interview will be voice recorded and listened to by the research team at the UEA. It is being recorded to enable the researcher to listen to you during the interview without being distracted by taking notes. It will also enable the researcher to listen to it again accurately after the interview. Your name won't be used at any stage in the analysis of the recordings or in any write up or published findings. Your views will be combined with those of others who are taking part in the research. Roles will be identified and described and we are likely to illustrate points of view with quotations. All quotations will be anonymised and assigned to the job role only. What you say will be typed into a computer at the UEA and then the voice recording destroyed. The typed up transcripts will only be seen by the UEA research team and will be stored in a secure location at the UEA and destroyed ten years after the completion of the study. Please be assured that all information about you and that you provide will remain confidential.

**What if there is a problem?**

In the unlikely event of a problem occurring, indemnity (a form of insurance cover) will be provided by the UEA.

**Who has reviewed the study?**

The UEA has a Research Ethics and Governance Committee which reviews all studies undertaken by UEA staff to ensure that the interests of the participants are protected. This study has had a favourable opinion from the Faculty of Medical Health (FMH) Ethics committee.

**What will happen to the results of the study?**

The results will be used as part of a PhD thesis and may be published in scientific journals, or presented at meetings. We may publish quotations or summary opinions but we will not publish names.

We would like to give you a summary of the study results after the research has been completed.

**Who do I contact if I have any concerns?**

Should you have any concerns, please contact Sarah Hanson whose contact details are on the front page. Should you have any further concerns that cannot be answered by Sarah, please contact Professor Andy Jones on 01603 593127 or [a.p.jones@uea.ac.uk](mailto:a.p.jones@uea.ac.uk). If this has not answered your concerns please contact the head of Norwich Medical school on 01603 593971 or Norwich City council on 0344 980 3333

*Thank you for taking the time to read this information sheet.*

*Please keep this sheet so that you can refer to it in the future.*



Norwich Medical School  
University of East Anglia  
Norwich  
NR4 7TJ

Dear {study Participant},

**Would you be willing to be interviewed about your involvement with Walking Champions?**

I am a postgraduate researcher at the Norwich Medical School at the UEA and am researching walking groups as a way of improving people's health, both in the short and longer term. This part of the research, working with Norwich City Council, involves an evaluation of the implementation of the Walking Champions scheme. Your name has been suggested to me because you have been involved with the scheme and I am most interested in your views and would like to meet with you and discuss the scheme.

There is no obligation to take part and before you decide whether or not to be interviewed, I wanted to provide you with information about why the research is being done and what it would involve for you.

Please take time to read the attached **Participant Information Sheet** carefully. If you require further information please contact me (see below) and I will be very happy to discuss any questions that you may have.

If, after reading the Participant Information Sheet, you decide that you would like to take part, please could you return the enclosed **consent form** in the stamp addressed envelope. I will then contact you to set up an interview time and location that best suits you. Please remember that you are free to change your mind and withdraw from the study at any point.

If you have any questions about taking part, please call me on 01603 593320 or by email at [s.hanson@uea.ac.uk](mailto:s.hanson@uea.ac.uk).

With thanks,

Sarah Hanson  
Post graduate researcher  
Norwich Medical School

Sarah Hanson Letter to invite to interview (V1) 7th May 2014



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### Consent Form – Interview for Walking Champions evaluation

Please initial boxes

- |                                                                                                                                                                                                                      |                          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| 1. I confirm that I have read and understand the information sheet for <u>the</u> above study. I have had the opportunity to consider the <u>information</u> , ask questions and have these answered satisfactorily. | <input type="checkbox"/> |
| 2. I agree for the interview to be audio taped.                                                                                                                                                                      | <input type="checkbox"/> |
| 3. I understand that data collected during the study may be looked at by <u>individuals</u> from the UEA.                                                                                                            | <input type="checkbox"/> |
| 4. I understand that I am under no obligation to take part and <u>can</u> withdraw at any stage.                                                                                                                     | <input type="checkbox"/> |
| 5. I agree to take part in the above study.                                                                                                                                                                          | <input type="checkbox"/> |
| 6. I have a copy of the letter and participant information sheet so that I know who to contact at the UEA if I have any questions or concerns.                                                                       | <input type="checkbox"/> |

Name (please print)

Signature

Date

.....

Telephone number for contact

.....

