An Evaluation of the Green Prescription Programme in Co. Donegal

By

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Abstract

Thesis Title: An Evaluation of the "Green Prescription" Pilot Programme in Co. Donegal

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There is a need for innovative, effective, and sustainable initiatives aimed at increasing the physical activity levels of the general population, particularly those who are least active (Hellénius 2011; DoHC, HSE 2009; Durstine et al. 2013). The purpose of this study was to evaluate an adapted model of exercise on prescription – called the *Green Prescription Programme* - that was piloted in a number of communities in Co. Donegal during 2011 / 2012. The *Green Prescription Programme* was delivered in partnership between local community groups, local health professionals and the Health Service Executive. The programme involved the referral of suitable patients from health professionals onto a supported community-based walking programme. Community participants could also self-refer onto the programme.

This evaluation aimed to (a) determine the feasibility and acceptability of implementing the programme; (b) determine the impacts of programme participation on the participants; (c) to determine the impact of the programme on the referring health professionals and community groups involved; and also aimed to (d) make recommendations for the future development of the programme. A mixed-methods evaluation design was used. Quantitative data included pre- and post-programme measurements of participants'   (i) physical activity levels, (ii) mental wellbeing, (iii) blood pressure, (iv) resting heart rate, (v) waist circumference and (vi) body mass index. Qualitative data was derived from interviews and focus groups with programme participants *and* those involved in the implementation and delivery of the programme. Interviews were also conducted with a small selection of "key stakeholders and experts".

Key results suggested the programme was acceptable to all those involved and was generally feasible to implement, however some areas of the programme were in need of further development. Programme participants, health professionals and community group leaders self-reported many benefits of programme engagement. Determination of the quantitative impact of the programme was limited by the small number of participants completing post-programme measurements (n=19). However comparison of averaged pre-post-programme scores for these 19 participants showed a significant ($p = 0.001$) decrease in daily sitting time score from pre- (*Mdn* = 240 mins/day, *IQR* = 180) to post-programme (*Mdn* = 180 mins/day, *IQR* = 180); a significant ($p = .020$) increase in mental wellbeing scores from pre- *(M* = 52.5, *SD* = 9.7)* to post-programme (*M* = 56.4, *SD* = 8), and a significant ($p = .022$) reduction in mean systolic blood pressure from pre- (*M* = 134.6, *SD* = 19.2) to post-programme (*M* = 126.1, *SD* = 18.1).

In conclusion this evaluation suggests the Green Prescription programme has merit and is a potentially viable model for larger-scale rollout. However it is imperative that further outcome evaluation is conducted utilising an experimental evaluation design and a larger sample of participants to produce generalisable results.

Key Words: exercise referral; exercise on prescription; green prescription; walking programme

List of Abbreviations

USDHHS	United States Department of Health and Human Services
HRB	Health Research Board
DoH	Department of Health
DoHC	Department of Health and Children
ERS	Exercise Referral Scheme
EOP	Exercise on Prescription
GAPA	Global Advocacy for Physical Activity
LCDP(s)	Local and Community Development Programme(s)
SLAN	Survey of Lifestyles, Attitudes and Nutrition
SCT	Social Cognitive Theory
TTM	Transtheoretical Model
SoC	Stages of Change
HBM	Health Belief Model
GP(s)	General Practitioner(s)
RCT	Randomised Controlled Trial
NICE	National Institute for Health and Clinical Excellence
HSE	Health Service Executive
PAR-Q	Physical Activity Readiness Questionnaire
BHF	British Heart Foundation
NOO	National Obesity Observatory (UK)
NHS	National Health Service (UK)
BMI	Body Mass Index
IPAQ	International Physical Activity Questionnaire
IPAQ-SF	International Physical Activity Questionnaire-Short From
MET	Metabolic Equivalent
WEMWBS	Warwick Edinburgh Mental Wellbeing Scale
ICGP	Irish College of General Practitioners
SD	Standard Deviation
M	Mean
Mdn	Median
IQR	Interquartile Range
CI	Confidence Interval
BP	Blood Pressure
SBP	Systolic Blood Pressure
DBP	Diastolic Blood Pressure
RHR	Resting Heart Rate

BPM	Beats per Minute
WC	Waist Circumference
GSF	Green Step Facilitator
No.	Number
DSPC	Donegal Sports Partnership Coordinator
LSP(s)	Local Sports Partnership(s)

Glossary of Agencies / Groups

Health Service Executive (HSE)

The HSE is a large organisation of over 100,000 people, whose job is to run all of the public health services in Ireland. The HSE provides health and social services to everyone living in Ireland. The HSE's services are delivered in hospitals, health facilities and in communities across the country. (For more information refer to www.HSE.ie).

Donegal Sports Partnership (DSP) and Local Sports Partnerships (LSPs)

The DSP is one of a network of 30 LSPs throughout Ireland. The key aim of LSPs is to increase participation in recreational sport within communities and to ensure that local resources are used to best effect. Key tasks that the partnerships are involved in include:

- The creation and implementation of plans for long term local sports development
- The establishment of a sustainable structure to assist all those involved in local sports development to face the associated challenges -e.g. recruiting and managing volunteers, quality training, etc
- Delivery of projects and programmes particularly for target groups - Establishing networks at local level and liaising with existing initiatives

LSPs are often comprised of partners such as Local Authorities, Vocational Education Committees, Health Sector, sports bodies and other community and voluntary organisations. (For more information refer to

http://www.irishsportscouncil.ie/Participation/Local_Sports_Partnerships/About_LSPs/).

The Donegal Sports Partnership Coordinator **(DSPC)** is Myles Sweeney.

Coillte

Coillte is a commercial company operating in forestry, land based businesses, renewable energy and panel products. The company employs approximately 1,000 people in Ireland and was established in 1988. Coillte is Ireland's largest landowner and owns over 445,000 hectares of land, about 7% of the land cover of Ireland. Coillte has a recreation policy and provides the public with access to many of its forests. According to its website over 18 million visitors visit Coillte forest each year. Coillte states it has ten forest parks and more than 150 recreation sites that the public can access. Coillte also owns the longest trail network in Ireland. (For more information refer to http://www.coillte.ie/aboutcoillte/about_coillte/).

Rural Recreation Programme in Co. Donegal

The Rural Recreation Programme was developed to work with communities, landowners, local and national agencies to support the development, maintenance and promotion of trail based outdoor recreation opportunities in County Donegal. The programme is directly co-funded by the Department of Community, Environment and Local Government and Fáilte Ireland. Within Donegal the Rural Recreation Programme is coordinated by the Rural Recreation Officer. (For more information refer to http://www.dldc.eu/site/rural-recreation/).

The Quality of Life Programme

The Quality of Life Programme is a self–management programme for people with chronic conditions in Co. Donegal. The programme is provided by the HSE. The programme is provided free of charge over six weekly sessions each lasting 2 hours per week. The programme aims to provide participants with the practical skills around self-care and support them to play a more active part in managing their own condition.

Local and Community Development Programmes (LCDPs)

LCDPs aim to tackle poverty and social exclusion through partnership and engagement between Government, its agencies, volunteer organisations and people in disadvantaged communities. LCDPs work from community development principles and methods. The programmes have the following goals:

- Promote awareness, knowledge and uptake of a wide range of statutory, voluntary and community services
- Increase access to formal and informal educational, recreational and cultural development activities and resources
- Increase peoples' work readiness and employment prospects
- Promote active engagement with policy, practice and decision making processes on matters affecting local communities

LCDPs are delivered primarily by Local Development Companies on behalf of the Department of the Environment, Community and Local Government.

(For more information refer to

https://www.pobal.ie/FundingProgrammes/LocalCommunityDevelopmentProgramme/Pages/Home.aspx).

Donegal Road Safety Group

The Donegal Road Safety Working Group was founded in 1997 and included members of Donegal County Council (including the Fire Service), An Garda Síochána, North West Health Board and the National Safety Council. The main aim of the Road Safety Working group is to reduce the number of deaths and casualties on the roads. The group works in partnership to address road safety issues. Some of its specific activities include Road Safety Enforcement; implementation of Road Safety Programmes in schools and Road Safety Public Awareness campaigns. (For more information refer to http://www.donegalcoco.ie/services/roadstransport/RoadSafety/drswg.htm).

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Chapter One: Introduction

1.1 Background, Purpose & Rationale for the Study

Physical inactivity has been described, with good reason, as "*the greatest public health problem of our time*" (Sallis 2009). Sedentary lifestyle and physical inactivity is linked with some of the most common modern day health problems including overweight / obesity, coronary heart disease, stroke, type 2 diabetes, some cancers, dementia and depression; and is associated with an increased risk of overall mortality (Fox and Hillsdon 2007; Hellénius and Sundberg 2011). Conversely the health promoting effects of regular physical activity have been well documented, and include a lower risk of all-cause mortality, a reduction in cardiovascular risk factors, diabetes, some cancers, depression, osteoporosis, a reduction in the risk of falls and fall-related injuries and an improvement in cognitive function and perceived quality of life (USDHHS 1996; Nocon et al. 2007; Physical Activity Guidelines Advisory Committee 2008; The National Guidelines on Physical Activity in Ireland 2011). Physical activity is considered a key intervention for the prevention of primary and secondary diseases (Durstine et al. 2013). Furthermore an increase in physical activity is believed to be one of the measures with the potential to have the greatest positive impact on the health of the population and could dramatically reduce public healthcare costs (Swedish National Institute of Public Health 2010).

Increasing the physical activity levels of the population has been and remains a core objective of numerous past and present governmental health policies and strategies including: The National Health Strategy 2001 (DoHC 2001); The Report of the National Taskforce on Obesity 2005 (DoHC 2005); The National Recreation Policy for Young People 2007 (DoHC 2007); HSE Framework for Action on Obesity 2008-2012 (HSE 2008[a]); The National Guidelines on Physical Activity for Ireland (DoHC, HSE 2009); Smarter Travel – A Sustainable transport future 2009-2020 (Department of Transport 2009); The National Cardiovascular Health Policy 2010-2019 (DoHC 2010); Healthy Ireland: A Framework for Improved Health and Wellbeing (2013-2015) (DoH 2013). While there has been some evidence of an improvement in the physical activity levels of the Irish population in recent years, recent research indicates the majority (69.9%) of the population still remain insufficiently active (Irish Sports Council 2011).

There is a need for innovative, effective, cost-effective, and sustainable initiatives aimed at increasing the physical activity levels of the general population, particularly those who are least active (Hellénius 2011; DoHC, HSE 2009). There is also a need for initiatives targeted at individuals who already have lifestyle-related chronic diseases. A chronic disease is a prolonged illness that "*does not often resolve spontaneously, and is rarely cured completely. Chronic diseases are complex and varied in terms of their nature, [and] how they are caused…. While some chronic diseases make large contributions to premature death, others contribute more to disability*" (Australian Government Department of Health 2012). Examples of chronic diseases include heart disease, stroke and diabetes (WHO 2014[a]). Importantly research indicates these conditions are "*drastically improved*" when physical activity is used as part of the disease management plan, and furthermore physical activity can improve the quality of life and potentially extend the lifespan of individuals with chronic disease (Durstine et al. 2013). It has been argued that physical activity interventions "*should be viewed as a medication*" in the treatment of chronic disease "*as is the case for many chronic diseases, the health benefits of physical activity and exercise surpass those of conventional medications*" (Durstine et al. 2013, p. 9).

The primary health care setting[1] has been consistently identified as a promising setting to implement and initiate physical activity interventions (Elley et al. 2003[a]; Rose et al. 2007; Global Advocacy for Physical Activity (GAPA) 2011). Notably the recent GAPA publication identified physical activity promotion in primary care settings (in conjunction with referral to community-based supports) as one of "*seven best investments for physical activity which are supported by good evidence of effectiveness and that … have worldwide applicability*" (GAPA 2011). There are numerous reasons why the primary care setting is considered so promising for physical activity promotion. Firstly primary health care professionals are known to have access to large proportions of the population, including frequent access to those with chronic diseases (GAPA 2011; Rose et al. 2007; Elley et al. 2003[a]).

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[1] Primary care has been defined as "*first contact, continuous, comprehensive and co-ordinated care provided to individuals and populations*" (HRB 2006). Primary care includes "*a range of services designed to keep people well, from promotion of health and screening for disease to assessment, diagnosis, treatment and rehabilitation as well as personal social services*" (DoHC 2001). Within Ireland primary care is predominantly provided by general practitioners, but is also provided by other health professionals such as nurses and therapists, within the community setting (HRB 2006).

People also expect to receive health messages within primary care, and furthermore respect the advice provided by their primary health care professional (Rose et al. 2007; Swinburn et al. 1998).

> Doctors and health care professionals are important influencers of patient behaviour and key initiators of NCD [non communicable disease] prevention actions within the health care system and can influence large proportions of the population. (GAPA 2011)

In particular it has been argued that interdisciplinary models, whereby primary care professionals work in conjunction with allied health professionals within the community setting (e.g. the referral of suitable patients by a health care professional to a community-based partner for a physical activity programme), may offer a promising means of providing effective primary care initiated physical activity interventions (Tulloch et al. 2006; Stange et al. 2002). Common examples of these interdisciplinary models include exercise referral schemes (ERS) and some versions of "exercise on prescription" (EOP) programmes (including "green prescription" programmes). While each of these approaches share similarities they also vary, to some degree, in their design / structure.

Figure 1.1 (p. 6) provides a brief overview of the general structure of ERS and EOP programmes. From Figure 1.1 it can be seen that EOP programmes refer to programmes that include *a personalised written physical activity prescription written by a primary care professional* to patients who need to increase their physical activity to improve their health. This differs from the ERS whereby it is an *exercise professional who devises the physical activity plan* rather than the primary health care professional. In spite of this the terms "ERS" and "EOP programmes" are often used interchangeably within the literature. (Refer to *Table 2.4: Models of Physical Activity Interventions Implemented in the Primary Care Setting*, p. 48 for a more detailed outline of the structure of ERS and EOP programmes).

A large amount of research had been conducted to determine the effectiveness of ERS and EOP programmes over the last two decades or so. A substantial amount of primary research studies on ERS and EOP programmes have produced some promising findings in terms the ability of these programmes to effect increases in physical activity levels and effect other health related improvements, such as reductions in indicators of

disease risk and improvements in mental wellbeing and quality of life (Taylor et al. 1998; Williams et al. 2007; Hanson et al. 2013; Stevens et al. 1998; Issacs et al. 2007; Wilson 2009; Yerrell 2008; Lee et al. 2009; Murphy et al. 2012; Wormald et al. 2006; Wormald and Ingle 2004; SØrensen et al. 2010; Kallings 2008; Leijon et al. 2008; Elley et al. 2003[b]; Lawton et al. 2008). However some systematic reviews of ERS studies have not produced such positive findings. Most notably two key systematic reviews on ERS studies in the UK raised concerns about the ability of these schemes to effect long-term changes in physical activity levels and deliver value for money (NICE 2006[a&b]; Pavey et al. 2011[a&b]). However it is crucial to note that both of these reviews (NICE 2006[a&b]; Pavey et al. 2011[a&b]) focussed primarily on the effectiveness of ERS models rather than EOP models (refer to Figure 1.1 p. 6). Most notably neither of the systematic reviews (NICE 2006[a&b]; Pavey et al. 2011[a&b]) included studies on Green Prescription programmes (a type of New-Zealand-based EOP programme of particular applicability to the current study). This is important as EOP programmes and Green Prescription programmes have consistently produced positive findings of effectiveness within primary research studies (Swinburn et al. 1998; Elley et al. 2003[b]; Lawtwon et al. 2008; Kerse et al. 2005; SØrensen et al. 2010; Kallings 2008; Leijon et al. 2008). Thus it is possible if EOP programmes and Green Prescription programme studies had been included in the systematic reviews by Pavey et al. (2011[a&b]) and NICE (2006[a&b]) more positive findings could have been produced, particularly in support of EOP programme models.

Within an Irish context an ERS was piloted in a small number of selected counties in 2000 and also between 2003-2008; and was later rolled out on a nationwide scale in 2009 (DOHC 2003; National Nutrition Surveillance Centre 2011). Within this programme suitable patients are referred from their primary health care professional to a specially trained exercise professional based in a leisure facility for a 12-week tailored exercise programme. However to date this national programme has not been evaluated (National Nutrition Surveillance Centre 2011); emphasising the need for research into the impact of such initiatives in an Irish context.

The purpose of this study "*An evaluation of the Green Prescription Pilot programme in Co. Donegal*" was to conduct an evaluation of an adapted model of EOP that was being piloted in Co. Donegal, Ireland. The Green Prescription programme in Co.

Donegal was an adaptation of a well-established New Zealand-based EOP model (Swinburn et al. 1998; Elley et al. 2003[a&b]; Elley et al. 2007). Refer to Figure 1.1 (P. 6) for a brief overview of the Green Prescription pilot programme, and what it entails in comparison to ERS models and other EOP programme models. The Green Prescription Programme involved local health professionals providing written advice to a patient (who matches certain referral criteria) to be physically active as part of their health management plan. Patients were then referred to a Green Prescription support worker who encouraged and supported the referred participants while they attended a 12-week community-based walking programme. Individuals could also self-refer onto the programme by contacting the support worker directly. For the first four weeks of the programme participants attended the "Green Steps", which consisted of group-based, tailored, low-level physical activity that was facilitated by trained instructors, in a community-based indoor setting. After the initial four weeks participants graduated on to outdoor Community Walks. The Community Walks were led by trained volunteer walking leaders, and were designed to be graded in intensity to meet different abilities. The Community Walks were open to, and actively encouraged the participation of, all members of the community who need to increase their physical activity levels as well as the graduating Green Steps participants.

Figure 1-1: Overview and Comparison of the Structure of ERS's, EOP Programmes and The Green Prescription Pilot Programme

Exercise Referral Scheme (ERS)

●Primary HCP identifies suitable patient in need of increasing their PA levels
●Patient referred to a 3rd party for a tailored programme of PA

●Usually patient is referred to qualified PA instructor based within a leisure centre, but alternatively patient may be referred to a structured walking programme

●PA instructor responsible for assessing participants PA needs, development of exercise plan, participant support & ongoing monitoring & supervision throughout.

Exercise on Prescription Programme (EOP)

●Primary HCP identifies suitable patient in need of increasing their PA levels
●Primary HCP assesses patients PA needs & provides patient with PA advice & information & a written exercise prescription
●The written exercise prescription outlines the exercise plan and PA goals

●Patients may (but not always) also referred to PA programmes within the community setting. e.g. leisure centre-based programmes or walking groups to avail of physical activity support

●In some versions of EOP (e.g. New-Zealand based Green Prescription Programmes) patients are also referred to a PA support worker. The PA support worker provides PA counselling to patients & provides ongoing telephone support to help patients meet physical activity goals.

The Green Prescription Pilot Programme

●Primary HCP identifies suitable patient in need of increasing their PA levels
●HCP explains the 12-week programme to patients. If patient agrees to participate the HCP issues them with a Green Prescription slip (written exercise prescription) & asks patient to sign a contract of commitment to the programme
●Patient referred to Green Prescription SW.

●SW encourages referred participant to attend the 12-week programme, & to set & meet PA goals.
●SW provides participant with ongoing support throughout the 12-week programme (through telephone & face-to-face contact).
●Individuals can also self-refer to the programme by contacting the SW worker directly.

12-Week PA Programme consists of:

4-Week Green Steps Programme
●Indoor, group-based, low-level PA programme (chair-based exercises & walking activities)
●Use of motivational prompts, e.g. step counters
●Facilitated by trained PA instructors
●Based in the community setting

8-Week Community Walk Programe
●Led by trained volunteer Walking Leaders
●Graded in intensity to meet different abilities
●Open to any member of the community who wants to increase their PA, as well as participants who have completed the Green Steps Programme
●Designed to run 4 times throughout the year & participants are encouraged to continue attending the walks to maintain PA levels

Legend
HCP: Health Care Professional; PA: Physical activity; SW: Support Worker

The Green Prescription programme was developed and implemented using a social ecological (community-level) approach. The programme was delivered in partnership between the Health Service Executive (HSE), local community groups and local health professionals. The Health Promotion Department within the HSE was the lead agency for the programme. Local community organisations (which were usually local volunteer organisations or Local and Community Development Programmes (LCDPs) were responsible for the development and sustainment of the Green Prescription programme within their community, with support provided by the HSE. Local primary care health professionals were responsible for the referral of suitable patients onto the community-based programme.

The Green Prescription Programme was the first of its kind in Ireland (i.e. it was first time an EOP programme, and specifically a "green prescription programme", was piloted in Ireland), and thus the *feasibility and acceptability* of implementing this programme, and the potential *impact* of this programme, was unknown. This warranted the need for a comprehensive evaluation of the pilot Green Prescription Programme in Co. Donegal. This evaluation study took place over a 16-month period from January 2012 to April 2013. It tracked the programme as it was rolled out into 8 different urban and rural communities across Donegal in 3 separate phases during that period. This evaluation study had four primary objectives:

- To determine the feasibility and acceptability of implementing the programme using both qualitative and quantitative inquiry
- To determine the impact of the programme on the participants
- To determine the impact of the programme participation on the referring health professionals and community groups involved
- To make recommendations on the future development of the Green Prescription and Community Walks programme

1.2 Methodology Overview

An evaluation framework that consisted of four separate stages was used to guide the evaluation study (O'Hara et al. 2013; Rajaraman et al. 2012). The first two stages "*Stage 1: Synthesis of Evidence*" and "*Stage 2: Environmental and Situational Analysis*" involved conducting a review of the evidence base for primary care initiated

physical activity interventions (particularly the evidence base for ERS and EOP programmes), providing a profile of physical inactivity in Ireland and examining how governmental policies and strategies align with the aims and objectives of the Green Prescription programme. The results of both these stages are presented in Chapter 2 and Chapter 3. The aforementioned four primary objectives of this study were achieved during the third and fourth stages of the evaluation. The third stage, *"Stage 3: Mixed-Methods Research with the Target Audience"* involved using both quantitative and qualitative inquiry with the target audience (the target audience included both programme participants and those involved in implementing and delivering the intervention) to determine the feasibility, acceptability and impact of the programme. Quantitative data collection included pre and post measures of programme participants physical activity levels, mental wellbeing, weight, height, body mass index, waist circumference, blood pressure and resting heart rate to determine the impact of the programme on participants. Qualitative data collection consisted of interviews and focus groups with the target audience to determine the feasibility and acceptability of implementing the programme, and also to determine the impact of the programme. The fourth stage of the evaluation, "*Stage 4: Consultation with Key Stakeholders and Experts",* involved consulting with key experts and stakeholders to gather information regarding the perceived acceptability, feasibility and impact of the programme particularly in terms of wider scale programme rollout. Perceived opportunities to enhance the programme model were also discussed during this fourth stage.

Qualitative data was analysed and reported using thematic analysis. Quantitative data was analysed using both Microsoft Excel 2010 and the Statistical Package for Social Sciences (SPSS) Version 20 for Windows, to produce both descriptive and inferential statistics.

1.3 Outline of Thesis Structure

This thesis has a 7-chapter structure. A brief outline of the 6 remaining chapters is presented below.

Chapter Two consists of a literature review relating to physical activity, physical inactivity, the relationship between physical activity and health, and the current profile of physical activity in Ireland. Chapter Two also outlines the theories and concepts

relating to physical activity and physical activity promotion. Chapter Two also reviews the evidence base for primary care initiated physical activity interventions, with a focus on ERS and EOP intervention models. Finally Chapter Two reviews the evidence for the adapted intervention model proposed by the Green Prescription Programme.

Chapter Three describes the Green Prescription intervention model that is the subject of this evaluation. Chapter Three also outlines how current governmental policies and strategies align with the aims and objectives of the Green Prescription Programme.

Chapter Four describes the research methodology and the methods used to conduct this evaluation study. The aims and objectives of the study are outlined, a justification for the mixed methods evaluation design used is provided and the evaluation framework is outlined. A detailed description of each of the qualitative and quantitative methods employed is provided including the recruitment procedure, the instruments used, the various processes involved in data collection and the methods of analysis. Ethical considerations relevant to the evaluation are also described.

Chapter Five details the results from the evaluation. First the results from "*Stage 3: Mixed-Methods Research with the Target Audience*" of the evaluation are presented. Quantitative results are presented first, followed by qualitative results. Following this the qualitative results from "*Stage 4: Consultation with Key Stakeholders and Experts*" of the evaluation are presented.

Chapter Six discusses the key results presented in Chapter Five, and also relates these results to the research presented in Chapter Two.

Chapter Seven provides a brief recap of the aim of this study; the findings of the literature review, the methodology used to conduct this study, and the key results of this study in relation to the programme objectives, and will make recommendations for the future development of the Green Prescription programme. In addition this chapter will outline the strengths and limitations of this study, and finally it will recommend areas for future research.

1.4 The Candidates Role in the Green Prescription Programme

The candidate applied to complete a research masters based on the evaluation of the pilot Green Prescription programme in Co. Donegal through an open application process as advertised on the Institute of Technology Sligo's website in November 2011. The candidate was subsequently successful in the interview and application process for this postgraduate research opportunity; and initiated the research masters in January 2012.

The candidate's role in the Green Prescription Programme was: to objectively evaluate the programme; to produce an evaluation report based on the results of the evaluation of the Green Prescription Programme which was submitted to HSE West (Stirrat et al. 2014); and to complete and submit this thesis to fulfil the requirements of the Master of Science degree. The candidate did not have any responsibility for any operational aspects of the Green Prescription Programme.

Chapter 2: Literature Review

2.1 Introduction

This chapter is divided into four main parts. The first part "Part One: Setting the Context", defines what physical activity is; briefly discusses the relationship between physical activity, health and obesity; and provides a profile of physical activity in Ireland. The second part of this literature review "Part Two: Understanding Physical Activity Behaviour and How to Influence it", describes some of the common theories, concepts and perspectives that have been developed with an aim to explain physical activity behaviour and how to influence it. This part of the literature review also briefly refers to the limited evidence-base for the use of theory in practice, and highlights the limited use of theory in primary care initiated physical activity interventions, particularly within exercise referral schemes (ERS) and "exercise on prescription" (EOP) programmes. The third part of this literature review "Part Three: Primary Care Initiated Physical Activity Levels Interventions" provides a rationale for using primary care as a setting to implement or initiate physical activity interventions. This part of the literature review also describes the most common physical activity interventions implemented or initiated within primary care, namely brief advice, "brief interventions" and motivational interviewing interventions, ERS and EOP programmes. The evidence base for each of these interventions is then reviewed in detail, with a particular focus on ERS and EOP programmes. The researcher concludes this chapter with "Part Four: Towards an Adapted Model" by discussing the potential for an adapted model of physical activity intervention based on the evidence gleaned from the literature review.

2.2 Part One: Setting the Context

2.2.1 Defining Physical Activity, Exercise & Physical Inactivity

Physical activity is defined as "*any bodily movement produced by skeletal muscles that results in energy expenditure*" above a basal level (basal energy expenditure refers to the minimum amount of energy required to sustain life) (Capersen et al. 1985, p. 126; USDHHS 2008). Exercise has been defined as "*a subset of physical activity that is planned, structured, and repetitive and has as a final or an intermediate objective the improvement or maintenance of physical fitness*" (Capersen et al. 1985, p. 126). Intensity is a very common method of categorising physical activity and exercise, and

refers to the amount of effort required by the body to perform an activity or exercise. Physical activity can be categorised as "light", "moderate" and "vigorous" intensity (refer to Table 2-1). As shown in Table ? light physical activity is activity that requires little effort, does not cause an increase in breathing rate and/or heart rate, and does not cause sweating. An example of light intensity physical activity would be casual or light walking. Moderate-intensity physical activity (refer to Table 2-1) is activity or exercise which requires a moderate amount of effort, raises the breathing rate (but an individual could still hold a conversation) and noticeably accelerates heart rate. An example of moderate-intensity activity or exercise is brisk walking. Vigorous-intensity physical activity (refer to Table 2-1) refers to activity or exercise which requires a large amount of effort, causes rapid breathing (an individual could not say more than a few words without pausing for breath) and substantially increases heart rate. An example of vigorous-intensity activity or exercise is running (WHO 2014[b]; CDC 2011; Northern Ireland Chest Heart & Stroke 2014; Department of Health, The Government of the Hong Kong Special Administrative Region 2013; USDHHS 1999; Peterborough County-City Health Unit 2012).

Table 2-1: Overview of Physical Activity Intensity Levels (adapted from Northern Ireland Chest Heart & Stroke 2014; Department of Health, The Government of the Hong Kong Special Administrative Region 2013; USDHHS 1999; Peterborough County-City Health Unit 2012)

	How an Individual Will Feel	Examples
Light Physical Activity	Requires little effort Breathing as normal - can talk and sing Not sweating Heart beating at resting pace	Light walking, stretching, push-ups against a wall, sit-ups, leisurely sports (e.g. table tennis), golf (using a cart), bicycling less than 5 miles / hour
Moderate Physical Activity	Requires medium effort Heart Beating Faster Slight sweating Raises breathing rate - can still talk but cannot sing	Fast walking, cycling, hiking, pushing a lawnmower, doubles tennis, basketball, water aerobics, bicycling 5-9 miles per hour
Vigorous Physical Activity	Requires a lot of effort Heart beating faster Sweating a lot Rapid breathing - cannot talk or sing	Jogging, swimming fast, bicycling more than 10 miles / hour, bicycling up hills, football, rugby, singles tennis, aerobics, martial arts

The *Physical Activity Guidelines for Americans Advisory Committee Report* provided four classifications of weekly physical activity. According to these classifications an individual can be described as "inactive", "low active", "medium active" or "high active" depending on how much time they spend engaging in aerobic physical activity per week, and the intensity at which they engage in it at (USDHHS 2008). Refer to Table 2-2 for a general outline of how physical activity levels are

classified according to the number of minutes individuals spend engaged in moderate physical activity per week.

Table 2-2: Classification of Physical Activity Levels According to the Number of Minutes Individuals Spend Engaged in Moderate Physical Activities per Week

Classification of Physical Activity Levels	Minutes Spent Engaged in Moderate Physical Activity / Week
Inactive / Sedentary	0 (no activity beyond baseline activities of daily living)
Low Active	<150
Medium Active	150-300
High Active	>300

As referred to in Table 2-2 a person is classified as "inactive" if they engage in no activity beyond the baseline activities of daily living, and thus do not engage in activities that increase energy expenditure "*substantially above the resting level*" – this is also referred to as sedentariness (USDHHS 2008; Pate et al. 2008). Low active refers to engaging in some physical activity beyond baseline but fewer than 150 minutes of moderate-intensity physical activity a week or the equivalent amount of vigorous-intensity activity. Medium active refers to engaging in 150-300 minutes of moderate intensity physical activity per week (or the equivalent amount of vigorous-intensity activity). Finally high active refers to engaging in more than 300 minutes of moderate-intensity physical activity a week (or the equivalent amount of vigorous-intensity activity) (USDHHS 2008). (One minute of vigorous physical activity is approximately equivalent to two minutes of moderate activity (CDC 2011).

2.2.2 Physical Activity & Public Health

Physical activity levels are an important determinant of health status, with regular physical activity found to have a protective effect against a wide range of conditions. Evidence suggests that physically active adults have lower rates of all-cause mortality, coronary heart disease, high blood pressure, stroke, type 2 diabetes, metabolic syndrome, colon cancer, breast cancer, have healthier body mass and composition, lower rates of depression, lower risk of mental health problems and musculoskeletal conditions, better perceived quality of life, and better sleep quality when compared to less physically active adults (Nocon et al. 2007; Physical Activity Guidelines Advisory Committee 2008; Department of Health 2011).

There is evidence of a dose-response relationship[2] between physical activity and health, with increasing health benefits associated with increasing levels of physical activity. Figure 2.1 shows the dose response curve between physical activity and disease risk as reported in "*At least five a week, A report from the Chief Medical Officer*" (Department of Health, Physical Activity, Health Improvement and Prevention 2004). (Note: the blue line represents the risk of disease). From Figure 2.1 it can be seen that the risk of disease is highest for those who are inactive, with disease risk consistently decreasing with increasing physical activity levels (i.e. the higher the level of physical activity the lower the risk of disease). According to the Department of Health, Physical Activity, Health Improvement and Prevention (2004) "*this curvilinear dose-response generally holds for coronary heart disease and type 2 diabetes .... Curves for other diseases will become more apparent as the volume of evidence increases*".
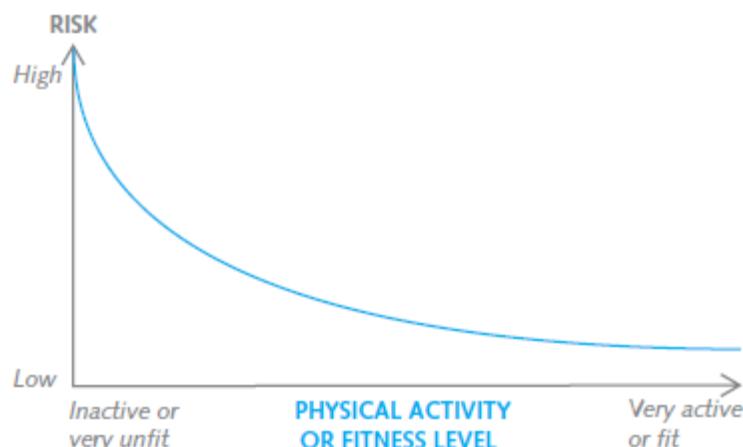
Figure 2.1: Dose-Response Curve between Physical Activity Levels and Disease Risk. Source: Department of Health, Physical Activity, Health Improvement and Prevention (2004, p. 17)

Research suggests that most health benefits occur with at least 150 minutes of moderate physical activity per week with additional health benefits occurring with increasing levels of physical activity (Physical Activity Guidelines Advisory Committee 2008). Research has not identified an upper limit of physical activity above which there are no additional health benefits. Furthermore there is consistent evidence to suggest many additional health benefits, such as a continuing decline in the relative risk of premature

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[2] A general definition of dose response relationship is "*the relationship between the amount of exposure [dose] to a substance and the resulting changes in body function or health (response)*" (Agency for Toxic Substances and Disease Registry 2009). In terms of physical activity the dose response relationship has been defined by the Physical Activity Guidelines Advisory Committee (2008) as "*the relation between the dose of physical activity and the health or fitness outcome of interest.... "dose" refers to the amount of physical activity performed by the subject or participants. The total dose, or amount, is determined by the three components of activity: frequency, duration, and intensity*."

death, can be achieved when individuals are moderately active for over 300 minutes per week (Physical Activity Guidelines Advisory Committee 2008).

The current physical activity guidelines for adults (aged 19 – 64 years) in Ireland and the United Kingdom is "*at least 30 minutes a day of moderate activity on 5 days a week (or 150 minutes a week)*" or at least 75 minutes of vigorous activity per week spread throughout the week (DoH&C, HSE 2009; Department of Health, Physical Activity, Health Improvement and Protection 2011). As such the current guidelines recommend adults should be at least medium active (refer to section 2.2.1). Included in the guidelines is the recommendation that adults should engage in activities that increase muscular strength and endurance on at least two days of the week. The current physical activity guidelines for older adults (aged 65 years and over) is at least 30 minutes a day of moderate intensity activity on five days a week, or 150 minutes a week, with a focus on aerobic activity, muscle-strengthening and balance and coordination on at least two days a week (DoH&C, HSE 2009; Department of Health, Physical Activity, Health Improvement and Protection 2011).

It should be noted that evidence suggests that engaging in less than the recommended amounts of physical activity still has the potential to be health enhancing, with low levels of physical activity preferable to complete inactivity (Wen et al. 2011). Wen et al. (2011) conducted a prospective cohort study with an average follow-up of 8.05 years. This study involved 416175 individuals, who were categorised as "inactive", "low" active, "medium" active, "high active" and "very high active" according to self-reported physical activity levels. This study found that individuals who engaged in just 15 minutes of moderate intensity physical activity per day (classified as "low" active) experienced significantly greater health benefits than those in the "inactive" category. Specifically 15 minutes of moderate intensity physical activity per day (or 90 minutes per week) resulted in "*a reduction in all-cause mortality and all-cancer mortality and extended an individual's lifespan for an average of 3 years*" (Wen et al. 2011, p. 1251). It is acknowledged that this study has a number of limitations that must be taken into account when considering the results. Firstly this was an observational study, thus the researchers could not attribute recorded health outcomes entirely to physical activity levels. Additionally data collection relied on self-report questionnaires and thus there is a risk that the results of this study may have been

affected by social desirability bias (where respondents provide socially desirable answers to survey questions). However the large study population size and the lengthy period of follow-up (ranging up to 12 years for many participants) strengthen the results of this study. Based on the reported results this study suggests moving adults from the inactive category to the low active category still has the potential to produce positive health benefits, and should be encouraged.

2.2.3 Physical Inactivity & Public Health

> At this point in time, I believe physical inactivity has become the greatest public health problem of our time and finding a way to get patients more active is absolutely critical to improving health and longevity in the 21st century (Sallis 2009, p. 3)

Physical inactivity is now widely recognised as a contributory factor to the increasing prevalence of chronic diseases and disorders in the developed world. A lack of physical activity and sedentariness is associated with an increased risk of overall mortality, coronary heart disease, stroke, diabetes, some cancers and some mental health problems such as depression (Fox and Hillsdon 2007). Physical inactivity has been identified as the fourth leading risk factor for deaths worldwide -accounting for 6% of deaths globally (WHO 2010).

In an Irish context a high proportion of the population are insufficiently active. The Irish Sports Council conducts regular survey research, termed the Irish Sports Monitor, to determine the physical activity levels of the Irish population. The survey samples are designed to be representative of the Irish population aged 16 years and over and thus involve large sample sizes. In 2011 the Irish Sports Council surveyed 8, 749 individuals for the Irish Sports Monitor 2011 report. As represented in Figure 2.2, findings of the Irish Sports Monitor 2011 showed that 12.8% of the population were sedentary; 57.2% did some physical activity but not enough to meet the recommended guidelines; while only 30% engaged in a sufficient amount of activity to meet the recommended guidelines. However there is some evidence of an improvement in the physical activity levels of the Irish population, as the same research conducted in 2009 (refer to Figure 2.2) (n=9, 767) reported only 26% of the population were meeting recommended physical activity guidelines, while 15.5% were sedentary (Irish Sport Council 2011). It is worth considering however that as the Irish Sports Council's research relied on self-report measures of physical activity it is likely the true number of sedentary individuals

may in fact be even higher, the reason being self-report methods are widely known to be associated with social desirability bias (the tendency of individuals to respond in a way which is consistent with social norms and beliefs) and thus need to be interpreted with caution (Taber et al. 2009).
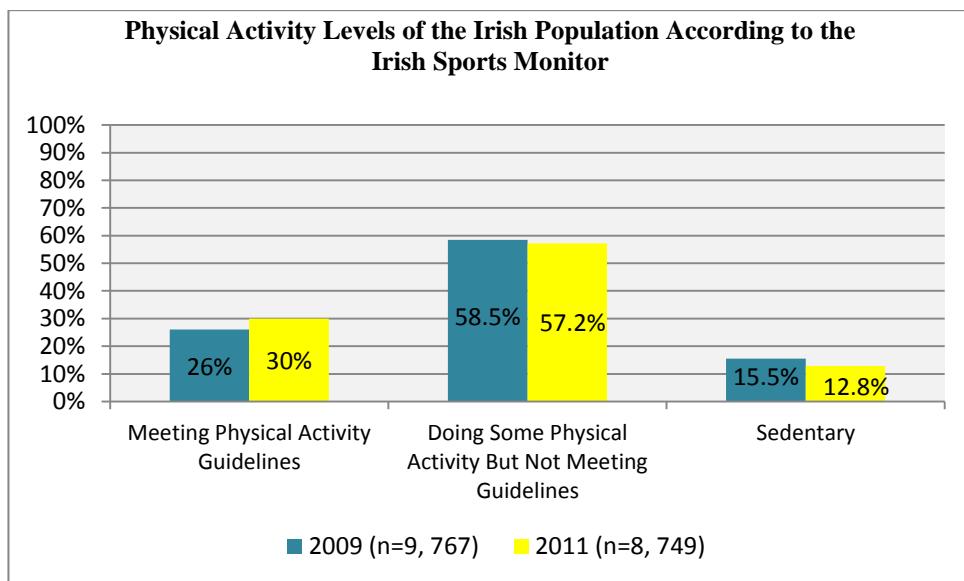
Figure 2.2: Physical Activity Levels of the Irish Population in 2009 and 2011 According to the Irish Sports Monitor (Irish Sports Council 2011)

Another positive finding from the Irish Sports Monitor 2011 research (in addition to the decrease in the number of sedentary respondents and the increase in the number of respondents meeting the physical activity guidelines) was that 60.5% of those surveyed reported that they would like to increase their physical activity levels (Irish Sports Council 2011).

In general, in Ireland, peoples physical activity levels tend to decrease as people get older, with levels of sedentariness usually highest amongst older adults (aged 65 years and over) (Morgan et al. 2008; IUNA 2011). This was clearly demonstrated by findings from the 2007 Irish National Survey of Lifestyle, Attitudes and Nutrition (SLAN)[3] (Morgan et al. 2008) which collected data on the physical activity levels of respondents (n=10, 364). The International Physical Activity Questionnaire (IPAQ) was used to

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[3] The National Survey of Lifestyle, Attitudes and Nutrition (SLAN) in Ireland (2007) was conducted using face-to-face interviews with adults aged 18 years and older at their home addresses. The sample was designed to be representative of the general population and involved 10, 364 respondents. The overall aim of SLAN was to provide nationally representative data on the general health, health behaviours and health service use of adults living in Ireland (Morgan et al. 2008).

collect data on respondents physical activity levels (refer to page 124 for a detailed description of the IPAQ). As shown in Figure 2.3 findings from SLAN 2007 revealed that the most physically active age group were those aged 18-29 years, while the least physically active age group were those aged 65 years and over (Morgan et al. 2008).
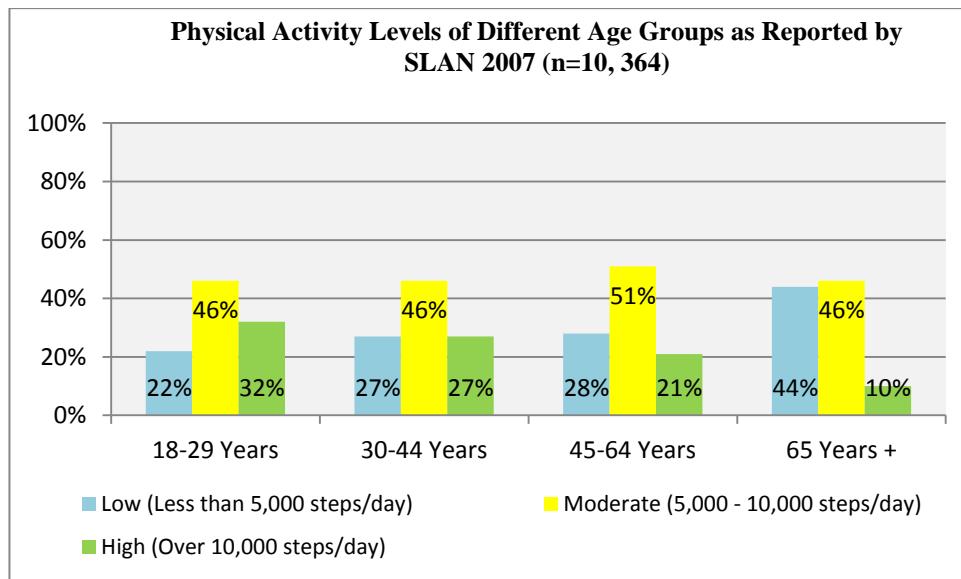
Figure 2.3: Physical Activity Levels of Different Age Groups in Ireland (based on findings reported by SLAN 2007 (Morgan et al. 2008))

Considering that Ireland has an increasingly aging population it is likely that that the number of people with a sedentary lifestyle will continue to rise (the number of older people aged 65 and older has increased by 14.4% in Ireland since 2006 (Central Statistics Office 2012); and government projections indicate that by 2031, one in five Irish people will be 65 years or older (Barrett and Bergin 2005)). Thus it is likely the levels of conditions associated with sedentary lifestyle will steadily increase as a direct consequence.

Other research findings relating to physical activity in Ireland include that females are generally less likely than males to be highly physically active (refer to Figure 2.4). As depicted in Figure 2.4 32% of male respondents in SLAN (2007) reported being "highly" physically active in comparison to only 16% of female respondents. Furthermore 31% of female respondents reported "low" levels of physical activity in comparison to 26% of males (Morgan et al. 2008). In relation to the effect of social class grouping on physical activity levels, research indicates those in lower socio-economic groups and lower income groups are less likely to be physically active than

those in higher socio-economic groups (Irish Sports Council 2011; Institute of Public Health 2011; Sun et al. 2011).

Comparision of Physical Activity Levels by Gender as Reported by SLAN 2007 (n=10, 364)
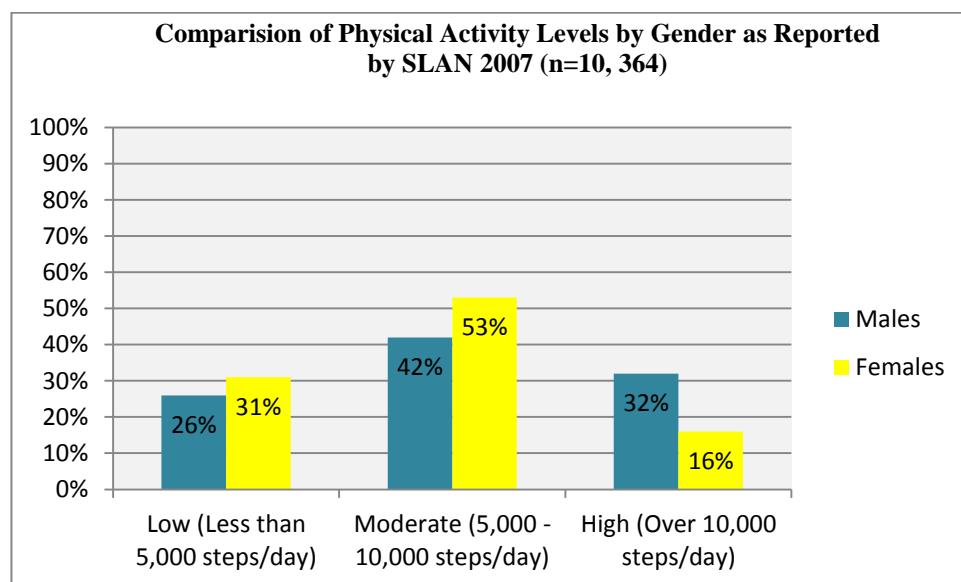
Figure 2.4: Comparison of Physical Activity Levels by Gender in Ireland (based on the findings reported by SLAN 2007 (Morgan et al. 2008)

Although very limited research exists in an Irish context, a recent study on the effect of physical inactivity on the major non-communicable diseases[4] world-wide crudely estimated that physically inactivity contributes to 8.8% of the burden of coronary heart disease; 10.9% of the burden of Type 2 diabetes; 15.2% of the burden of breast cancer; 15.7% of the burden of colon cancer and 14.2% of the burden of all-cause mortality in Ireland at present (Lee et al. 2012).