Sarah Hanson Consent form Interview walking champions (V1) 9th May 2014

Questioning framework for Walking Champions process evaluation  
– scheme organisers (stage 1)

**1. Just want to double check that you are happy to be interviewed and you have signed the consent form. This is a study about the process of the Walking Champions scheme – going to ask about your role within it, the origins and history of it, the design, implementation and ongoing project management. You may or may not have been involved in it all and it is about answering from your perspective. I may take some notes to refer to and am recording it so that I can listen again later.**

**2. Role**

Broad job role and how WC fitted within this.

Ongoing responsibilities for WC. (refer to Annex 1 governance structure)

**3. Origins and history of the programme and underlying rationale**

Did you have a role in the origins of the scheme? (if no skip to next section)

What guidance was given within which to frame the bid?

What evidence was used to **develop the bid**?

How did this fit with other programmes and initiatives e.g. environmental 'greening' of the city, sustainable transport (section A2), Cycling City Ambition Grant (B3), sports and leisure development team – how does this fit with PH more generally (and the relatively new concept of PH back with LA)

National policies –what are they? How did you see this fitting with them?

**4. Project design**

Were you involved with the design? (if no skip to next section)

Can you talk me through the evidence that was available to you in **designing the scheme**?

How far was any available evidence helpful? Was there anything else that could have helped?

To your knowledge was this based on a particular theoretical framework? (Prompt e.g Foresight / NICE, Walking and Cycling; physical activity and the environment, CVD programmes, Obesity, Community based approaches)

What resources were available in developing the bid? (including people and DoH)

What (and who) else would have been helpful to you in retrospect?

The bid includes a map showing poor/v poor health (census 2011) and Obesity (Great Norwich cycling network 2006-2008) (Annex 8). How far was the location for the walks driven by SE /Obesity / Poor health or other PA information?

How much control did you feel you had in designing the programme? (push v pull)

Have there been other influences on the design of the scheme (positive and tensions) that you didn't anticipate?

How far do you see this as a 'package' of interventions to target poor health – what else would be in that package? (this may be a more effective question at wave 2 when can reflect back)

What are the intended outcomes (as you see it)?

## 5. Project implementation

How do you see the 4 strands (Living Streets / Intelligent Health / Lift share / Active Norfolk) working together (synergies and challenges)?

What have been the effects of running the 4 projects simultaneously as you see it?

Who have you had to involve / work with to implement the scheme?

How has that worked out / what has been helpful and unhelpful

What would you do differently in retrospect?

Resources - Are there any other resources you have had to utilise that you didn't anticipate?

Issues - Can you talk through any other difficulties you have had setting up the scheme? (people and process) (may have already been answered in barriers and facilitators)

Do you think there have been other outside influences that have influenced the implementation of the scheme? (context: economic, political e.g. recession / local restructuring that has influenced the implementation of the scheme at this moment in time)

Partnership working - The bid mentions utilising Health trainers, GP referrals and community engagement officers for recruitment purposes.

Who are you working with?

How has this worked out in practice? (is there anyone that I could speak to within this group to understand this better)

Who do you see as essential partners (formal and informal)?

What are the implications of partnership working for reporting?

Has partnership working led to compromises (+ve and -ve) – examples?

To what extent might they take away from the original aims?

Are there things you would have liked to have done in an 'ideal world' / are there compromises you have had to make? (Budget, people etc.) when implementing the scheme (we are 2- 3 months post start)

## 6. Project management and ongoing evaluation

Are you involved in the management of the project? Can you describe your role?

Steering group - Alignment of walk interventions with existing commissioned schemes (project steering group from Norwich CCG and Norfolk Public Health) (B2). How is this working in practice (people and process)? Tensions between agendas?

Have you met yet / had formal discussions to evaluate progress? Two / three months in (specify) have these evaluations to date led to adjustments to the scheme?

What sort of processes are in place to ensure that the programme is on target? ) robust and sustainable in the longer term)?

What support has there been from central government (DoH)?

How have/ will results be fed back to the DoH? How practicable has this been?

## 7. Other aims / the future

Exit routes (Fit together, Ramblers, Park Run) (Annex 7) – how do you see this developing in practice? How will you establish the evidence for this?

How far do you see this as a community led project?

Were there / are there other outcomes that you might also like to see coming from this scheme other than those stated in the bid?



How will the evidence from this scheme be used to inform future practice? (nationally and locally)

**Any other points you would like to make, that you feel we haven't covered?**

Questions for Stage 2 (scheme organisers etc.)

### **Your Role in the WC programme**

What are your key responsibilities at this stage?  
Have they changed in any way since the beginning of the scheme? If so, how?

### **The programme**

What did you see were the objectives at the beginning of the programme?  
Do you think these changed over the past year? If yes a) In what way? b) Why have they changed?

Has the scheme run the way you thought it would at the outset?  
If different – a) in what way is it different? b) What drove the changes?

What have been the particular barriers and facilitators that have influenced the way the programme has run?

Within the scheme you tried some new Initiatives during the year (e.g. the new style brochure, offering of small grants, running alongside park run) to generate new interest in the health walks

- a) How were these ideas generated?
- b) How successful have they been from your point of view?
- c) Will the learning from this be shared? If so, how.

What have been the most / least successful elements of the programme from your point of view?  
Have any of these surprised you? If so, which ones and why

### **Evaluation of the programme**

How has the programme been evaluated?  
Are you aware of the outcomes and, if so, what have they been?

### **Contribution to evidence base and policy**

Do you think your scheme has been able to make a contribution to the evidence base / policy for physical activity / obesity / community physical activity schemes  
If yes a) what are the contributions and b) What do you consider to be the key learnings that would be useful to others? (to inform policy and local practice)  
c) How can / will you disseminate your findings?

### **Community based programme**

Were there target groups of people you wanted to attend the walks or volunteer as walk champions? If so who were they?

To what extent did they attend the walks or volunteer as walk champions?

For any you didn't reach, why do you think this was?

What learning from this could be passed onto other community based health initiatives?

### **Sustainability**

From your point of view, is the scheme sustainable into the future?  
If no, can you explain why not?  
If yes, in what guise will it take, now that the DoH funding has stopped?

**Any other points you would like to make, that you feel we haven't covered?**

Questioning framework for Walking Champions process evaluation  
Volunteers (Stage 1: Summer 2014)

**Consent form and pre-amble**

We would like to better understand the Walk Norwich scheme from your point of view as a walking champion. When did you start with the scheme?

**Training and objectives**

Can you explain the training you had to me as you remember it  
What is your understanding of how Walk Norwich came into being  
Can you remember the objectives of the scheme as told to you then

**Motivation for volunteering and for walking**

What motivated you personally to be involved with the scheme  
Why a walking scheme – what does it mean to you  
Roughly how often do you volunteer with this / WfH / other volunteering  
What keeps you motivated to volunteer with the scheme

**Community champions?**

I don't need to know where you live but would you say the walks are roughly within the community in which you live or do you travel to the walks

**Ongoing involvement**

How are you finding it so far – from your point of view how is it working  
Are there aspects that are working well  
Are there aspects that could be improved  
Has there been any ongoing briefing or training from the scheme's organisers since you started

**Anything else to add that we haven't covered?**

Questioning framework for Walking Champions process evaluation  
Volunteers (Stage 2: Summer 2015 )

**Pre-amble**

We would like to better understand:

The Walk Norwich scheme from your point of view as a walking champion.

What you have personally gained from volunteering with the scheme.

(For those that are interviewed for a second time, how have their views changed now that have volunteered for longer)

**Motivation**

Roughly how often do you volunteer with the Walk Norwich scheme (and /or WfH?) (Is this more or less than when you started – if so what has affected this?)

Why did you volunteer for a walking scheme – what does it mean to you personally? (for those not interviewed at stage 1)

Do you do other volunteering? If so can you explain it and what is different about volunteering for this scheme. (for those not interviewed at stage 1)

What motivates you personally to continue to be involved with the scheme?

What do you think the benefits are to you / what have you gained from personally from your involvement? (Examples of social networks, transferable skills)

**Community champions**

What do you see as the role of a community walking champion? (for those not interviewed at stage 1)

How well is it working overall? (Prompt: Examples of successes of the scheme at this stage? What do you think could be improved?)

How far do you think the scheme has brought people from Heartsease, Mile Cross and Earlham as intended (or other communities) into the scheme?

How do people find out about the scheme – do you have any examples?

What keeps walkers in / what do they like / what do you think they don't like?

For those interviewed a second time, how has the scheme adapted since the beginning and why do you think it has changed this way – examples both positive and negative.

**Anything else to add?**

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