Interestingly accumulating research has also found sitting time to be "*an independent risk factor*" for the development of health risk factors (Laskowski 2012[a]; Hamilton et al. 2007; Katzmarzyk 2010). Evidence suggests the more time people spend sitting down per day, the more likely they are to develop metabolic risk factors such as high blood glucose levels, high cholesterol, high blood lipid levels, high blood pressure and high waist circumference measurements - irrespective of whether or not they are achieving the recommended amount of physical activity (Laskowski 2012[a]; Healy et al. 2008; Owen et al. 2009). Prospective studies have also shown a dose-response

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[4] Non-communicable diseases are defined as "*a medical condition or disease that is … non-infectious and non-transmissible among people*" (Kim and Oh 2013). Non-communicable diseases are the primary causes of global death and disease burden. The four main types of non-communicable diseases are cardiovascular disease, cancer, chronic lung disease, and diabetes (Kim and Oh 2013).

relationship between sitting time and cardiovascular mortality and overall mortality (Hellėnius 2011). In light of this it has been acknowledged that "*limiting inactivity is probably as important as promoting physical activity*" and thus there have been calls for recommendations regarding reduced sitting time to be added to the current physical activity guidelines (Hellėnius 2011).

However it must be acknowledged the evidence supporting an independent effect of sedentary behaviour on health is relatively new (in comparison to the evidence for the beneficial effect of regular moderate to vigorous activity) (Hamilton et al. 2007; Katzmarzyk 2010). Furthermore while the evidence supporting the independent effects of sedentary behaviour on health is convincing, much of the evidence has come from observational and cross-sectional studies (Hamilton et al. 2007; Katzmarzyk 2010). Thus there remains a pressing need for rigorous interventional studies to more conclusively test for specific negative metabolic effects of prolonged sitting, and to compare and contrast the potential benefits of daily non-exercise physical activity (e.g. standing, cooking, cleaning, fidgeting) and structured exercise / physical activity (Hamilton et al. 2007). The following excerpt from a review article by Katzmarzyk (2010, p.2723) also highlights the range of other questions that remain to be answered by future research on the independent health effects of sedentary behaviour on health:

> The evidence for an independent effect of sedentary behaviour on health is both intriguing and convincing; however, several important questions remain. What are the dose-response relationships between sedentary behaviours and various health outcomes? Are health risks equivalent across all types of sedentary behaviours? Do reductions in sedentary behaviour result in changes in health parameters or disease incidence? What types of interventions to reduce sedentary behaviour are feasible from a public health standpoint? Given the ubiquitous nature of sedentary behaviours, what activities could feasibly be used to replace them? What are the distinct pathophysiological mechanisms linking sedentary behaviour and health? These questions will provide a fertile area of research in the coming years. At present, the available evidence suggests that it is prudent to recommend that time spent in sedentary behaviours be minimized; however, optimal levels of sedentary behaviour to recommend are not currently known.

Presumably due to these considerable gaps in the evidence base no sitting time recommendations have not been formally adopted into Irish national physical activity guidelines (DoH&C, HSE 2009). However as recommended by Katzmarzyk (2010) the physical activity guidelines within the UK *do* stipulate that all adults and older adults should "*minimise the amount of time spent being sedentary (sitting) for extended periods*" (Department of Health, Physical Activity, Health Improvement and Protection

2011). "*The Start Active, Stay Active*" report on physical activity from the four home countries' Chief Medical Officers clarifies why *specific* recommendations for daily sitting time are not incorporated in the UK guidelines as a result of the immature evidence base:

> While there is accumulating evidence suggesting that sedentary time predicts a number of adverse health outcomes in adults, the available data are not sufficient to suggest a specific quantitative recommendation on daily sedentary time for health,…. Based on the current evidence [however], reducing total sedentary time and breaking up extended periods of sitting is strongly recommended. (Department of Health, Physical Activity, Health Improvement and Protection 2011, p.34).

2.2.4 Obesity & Public Health

Overweight and obesity is defined as "abnormal or excessive fat accumulation that may impair health" (WHO 2014[c]). In particular excessive fat that is accumulated in the abdominal region (e.g. subcutaneous abdominal fat and/or visceral fat) is associated with the highest disease risk (Ross and Janssen 2007, p.177). According to the World Health Organisation the level of obesity worldwide has more than doubled since 1980. Overweight and obesity is recognised as "a major health concern" in Ireland (Oireachtas Library & Research Service 2011). SLAN 2007 found that 50% of respondents (n=9,735) were either overweight or obese (refer to Figure 2.5). Evidence from other research studies suggest that 61% of the population fall into the combined overweight and obese category (IUNA 2011; Tully et al. 2008).
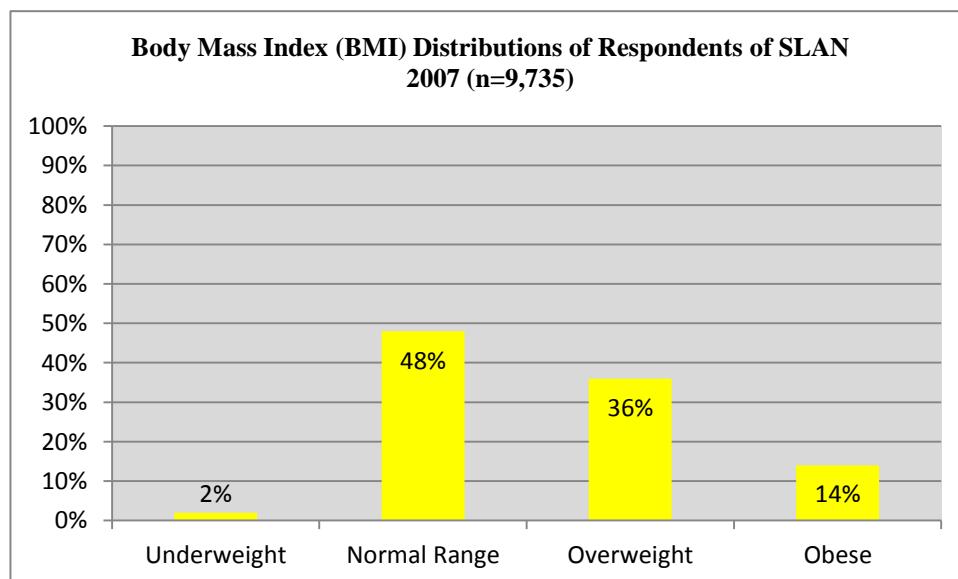
Figure 2.5: Self-Reported BMI Distributions of Respondents of SLAN 2007 (n=9,735) (Morgan et al. 2008)

Evidence also suggests that overweight and obesity is a *steadily growing problem* as consecutive SLAN reports have found the numbers of self-reported overweight to be increasing with each survey - from 31% in 1998 to 33% in 2002 to 36% in 2007 (Morgan et al. 2008). Similarly the 2011 National Adult Nutrition Survey found "*the prevalence of obesity in 18-64 year old Irish adults has increased significantly*" since 1990 to 2011 from 8% to 26% in men, and from 13% to 21% in women (IUNA 2011). Again considering both the SLAN survey and the National Adult Nutrition Survey rely on self-report measures it is possible that the actual numbers of overweight and obesity are even higher as people are known to underestimate their true weight (Oireachtas Library & Research Service 2011). This has the potential to result in severe consequences not only from a population health perspective but also from a governmental health expenditure perspective considering that overweight and obesity, similarly to physical inactivity, are acknowledged as a major risk factor for cardiovascular diseases, diabetes, musculoskeletal disorders, and some cancers and are among the leading risks for global deaths (WHO 2014[c]). In fact the costs of deaths attributable to obesity alone in Ireland have been estimated to be in the region of €1.13 to €4 billion euro per annum (Safefood 2012; National Taskforce on Obesity 2005). Considering the broad scale of these estimated costs of obesity there is evidently a need for further research so the true costs of obesity in Ireland can be discerned.

2.2.5 Physical Activity & Obesity

Although there are many determinants of overweight and obesity, trends suggest that the rising prevalence of obesity is, at least in part, attributable to the increase in sedentary lifestyles (National Taskforce on Obesity 2005). However the relationship between physical activity and obesity is not straightforward. While physical activity can be used as a treatment for obesity, much of the research has found increasing physical activity levels alone only has a small effect on the reduction of body weight, and needs to be combined with diet changes to produce substantial weight reduction (Fox and Hillsdon 2007; Wareham et al. 2005; Laskowski 2012[a]). That is not to say physical activity interventions cannot be used independent of diet restriction to induce weight loss, however high volumes of physical activity are usually needed in this instance (Ross and Janssen 2007, p. 186). For example, it has being suggested that adults would need to engage in 60 minutes of moderate-intensity physical activity daily to effectively reduce body weight and abdominal obesity through physical activity alone (Ross and

Janssen 2007, p.188). While abdominal obesity and visceral fat can be reduced through physical activity in absence of weight loss, the evidence clearly suggests the greatest reductions in abdominal obesity and visceral fat occurs when weight loss also occurs (Ross and Janiszewski 2008). Similarly although regular physical activity is thought to be essential for the prevention of weight gain over a lifespan, research suggests that the amount of physical activity needed to prevent weight gain in the absence of calorie restriction, is likely to be double the current recommended weekly guidelines for physical activity (Lee et al. 2010). The current consensus is that adults would need to engage in 60-90 minutes of leisure-time physical each day to prevent age-related weight gain (Ross and Janssen, p.185). However regular physical activity has been shown to have "*significant beneficial effects*" on cardiovascular and metabolic risk factors independent of weight loss (Laskowski 2012[a]). Thus regular physical activity can have a protective effect against health risk factors commonly associated with overweightness and obesity, even if it does not result in weight loss.

2.3 Part Two: Understanding Physical Activity Behaviour & How to Influence it

2.3.1 Application of Theory to Physical Activity

Health behaviour theories and social theories help explain the factors that contribute to physical activity behaviour (i.e. why an individual is inactive or active), whilst also helping to identify effective methods of changing physical activity behaviour (i.e. increasing physical activity levels). The use of theory during programme evaluation is also useful to help interpret why a change had occurred (e.g. what factors contributed to an observed increase or non-change in physical activity behaviour).

> theories can provide answers to program developers' questions regarding why people aren't already engaging in a desirable behaviour of interest, how to go about changing their behaviours, and what factors to look for when evaluating a program's focus (van Ryn and Heaney 1992)

Commonly used theories and concepts in relation to physical activity and physical activity interventions include: Social Cognitive Theory (SCT); The Transtheoretical Model (TTM); The Health Belief Model; Social Support (ACSM 2006; Swedish National Institute of Public Health 2010). Each of the aforementioned theories and concepts are most useful in explaining individual level behavior change. Broader theoretical perspectives include socio ecological theory and community level approaches to physical activity promotion.

2.3.1.1 Social Cognitive Theory (SCT)

First called *Social Learning Theory* (based on the work of Miller and Dollard (1941) and Rotter (1954)), this theory was further developed by Bandura to become SCT (Bandura 1986; Glanz et al. 2008). SCT has been described as "*one of the most widely applied theories in health promotion because it addresses both the underlying determinants of health behaviour and the methods of promoting change*" (Davies and MacDowdall 2006). SCT assumes individuals exist within and are influenced by their surrounding environment. Reciprocal determinism is the core concept of SCT (refer to Figure 2.6), and suggests that three main factors influence behaviour: (1) personal factors (e.g. beliefs about benefits of engaging in an activity), (2) environmental factors (e.g. role models in an individual's social environment) and (3) the behaviour itself (e.g. a person's skills, actions, intensity of activity, and level of enjoyment of physical activities). Furthermore it suggests these three factors interact and influence each other.
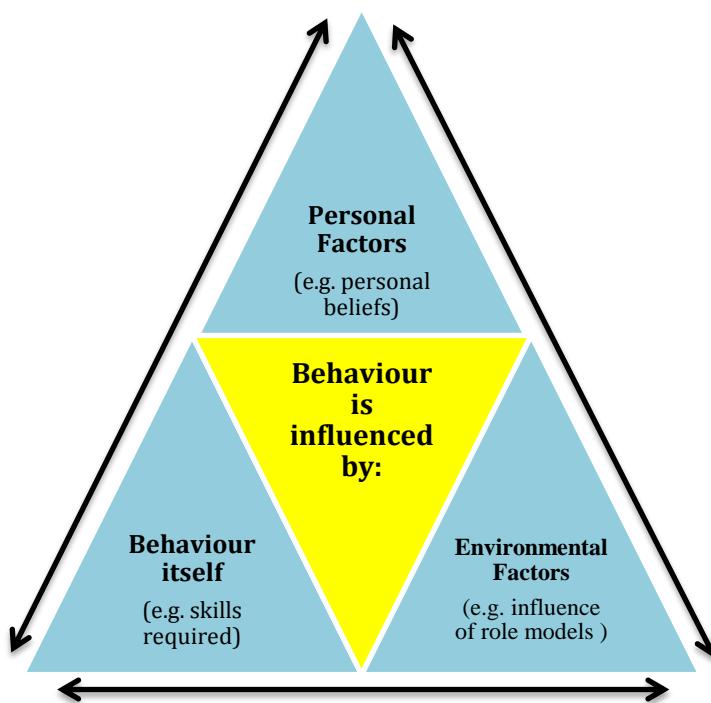
Figure 2.6: Graphical Representation of Reciprocal Determinism - the core concept of SCT

SCT also stipulates that three main factors affect behaviour change: Self-efficacy, goals (goals provide direction and allow people to monitor progress) and outcome expectancies (Bandura 1986; Glanz et al. 2008; National Cancer Institute 2005; ACSM 2006, p. 550; Bandura 1989).

Some of the key concepts of SCT which commonly guide physical activity interventions include:

- Self-efficacy – this is one of the core concepts within SCT (ACSM 2006, pp.549-550) and has been defined as "*the conviction that one can successfully execute the behaviour required to produce change*" (Bandura 1997). Self-efficacy relates to an individual's confidence in their ability to take action and engage in a specific behaviour and overcome potential barriers. If individuals have a sense of self-efficacy they are more likely to change behaviour even when facing barriers (National Cancer Institute 2005). Strategies for increasing self-efficacy include setting achievable, incremental and specific goals and using behavioural contracts.

- Outcome Expectations – what results an individual expects to gain from engaging in a specific behaviour. If an individual expects positive outcomes they are more likely to engage in the behaviour than if they expect negative outcomes. Developing realistic expectations of physical activity behaviour change is important (ACSM 2006, p. 550).

- Behavioural Capability – in order to perform a particular behaviour an individual must know what to do and how to do it (knowledge and skills). Teaching people skills promotes behavioural capability.

- Observational Learning – this assumes people learn through the experience of others, e.g. "modelling" is a type of observational learning and relates to how an individual might change their behaviour by observing the actions and outcomes of other people's behaviour (watching someone demonstrate an exercise, or observing others in a physical activity group increasing their fitness levels, can increase an individual's exercise self-efficacy and sense of motivation).

- Incentive Motivation / Reinforcements – these are responses to a person's behaviour that may increase or decrease the likelihood of reoccurrence, e.g. if a person receives a positive reinforcement after engaging in a specific behaviour they are more likely to repeat that behaviour again. Reinforcements may be internal (e.g. a person feels a sense of wellbeing after engaging in physical activity and thus wants to be physical active more often) or external (e.g. a physical activity counsellor praises an individual after they engage in physical activity which in turn makes the individual feel good and increase their sense of self-efficacy).

(Bandura 1986; Bandura 1997; National Cancer Institute 2005; Boston University of Public Health 2013; Simons-Morton et al. 2012; Glanz et al. 2008; Bandura 1989).

The SCT has been criticised for the fact it mainly overlooks the influence of individuals' biology; and has also been criticised for placing too much emphasis on the social context and too little emphasis on individuals' personalities and inner traits (Rootman 2013). Other critiques have also reasoned that the theory is not collective as it fails to explain the relationship between two of its key concepts – observational learning and self-efficacy (Rootman 2013). It has also been argued by some critiques that the ability of the concept of self-efficacy to explain human behaviour is "largely illusory" (Lee 1990 cited in Partridge 2007). More recent systematic reviews on the predictive ability of SCT in explaining exercise behaviour have confuted this argument concluding "*self-efficacy was predictive of exercise initiation and maintenance over time*" (Allen 2004). In general SCT remains very well regarded within the research community, has been used within many different disciplines, and has been reported, measured and supported by a large number of studies (Davies and MacDowdall 2006; Partridge 2007; Kahn et al. 2002; Wilcox et al. 2006).

2.3.1.2 The Transtheoretical Model of Behaviour Change (TTM)

The Transtheorectical model was developed by Prochaska and DiClemente to describe and explain the different stages individuals go through during behaviour change (Prochaska and DiClemente 1983; Prochaska and Velicer 1997). This model is based on the idea that behaviour change is not an event but a process, and stresses the importance of not assuming all individuals present to a programme with the same levels of motivation (Prochaska and DiClemente 1983; Prochaska and Velicer 1997; Glanz et al. 2008; Davies and MacDowell 2006). The model suggests that individuals who are at different stages of change have different needs, and thus benefit from different stage-matched interventions (Prochaska and Velicer 1997; National Cancer Institute 2005). Primarily the model posits that as an individual attempts to change a particular behaviour, e.g. increasing their physical activity levels, they move through five primary "stages of change". These stages – Pre-contemplation, Contemplation, Preparation, Action and Maintenance - are described in Figure 2.7.
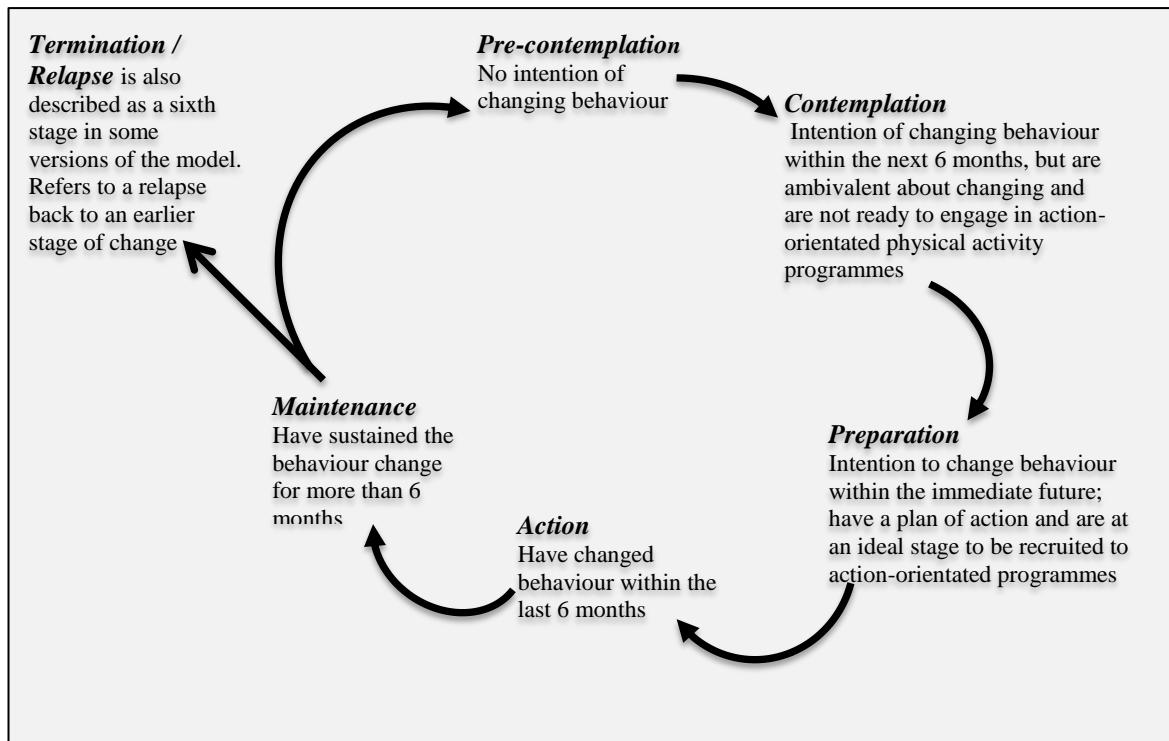
Figure 2. 7: Overview of the Stages of Change within the TTM (Marcus et al. 1992b; Prochaska and Velicer 1997; Cancer Prevention Research Center Undated;; Swedish Institute of Public Health 2010; Glanz et al. 2008)

A Stage of Change questionnaire (refer to Appendix I for an example of a Stage of Change questionnaire) can help to determine what stage an individual is at in the continuum. The model advises that people may not systematically progress from one stage to the next; they may enter the change process at any stage. People may also relapse back to earlier stages at any time, and may move through the different stages repeatedly throughout their life. The model also proposes that as people move from one stage to the next they use different "processes of change" (Prochaska and Velicer 1997; Marcus et al. 1992[a]). The process of change are defined as different cognitive and behavioural strategies and techniques people use to aid behaviour change (Marcus et al. 1992a). These processes include (but are not limited to) consciousness raising (e.g. seek knowledge and awareness), dramatic relief (e.g. *fear* of getting ill), social liberation (e.g. increasing healthy opportunities), self-liberation (e.g. making a commitment to change behaviour), stimulus control (e.g. removal of cues for unhealthy habits and using prompts to encourage healthy habits), and helping relationships (e.g. enlisting social support for behaviour change) (Prochaska and Velicer 1997; Glanz et al. 2008; ACSM 2006 pp. 546; Cancer Prevention Research Center Undated). Depending on an individual's stage of change different processes of change will be more or less

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applicable (Davies and MacDowall 2006; Cancer Prevention Research Centre Undated). It has been argued that the process of change provide an important guide for intervention programmes, as they clarify for programme planners what are the most appropriate strategies to employ to move participants from stage to stage (Cancer Prevention Research Centre Undated). For example the processes of change imply that individuals who are in the early stages of change, such as pre-contemplation, would benefit from interventions to aid in "consciousness raising", e.g. a GP advising a patient of the importance of physical activity in relation to disease management. Whereas for individuals in the later stages of change, such as "action", interventions that make it easy for them to access "helping relationships" would be more useful, e.g. a walking programme that facilitates the exchange of social support between group members or incorporates telephone support from a physical activity support person (Davies and MacDowall 2006; Cancer Prevention Research Centre Undated).

The model also posits that behaviour change is also affected by "decisional balance" (i.e. an individual's perception of the pros and cons of changing) and "self-efficacy" (Glanz et al. 2008). Research has shown that self-efficacy tends to increase as people progress through the stages of change e.g. with the pre-contemplation stage associated with low self-efficacy and the maintenance stage associated with high self-efficacy (Marcus et al. 1992[b]).

The TTM is appealing as it claims to offer practitioners or programme planners strategies to tailor interventions to align with participants' stage of change and also claims that it be used to aid the recruitment of individuals to different programmes, e.g. smoking cessations programmes and physical activity programmes (e.g. can help ensure only individual who are ready to change are recruited to action orientated programmes) (Cancer Prevention Research Center Undated). However the TTM is not without criticism. Some critiques have questioned the merit of the TTM model, claiming the model lacks scientific rigour, is not founded on evidence and have even argued that the model should be "abandoned" (West 2005). Other critiques believe the TTM has merit but argue that its flaws cannot be overlooked. For example one of the flaws of the TTM is that although it describes the stages of behaviour change it does not offer any explanations for *why* behaviour change occurs (Kadowaki Undated). Furthermore as the TTM was originally designed to address specific behaviour problems such as smoking,

it is commonly argued that the model may not be congruent or applicable with other complex behaviours (Kadowaki Undated). Evidence for the construct validity of the TTM as applied to physical activity behaviour is mixed (Spencer et al. 2006); with some researchers reporting little benefit of applying the model to the promotion of physical activity (Adams and White 2005). However a relatively recent "*systematic and comprehensive review*" of the literature related to the TTM by Spencer et al. (2006) concluded that the TTM *can effectively be applied* to physical activity behaviour.

> The literature in this review suggests that the TTM can be applied to exercise behaviour. Valid and reliable measures are available to assess stage of change, processes of change, decisional balance, and temptations not to exercise. These measures have been used to describe a variety of priority populations. Stage-based interventions also appear to be effective in promoting exercise. (Spencer et al. 2006)

2.3.1.3 The Health Belief Model (HBM)

The HBM was originally developed in the 1950's by social psychologists (Rosenstock, Hochbaum, Kegeles and Leventhal), as a means to explain health behaviour by understanding people's beliefs about health (Davies and MacDowall 2006; Glanz et al. 2008). The HBM posits that an individual's readiness to engage in a health-related behaviour (e.g. regular physical activity) depends on that individual's perception of four key factors (strategies can also be developed to motivate individuals to change based on these factors):

- Perceived Susceptibility – beliefs regarding the likelihood of getting an illness (e.g. an illness, like diabetes, as a result of been physical inactive - health professionals can act to educate individuals about their susceptibility to illness)

- Perceived Severity – beliefs about the potential consequences or seriousness of contracting an illness (personal impact) as a result of being physically inactive (e.g. a health professional can educate an individual about the severity of said illness)

- Perceived Benefits – beliefs regarding the benefits of undertaking specific behaviours (e.g. perceived benefits of becoming more active – information can be provided on the health and other benefits of becoming physically active; individual could be asked to consider benefits for oneself)

- Perceived Barriers – beliefs regarding the barriers to taking action (e.g. the perception that the costs of engaging in regular physical activity would outweigh the benefits – strategies to make engaging in physical activity an easier option could be devised e.g. referral to low-cost physical activity options)

The model also suggest "cues to action" are an important element in an individual's decision to start and maintain a new health behaviour, e.g. getting an illness e.g. diabetes or a written physical activity prescription from a health professional could be an important "cue to action" for an individual to start engaging in a physically active lifestyle. Again, this model also highlights "self-efficacy" as an important concept in an individual's decision to elicit a new health-promoting behaviour. (Glanz et al. 2008; National Cancer Institute 2005; Sparling et al. 2000).

Like other theories the HBM has been criticized. One of the criticisms of the HBM is based on the fact that not all health behaviour is based on rational or conscious thought as is presumed by the HBM (Raingruber 2014). Other criticisms include that the HBM lacks concepts associated with strategies for change (Raingruber 2014). However "*the major complaint [of the HBM] has been that the model focuses on individual factors rather than socioeconomic and environmental factors, and therefore, encourages victim blaming*" (Raingruber 2014).

2.3.1.4 The concept of Social Support

Social support is a complex concept that has been defined as "*the process of interaction in relationships which improves coping, esteem, belonging and competence through actual or perceived exchanges of physical or psychological resources*" (Gottlieb 2000, p.28 cited in Hunt 2011, p. 183). Social support can come from many different sources, including family members, friends, doctors, nurses and community organisations (Sarafino and Smith 2012). Social support refers to both *received support* (i.e. support that is actually received from others) and *perceived support* (i.e. the perception that support is available if needed) (Sarafino and Smith 2012). Individuals who have high levels of social support "*believe they are loved, valued and part of a social network, such as a family or community organisation, that can help in times of need*" (Sarafino and Smith 2012).

Social support has an important role to play in each of the aforementioned theories (TTM, SCT, HBM), and is closely related to the concept of self-efficacy. Social support may be used to encourage individuals to elicit and maintain a more physical active lifestyle. Social support may be offered in a number of different forms. *Tangible or*

instrumental support involves direct assistance or practical support e.g. providing a lift to an exercise class / hosting an exercise class in an easily accessible location that suits all involved (Sarafino and Smith 2012; Isreal and Schurman (1990) cited in USDHHS 1996). *Informational support* involves offering helpful information, advice, suggestions e.g. an individual who is ill might get information from their GP about managing the illness. Informational support could also involve a GP informing a patient about a new community walking programme that could be of benefit to their health (Sarafino and Smith 2012; Isreal and Schurman (1990) cited in USDHHS 1996). *Emotional or esteem support* conveys empathy, caring, concern, positive regard, encouragement and communicates a sense of belonging and acceptance to the recipient. Examples of social support may include the support offered by other participants in a physical activity programme or a physical activity support worker calling a participant to see how they are faring on a walking programme (Sarafino and Smith 2012; Isreal and Schurman (1990) cited in USDHHS 1996). *Companionship support* refers to the availability of others to spend time with the individual, thus providing the individual with a sense of membership in a group of people who share interests and social activities (Sarafino and Smith 2012). Finally *appraisal support* includes providing encouragement or reinforcement for learning a new skill or activity (Isreal and Schurman (1990) cited in USDHHS 1996). An example of appraisal support might include praise from a GP or family member for starting a new exercise programme.

2.3.1.5 Broader Perspectives: Social Ecological Models &Community-Level Approaches

In recent decades many researchers within health promotion fields have come to recognize the limitations of focusing on individual behaviour change alone and have moved towards broader approaches, such as social ecological approaches and community level approaches (King 1994; King 1998; Sharpe 2003; Kothari et al. 2007). Social ecological and community-level approaches are so called "high-level approaches" to health promotion (King 1994) and although they are undoubtedly complex to implement, they are believed to offer more effective, farther-reaching and sustainable behaviour change interventions in comparison to person-focused approaches (King 1994; King 1998; Sharpe 2003; Kothari et al. 2007; Brownson et al. 2004; Bauman et al. 2012). Social ecological models and community level approaches are "*generally intended for use as organising frameworks rather than testable theories*" (Brownson et al. 2004, p. 29).

The Socio Ecological Model

Level	Description
Global	Economic development, media, product marketing, urbanisation etc
National & Local Policy	National physical activity advocacy, national physical activity plans, policies with the health sector, organised sports sector, transport sector etc
Physical Environment	**Built Environment** – Community design, walkability, parks & recreation facilities, aesthetics & pleasantness, walking facilities, pedestrian safety **Natural Environment** – weather, scenery, walking routes & trails
Community	Relationships & communications between organisations, levels of Social Cohesion, Cultural norms
Organisational	Practices, programmes, norms & policies in healthcare settings, community organisations, schools, worksites etc
Interpersonal	Social Support – Individual relationships, Support Groups, Social Networks, Role models
Individual	Intrapersonal determinants - Psychology, Biology, Cognition, Beliefs, Motivation, Self-Efficacy etc

Figure 2-8: Social Ecological Model of the Determinants of Physical Activity (adapted from Bauman et al.'s (2012) Adapted Model of the Determinants of Physical Activity and the Socio-Ecological Model depicted in Glanz 2013)

The social ecological model posits that there are multiple levels of influence on physical activity behaviour including not only individual and interpersonal influences but also wider levels of influence originating within the organisational, community, physical, social and policy environment (refer to Figure 2.8) (Spence and Lee 2003; Bauman et al. 2012; Brownson et al. 2004). All levels of influence within the model are interdependent and thus can exert direct effects on each other. This means if a change is made at one level of influence all other levels of influence can be affected by consequence (Spence and Lee, 2003). For example if a change is made at a policy level this can filter down through the community and organisational levels to have an effect at an individual level and vice versa. The social ecological model suggests interventions should not only aim to create changes at an individual and interpersonal level, but should also aim to create organisational, community, environmental and policy level changes that are conducive to the adoption and maintenance of healthier behaviours. It is now common for social ecological models to integrate ideas from several theories,

such as individual-level theories (e.g. TTM) and interpersonal level theories (e.g. the SCT) in an attempt to create one comprehensive framework (Bauman et al. 2012).

Physical activity programmes that are guided by a social ecological framework are believed to offer the best chance of success in raising the physical activity levels of both individuals and populations due to the fact the model attempts to address the problem of physical inactivity at multiple levels and create sustained changes (Brownson et al. 2004; Bauman et al. 2012). The importance of following an ecological framework is attributed to the increasing evidence base that suggest interventions which focus on individual factors alone are not sufficient to increase physical activity and sustain behaviour change in the long-term, as it is likely that enduring social and environmental factors influence individuals to return to an inactive lifestyle once individually-focused intervention is over (Browson et al. 2004; Spence and Lee, 2003).

Following an ecological framework presents challenges due to the difficulty of creating interventions that address the multiple levels of influence. At the very least using a social ecological approach requires a great deal of collaboration and the formation of strong interdisciplinary partnerships across sectors. Using a social ecological framework does not necessarily mean that an intervention must create changes within every level of influence. Theorists suggest that intervention planners can choose to use the complete model but if this is not feasible they could choose to address only a few levels of influence (arguably it would be very hard for any individual intervention to create changes within all levels of influence) (Spence and Lee 2003). However the more levels of influence the intervention aims to address presumably the more effective the intervention is likely to be.

Community Level Approaches to Physical Activity Promotion

Community-level interventions (also called community-wide approaches) are examples of interventions that have comprehensive goals and usually aim to embody a socio-ecological approach (King 1994; Maley 2005; Baker et al. 2011).

> Initiatives serving communities…not just individuals, are at the heart of public health approaches to preventing and controlling disease. Community-level models explore how social systems function and change and how to mobilize community members and organizations. They offer strategies that work in a variety of settings, such as health care institutions, schools, worksites, community groups,

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and government agencies. Embodying an ecological perspective, community-level models address individual, group, institutional, and community issues. (National Cancer Institute 2005, p. 22)

Literature relating to community-level physical activity interventions have emphasised the distinction between community-level physical activity interventions and individual physical activity interventions that are simply community-based interventions (King 1994; King 1998; Sharpe 2003). Individual level physical activity interventions are based within a community setting but remain person-focused and just aim to increase the physical activity levels of individuals (e.g. an exercise class) (King 1994; King 1998; Sharpe 2003). In contrast community-level approaches not only aim to just create changes in physical activity levels at an individual level, but also aim to create changes in social networks, the local environment (social and physical environment), and in community and organisational norms and policies that are conducive to physical activity promotion (King 1994; King 1998; Maley 2005). While community level physical activity interventions do commonly embed strategies that have been found to be successful on an individual level, they aim to extend the reach of these interventions. Community-level interventions are usually targeted and tailored so they are successful in reaching and recruiting sedentary community members who wouldn't voluntarily seek out participation in individually oriented physical activity programmes (Maley 2005; King 1994).

Baker et al. (2011) defined a community-wide approach as an approach that has scope to reach disadvantaged groups within a community and incorporates at least two of the following six strategies aimed at increasing physical activity levels:

(1) Social marketing through local media (television, newspaper, radio)

(2) Other communication strategies to raise awareness of the project and provide specific information to individuals within the community (e.g. flyers, posters, websites)

(3) Individual counselling by health professionals (e.g. physical activity prescriptions)

(4) Working with voluntary, government and non-government organisations to encourage participation in walking, other physical activities and events

(5) Working within specific settings, e.g. schools and community centres – this may include settings that provide an opportunity to reach disadvantaged groups

(6) Environmental change strategies e.g. creation of walking trails and infrastructure with legislative, fiscal, policy requirements and planning for the broader population

In consideration of the aforementioned factors it is intelligible that the target of community level interventions / community-wide approaches are not just the individuals who are in need of increasing their physical activity levels, but also include the "gate keepers" within communities (King 1998, p. S7). The "gate keepers" include the various different individuals, groups and organisations within communities *"who are likely [to] have the greatest influence on delivering the intervention message to the community"* (King 1998, p. S7). These may include individuals or groups who have access to large proportions of the community or those who are respected by the community. Examples of such gatekeepers may include health professionals, local public health departments, voluntary organisations, local community organisations, local opinion leaders, the media and policy makers. As explained within the socio ecological perspective, community level approaches also require the formation of multidisciplinary partnerships between these different "gate keeping" organisations, groups and sectors (King 1994; 1998); with the majority of community-level approaches characterised by a partnership between professionals and local leaders (Sharpe 2003, p. 459). By utilising a wide range of strategies to support and promote programmes, and spreading the responsibility for programme implementation and delivery among a range of community-based stakeholders / gate keepers, rather than relying solely on health or physical activity professionals, community level approaches are in a better position to create more comprehensive and sustainable physical activity interventions in comparison to individual level interventions. The long-term goal of community-level interventions is *"institutionalisation of programs and strategies to affect change"* (King 1998, P. S4) in contrast to the long-term goal of individual level interventions which tend to be the long-term maintenance of individual level behaviour change (King 1994). Active community involvement, participation and local leadership are key requirements for effective community level interventions (Maley 2005; Sharpe 2003). Maley (2005, p. 13) suggests community participation is particularly important to identify the *"unique social and physical features of a community that might present sustainable opportunities for intervention"*.

Key theories and modes of practice that underpin successful social ecological and community-level interventions include community development, community organising and community capacity building (Maley 2005; Health Service Executive 2008; National Cancer Institute 2005; Fleming et al. 2007). All of these approaches aim to facilitate community participation and promote local leadership and local ownership of the interventions. These combined approaches also aim to:

- utilise existing strengths and competencies within the community

- help communities groups "*mobilize resources and develop and implement strategies to reach common goals*" (National Cancer Institute 2005, p. 23)

- not rely solely on professionals to solve the problem, but to form partnerships with professionals so they are a resource to the community in helping to solve the problem

- enhance *community capacity* by increasing the opportunities for community members to get actively involved in community decisions, changes and activities that affect them; build social networks, build skills and build community resources; strengthen links between organisations within the community and create helping relationships with outside organisations

- engage community members and community organisations as *equal partners*

- *empower* individuals and empower community organisations by helping them gain the confidence and skills to increase control over and improve their health and quality of life. At a wider level these approaches also aim to empower the community.

(Poland et al. 2000 cited in Health Service Executive 2008a; National Cancer Institute 2005; Fleming et al. 2007)

The concept of social capital[5] is also strongly linked to community-level interventions. This is because promoting the development of social capital within communities is believed to be integral to achieving community *empowerment* (Fulbright-Anderson and Apos 2006); which, as described above, is a goal of community level interventions.

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[5] Social capital has numerous definitions. It has been defined as "*the networks, norms and social trust that enable people to coordinate and cooperate to achieve shared goals*" (Chau 2007). Social capital has also been defined as the social cohesiveness within a community; and the material or psychosocial resources available to individuals and society through social relationships (Chau 2007). However the "*common aspects of social capital that may be drawn from its varied definitions include participation in networks, trust, cooperation, social norms and reciprocity*" (Chau 2007).

There is also research to suggest participants are less likely to be inactive in communities that have high social capital (Chau 2007). Thus community-level interventions often aim to increase the level of social capital within communities (Chau 2007). Social capital can be increased within communities through activities that bring community members together, promote social interaction and the development of social networks, promote a sense of community, facilitate social cohesion and foster a sense of informal social control (Fulbright-Anderson and Apos 2006, p. 44-49).

Although the comprehensive nature, the potentially wide reach and the potential long-term benefits of community-level interventions make them appealing, they also have a number of drawbacks. The primary drawback is their complexity (Fleming 2007), which not only making them challenging to implement but also challenging to evaluate. As explained under the socio-ecological perspective it is undoubtedly challenging to establish effective multi-disciplinary partnerships within the community setting. In addition the use of community organising, community development and community capacity building approaches to promote community participation, empowerment and community ownership mean community level interventions are time-consuming to implement and also take time to show evidence of effect (Fleming et al. 2007). This can mean funding community-level interventions can often be challenging (Fleming et al. 2007).

> Recognising the complexity of such approaches and the time required to develop and sustain community-based interventions is central to achieving positive outcomes (Fleming et al. 2007, p. 27)

> The promotion of community ownership of health promotion activities is a complicated process, given that time, resources, expertise and community involvement require a much longer-term commitment than currently imposed by many funding bodies (Fleming et al. 2007, p. 22)

Furthermore the multifaceted nature of community level interventions makes them difficult to evaluate, as having many programme components "*can result in the situation that if a program works or does not work, it is often difficult to understand why*" (King 1998, p. S10).

2.3.2. Use of Theory in Practice

Using evidence-based theories, such as those mentioned above, to guide intervention development and implementation is believed to be among the best ways of

ensuring interventions achieve desired goals (e.g. the goal of increasing physical activity levels of a certain group or community etc) (National Cancer Institute 2005; Green 2000; Swedish National Institute of Public Health 2010). However, in general, the explicit use of theory to guide the development and implementation of health and physical activity intervention's is limited (Michie 2004; McEachan et al. 2008; Bird et al. 2013). In particular the explicit use of theory within ERS and EOP schemes, which are the focus of this study, is very limited (Pavey et al. 2011a; Riddoch et al. 1998; Khatta 2008; Swedish National Institute of Public Health 2010). Within some research studies on EOP programmes, it has been reported that the physical activity on prescription model is based on "*several theory-based behaviour change models, but is primarily inspired by the transtheoretical model and social cognitive theory*" (Persson et al. 2013, p. 2). Others have also reported that the Green Prescription Programme, which is a type of EOP programme based in New Zealand, is based on the TTM of behaviour change (Patel et al. 2011; Patel 2010, pp. 61-62). However, in general, the theory upon which a programme or intervention is based is rarely mentioned within the literature (Swedish National Institute of Public Health 2010, pp. 56-57; Michie and Abraham 2004).

> Methods for behavioural change are … considered important for successful change efforts, but to date few programmes have systematically used evidence-based methods for behavioural change, even though this has been encouraged to increase the effectiveness of health promoting programmes. (Swedish National Institute of Public Health 2010, pp. 56-57).

> Identifying interventions that promote behavioural change does not necessarily clarify which psychological change techniques incorporated in those interventions are responsible for generating behaviour change, nor how they generate change. Intervention descriptions are often not specific about the techniques employed…. In addition, tests of theory-specified psychological changes used to explain behavioural change … are the exception rather than the rule in evaluations of behaviour change interventions. (Michie and Abraham 2004)

Within interventions where behaviour change theories have been used to guide programme development and implementation positive results have been reported. For example Burbanks et al. (2000) and Marcus et al. (1998) reported evidence to suggest that interventions which are tailored to an individual's stage of change (TTM) are more likely to successfully achieve behaviour change. Theory-based physical activity interventions, including physical activity counselling in primary care that is based on the TTM and / or incorporates elements of SCT, have been found to produce greater increases in the proportion of patients engaging in regular physical activity and a greater

movement through the stages of change for physical activity, in comparison to standard care (Steptoe et al. 1999; Calfas et al. 1996; Swedish Council on Technology Assessment in Health Care 2007). (These studies are discussed in more detail later in this literature review under section *2.4.3 The Evidence Base for Physical Activity Interventions within Primary care*). A systematic review by Kahn et al. (2002, pp. 85-87) also found "*strong evidence*" that physical activity interventions grounded in SCT, the HBM or the TTM are effective in increasing physical activity levels and in increasing the energy expenditure of participants. All programs reviewed included the following behavioural approaches: goal setting and self-monitoring; social support for behaviour change; behavioural reinforcement techniques (e.g. rewards); "*structured problem-solving geared towards the maintenance of behaviour change*"; and relapse prevention strategies. The same review by Kahn et al. (2002, pp. 84-85) also found "*strong evidence*" that interventions that provide social support for behaviour change within community settings – e.g. interventions that aim to build social networks, utilise "buddy" systems and group support – are also effective in increasing physical activity levels.

Although the explicit use of theory within studies on ERS and EOP programmes is sparse, it would appear that health behaviour theories have influenced the development and implementation of many of these schemes even if not explicitly stated. For example, ERS generally aim to: raise patients about the importance of a physically active lifestyle for health; provide supportive immediate social environment to facilitate individual participants in the adoption of a more physical active lifestyle; enhance participants behavioral capability to perform physical activity *and* increase participants self-efficacy around engaging in physical activity - all of which are constructs of the aforementioned behavior change theories. However, as highlighted by Bird et al. (2013, p. 830), because the majority of exercise referral and exercise on prescription studies do not explicitly state which specific behavior change techniques or theories were applied to guide the content of the intervention, it is difficult to determine how intervention content is related to intervention effectiveness and thus it is difficult "*to identify the most valuable intervention techniques that should be incorporated into future intervention design*".

Evidence of the effectiveness of community level interventions / community wide approaches to physical activity promotion is inconsistent (Baker et al. 2011). Baker et al. (2011) conducted a Cochrane Collaboration systematic review on the effectiveness of community-wide physical activity interventions for increasing physical activity. Twenty five studies relating to community-wide physical activity interventions were included in the review. All studies included in the review incorporated at least two of the following strategies:

(1) Social marketing through local media (television, newspaper, radio)

(2) Other communication strategies to raise awareness of the project and provide specific information to individuals within the community (e.g. flyers, posters, websites)

(3) Individual counselling by health professionals (e.g. physical activity prescriptions)

(4) Working with voluntary, government and non-government organisations to encourage participation in walking, other physical activities and events

(5) Working within specific settings, e.g. schools and community centres – this may include settings that provide an opportunity to reach disadvantaged groups

(6) Environmental change strategies e.g. creation of walking trails and infrastructure with legislative, fiscal, policy requirements and planning for the broader population

The authors found it difficult to draw firm conclusions from the review due to the inconsistency of the findings of the available studies and the "*serious methodological issues within the included studies*" (Baker et al. 2011). The authors also emphasized that the tools used to measure physical activity levels in the majority of the included studies – primary self-report telephone surveys - severely limited the interpretation of the results.

Although numerous studies of community wide interventions have been undertaken, there is a noticeable inconsistency in the findings. The body of evidence in this review does not support the hypothesis that multi-component community wide interventions effectively increase population levels of physical activity. It could be postulated that, given the conflicting findings, community wide interventions lack efficacy, however we believe such a conclusion would be premature given the poor quality of studies. In particular, the tools used to measure physical activity were generally weak, inhibiting the ability to interpret the results and draw conclusions. (Baker et al. 2011)

One clear message is that any new studies should be rigorously designed and analysed, ensuring that the measures are reliable and sensitive to change at a population level. Design issues of particular importance in this field include the quality of the measurement of physical activity. Alternatives for self-report telephone surveys should be considered. It is disappointing that several of the included studies were intensive but relied on a singular low quality measure. (Baker et al. 2011)

Baker et al. (2011) concluded that there remains a need for well-designed community-wide interventions studies to test the effectiveness of such approaches for increasing physical activity levels.

> The central question of this research is whether it is worthwhile to develop and undertake multi-component interventions to increase population levels of physical activity. Based on the lack of robust studies and conflicting results to date, further exploration of combined community interventions is merited. (Baker et al. 2011)

A more recent systematic review by Bock et al. (2013) reported on a small number of community-level physical activity interventions, guided by theories such as the ecological model and community empowerment theory that produced some moderate evidence of effectiveness. However again there was inconsistency among of the findings of the studies included in the review (Bock et al. 2013).

The researcher could not find any research on ERS-focused or EOP-focused studies that were implemented using a social ecological / community level approach; highlighting this as a current gap in the evidence base. The literature reviewed suggests that while ERS and EOP programmes are community-based, they most aptly fit the description of a person-focused intervention (Sharpe 2003, p.456) in that they focus on achieving behaviour change at an individual level rather than aiming to create changes within the wider community environment that are conducive to physical activity promotion. Also consistent with an individual level /person-focused approach ERS and EOP programmes primarily depend on health and fitness professionals for programme delivery and do not seek the active involvement of the local community. The individual level focus of ERS and EOP programmes may highlight a weakness in the model design, as it would appear the majority of ERS and EOP models fail to take into account the wider community environment in which they operate.

2.4 Part Three: Primary Care Initiated Physical Activity Levels Interventions

2.4.1 Rationale for Primary Care Based / Initiated Physical Activity Interventions

Physical activity promotion in primary care is not a new concept, having been used in many countries, such as Sweden, New Zealand and the UK, since the 1980's (Hellenius, 2011). There is a strong rationale for promoting physical activity within primary care. Firstly General Practitioners (GPs) have frequent access to a very large proportion of the general population, including those who could stand to benefit most

from increasing their physical activity levels, for example older age groups and those with lifestyle related diseases (McNamara et al. 2013; Elley et al. 2003[a]). For example in 2010 74% of Irish adults had visited their GP in the previous 12 months, with the average number of visits per year standing at 3.2 (CSO 2011). Older people visit their GP more frequently than younger people and those with chronic diseases are also more likely to be frequent attenders (McNamara et al. 2013). Sedentary adults presenting in GP practices have been found to have higher levels of health risk factors (e.g. higher levels of hypertension, overweightness and obesity and diabetes) when compared with the general population – again highlighting the potential of interventions within the primary care setting to reach those most at risk from lifestyle related diseases (Elley et al. 2003[a]).

Other compelling arguments for the benefits of physical activity promotion within primary care include the fact that GPs often have an established relationship with their patients (Van Sluijs et al. 2005), with patients viewing their GP as a credible source of advice (Swinburn et al. 1998). Patients have also cited their GP to be an important source of influence on their health and physical activity behaviour (Stange et al. 2002; CalderÓn et al. 2011; Horne et al. 2009). Primary health care professionals may also have access to patients when they are most receptive to considering behaviour change. This is because fear of disease is a key motivator for change for many individuals (CalderÓn et al. 2011), and consequently if physical inactivity is suggested as a threat to health it can become a powerful motivator for changing behaviour (Elley et al. 2007; Calderón et al. 2011).

Health professionals have been recommended to act as advocates for community changes which make active lifestyles more achievable by recognizing environmental barriers and by identifying and informing their patients of the community and individual supports available for increasing their physical activity levels / walking (Murtagh et al 2010).

2.4.2 Models of Physical Activity Interventions Implemented within Primary Care

Based on the rationale that primary care is a potentially suitable and efficacious setting to implement physical activity interventions (Pavey et al. 2011[a]), a wide variety of different types of interventions have been implemented within primary care settings

since the 1980s. The most common interventions include brief advice, Brief Interventions and motivational interviewing interventions, ERS, green exercise-based referral schemes, and EOP programmes. (Refer to Table 2-4 (p. 48) for an overview of what each of these interventions generally entail). While some of these interventions are implemented solely within primary care; others are implemented via a partnerships approach between primary care and local community organisations. The aim of the literature review is to present the evidence of effectiveness for each of the aforementioned interventions. The researcher aimed to ensure the literature review was as thorough as possible without conducting a systematic review.

2.4.2.1 Methods Employed for Conducting the Literature Review of Physical Activity Interventions Implemented / Initiated in Primary Care

Search Strategy

Literature relating to physical activity intervention studies implemented / initiated within primary care settings was sourced through internet searches, open access repositories (through OpenDOAR), and the following databases: Science Direct, Academic Search Complete, PubMed, and the Cochrane Library. The following search terms were used:

▪ Physical activity	▪ Exercise	▪ Effectiveness	▪ Primary Care
▪ Exercise referral schemes	▪ Exercise on prescription	▪ Physical activity on prescription	▪ Referral
▪ Brief interventions	▪ Counselling	▪ Prescription	▪ Walking program*
▪ General Practice	▪ GP	▪ Green	▪ Community
▪ Social Prescribing	▪ Evaluation	▪ Intervention	

Search terms were combined using the Boolean operators "AND" and "OR". Where applicable parentheses were also used to nest query terms within other query terms to make better use of Boolean operators. Double quotes were used to search for specific phrases. An asterisk "*" was also used as a wildcard symbol where applicable to achieve variations on certain word stems (e.g. program* finds programme, programmes, program). The following are examples of how search terms were combined:

- ("physical activity" OR exercise) AND counselling AND "primary care" AND evaluation
- "exercise on prescription" AND effectiveness
- "exercise referral scheme" AND "primary care" AND "walking program*"
- green AND prescription AND program* AND "primary care" AND effectiveness

In addition, reference lists and bibliographies of relevant studies were reviewed to identify studies not found through the primary electronic searches. The researcher conducted the first search in January 2012 and searches were updated weekly until May 2014. The literature search was limited to studies that were in the English language and that were published from 1990 onwards.

Challenges Encountered in Study Selection and Inclusion and Exclusion Criteria for Studies

Conducting a literature review of research on the effectiveness of physical activity interventions implemented/initiated within primary care was challenging. Research studies which have assessed the efficacy and / or effectiveness of primary cared based interventions have used heterogeneous outcomes as measures of intervention success which makes comparisons difficult. The following have all been used to measure efficacy / effectiveness: (i) increases in physical activity levels from baseline, (ii) increases in the proportions of participants meeting pre-determined physical activity recommendations (which differ between studies), (iii) increases in cardiorespiratory fitness, (iv) changes in clinical indices in relation to disease risk from baseline, (v) changes in various psychosocial parameters related to improved health and wellbeing from baseline to follow-up, e.g. changes in quality of life and (vi) self-reported adherence to recommended physical activity.

Other complications with direct comparison of the literature included: differences in study design (e.g. range from Randomised Controlled Trials (RCTs) to observational studies to cross-sectional studies), differences in intervention duration and duration of follow-up, differences in intervention intensity (e.g. number of physical activity sessions per week), differences in the treatment of control groups (e.g. some studies used a true control group (received standard care), in other studies the "control group" received an alternative form of intervention, while other studies used no control group)

(Youell and McCallion 2011). There were also differences in how study results were analysed, e.g. some RCTs used intention-to-treat analysis to analyse findings while others only focused on the results of completers.

In order to provide the most comprehensive overview the findings of a wide range of studies that used various outcomes as measures of success were selected for inclusion in the literature review. Studies with varying methodological designs were included in order to produce a review with broad scope. Traditionally heralded as the "gold-standard" within study designs, randomised controlled trials (RCTs) were included within the literature review to garner information regarding the efficacy of interventions (Saturni et al. 2014; Ho et al. 2008; Gartlehner et al. 2006). Efficacy is defined as "*the performance of an intervention under ideal and controlled circumstances*" (Singal et al. 2014). In cases where RCTs were implemented under "real-world" conditions these studies were also deemed to be a good measure of the effectiveness of an intervention (Singal et al. 2014; Gartlehner et al. 2006). Effectiveness can be defined as the performance of an intervention (or the degree of beneficial effect of an intervention) under "real-world" conditions (e.g. everyday primary care practice) (Singal et al. 2014; Gartlehner et al. 2006). (Cost-effectiveness is another means of assessing the effectiveness of an intervention and "*compares the costs and health effects of an intervention to assess the extent to which it can be regarded as providing value for money*" (Philips 2009)). Systematic reviews (where findings from multiple studies, most commonly from experimental studies but sometimes from observational studies, are combined to produce aggregated data) were also selected for inclusion within the literature review to determine the efficacy and effectiveness of interventions (Ho et al. 2008). Only RCTs and systematic reviews published in peer-reviewed journals were selected for inclusion.

Non-RCTs, observational studies and cross sectional studies were also included to provide an indication of intervention effectiveness in instances where no RCTs where available. Studies with methodological weaknesses, for example those with small or convenience samples, subjective reporting of outcomes, weak data analysis, or those not published in peer-reviewed journals, were included only when they provided insights not available from more rigorous studies. It has been argued that both RCTs and real-life studies, such as observational studies, "*have opposite strengths*" as well as inherent

weaknesses (Saturni et al. 2014), thus the researcher believed the inclusion of both types of study designs enriched the literature review. Qualitative studies were also included in the literature review to garner additional information not provided in RCTs, e.g. narrative stories from programme stakeholders, perceptions of intervention participants, explanations of why or how an intervention does or does not work and to provide insight into other factors affecting programme success (Ho et al. 2008; Williams et al. 2007).

> [Qualitative studies are] often used in areas in which data or knowledge is inadequate ….. Qualitative studies can generate theories and identify relevant variables to be studied subsequently in quantitative studies, or they can be used in a complementary fashion to yield findings that are broader in scope and richer in meaning. (Ho et al. 2008)

Studies were considered to be eligible for inclusion in the literature review if they met the criteria outlined in Table 2-3.

Table 2-3: Inclusion Criteria for Studies Eligible for Inclusion in the Literature Review

Inclusion Criteria for Eligible Studies	
Type of Study	Randomised controlled trials; non-randomised controlled trials; observational studies; process evaluations; qualitative studies; systematic reviews.
Type of Participant	Any individual with or without a medical diagnosis. Eligible participants could be recruited during routine consultations, or after searching the primary care medical record database.
Type of Intervention	Physical activity interventions implemented or initiated within a primary care setting to include either: - Brief advice / written information / motivational interviewing / provision of physical activity prompts - Exercise referral (defined as referral from a primary care setting to a programme that encouraged increased physical activity or exercise, involving an initial assessment and a programme tailored to individual needs, as well as monitoring and supervision throughout the programme. The physical activity programme could either take place in a leisure centre or outdoors). - Exercise on prescription (defined as the provision of verbal and written information and the provision of a written, personalised exercise prescription from a primary health care professional. Participants may or may not have been referred to third party physical activity organisers / exercise specialist for follow-up support). - Interventions may or may not have been based on behaviour change theories
Type of Outcomes (Measures of Efficacy / Effectiveness)	Changes in physical activity levels; psychosocial outcomes; mental health outcomes; clinical outcomes; quality of life; subjective wellbeing; subjective health and social outcomes. Both short-term (mid-intervention and immediately post-intervention) and long-term outcomes (at least six months post programme completion) were eligible for inclusion.

Interventions whose main purpose was not to increase physical activity levels or improve health outcomes were excluded from inclusion in the literature review.

Similarly physical activity interventions that were implemented or initiated in secondary or tertiary care, e.g. cardiac or pulmonary rehabilitation programmes, were excluded from the literature review.

Study Selection Process

The study selection process involved two core stages. In stage one titles and abstracts of potential studies were screened and clearly irrelevant studies were excluded, while titles and abstracts deemed potentially relevant were marked for inclusion in stage two of the study selection process. In stage 2 full papers of abstracts deemed potentially relevant during stage one were screened to determine eligibility of inclusion in the literature review.

Data Analysis and Synthesis

The following information was collated and summarised from eligible studies: intervention description, study setting, study population / participant characteristics, outcome measures (i.e. measures of efficacy / effectiveness) and reported results / findings. Studies were then assessed for compatibility in terms of intervention structure and delivery, study setting, study populations and outcome measures. Compatible studies were grouped together and qualitatively assessed to identify common trends or discrepancies.

Table 2.4: Model of Physical Activity Interventions Implemented in the Primary Care Setting

Type of Intervention	Description of Intervention
Brief Advice	• Short, opportunistic, informal intervention (3 minutes or less) • HCP provides information about the importance of becoming physically active & simple verbal advice to support behaviour change (Evans et al. 2011)
Brief Intervention (BI) & Motivational Interviewing (also called physical activity counselling)	• Structured, in-depth intervention. Includes the provision of advice & information • Explores an individual's motivation to increase PA levels through interview • Aims to resolve ambivalence the individual might feel towards changing their behaviour & assist them towards the goal of becoming physically active • Often based on behaviour change models e.g. SOC Model (Evans et al. 2011) • Sometimes additional motivational "prompts", such as pedometers or discount vouchers for leisure centre attendance, will also be provided to patients during BI
Exercise Referral Schemes (ERS)	• Suitable patients referred by primary HCP to a 3rd party for a tailored programme of PA • Usually the patient is referred to a qualified PA instructor within a leisure facility, but can alternatively involve referral to a structured walking programme. • The PA instructor is responsible for initial assessment of the patient, the development of the PA plan, goal setting & monitoring & supervision throughout (Williams et al. 2007; Pavey et al. 2011;BHFNC Undated)
Green exercise-based referral programmes	• HCPs refer patients to green exercise based programmes • Green exercise is exercise in natural environments, e.g. outdoor walks, gardening projects & conservation projects (Peacock et al. 2007) • Based upon research that suggests PA in natural environments can generate greater physical & mental health benefits than PA in man-made environments (Wilson 2009) • Usually group-based; often open to all community members as well as referred participants • Some programmes specifically target patients with mental health difficulties; whereas others accept referrals & self-referrals for a wide range of reasons • Usually less structured than traditional ERS, with regards to PA plans & the programmes are often lay-led rather than led by trained PA instructors

Exercise on Prescription Programmes (EOPs)*[6] (also called Physical Activity on Prescription programmes)	• Primary HCPs provide PA advice, written information & a personalised written PA prescription to patients who need to increase their PA
	• The prescription is usually written on a special prescription slip
	• In some versions of EOP the HCP has pre-formed links with PA organizers within the community, e.g. local walking groups, so the patient can be referred to a group-based programme & thus benefit from a supportive environment (Shares similarities with ERS)
	• Patients may (not always) receive exercise counselling, telephone follow-up support or supervised training from an exercise specialist (SØrensen et al. 2006; Hellenius, 2011).
	• Green Prescription programmes (a type of EOP founded in New Zealand) involve:
	   o Brief motivational interviewing & advice by the GP
	   o A written exercise prescription (which usually includes goals to increase home-based PA or walking)
	   o Referral of patients to an exercise specialist (in most cases) for follow-up telephone support (Elley et al. 2003[b])

HCP: Healthcare Professional; PA: Physical Activity; SOC: Stage of Change

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[6] Within the literature ERSs are sometimes also referred to as EOPs however in the context of this literature review EOPs refer specifically to programmes that include **a personalised written physical activity prescription by a primary care professional** to patients who need to increase their physical activity to improve their health. This differs from the ERS noted above whereby it is an exercise professional who devises the physical activity plan rather than the primary health care professional.

2.4.3 The Evidence Base for Physical Activity Interventions within Primary care

A number of key reviews, RCTs and observational studies conducted over the past two decades provide considerable evidence to suggest that physical activity interventions initiated and / or implemented within the primary care setting are efficacious and / or effective (Hellenius 2011; Orrow et al. 2012). However the degree to which interventions have been found efficacious / effective has differed from study to study, with some types of interventions found to produce greater effects than others.

A recent systematic review by Orrow et al. (2012) found that the promotion of physical activity to sedentary adults identified through primary care can lead to sustained small to medium improvements in self-reported physical activity. 15 RCTs were included in the review each assessing the effectiveness of different types of physical activity interventions within primary care including brief advice, exercise referral programmes, exercise on prescription programmes and green prescription programmes. For every 12 sedentary adults that were exposed to an intervention, one reported achieving the recommended level of physical activity at follow up one year later (i.e. the number needed to treat was 12). This compared favourably with the estimated number needed to treat of 50-120 for smoking cessation services (Orrow et al. 2012). However this study was unable to differentiate if some types of interventions were more effective than others, with the authors also questioning if ERS were any more effective than brief advice interventions.

The following sections review the evidence of efficaciousness / effectiveness of the different types of primary care based / initiated physical activity interventions. First the evidence relating to the efficaciousness / effectiveness of Brief Advice, Brief Interventions and Motivational Interviewing interventions is reviewed, followed by the evidence for ERS and EOPs.

2.4.4 Brief Advice, Brief Interventions & Motivational Interviewing Interventions

There is some evidence to suggest offering brief advice in primary care can lead to increased physical activity levels and move patients along the stages of change for physical activity engagement. A RCT study (Ortega-Sanchez et al. 2004) examined whether brief advice by a primary health care physician was effective in increasing or maintaining young adults (n = 448) (with a mean age of 17 ± 2.4 years) physical activity

levels over a one year period. The intervention group received brief physical activity advice tailored to their current physical activity levels – i.e. whether they were inactive, partially active or active, and the control group received no intervention. Results were highly favourable towards the efficaciousness and effectiveness of brief advice – the intervention group increased its proportion of "active" individuals at both 6 month (31% increase) and 12 months (41.5% increase) while in the control group there was a decrease in the proportion of individuals classified as "active" at 6 months (a 12.5% decrease) and 12 months (a 9.1% decrease). Individuals in the interventions groups were also exercising more regularly, for longer periods of time and at a higher intensity than the control group at follow-up.

Grandes et al. (2009) conducted a large RCT, involving 56 GPs and over 4000 patients, to assess the effectiveness of physical activity advice in primary care. Concurring with the findings of Ortega-Sanchez et al. (2004) the intervention group (divided into two subgroups of patients who received (1) verbal physical activity advice alone *or* (2) verbal advice plus a written exercise prescription) took part in significantly more physical activity per week, with a higher proportion achieving the minimum recommended level per week at 6-month follow-up compared with controls (who received usual care). Furthermore 10.8% more patients in the intervention groups were in the preparation, action or maintenance stage of change at 6 months. However the intensity of the intervention affected outcomes as the patients who received the most intensive intervention (advice plus prescription) showed significantly greater program effects. The strengths of this study included that it was performed in a "real world" setting, however the high-intensity of the intervention (required GP to spend 15 minutes counselling patients) meant it was notably time-consuming for the GPs involved and according to the authors "markedly increased" their workload. Thus it is questionable if such an intervention would be feasible within general primary care practice especially in an Irish context.

A high quality systematic review of literature concerning methods of promoting physical activity conducted by The Swedish Council on Technology Assessment in Health Care in 2007, further added to the evidence supporting physical activity advice and counselling in primary care. Fifteen studies were reviewed, the majority of which took place in everyday clinical practice and combined verbal advice with one or more

additional interventions such as individualised prescription of physical activity, support phone calls, information about local exercise facilities etc. The studies varied in intensity, provider of the support/advice, recruitment of participants, duration, the type of physical activity engaged in (e.g. walking, gym-based exercises) and the location where the physical activity took place (e.g. home, a leisure centre etc). Overall advice and counselling in everyday clinical practice was consistently shown to increase physical activity levels by 12% to 50% after 6 months or longer. The more frequent and intensive advice and counselling interventions additionally boosted physical activity levels. Furthermore advice and counselling was found to be 15% to 50% more efficacious and / or effective when combined with an exercise prescription, pedometers, exercise diaries and discussions about goals (Swedish Council on Technology Assessment in Health Care 2007).

As briefly discussed previously in section *2.3.2. Use of Theory in Practice*, evidence suggests physical activity counselling based on behavioural change models may be particularly effective in increasing physical activity levels in comparison to usual care. Steptoe et al. (1999) conducted an RCT (n = 883) to determine the effect of behavioural counselling in primary care based on the Stages of Change model. Participants in the intervention arm were invited to two to three behavioural counselling sessions delivered by a primary care nurse, and participants also received follow-up support telephone calls from the nurse to consolidate the counselling. Participants in the control arm received standard care. Results of this study showed that behavioural counselling based on the Stages of Change model led to greater improvements in healthy behaviours, including increased physical activity levels, in comparison to standard care at four month follow-up and these improvements were sustained at 12-month follow-up (Steptoe et al. 1999). Calfas et al. (1996) conducted a very similar non-randomised controlled trial involving 255 sedentary adults recruited from GP offices. Participants in the intervention arm received 3-5 minutes of physical activity counselling based on the TTM and SCT from their GP during a routine visit, and also received a follow-up booster phone call (from a health educator) two weeks post counselling. Control participants received standard care. At follow-up (4-6 weeks post intervention), intervention participants reported a greater increase in walking and a greater increase in readiness to adopt physical activity in comparison to controls. The systematic review by The Swedish Council on Technology Assessment in Health Care (2007) also reported

that physical activity interventions based on behavioural change models, most commonly the TTM and the SCT or a combination of both, are 10%-15% more successful at increasing physical activity levels in comparison to usual care. More intensive/extensive interventions resulted in greater increases in physical activity. This review especially highlighted that self-efficacy (i.e. a person's confidence in their ability to change their behaviour) *was a significant mediator for increasing physical activity levels*" (Swedish Council on Technology Assessment in Health Care 2007, p. 18; Hellėnius 2011).

However other studies have questioned the long-term effectiveness of advice and counselling interventions in primary care. A RCT study by Harland et al. (1999) compared the effectiveness of different methods of intervention (including brief advice and a range of different intensities of motivational interviewing combined with vouchers for leisure centre attendance) against controls. At the 12 week follow-up a greater number of intervention group participants reported increased physical activity levels in comparison to controls, and again individuals who received the most intensive interventions reported the greatest increases in physical activity scores. However at 12 month follow-up the increases in physical activity levels were not maintained for any group, which led the authors to conclude that brief interventions promoting physical activity in primary care "are of questionable effectiveness".

Similar findings were reported by Hillsdon et al. (2002) who compared the efficaciousness and effectiveness of two different types of intervention - (1) direct advice only and (2) Motivational Interviewing – to increase physical activity levels against a no-treatment control group. Participants within the intervention groups received one face-to-face session with the health promotion specialist delivering the intervention and then periodically received "support" phone calls over a 34 week period. Intention to treat analysis revealed all groups increased their physical activity levels at 12-month follow-up, but there were no significant differences in physical activity levels between any of the groups. However the participants in the Motivational Interviewing group (again the most intensive intervention) who *completed* the study *did* increase their physical activity levels significantly more than controls (while the direct advice group did not increase their physical activity levels significantly more than the controls); and the Motivational Interviewing group also experienced a greater reduction

in diastolic blood pressure than the direct advice group. The authors suggested more intensive interventions are likely to be more efficacious / effective than brief advice, but based on the results of the study they would not advocate *"blanket physical activity promotion in primary care"*. There were some limitations to these studies however that may have affected results. Firstly although it was the participants primary care physician who invited the participants to participate in the studies (and attend the health checks); it was the study researchers who actually delivered the brief advice/motivational interviewing in both studies. Thus it could be argued that participants would be more likely to adhere if the advice and counselling had been delivered by the participants GP (known to be a trusted and influential source of advice) rather than by researchers. It is also questionable if the control group in the study by Harland et al. was a "true" control group, as the authors themselves conceded that the control group received a "considerable intervention", which may have acted to dilute the apparent effects of the intervention group. No participant follow-up support was provided in the study by Harland et al. (1999) post the 12 week intervention. Similarly the average number of support phone calls that were successfully made to participants in the study by Hilsdon et al. (2002) over the 34-week period was only 3 − thus the amount of support the participants received during the interventions was limited. Finally the study by Hilsdon et al. (2002) suffered from high loss to follow-up, thus the authors acknowledged that the use of intention-to-treat analysis *"may also explain in part why our findings are less encouraging than that found"* in similar trials.

In conclusion studies on the effectiveness of brief advice and motivational counselling in primary care, although not unanimous, suggest that they are effective in increasing physical activity levels at least in the short-term. However further research is needed to determine if these positive effects are sustained long-term (Tulloch et al. 2006). Evidence also suggests although brief advice does seem to produce some positive effect, more intensive interventions involving use of behaviour change models, goal setting, prompts and frequent follow-up appear to be much more efficacious (Tulloch et al. 2006; Swedish Council on Technology Assessment in Health Care 2007). However such interventions are likely to place a lot of demand on GPs and primary care professionals and may not be feasible in everyday practice. An interdisciplinary model is believed to offer the best potential to address this issue (Tulloch et al. 2006; Stange et al. 2002), whereby primary care professionals form relationships with other allied health

professionals within the community with the aim of providing a comprehensive physical activity intervention. Tulloch et al. (2006) believes the cross disciplinary model has many advantages including that it reduces the time demands on primary care professionals while giving them the opportunity to exert influence on patients physical activity behaviour.

> we propose an interdisciplinary model in which primary care physicians use their credibility and existing relationship with their patients to recommend physical activity behaviour change, and offer referrals to an allied health professional for specialized treatment. In this model, the different members of the health care team take appropriate and complementary roles to increase treatment effectiveness and health care system efficiency by creating an alliance between clinical interventions and broader community (Tulloch et al. 2006, p. 17)

The interdisciplinary model holds promise because a) it acknowledges the barriers GPs face in physical activity counselling but is cognisant of the potential power they hold to influence patient decision making and reach large proportions of the population, b) it acknowledges that physical activity counselling by GPs alone is unlikely to result in long-term behaviour change without on-going patient support and c) is more likely to be sustainable as it utilises the resources of a number of different sectors rather than solely depending on GPs (Tulloch et al. (2006); Stange et al. 2002; Gjeltema 2001 cited in Stange et al. 2002). Interdisciplinary models can be located within ERSs and many forms of EOP programmes (including the Green Prescription Programme).

2.4.5 Exercise Referral Schemes (ERS)

ERS are employed throughout the UK, Spain and in Scandinavian countries (Pavey et al. 2011[b]); however the evidence base for their effectiveness has been described as "*equivocal*" (Murphy et al. 2012, p. 1). Studies on the effectiveness of ERS are among the most plentiful of all of the interventions discussed in this review. However a common limitation of many studies is that they have not been conducted in a "real world" setting, and as such have not used the direct involvement of primary care professionals (with researchers assuming the role of the primary care professional in terms of patient recruitment/referral instead). Furthermore the types of ERS evaluated within studies vary greatly in terms of scheme duration (from 8 weeks in some studies to 2 years in others) and the location where the activities take place (leisure centre verses outdoor walks etc) (Williams et al. 2007). These are factors which are likely to affect eventual outcomes thus making drawing definitive conclusions about the

effectiveness of such schemes and making direct comparison between studies difficult. However bearing these limitations in mind, the following section gives an overview of the current evidence base for ERS.

2.4.5.1 General characteristics of participants recruited to ERS

Participants recruited/referred to ERS were generally white and middle-aged, with a higher number of females' taking up the offer of an ERS than males (Pavey et al. 2011; Williams et al. 2007; Lee et al. 2009; Gidlow et al. 2005). There is some evidence to suggest green exercise based referral schemes, e.g. Green Gyms and conservations projects are more successful in recruiting male participants (Yerrell 2008; Wilson 2009). The majority of participants recruited to ERS fell into one or more of the following categories: had a sedentary lifestyle; had at least one cardiovascular risk factor such as high blood pressure; were overweight or obese; had diabetes; had mobility issues and/or had poor cardiovascular fitness (Pavey et al. 2011; Williams et al. 2007; Lee et al. 2009).

2.4.5.2 Effect of ERS on physical activity levels

Evidence from a number of key RCTs and systematic reviews of RCTs suggest ERS are effective in increasing physical activity levels at least in the short-term. A RCT by Taylor et al. (1998) found ERS scheme participants engaged in significantly more moderate physical activity per week 8 weeks into the 10 week scheme in comparison to controls. Following this two systematic reviews in more recent years provided further evidence that ERS could increase moderate physical activity levels. A review of 5 RCTs conducted by Williams et al. (2007) concluded that ERS resulted in a statistically significant increase in the numbers of sedentary people becoming more moderately active. Although the absolute risk reduction was small with 17 people needing to be referred for one to become moderately active, it is worth noting using "moderate" physical activity as a threshold to measure programme effectiveness may have been too high and thus may have ignored those who made smaller increases in their physical activity levels (Williams et al. 2007). A naturalistic observation study conducted by Hanson et al. (2013) involving over 2000 patients referred to a 24 week ERS in the UK found that patients who completed the scheme reported significantly increased physical activity levels. Even though the levels achieved were below the current physical activity guidelines (mean of 52 minutes/week of moderate physical activity pre programme versus mean of 81 minutes/week of moderate physical activity post-programme), even

small increases in physical activity levels can lead to health improvement and improvements in cardiovascular fitness and thus should be welcomed (Hanson et al. 2013; DoH&C, HSE 2008; Church et al. 2007).

Four of RCTs reviewed (Murphy et al. 2012; Stevens et al. 1998; Isaacs et al. 2007; Lamb et al. 2002) conducted longer-term follow-ups than Williams et al. (2007) and Hanson et al. 2013). Murphy et al. (2012) conducted an independent RCT on the Welsh National Exercise Referral Scheme in the UK and found that although all patients in the intervention group had higher levels of physical activity at 12 months this was only of borderline statistical significance. However rather interestingly those who were referred for Coronary Heart Disease risk factors were the only group who displayed significantly increased physical activity levels in comparison to controls, suggesting reason for referral may have the potential to affect outcomes. Stevens et al. (1998) examined the effects of an exercise referral programme on 714 middle-aged, sedentary patients. Intervention participants were invited to a consultation with an exercise specialist, and offered a personalised 10 week programme to increase their level of regular physical activity. Intervention participants were informed of the existing recommendations on physical activity and health, but they were not pressured into achieving these standards. The physical activity options offered to intervention participants, which included leisure centre and home-based activities, "*were designed to increase what the participants already did, rather than to try to force major changes to lifestyle*".The control group received basic information about local leisure centres. Eight months after the intervention there was a 10.6% reduction in the proportion of people classified as sedentary in the intervention group compared with the control group. The intervention group also reported an increase in the mean number of times they engaged in physical activity per week compared to controls. Again this trial concluded moderate physical activity can be successfully encouraged in previously sedentary adults through exercise referral from primary care. However an interesting unexpected finding from this study was that the majority of the participants within the intervention group choose to exercise outside the leisure centre, preferring to engage in walking as an activity. This led the authors to theorise that increasing the opportunities for activities not requiring leisure centre attendance, such as walking based activities, may have had an even greater impact on the prevalence of inactivity.

Isaacs et al. (2007) tested this theory in an RCT which compared the effectiveness of GP referral to a leisure centre based exercise programme versus referral to a community based walking group (each programme lasting 10 weeks) against physical activity advice alone in 943 middle-aged adults. Increases in the number of participants achieving at least 150 minutes of moderate physical activity per week (i.e. meeting the recommended guidelines) were seen across all three groups at 6 month follow-up (13.8% in leisure centre group; 11.1% in walking group; 7.5% in advice only group). Although not proving the theory set forth by Stevens et al., the authors concluded that referral to a walking scheme is as effective as referral to a leisure centre, and furthermore is cheaper.

In a similar study Lamb et al. (2002) examined if referral to a lay-led, community based health walks scheme was more effective in encouraging middle-aged adults to increase physical activity levels compared to physical activity advice alone. In relation to *trial completers*, at the 12-month follow-up the proportion of "active" (defined as engaging in 120 minutes of moderate intensity physical activity per week) in the health walks group increased by 35.7%, while the proportion of active people in the advice only group also increased but to a lesser degree at 22.6%. Thus the difference between the groups was 13%. Analysis of the continuously scaled physical activity items supported the trend of improvement in activity. People in the health walks arm of the trial increased the frequency of moderate intensity activity more than the advice only group, however there were no statistically significant differences between groups in terms of total amount of activity. Even in the absence of a statistically significant difference between the intervention and control arms of the study the authors concluded that "*the relatively modest effects demonstrated in this trial are likely to be worthwhile considering the importance and prevalence of physical activity as risk factor for cardiovascular disease*". Also echoing the findings of Isaacs et al. (2007) the authors stated that "*lay-led walking programmes have the potential to offer cheap and effective physical activity promotion in primary care*". Further evidence supporting the potential of walking schemes over leisure-centre based programmes came from a comprehensive review by the Swedish Council on Technology Assessment in Healthcare (2007) which found that programmes which encourage walking, are home-based and include regular follow-ups are the most effective in increasing physical activity levels among inactive adults.

Both leisure centre based ERS and community walking based ERS have also been found to successfully move participants through the stages of change for physical activity (Lamb et al. 2002; Williams et al. 2007). Within qualitative studies on ERS participants have also self-reported increased physical activity levels following programme participation (Wormald and Ingle 2004; Wormald et al. 2006).

Green exercise referral programmes have not been subjected to rigorous efficacy or effectiveness trials, the majority of research conducted on green exercise programmes has been cross-sectional or observational in nature. However a number of these observational studies have provided some evidence that green exercise programmes can report increases in the physical activity levels of participants. Wilson (2009) conducted a pre-post evaluation of the pilot "Branching Out" programmes in Scotland. "Branching Out" was 12 weeks in duration and involved weekly health walks, nature conservation activities and other forms of green exercise. In total 77 participants completed pre and post programme measures, all of whom had been referred with mental health difficulties. Results showed a significant increase ($p=.003$) in participants' physical activity levels at follow-up. Yerrell (2008) conducted a pre-post evaluation on the BTCV Green Gym projects, which included outdoor and country walks and gardening programmes as activities. In total 194 participants completed pre and post programme questionnaires. Participants included self-referred volunteers and volunteers who had been referred from health and social care professionals for a variety of reasons. Similar to the findings of Wilson (2009) averaged results showed an increase in the physical activity levels of participants at follow-up (although this was not significant ($p=.095$). However both studies by Wilson and Yerrell relied solely on participant self-report measures however, and thus results are open to reporting bias, such as social responsiveness bias (Cook 2010). Social responsiveness bias occurs when participants provide what they feel are socially desirable responses when, for example, filling in surveys or questionnaires (i.e. participants provide more positive responses after an intervention) (Cook 2010). This type of bias is most likely if participants think the researcher or their clinician will be privy to the results of their outcomes (Cook 2010).

Overall, however, the current consensus on ERS in the UK is not very positive. Two key reviews of ERS in the UK have raised concerns about the effectiveness of ERS both in terms of ability to increase physical activity levels and in terms of value for money.

Firstly a review of RCT of ERS carried out by the National Institute for Health and Clinical Excellence (NICE) in 2006, concluded that there was "*insufficient evidence*" to support the routine use of ERS and stated a need for further trials on scheme effectiveness. This was later followed up by Pavey et al. (2011[a&b]) who conducted a review of 8 RCTs on ERS, whereby GPs in primary care were the main referrers and scheme duration was typically 10-12 weeks. In this review Pavey et al. (2011[a&b]) found "*weak*" evidence of an increase in physical activity levels after participation in the scheme in comparison to usual care. Specifically they reported a 16% increase in the relative risk of ERS participants engaging in 90-150 minutes of at least moderate intensity physical activity per week in comparison to usual care. However in accordance with the NICE review, Pavey et al. (2011[a], p. xi) were not convinced about the strength of the evidence of the effectiveness of ERS, and concluded "*there remains very limited support for the potential role of ERS for impacting on physical activity, and consequently public health*". Concurring with the NICE report Pavey et al. outlined a need for further research on ERS. Recommendations for further research included research to identify the determinants of ERS uptake and adherence; as well as research to determine the effects of different programme components on scheme effectiveness (e.g. the role of ERS staff). In addition it was recommended that theory driven interventions should be developed to improve the ability of ERS to sustain long-term changes in physical activity levels (Pavey et al. 2011[a]). NICE is currently updating the guidance document for the use of ERS, which is due for publication in January 2015 (NICE 2013).

2.4.5.3 Effects of ERS on Clinical Indices

The research examining the effect of ERS on clinical indices is limited. The recent review by Pavey et al. reported inconclusive evidence to support the benefits of ERS in relation to clinical indices. Nonetheless significant reductions in waist circumference, mean weight, body mass index and skinfold measurement have been reported from other studies (Taylor et al. 1998; Williams et al. 2007; Lee et al. 2009). Other reported benefits have included improvements in cardiorespiratory fitness, reductions in resting heart rate and reductions in cholesterol levels (Williams et al. 2007; Isaacs et al. 2007). Other *self-reported* benefits from ERS participation included a reduction in joint stiffness and healthier lifestyle habits (e.g. healthier eating habits) (Wormald and Ingle 2004).

Reductions in blood pressure have also been reported - in one audit study systolic blood pressure reduced by an average of 7 mmHg in males and 4 mmHg in females and diastolic blood pressure reduced by an average of 4 mmHg in males and 2 mmHg in females over the course of a 10 week scheme (Lee et al. 2009). Isaacs et al. (2007) reported evidence of sustained reductions in systolic blood pressure of 6mmHg one year post programme completion. Taylor et al. (1998) found reductions in blood pressure were directly related to programme adherence with high adherers (classified as participants who attended 15 or more exercise sessions over the 10 week programme) experiencing greater reductions than low adherers (classified as those who attended less than 15 sessions over the 10 week programme).

From a critical stance however it must be acknowledged that blood pressure is naturally variable (British Hypertension Society 2010), and thus some variability (i.e. decreases or increases) in blood pressure readings from pre programme to post programme are to be expected. Thus it is *possible* that reported decreases in blood pressure readings in the aforementioned studies were, at least to some degree, the result of natural variation in participants' blood pressure, rather than exclusively the result of ERS participation. Another potential source of blood pressure measurement error that could account for the reported decreases in blood pressure readings in the aforementioned studies is improper blood pressure measurement technique (Handler 2009). Research suggests that improper blood pressure measurement technique (e.g. obtaining a reading from an unsupported arm or taking a reading while the subject is talking) can commonly result in measurements errors of 5 mmHg to 10 mmHg (Handler et al. 2009). However in support of the three aforementioned studies (Lee et al. 2009; Issacs et al. 2007; Taylor et al. 1998) it would seem very unlikely that three separate research teams would have used improper blood pressure measurement techniques.

2.4.5.4 Effect of ERS Mental Health & Psychosocial Variables

Again the research examining the effect of ERS on mental health and psychosocial variables is limited. There is evidence to suggest exercise referral programmes can effectively reduce depression and anxiety levels and improve mental wellbeing scores and furthermore some studies found these positive effects can be maintained over time (Murphy et al. 2012; Isaacs et al. 2007). Pavey et al. (2011[b]) also found evidence of a short-term reduction in depression among sedentary individuals who participated in an

ERS. Although the same review by Pavey et al. found inconsistent evidence to support the benefits of schemes in relation to quality of life, process and audit evaluations of "real world" exercise referral programmes have reported significant improvements in psychological (e.g. reduced anxiety levels and reductions in levels of depression), social, emotional and physical scores at follow-up (Williams et al. 2007; Lee et al. 2009). Wilson (2009) and Yerrell (2008) found evidence of improved subjective mental health, wellbeing and physical functioning following participation in green exercise referral programmes. Within qualitative studies participants have also reported deriving physical, social and psychological benefits as a result of ERS participation (Williams et al. 2007). Examples of reported benefits include increased self-confidence and improved well-being as a result of ERS involvement (Wormald and Ingle 2004; Wormald et al. 2006). Participants also commented how the programme proved them with a temporary escape from problems and furthermore the accomplishment of participating in and completing the scheme provided them with a sense of achievement and satisfaction.

2.4.5.5 Wider Ranging Benefits of Green Exercise- & Walking-Based Programmes

Participants in green exercise referral schemes have consistently self-reported improvements in self-esteem, self-confidence, reductions in stress, increased sense of relaxation, reduction in depressive symptoms, increased feelings of positivity, weight reduction and improved mobility and agility (Wilson 2009; Yerrell 2008; Peacock et al. 2007). Green exercise referral programmes tended to be group-based and as a result many participants reported numerous social benefits from taking part including: improved social skills; increased opportunities for social engagement and feelings of social inclusion; and enjoyment from socialising with like-minded people (Wilson 2009; Peacock et al. 2007). Interestingly in one cross-sectional study involving 108 referred and self-referred participants of various different green exercise programmes, 89.6% of these participants attributed the physical, mental and social benefits they had gained to the fact they were exercising outside in the presence of nature (Peacock et al. 2007). In addition Peacock et al. (2007) stated the ability of green exercise programmes to facilitate social networking and connectivity *and* improve mental and physical wellbeing can contribute to the development of healthier communities.

Similarly participants from community-walking programmes in Australia and the UK reported wide-ranging benefits of programme participation (Bayly and Bull 2001; Milton et al. 2011). These benefits included not only increased participation in physical activity and physical health benefits but also the development of social networks with others in the walking group / community, development of friendships, increased sense of belonging, increased social support (Bayly and Bull 2001; Milton et al. 2011). The social support provided by the social networks formed within walking groups is also believed to have an important influence on changing physical activity behaviour; for example by encouraging ongoing adherence to the walking group (Milton et al. 2011). Walking interventions that encourage participation of all age groups have a particular advantage over other types of physical activity interventions targeted specifically at adults (e.g. gym-based interventions) as they allow for participation and interaction as a family unit (Milton et al. 2011).

Being part of a community walking *group* may also have the advantage of reducing perceived environmental barriers to walking within ones neighbourhood (Dawson et al. 2007[a]; Dawson et al. 2007[b]). For example walking in a group may help alleviate commonly reported environmental barriers to walking such as worries about personal safety when walking alone and the barrier of not having someone to walk with (Dawson et al. 2007[a]; Dawson et al. 2007[b]). There is also evidence to suggest "*walking in the local neighbourhood increases the potential for chance encounters or social interaction, which in turn can increase the sense of community and social control*" (Sinnett et al. 2011, p. 14). Previous research has also suggested community-based walking programmes contribute to the development of social capital and contribute to community development within communities (Bayly and Bull 2001; Sinnett et al. 2011; Chau 2007); however establishing definite causal relationships is difficult (Chau 2007).

2.4.6 Exercise on Prescription (EOP) Programmes

Physical activity prescribed by GPs and other health care professionals has gained popularity in recent years, and is commonly used in countries such as Sweden, Denmark and New Zealand (Hellènius 2011; SØrensen et al. 2010). Research available for EOPs was not as plentiful in comparison to amount of research available for ERS. However the advantage of the available research was that it was conducted in a "real world"

setting whereby primary care health professionals were directly involved in providing the prescriptions to their patients.

Most EOP's share many similarities with ERS with the main difference been that in addition to referral to a third party for a programme of physical activity and support, patients are also provided with a written physical activity prescription from their primary care professional. Although it should be noted some EOP programmes do not involve referral to a third party, the majority of the EOP and Green Prescription studies reviewed below included a referral component in keeping with the interdisciplinary approach. EOP programmes are based on the idea that "prescriptions" hold a symbolic and significant meaning for patients, represent a well-understood interaction between patient and physician (Swinburn et al. 1998; Persson et al. 2013).

> The routines for prescription and the layout of the prescription itself have been developed to resemble prescriptions for medicines, as a way to enhance the significance of the prescription (Persson et al. 2013, p. 2)

Prescriptions also provide a tangible reminder of the exercise goals set between the physician and patient and thus act as a source of motivation (Swinburn et al. 1998; Persson et al. 2013; Gribben et al. 2000). Research suggests EOPs within the health care system are a feasible and effective method to increase patients' physical activity levels (Hellénius 2011).

2.4.6.1 Effect of EOP Programmes on physical activity levels

SØrensen et al. (2010) reported on the results of an uncontrolled follow-up study involving 449 participants in four Danish EOP programmes. Patients were first assessed by their GP for their readiness to change and suitable patients were then issued with a written physical activity prescription, and referred onto a trained physical activity instructor for group-based training sessions and a series of motivational counselling sessions and health-profile assessments (SØrensen et al. 2010). Participants were found to have increased their physical activity levels from baseline to four months (intervention end point), and maintained these improvements until the end of the 16-month observation period. Specifically the results suggested "*that one in three participants who…participate[d] in the study achieved an important improvement [an increase of 1 MET per day which is equivalent to walking an extra 10-15 minutes per day] in self-reported physical activity…after 4 months*" (SØrensen et al. 2010, p. 58).

Kallings (2008) reported similar findings in an observational study on patients (n = 481) issued with a physical activity prescription, as part of Sweden's "Physical Activity on Prescription" (PAP) programme. Like the participants in the study by SØrensen et al. (2010), these participants also reported significantly increased physical activity levels and in addition showed progression through the stages of change at 6 month follow-up (Kallings 2008). Kallings (2008) also conducted a second study, a prospective cohort investigation, involving 101 participants (54 assigned to a control group; 47 assigned to an intervention group). The control group received a minimal intervention of written information about the importance of physical activity for health. The intervention group received patient centred counselling on the importance of physical activity, a written physical activity prescription, a group counselling session, short-telephone follow-up support, they were also provided with pedometers and directed towards group-based activities. The theoretical framework used to guide the intervention was based on SCT, the TTM, Motivational Interviewing and social support (Kallings 2008, p. 20). At 6-month follow-up self-reported physical activity increased in both the control and the intervention group, but increased significantly more in the intervention group. The intervention group also engaged in significantly more physical activity sessions per week than the control group. Both groups also significantly decreased their median daily sitting time, with the intervention group reducing median daily sitting time by 2 hours and the control group reducing median daily sitting by 1 hour (Kallings 2008). The fact the control group received a minimal intervention rather than no intervention is likely to have diluted the magnitude of effect found in the intervention group.

A much larger observational study by Leijon et al. (2008) (n = 6300), which analysed the effectiveness of an EOP scheme implemented in routine primary health care practice in Sweden over a 2 year period, provided further support for the effectiveness of EOP programmes. Primary health care staff issued eligible patients with written physical activity prescriptions and usually referred patients to local community based physical activity organisations for group-based activities. Participants could also engage in lifestyle-based activities such as walking if they preferred. The scheme was found to be effective in increasing physical activity levels in both the short term and the long term, with approximately 50% of patients reporting an increase in physical activity levels at both the 3-month and 12 month follow-up. Furthermore the

proportion of "inactive" participants reduced from 33% at baseline to 20% at the 12 month follow-up. A number of interesting factors were associated with increased physical activity including the following: (a) participants issued a prescription by a physician or nurse increased their physical activity to a greater extent than those issued a prescription by a physiotherapist – suggesting the importance of the prescriber in predicting outcomes; (b) those who were least active at baseline increased their physical activity the most at 12 month follow-up – thus the programme provided benefits to those with most to gain; and (c) those prescribed lifestyle based activities such as walking increased their physical activity to a greater extent than those prescribed leisure facility based activity (again echoing the findings of the review from Swedish Council on Technology Assessment in Healthcare (2007) that walking based activities are among the most effective).

One of the earliest studies on the Green Prescription initiative in New Zealand found this model more effective in increasing physical activity levels than verbal advice alone (Swinburn et al. 1998). The results of this RCT showed over a 6 week period 73% of patients issued with a Green Prescription by their GP (walking was the most popular activity prescribed by GPS) increased their total physical activity levels (by over one hour per week), in comparison to 63% of patients in the verbal advice group. Furthermore the patients participating in recreational physical activity increased by 35% in the Green Prescription group in comparison to 21% in the verbal advice group. Additionally the number of patients in the Green Prescription group who reported participating in physical activity as part of their health maintenance plan increased significantly over the course of the 6 weeks (36% at baseline V's 68% at follow-up), signifying not only a change in behaviour but also attitudes towards the health benefits of physical activity. The limitations of this study were the short period to follow-up (6 weeks) and the lack of a proper control group (i.e. the provision of physical activity advice to patients was in itself an intervention).

More recent studies on the Green Prescription programme have included longer term follow-up and the use of controls. Elley et al. (2003) conducted a cluster randomised controlled trial to test the effectiveness of the Green Prescription programme. The study followed patients issued with a Green prescription (n=878) aged 40-79 years, with sedentary lifestyle, from 42 general practices over a 12 month period.

The results supported the findings of Swinburn et al. (1998), with a higher increase (14.6%) in the number of intervention (Green Prescription) patients achieving minimum physical activity recommendations – i.e. 150 minutes of moderate intensity physical activity per week - at 12 months in comparison to controls (4.9%) who just received usual care. In this study one in every ten patients issued with a Green Prescription achieved and sustained at least 150 minutes of moderate intensity physical activity at 12 months, although this is a higher "number needed to treat" than that reported by SØrensen et al. (2010) it is still acceptable and, again, compares very favourably with the number needed to treat in other commonly used interventions such as smoking cessation programmes (Orrow et al. 2012).

Lawton et al. (2008) conducted a RCT to test the effectiveness and sustainability of a Green Prescription programme with extended support over two years. Patients in the intervention group were issued with a Green Prescription by their GP or nurse and received 9 months of follow-up support from a community based Green Prescription facilitator. Patients were recommended to build up to 30 minutes of brisk walking 5 days per week. Patients also received a face-to-face visit from their nurse at 6 months. At baseline 10% of intervention participants and 11% of control participants were meeting the recommended levels of physical activity per week (150 minutes of moderate intensity physical activity per week). At 12 month follow-up a greater proportion of both the intervention group and control were achieving the recommended amount of physical activity, however the intervention group displayed the greatest increases (43% V.'s 30%). A greater proportion of the intervention group also sustained this increase at 2 years (39.3% V.'s 32.8%). In comparison to findings of Elley et al. (2003) a substantially greater number of participants increased their physical activity to recommended levels at follow-up, with the authors suggesting these findings are possibly attributed to the increased and prolonged level of support provided. The authors could not account for the high increases in physical activity levels among controls over the course of the intervention. However it is possible the control participants altered their physical activity levels over the course of the study period as they knew from the start of the intervention they were taking part in a "*lifestyle study*". It is also possible that knowing they were participating in a lifestyle study encouraged socially desirable reporting among control participants (i.e. falsely reporting higher

levels of physical activity than they actually did in reality in an aim to provide a socially desirable response) at follow-up.

The effectiveness of the Green Prescription programme in increasing the physical activity levels of older (aged 65+), community dwelling participants was also examined as a post-hoc subgroup analysis of the above trial. The results were very positive and concurred with previous findings – with physical activity levels found to have increased more within the intervention group in comparison to controls at 12 month follow-up (Kerse et al. 2005).

2.4.6.2 Effect of EOP Programmes on Clinical Indices & Psychosocial Variables

Research on the effectiveness of physical activity on prescription programmes in improving clinical indices is very limited. One study reported a trend towards decreased blood pressure at 12 month follow up (Elley et al. 2003), however this trend could potentially be the result of natural variation in participants blood pressure (British Hypertension Society 2010) rather than as a result of EOP programme participation. Another study reported physical activity on prescription patients had undergone significant decreases in all measures of central obesity and greater decreases in total body weight in comparison to control patients at 6 month follow-up (Kallings et al. 2008). In analysing the effectiveness of the Green Prescription on older participants Kerse et al. (2005) noted an overall decrease in the number of hospitalisations of intervention group participants in comparison to controls at 12 month follow-up.

2.4.6.3 Effect of EOP Programmes on Mental Health & Psychosocial Variables

Numerous studies have reported sustained and significant improvements in quality of life and health related quality of life scores among participants of EOP and Green Prescription programmes (Kallings 2008; Elley et al. 2003; Kerse et al. 2005; SØrensen et al. 2010). SØrensen et al. (2010) found that for every 4 to 10 participants issued a prescription one participant reported an improved quality of life. Lawton et al. (2008) also found evidence of improved mental wellbeing scores of Green Prescription participants at both 12 month and 24 month follow-up.

2.4.7 Long-term Effectiveness of ERS & EOP Programmes

Orrow et al. (2012) found evidence that physical activity interventions in primary care can achieve sustained improvements in activity levels at 12 months; however this review was unable to clarify if different types of interventions differed in terms of sustained effects. It is important to ensure interventions are capable of creating sustained increases in physical activity levels as benefits will be lost if participants return to a sedentary lifestyle post-programme completion (Morgan 2005). The long-term effectiveness of ERS has been questioned many times throughout the literature. A review by Pavey et al. (2011[a&b]) found "*weak evidence*" that a greater number of ERS participants were achieving 90-150 minutes of at least moderate intensity physical activity at 6-12 months follow-up in comparison to controls. However Pavey et al. also stated the lack of long-term follow-up within ERS studies generally, caused difficulties in establishing long-term effectiveness. Williams et al. (2007) reported inconclusive evidence regarding long-term programme effects, while Taylor et al. (1998) found only weak evidence supporting longer-term effects with improvements in body mass and blood pressure sustained during follow-up at 26 and 37 weeks post intervention. However the studies by Murphy et al. (2012), Stevens et al. (1998), Isaacs et al. (2007) and Lamb et al. (2002) did find evidence of long-term effectiveness (in terms of either increased physical activity levels, improved clinical indices and improved psychosocial variables) up to 12 months post programme completion.

The evidence base for the long-term effectiveness of EOPs and Green Prescription programmes (that involve the referral of patients to a third party) appeared quite solid with most studies showing evidence of effectiveness one to 2 years post programme completion (SØrensen et al. 2010; Leijon et al. 2008; Elley et al. 2003; Lawton et al. 2008; Kerse et al. 2005).

2.4.8 Uptake and adherence to ERS & EOP Programmes

Physical activity programmes can only be effective if sufficient numbers of the population not only join them but also sustain their participation until programme completion. Uptake and adherence are common basic methods of measuring ERS and EOP success. Uptake refers to the proportion individuals offered entry / referred to an ERS or EOP programme who attend the first exercise session; while adherence refers to the proportion of individuals who continue to participate in the ERS / EOP following

initial uptake (Pavey et al. 2012; Hanson et al. 2013). Adherence "rate" refers to the proportion of participants who complete a physical activity programme following initial uptake (Pavey et al. 2012). Low uptake rates and, particularly, low adherence rates of participants are common problems associated with ERS (Stevens et al. 1998; Lamb et al. 2002). Hanson et al. (2013) reported a relatively high uptake with 81% of participants accepting the offer of an ERS, however only 42.9% of participants completed the 24 week programme. Others reviews have reported programme completion rates of 12%, 20% and 42% (Williams et al. 2007; Gidlow et al. 2005). Some studies have reported slightly more positive findings with 52%- 55% of ERS participants completing the programme (Lee et al. 2009; Stevens et al. 1998). An evaluation study of a green exercise based referral programme reported a high rate of uptake and a comparatively high rate of adherence (relative to the aforementioned studies) with 70% of participants completing the programme (Wilson 2009).

The adherence rates within EOPs that include referral to a third party for on-going support appear to be slightly more positive, with reported adherence rates of 50-56% in one study (Leijon et al. 2010), 53% adherence in another (Kallings et al. 2009), and 65% and 73% in two other studies (Kallings 2008; SØrensen et al. 2010). Nonetheless there is a general consensus across the literature that strategies are needed to improve adherence to both ERS and EOPs in order to maximise effectiveness (Morgan et al. 2005; Williams et al. 2007). A high uptake and adherence rate would also maximise the cost-effectiveness [7] of ERS and EOPs (Stevens et al. 1998). Furthermore research suggests participants who complete programmes are more likely to sustain positive effects in the long-term (Dugdill et al. 2005). Addressing the barriers and maximising the facilitators of programme uptake and adherence are among the key challenges facing future programmes (Williams et al. 2007; Pavey et al. 2012).

2.4.8.1 Factors Associated with Uptake, Adherence & Programme Success

Following the recommendations for future research outlined by Pavey et al. (2011[a]) (section *2.4.5.2 Effect of ERS on physical activity levels)* this section of the literature review examines the research in relation to the factors determining uptake of and adherence to

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[7] Cost-effectiveness relates to how beneficial an intervention is in relation to the cost of the intervention. *"Cost-effectiveness analysis compares the costs and health effects of an intervention to assess the extent to which it can be regarded as providing value for money. This informs decision-makers who have to determine where to allocate limited healthcare resources"*. (Philips 2009)

physical activity programmes, with a main focus on ERS and EOPs schemes. Other relevant factors affecting programme success (i.e. whether a programme is successful in achieving desired outcomes) are also examined within this section.

Patient Characteristics

Sex and age are known predictors of uptake and adherence. Women are more likely to uptake an exercise referral programme however they are less likely to adhere to it than men (Hanson et al. 2013; Pavey et al. 2012). Older people (50 years of age plus) more likely to begin and adhere to an ERS (Hanson et al. 2013; Pavey et al. 2011; Tobi et al. 2012). Physical activity level at baseline has also been found to predict adherence, with individuals who are inactive at baseline less likely to adhere than participants who are more active at baseline (Taylor et a. 1998; Morgan 2005; Leijon et al. 2010).

Obese individuals have been found to be less likely to adhere to an exercise referral programme than individuals with a lower body weight; this is an important finding considering many of the individual referred to physical activity programmes are likely to be overweight (Hanson et al. 2013).

Personal Barriers

Low levels of self-esteem, low self-efficacy, low motivation, poor self-discipline and poor attitude towards physical activity have also been cited as prominent barriers to programme uptake and completion (Elley et al. 2007 Patel et al. 2012; Jones et al. 2005; Williams et al. 2007). Other personal barriers found to affect programme uptake and participation include illness, injury, clashing work commitments, poor personal organisation, interruption of routine by holidays or illness and caring duties (Hanlon et al. 2010; Gidlow et al. 2005; Williams et al. 2007).

The existence of certain health conditions could act as a barrier to referral or limit the extent to which an individual could partake in a programme. For example conditions like osteoarthritis could be a major obstacle in referral to a walking programme, as walking would cause the individual too much pain resulting in drop-out (Patel et al. 2010; Elley et al. 2007). This is further supported by previous research that found that overall physical activity levels are significantly adversely affected when an individual has a health problem that affects their walking ability (Dawson et al. 2007[a]). This is something which needs to be considered by physical activity programme coordinators

when defining referral criteria. Research also suggests that individuals who have a health condition that restricts walking ability, e.g. joint pain or dizziness, have a tendency to perceive and report a greater number of environmental barriers to walking and physical activity (e.g. fears of tripping on broken pavements or citing too much traffic) than those without such health conditions (Dawson et al. 2007[b]).

On a practical level lack of transport has been reported as a salient barrier for some patients, especially older adults, in relation to getting to organised activities (Patel et al. 2012).

Promotion of Schemes/Programmes

Poor advertisement and promotion of ERSs, resulting in low general awareness of schemes, has been cited as a cause of low programme uptake (Wormald et al. 2006; Horne et al. 2010).

The Role of Primary Health Care Staff

Primary health care staff are known to play a critical role in patient uptake and adherence of programmes, with GP recommendation directly influencing patients' decisions to partake in programmes (Schmidt et al. 2008; Elley et al. 2007). Evidently patient uptake of programmes is primarily dependant on whether health professionals offer a referral to patients. Two qualitative studies examining patient's experiences of an ERS's in the UK, found that schemes were not easily accessible and were poorly advertised by the primary health care staff (Wormald and Ingle 2004; Wormald et al. 2006). Referring health care staff also appeared to have little knowledge about the scheme and provided patients with little or no explanation of what the scheme entailed (Wormald and Ingle 2004; Wormald et al. 2006). The authors believed the "*general lack of understanding and awareness, and the poor efforts to promote and advertise the scheme*" among health care staff indicated that "*many patients who could benefit from it are not being offered the chance to do so*" (Wormald and Ingle 2004). Similarly Kerse et al. (2005) found low uptake was often related to health professionals not referring or forgetting to refer suitable patients during consultations. (Refer to Section *2.4.10 Primary Healthcare Professionals Perceptions of Physical Activity Promotion* for an overview of health care professionals' attitudes towards physical activity promotion within primary care and reasons relating to patient non-referral to schemes).

When it comes to referral, patients have been found to be more likely to uptake the offer of an EOP if they perceive the health professional has tailored the advice given to suit them individually (Elley et al. 2007). Health professionals need to determine the most suitable type of referral for each patient, taking into account the patients' physical ability but also the type of activities they find socially and psychologically acceptable. (Elley et al. 2007). Commonly patients with pre-existing illnesses, e.g. high blood pressure or heart disease, are fearful that engaging in physical activity will exacerbate their condition; similarly older individuals are often fearful of getting injured (Horne et al. 2010; Elley et al. 2007; Patel et al. 2012). This relays the need for health professionals to take the time to allay patients' fears and help them to understand the benefits of engaging in physical activity (Horne et al. 2010).

Internal & External Motivators

Participants readiness to change (or stage of change) at the point of entry into physical activity programmes has also been found to be an important factor affecting adherence rates (Moore et al. 2011; Riddoch et al. 1999 cited in Thurston and Green 2004). Adherence to programmes is also positively associated with greater expectation of exercise outcome (Damush et al. 2001). Participants are often motivated to begin a physical activity programme if they believe the programme will result in physical and mental health benefits (Damush et al. 2001). However it is important to ensure participants have realistic expectations of what changes can actually be achieved during a programmes timeframe in order to improve adherence; as participants with overly optimistic expectations are more likely to get disappointed and drop-out when they don't achieve anticipated changes (Jones et al. 2005). Once involved in the programme participants are often motivated to adhere by the achievement of benefits (Elley et al. 2007; Hanlon et al. 2010). Motivators for continued adherence include finding the programme enjoyable, perceived improvements in sleep, self-esteem and well-being, perceived reductions in anxiety and depression, weight loss, and gaining a sense of achievement as a result of programme participation (Elley et al. 2007; Hanlon et al. 2010). Some studies have also found external motivational prompts, such as physical activity diaries and goal setting activities as "extremely useful" in motivating participants to adhere to the prescribed physical activity plan (Wormald et al. 2006).

The Physical Activity Environment

Many factors related to non-adherence of ERS have been found to be associated with the leisure centre environment e.g. inconvenient opening hours, congested facilities and participants finding the gym environment and equipment intimidating (Gidlow et al. 2005; Williams et al. 2007; Riddoch et al. 1998). Inversely participants have been found to be more motivated to participate in programmes which they perceive to be undemanding, e.g. activities that are low cost, require no special equipment, and are convenient in terms of location (Hanlon et al. 2010; Damush et al. 2001; Schmidt et al. 2008). Furthermore programmes that do not require the use of specialised exercise facilities can lead to more sustainable increases in physical activity (Swedish Council on Technology Assessment in Health Care 2007) For example research suggests activities such as walking, increase levels of moderate physical activity and achieve better adherence than leisure centre-based interventions (Morgan 2005; Leijon et al. 2010; Hillsdon et al. 1995). This is likely to be because simple activities such as walking can more easily be incorporated into everyday life and become habits than more complex behaviours like going to a leisure facility (Leijon et al. 2010). Group-based walking programmes that take place within community settings, and provide social support for behaviour change, have been found particularly effective in increasing physical activity levels of participants (Kahn et al. 2002; Kassavou et al. 2013). On the other hand because walking tends to take place outdoors it can be affected by other barriers such as poor weather and lack of footpaths in rural areas (Elley et al. 2007). Participants involved in walking programmes have highlighted safety issues and the scenic nature of the exercise environment as important factors to ensure continued participation (Hanlon et al. 2010; Milton et al. 2011). Walking programme participants have also suggested that walking programmes should include areas of green space within the walking route, should incorporate activities as part of the walking route (e.g. looking at local landmarks), and should include an end destination to reach on the walks (Milton et al. 2011).

The Structure & Coordination of the Physical Activity programme

It has been suggested programme coordinators need to be cognisant of the physical activity preferences of participants, and should not expect one type of activity (e.g. gym based activity or walking) to appeal to all, but should instead allow participants to sample a broad sample of activities and choose which activity they prefer (Thurston and

Green 2004; Wormald et al. 2006). In recognition of the fact the majority of participants within ERS are older or middle aged, schemes should be tailored towards the preferences of this age group "*for individual or small group, non-competitive, flexible (so called lifestyle) activities*" (Thurston and Green 2004, p. 384).

Participants have also relayed the need for physical activity leaders to align physical activity plans with realistic patient expectations and capabilities (Elley et al. 2007). Physical activity plans that start slow and progress gradually are appreciated by participants (Wormald et al. 2006). Furthermore allowing participants to influence how activities are delivered within programmes has also been found to encourage participation (Hanlon et al. 2010). Participant motivation and adherence is also increased in well-structured programmes that provide participants with specified appointment times and offer support and supervision throughout (Wormald and Ingle 2004). Evidence also suggests that programmes should be ongoing rather than ending after a finite number of weeks, to give participants time to form a physical activity habit (Thurston and Green 2004).

The Support Structure within the Physical Activity Programme

The Support Role of Physical Activity Leaders /Physical Activity Support Workers

Research suggests the level of social support provided by programmes has a large influence on adherence rates. This is not surprising considering low motivation and low self-efficacy among participants have been cited as prominent barriers to programme completion (Elley et al. 2007; Patel et al. 2012; Jones et al. 2005; Williams et al. 2007). In particular physical activity leaders/support workers have been referred to as "*significant others*" who play a crucial role in maintaining participants motivation and adherence to ERSs and EOP programmes through the provision of support and supervision (Elley et al. 2007; Wormald and Ingle 2004). The interpersonal skills of the physical activity leaders/ support person have been found to be very important; with those in successful programmes taking a personalised, friendly, non-judgemental approach, displaying a caring, and empathetic manner, fostering a fun atmosphere and listening to patients concerns and fears. (Wormald et al. 2006; Hanlon et al. 2010; Bayly and Bull 2001). Parallel to good interpersonal skills, professional skills were also important; as participants reported they were encouraged to participate when they considered the instructor to be well-qualified and knowledgeable (Wormald et al. 2006;

Hanlon et al. 2010). Regular participant follow-up is also important to help sustain increases in physical activity levels (Hillsdon and Thorogood 1996). Within Green Prescription programmes a Support Worker monitors participants' progress and provides participants with frequent "prompting" telephone calls, which has been found to encourage increased physical activity levels and ongoing programme participation (Elley et al. 2007; Patel 2010, p. 214; Elley et al. 2003). Inversely low levels of support and supervision and an exercise leader lacking in motivational skills have been cited as reasons for programme drop-out, while participants' recommendations for improving ERS and EOPs have included increased face-to-face contact with the exercise specialist or support worker (Horne et al. 2010; Elley et al. 2007; Wormald and Ingle 2004; Gidlow et al. 2005; Williams et al. 2007).

Recent research has also drawn attention to the effectiveness of lay-person and peer-delivered physical activity interventions. For example walking and other physical activity interventions delivered by trained, lay people (usually volunteers) have been found to be effective as those delivered by professionals in increasing physical activity levels (Kassavou et al. 2013; Martin Ginis et al. 2013). The support provided by peers was found to enhance the self-efficacy of programme participants and increase levels of motivation, possibly because peers were seen as relatable role models by participants (Martin Ginis et al. 2013). Martin Ginis et al. (2013) argued that using peer mentors to deliver prescribed exercise programmes could ultimately benefit and increase the reach of the programme.

The Role of Other Participants

Providing opportunities for participants to socialise within programmes has been cited as a "*vital contributor towards physical activity program [sic] success*" (Hanlon et al. 2010, p. 278). Participants are often motivated to join physical activity programmes/walking groups in anticipation of social connection and "mixing" with others within their communities (Hanlon et al. 2010; Bayly and Bull 2001). Group-based programmes also enable participants to form friendships, which can increase participant enjoyment and satisfaction within programmes (Thurston and Green 2004). The social support offered by other participants has also been cited by participants as one of the core factors facilitating adherence to ERS's (Hanlon et al. 2010; Moore et al. 2011; Schmidt et al. 2008). Personal bonds formed with other participants within groups

can foster a sense of social commitment to the group further increasing adherence rates (Thurston and Green 2004). Participants have previously suggested ERSs and EOP programmes should provide increased opportunities for social interaction and meeting people (Elley et al. 2007; Wormald and Ingle 2004).

2.4.9 Perceptions of the Physical Activity Leaders Involved in the Delivery of ERS

Limited research exists with regards to the attitudes and perspectives of those involved in the delivery of the physical activities within ERS or EOP programmes. This represents a gap in the current evidence in light of the importance of the role of physical activity leaders in determining programme effectiveness (Elley et al. 2007; Wormald and Ingle 2004; Wormald et al. 2006; Hanlon et al. 2010; Bayly and Bull 2001), and the fact the experiences of these leaders "*may provide valuable insights into how their reach and effectiveness might be improved*" (Moore et al. 2011, p. 1).

Moore et al. (2011) conducted one of the few studies of exercise professionals' experiences within ERSs. Within this study exercise professionals emphasised that the majority of the participants they encountered were lacking in motivation, as well as physical activity knowledge, and stated that the instruction of physical activity often became secondary to the provision of interpersonal support. In some instances exercise professionals were in fact uncomfortable with the amount of interpersonal support some participants required of them. This highlights the importance of ensuring exercise professionals are competent and comfortable in the provision of interpersonal support before they are recruited to be physical activity leaders within ERS. This may also suggest in some cases referred participants may require the skills of a specialised support worker to ensure they receive adequate support during the ERS.

The exercise professionals in the study by Moore et al. (2011) also believed programmes were most effective for participants who were already intrinsically motivated to increase their physical activity levels (rather than those who were simply acting on the recommendation of their GP); and thus believed the programme should only be offered to patients who are ready to change. The exercise professionals also believed the exercise environment played an important role in participant adherence to schemes, and in particular emphasised the importance of the role played by other participants. They outlined the importance of providing an encouraging social

environment and believed fostering the development of social networks between participants was the best means of sustaining long-term behaviour change. Overall it was suggested that training for physical activity leaders should not only incorporate teaching on how *"to advise patients…to exercise safely given their conditions … [but also] should focus on providing the skills to meet the interpersonal support needs of patients"* (Moore et al. 2011, p. 1)

2.4.10 Primary Healthcare Professional Perceptions of Physical Activity Promotion

Health professionals' attitudes towards physical activity promotion within primary care are mixed. An Irish qualitative study found that while most GP and nurses perceived lifestyle counselling to be important they also experienced many barriers to practicing lifestyle counselling including "*insufficient time, patient resistance, lack of funding for prevention and lack of training*" (Lambe and Collins 2009). Similarly GPs in a Spanish qualitative study said although they were aware of the importance of health promotion activities (such as physical activity promotion), they were faced with so many competing demands during consultations with patients that health promotion activities often got relegated due to lack of time or the GPs simply forgot to bring them up (CalderÓn et al. 2011). Coupled with this some GPs were also doubtful in terms of the long-term feasibility and effectiveness of many health promotional activities and programmes, especially in comparison to traditional disease treatment (CalderÓn et al. 2011) (this perhaps suggests a need for GP education regarding the potential benefits of health promotional activities). Finally GPs questioned just how much they could truly affect patients' behaviour through the use of health promotional activities within routine consultations alone. They believed in order to create real changes in health behaviours community wide health promotion initiatives needed to be created, with some GPs believing coordinated efforts between primary care and community based interventions offered the best chance of success (CalderÓn et al. 2011).

Patel et al. (2011) and Gribben et al. (2000) conducted studies specifically in relation to the Green Prescription to determine 1) why GPs administer Green Prescriptions and 2) to examine their views and experiences in relation to the Green Prescription. In general GPs viewed the Green Prescription programme as beneficial. GPs prescribed Green Prescriptions both as a means for primary prevention (e.g. weight control) and for secondary management of chronic conditions (e.g. hypertension,

diabetes). GPs were more likely to select patients they believed would be compliant. GPs reported two main benefits of the Green Prescription programme: 1) it provided a non-medication approach to a healthier lifestyle 2) it provided the prolonged and specialised support they believed patients needed to initiate and maintain their physical activity levels through the provision of the specialised support worker (Patel et al. 2011).

The most prevalent barriers to issuing Green Prescriptions or referring patients to ERSs have been found to be time constraints (concurring with the findings of CalderÓn et al. 2011 and Lamb and Collins 2009); medico-legal responsibility (which relates to concerns over potential liability in case of patient injury / harm and concerns over who bears the legal responsibility over the care of the referred patient); and the belief that physical activity promotion is not a priority during routine consultations (Patel et al. 2011; Gribben et al. 2000; Graham et al. 2005). Patel et al. (2011) recommended that the barrier of time constraints could be alleviated by delegating the more time consuming tasks to the patient support counsellors and also by having practice nurses assist in the administration of the prescriptions. Many GPs felt more publicity about the Green Prescription programme was necessary to increase patient awareness of its existence (Gribben et al. 2000). Some GPs were reluctant to issue Green Prescriptions or refer patients to ERS because they believed they were patronising to patients or didn't believe patients would comply with the advice given (Gribben et al. 2000; Graham et al. 2005).

2.4.11 Summary of the evidence for Physical activity interventions within primary care

Although not undisputed there is some evidence to suggest physical activity interventions implemented and / or initiated within the primary care setting are effective, at least in the short-term. Although some studies have shown brief advice interventions can produce positive effects on physical activity levels there is a general consensus within the literature that more intensive interventions appear to be much more efficacious. Examples of intensive interventions include those that are guided by behavioural change models and include goal setting, use of prompts and frequent follow-up support Interdisciplinary approaches, whereby primary care professionals' work in conjunction with allied health professionals within the community, are believed

to offer the most potential in terms of providing such comprehensive interventions. ERSs and EOPs utilise such an interdisciplinary approach.

There is evidence to suggest both ERS and EOPs can produce increases in moderate intensity physical activity (at least in the short-term), with many participants achieving recommended levels of physical activity after programme participation. Exercise referral to walking programmes have also been found to be as effective as referral to leisure based facilities in increasing physical activity levels and furthermore referral to walking programmes has also been found to be cheaper. Although the evidence base supporting long-term effectiveness of both ERS and EOPs in sustaining increased physical activity levels is narrow, the limited research available for EOPs and particularly Green Prescription programmes seems to suggest these programme hold the most promise for producing sustainable effects. Green Prescription programmes have tended to provide more frequent and prolonged individualised follow-up support, which may help to explain their ability to produce sustainable effects. It is possible the written exercise prescription administered in EOPs and the fact they usually don't require attendance at a leisure-based facility also play a part in achieving greater adherence rates.

Again the evidence supporting the ability of ERSs and EOPs to produce improvements in clinical indices and psychosocial variables is very limited. Although the evidence is by no means conclusive both ERS and EOPs have shown some promise in terms of blood pressure reduction and weight/body fat reduction. However there is consistent evidence from RCTs, observational and qualitative studies to suggest ERS, and especially green exercise referral schemes, can positively affect mental wellbeing. Likewise green exercise programme, EOPs and Green Prescription programmes have consistently shown improvements in the quality of life among participants. Group-based ERS and green exercise programmes were also found to have many social benefits for participants.

The rates of uptake and, in particular, adherence to ERS and EOP are often poor, although limited research suggests EOPs have achieved slightly better adherence rates. There is a consensus within the research that levels of uptake and adherence need to be improved in order for ERS and EOPs to produce meaningful effects and for them to be

classed as an effective use of resources. Factors affecting the uptake, adherence and success of ERS and EOPs were found to be wide ranging and included individual patient characteristics, personal barriers experienced by individuals, the role played by primary healthcare staff, the internal motivations of the participants, the physical activity environment, the coordination of the physical activity programme/scheme and the level of support offered within the programme/scheme. The interpersonal skills of physical activity leaders implementing programme was found to be key, and training to equip physical activity leaders in the provision of interpersonal support is likely to be necessary. Participants also highly valued the opportunities for social interaction with other group members and it has been found as one of the key factors affecting uptake and adherence.

In general primary health care professionals appear to be supportive of physical activity interventions within primary care. However time constraints during patient consultations appears to be a prominent barrier and consequently this raises questions about the feasibility of successfully implementing interventions such as exercise referral and exercise prescriptions in routine primary health care practice.

There are some limitations to this literature review that should be considered when interpreting findings. Primarily the fact that a wide range of different studies of varying methodological rigour were included in the review could have potentially biased findings. In particular the inclusion of uncontrolled observational studies that used self-report measures to determine programme impact heightens the potential for bias. However the author believes the extensive amount of literature reviewed provides a comprehensive overview of the current evidence base.

2.4.12 Key Components of Successful Physical Activity Interventions

In conclusion the evidence for primary care initiated physical activity interventions, and particularly ERS and EOP interventions, suggests all of these interventions have the potential to increase physical activity levels and create positive changes in health and wellbeing. However certain features of EOPs and Green programmes in particular appear to promote greater adherence and seemingly have a greater ability to sustain changes long-term. In addition research examining the wide range of facilitators and

barriers to uptake and adherence of ERS and EOPs also suggest the inclusion of certain components are more likely to lead to a successful programme outcome. With this in mind the following features and components have been identified as important in order for physical activity programmes based within primary care to be successful:

- Programme development should be influenced by behavioural change theories
- Supportive primary health care professionals who are willing to promote the programme and its benefits to patients and work through patient concerns relating to programme participation
- A written physical activity prescription provided by a primary health care professional (as utilised in EOPs) to the patient in addition to referral to a third party, community-based organisation for programme delivery
- Clear criteria for patient referral that takes into account health conditions that may act as barriers to participation
- Walking programmes are preferable to leisure centre-based programmes, and should preferably take place in the natural environment (green exercise).
- Participants should ideally have a choice of a range of different physical activity options (e.g. walking, leisure-centre based physical activity programmes, gardening etc) and then be encouraged to choose their preferred option, rather than only being presented with a single physical activity option.
- The programme should have a strong in built support structure. This should include frequent follow-up support (face-to-face and telephone based) from a support worker/physical activity leader who helps participants set realistic goals and overcome personal barriers such as low self-efficacy, low motivation and low self-esteem.
- The programme should provide participants with an opportunity to socialise and receive support from other participants
- Physical activity leaders facilitating the programme should be professional, qualified and have good interpersonal skills. Trained volunteer lay-persons can be effectively used to lead interventions.
- The programme should incorporate the use of peer leaders where possible

- The physical activity programme should be structured and the physical activity plans should be in line with patients' expectations and capabilities. Participants should be allowed to influence programme delivery.

- The physical activity programme should be ongoing.

2.4.13 Other Opportunities to Enhance ERS and EOP Programmes

As discussed previously in Part Two, ERS and EOP programmes most aptly fit the description of a person-focused intervention. Research suggests that interventions which focus on individual factors alone have a reduced ability to sustain long-term behaviour change as it is likely that enduring social and environmental factors will influence individuals to return to an inactive lifestyle once the intervention is over (Brownson et al. 2004; Spence and Lee 2003; Sharpe 2003, p.460).

> The person-focused approach can be successful in the short term, particularly for persons motivated by pain and dysfunction to initiate behaviour changes; however, making physical activity a permanent lifestyle feature has proven challenging. Exercise prescription and individually oriented strategies are appropriate for rehabilitation efforts…however, physical activity levels decline at the end of short-term programs …. In addition to establishing skills for long-term maintenance, the importance of creating a supportive community environment that provides safe, accessible and pleasant options cannot be underestimated. (Sharpe 2003, p. 460)

It is possible that the reach, effectiveness and sustainability of ERS and EOP programmes could be improved if the development and implementation of these programmes was inspired / guided by community-level and social ecological approaches (as outlined in Part Two of this Chapter) (King 1994; King 1998; Maley 2005; Sharpe 2003; Brownson et al. 2004; Bauman et al. 2012). The creation of a supportive community environment that provides safe, accessible and pleasant physical activity options, as advocated by Sharpe (2003) above, is also most likely to be achieved by the use of social-ecological and community-level approaches. Utilising a community-level approach would require ERS and EOP programmes not only to aim to create changes at an individual and interpersonal level, but to also aim to create changes at an organisational level, community level and to create changes within the local social and physical environment that are conducive to physical activity promotion (King 1994; King 1998). This could be achieved by broadening the target of ERS and EOP programmes to include not just programme participants and health professionals, but also to include other important "gate keepers" (e.g. public health departments, local

community organisations, local community leaders; county councils) within the community setting (King 1998). A large amount of previous research suggests that the success of community-based physical activity interventions is improved when programmes actively seek to involve the local community in programme development and implementation, rather than depending solely on health and fitness professionals (King 1994; King 1998; Sharpe 2003)

> Program success is enhanced by a thorough assessment of community needs, assets, and preferences and by meaningful community participation and involvement in program development and implementation. Local leadership affects program success. (Sharpe 2003, p.459)

> a model of best practices to promote physical activity at the community level should be ecological and therefore should include intervention components to mobilize the community around physical activity [and] coordinate existing municipal and community organisations …(Nguyên et al. 2002, p. 485).

Research suggests that public health approaches that are integrated into existing community structures and utilise existing community assets are also more likely to be effective, successful and sustainable (NSW Premier's Council for Active Living 2008).

2.5 Part Four: Towards an adapted model

Considering each of the components identified as important for a primary care based physical activity intervention to be successful (sections *2.4.1* and *2.4.12*) it appears that a model that combines the most promising elements from ERS and EOP into one comprehensive adapted model, could hold the best potential in generating increased physical activity behaviour. This model could utilise the principles of the Green Prescription programme (which included brief physical activity counselling by primary care health professional, written physical activity prescription, and follow-up support provided by a support worker); and could also include referral to a structured, community based walking group (which would give participants the opportunity to socialise with other group members) led by trained and knowledgeable leaders. As guided by research walking leaders could be volunteers recruited from the local community and these walking leaders could possibly also act as peers (Kassavou et al. 2013; Martin Ginis et al. 2013). The substantial evidence base advocating the benefits of utilising a community-level, social ecological approach also suggests this adapted model should place emphasis on the involvement of the local community and local community organisations for programme *development and implementation,* utilise a

community development approach for programme implementation, *not* rely solely on health professionals for programme delivery and should seek to integrate the programme into existing community structures and utilise existing community assets.

This model should also seek to form strong interdisciplinary partnerships, particularly between local health professionals and local community groups as this is believed to be key for successful community-level physical activity interventions and in particular for successful ERS interventions (Tulloch et al. 2006; Stange et al. 2002; Horne et al. 2010; King 1998; King 1994). It is important that programme partners, especially those that have a role to play in participant recruitment, are familiar to and trusted by the target population as this is known to encourage participant uptake of walking programmes (Milton et al. 2011). If possible this model should also aim to create changes conducive to physical activity promotion at a number of different social ecological levels.

The development and implementation of this adapted model is likely to be challenging. Firstly it requires the support and involvement of local health professionals, which may be challenging due to time constraints in health professional practice (Lambe and Collins 2009; Patel et al. 2009; Gribben et al. 2000; CalderÓn et al. 2011). Secondly it requires the availability and involvement of local community organisations that have the capacity to deliver the physical activity component (the community walks). It also requires a close working relationship between primary care health professionals and the community organisations delivering the walking group.

In general there appears to be a lack of literature on the feasibility and acceptability of implementing a community-based walking group with a referral component. It is therefore not known if this adapted model would be feasible to implement or if the health professionals and community groups involved would find this adapted programme acceptable. Research on social prescribing[8] interventions, which often have a similar structure to that of the proposed adapted model, may illustrate the factors that

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[8] Social prescribing interventions involve the referral of patients with mental health difficulties from primary care to community based organisations for a variety of holistic, non-clinical services (Brandling and House 2007 cited in Keenaghan et al. 2012), and thus holds many similarities to Exercise on Prescription interventions that include referral of patients to community-based physical activity programmes

could affect the feasibility and acceptability of the adapted model. These factors include the approach used to establish the programme within communities (community development approach is deemed best); the demands (resources, personnel, skill and expertise) the programme places on the community organisations and health professionals that are delivering it and the capacity of those organisations to meet those demands; and the quality and equality of the partnership between the referring health professionals and the community organisations involved (Keenaghan et al. 2012; Edmonds, N. 2003). Good personal relationships between programme partners has also previously been outlined as a key factor in the formation of strong community health programme partnerships (Cheadle et al. 2010; Milton et al. 2011). In addition research suggests health-promoting partnerships are more likely to be successful when programme partners have a similar vision and similar objectives, and have different but complementary skills and resources to contribute to the partnership (Milton et al. 2011).

Research has also highlighted the importance of having a facilitator to act as a link between the referring health professionals and community organisations delivering the intervention to ensure the success of Social Prescribing initiatives (Keenaghan et al. 2012). The role played by the facilitator within Social Prescribing initiatives appears to share many similarities with the role of participant support workers within Green Prescription programmes, which again reiterates the importance of dedicated participant support and follow-up.

The adapted model would require the availability of structured and active walking groups within the local community (which may not be available), and the availability of suitable volunteers to lead the walks. The literature suggests participants referred to exercise referral schemes are commonly very unfit, have some form of chronic condition and have low levels of self-efficacy and have high support needs (Pavey et al. 2011; Williams et al. 2007; Lee et al. 2009; Patel et al. 2012; Jones et al. 2005; Williams et al. 2007; Wormald and Ingle 2004; Elley 2007; Moore et al. 2011). Thus to make this model feasible the community walking groups would need to be developed to a high standard to ensure they accommodate the needs of referred patients.

Nguyên et al. (2002) developed a social ecological model of best practice to guide public health officials in the development of community based walking initiatives that

aim to increase the health and physical activity levels of community members; and similarly Chau (2007) also outlined factors deemed important elements for the development of successful community walking groups. Within these two documents the following factors were outlined as key for the development of successful and sustainable community-based walking initiatives (these guidelines were aimed at public health officials in charge of setting up the initiative). Whether or not the adapted model incorporates the following factors may determine its success.

- Community partners should be informed of the intent and importance of the community walking intervention to facilitate their support of the project. A partnership approach should be utilised involving diverse organisations (government agencies, local government, health services, community organisations and businesses) to ensure the support of the programme (Nguyên et al. 2002; Chau 2007)

- Community organisations should be recruited to initiate, deliver and maintain the programme within the community. Research suggests action-orientated community organisations are in a prime position to successfully implement health promotion initiatives, and furthermore the involvement and commitment of community organisations are "*necessary to guarantee the successful implementation of a new project and to ensure its sustainability*". This is because community organisations are "*rooted in the neighbourhood*" and the people running them usually have a unique "*understanding of the history and culture*" of the local community. Furthermore they also "*influence social activation and policies within the community*" (Nguyên et al. 2002, p. 494).

- Volunteers who have a love of walking, have sufficient time to dedicate to the programme and who are organised, enthusiastic, understanding, caring and encouraging should be recruited as walking leaders (Chau 2007; Nguyên et al. 2002)

- Walking leaders should be provided with sufficient training and support, so that walking groups may be self-reliant and empowered to manage their own activities. (Chau 2007; Nguyên et al. 2002)

- A local facility should be designated as a meeting place before and after the walk. This promotes the presence of the walking group in the community and develops its identity. (Chau 2007)

- Multiple communication strategies should be used to promote the walking group and to recruit walking leaders and walking group members (Nguyên et al. 2002).

- Walking group coordinators should be supported through regular contact and practical support. Support provided should include training sessions to help in the management of walking groups; the provision of a small grants to support group activities have proven important to facilitate the creation of walking groups; and best practice also suggests periodic site visits should be conducted so public health officials are well-informed of the impact of the walking group and the needs of the group (Nguyên et al. 2002).

- A network should be established to allow walking group directors and leaders from different communities to interact – this facilitates learning, problem solving and social support (Nguyên et al. 2002; Chau 2007).

- Evaluations should be conducted with walking group directors, leaders, participants and other stakeholders/partners involved in the programme for feedback and suggestions regarding walking group (Chau 2007).

- All those involved in the running of the group should be acknowledged for their commitment and achievements (Nguyên et al. 2002).

2.6 Conclusion

Part One of this chapter has defined what physical activity is, briefly reviewed the evidence for how physical activity/inactivity is linked to health and ill-health, and also provided a profile of physical activity in an Irish context. Following this, Part Two of this chapter described some of the most common theories, concepts and approaches that have been developed to explain physical activity behaviour and how to influence it. The use of these theories and concepts in practice was also briefly discussed. In Part Three of this chapter a comprehensive review of the effectiveness primary initiated physical activity interventions was provided, with a focus on ERS, Green-Exercise-Based

Referral Schemes, EOP programmes and Green Prescription Programmes. The key factors that affect the success of these interventions were also reviewed. In the final part of this chapter, Part Four, the author put forward a suggestion for an adapted model of EOP based on the findings from the literature review. This study "*An evaluation of the Green Prescription Pilot programme in Co. Donegal*" evaluates a multi-community physical activity intervention that fits the description of the adapted model described in Part Four. The acceptability and feasibility of implementing the Green Prescription Pilot programme is assessed; together with the impact of the programme on the participants (physical activity levels, cardiovascular risk factors, anthropometric measurements and mental wellbeing), health professionals and community organisations involved. The next chapter provides a detailed description of the pilot Green Prescription Programmme.

Chapter Three: The Intervention Model

3.1 Introduction

This chapter provides the background to and describes the Green Prescription Programme in Co. Donegal. This chapter also describes the participant journey through the Green Prescription Programme. Finally this chapter outlines how the aims, objectives and activities of the Green Prescription Programme align with those outlined in recent governmental policies and strategies.

3.2 Background & Description of the Green Prescription Programme

The Irish Green Prescription programme was initiated by the Health Promotion Department of the Health Service Executive (HSE) in Co. Donegal as a small-scale pilot programme in one rural community in 2011. Following on from the successful evaluation of the small-scale pilot initiative, the programme was rolled out on a phased basis into 7 new communities across Co. Donegal over the course of 2012, and it was also implemented in the original pilot community twice during this time. Thus in total the programme ran 9 times during 2012. The rollout of the programme in 2012 was fundamentally a continuation of its pilot phase as the programme was continually refined during this time.

The Irish Green Prescription programme is a community-based, supported, walking-on-referral programme and is an adaptation of the New Zealand founded Green Prescription Programme (Swinburn et al. 1998; Elley et al. 2003; Elley et al. 2007). A "green prescription" is a health professional's (e.g. GP, nurse) written advice to a patient to be physically active as part of their total health plan and quality of life management (Ministry of Health 2014). The Irish Green Prescription programme additionally involved referral by a health professional (or alternatively individuals could self-refer) to a 12-week community-walking programme. The 12-week programme consisted of two parts – an initial 4-week Green Steps Programme followed by an 8-week volunteer led Community Walk. The Community Walk was also open to any members of the community who wanted to join as well as graduating Green Steps participants. A Green Prescription support worker supported referred participants throughout the programme. The participant journey through the Green Prescription Programme is explained in more detail in section 3.3. (Refer to Figure 3.1 for an outline of the Green Prescription Programme model).

The programmes focus on outdoor physical activity is based on research that suggests physical activity in natural environments ("green exercise") results in positive outcomes for physical, mental and social health, and is potentially more beneficial to mental and social health than physical activity in man-made environments (Peacock et al. 2007; Wilson 2009; Bowler et al. 2010: Hine et al. 2011). While there was no formal mapping of the programme to specific theories, the Green Prescription programme appeared to be influenced by constructs from Social Cognitive Theory, the Transtheoretical model, the health belief model and by the concept of social support in its design. For example the programme aimed to: increase participants awareness of the benefits of physical activity; recruit participants based on their readiness to change; provide cues to action (e.g. health professional referral and a written exercise prescription); increase participants exercise self-efficacy through clarifying outcome expectancies, use of goal setting techniques, observational learning (e.g. physical activity demonstration), increasing participants behavioural capability, facilitating participants access to helping relationships (e.g. the support worker, other participants), use of prompts (e.g. stepcounters) and the provision of various forms of social support. (A more detailed description of what the programme entailed is provided later in this chapter under section 3.3).

The Green Prescription programme was developed to promote health and wellbeing within communities by providing a means to address the issues of physical inactivity, overweight and obesity and poor mental health. The programmes primary target groups included sedentary individuals and individuals with or at risk of lifestyle diseases (e.g. overweight and obesity, type 2 diabetes, coronary heart disease, high blood pressure). The Green Prescription programme was developed with a social ecological perspective (community-level approach) and aimed to produce outcomes at multiple social ecological levels. At an individual level it aimed to increase (referred and self-referred) participants' physical activity levels, increase participants' confidence in the ability to be physically active and increase motivation to be physically active. In addition it aimed to improve participant's physical health and mental wellbeing. At an interpersonal level the programme aimed to create a supportive environment for physical activity. At an organisational level it aimed to promote the proactive prescription of physical activity within primary care and facilitate communities to increase physical activity levels by developing community-walking groups. At a community level it aimed to develop

interdisciplinary partnerships conducive to physical activity promotion, promote social cohesion and promote a culture of physical activity within communities. At an environmental level it aimed to promote the benefits of physical activity in the natural environment and promote the use of local walkways.

Consistent with the social ecological approach used, the principles of community development (namely active community participation, equality of opportunity, interdisciplinary partnership working and sustainability) influenced programme development and implementation. The primary partners responsible for programme delivery were the Health Promotion Department in the HSE in Donegal, local community groups and local health professionals. The Health Promotion Department was the lead agency for the programme - the Eco-Health Promotion Officer is the programme coordinator, and was supported in her role by the Community Walks development officer (also based within the HSE).

Community groups and health professionals formed a central partnership, and the commitment and support of both were required before a Green Prescription programme could be introduced to a community. Local community organisations were responsible for the development and sustainment of the Green Prescription programme within their local community, with support provided by the Health Promotion Department of the HSE in Co. Donegal. Their multifaceted role involved hosting the Green Steps and establishing the Community Walks (which involved identification and provision of a suitable venue and facilities for the Green Steps programme, recruitment and management of volunteer walking leaders, programme promotion and marketing, recruitment of community members onto the community walks, and identification of walk routes among other responsibilities). Community organisations were supported in this role by the programme coordinator and development officer. Health Professionals were responsible for the referral of suitable patients onto the community-based programme (refer to Table 3-1 and Appendix A for an overview of the roles and responsibilities of community group and health professional partners). Initially only GPs and nurses were eligible to refer patients to the programme; however the referral pathway was subsequently widened to allow referral from a range of other health professionals (e.g. physiotherapists) in an effort to increase the referral rate. (It should be noted however that during the timeframe of the evaluation only GPs and nurses were

eligible to refer patients). Other partner organisations involved in supporting the programme were the Donegal Sports Partnership, the Donegal Road Safety group, Donegal County Council, Coilte, Rural Recreation, and the Irish Heart Foundation (refer to Appendix A for an overview of the roles and responsibilities of each of these partners within the Green Prescription Programme).

Table 3-1 provides an overview of how each of the key stakeholders were recruited to the Green Prescription Programme, and also provides a brief description of the role of these stakeholders within the programme. Following this Figure 3.1 provides an outline of the Green Prescription Programme model, including the programme partners involved and its key elements.

Table 3-1: How Key Stakeholders were Recruited to the Green Prescription Programme and Overview of the Key Role of these Stakeholders

Title	Recruitment	Description / Role
EcoHealth Promotion Officer (HSE)	Longstanding employee of HSE West.	Green Prescription Programme Coordinator & lead. Responsible for programme development, funding & linking with all stakeholders. (Referred to as "Programme Coordinator" throughout this report).
Community Walks Development Officer (DO)	Position & role description advertised by HSE West. Recruited as an employee by HSE West.	Links with community groups to help them develop, plan, implement & sustain the Green Prescription & Community Walks programme within their communities. Links with the GSFs to ensure smooth running of Green Steps. (Referred to as "Development Officer" throughout this report).
Support Worker (SW)	Position & role description advertised by HSE West. Recruited as an employee by HSE West.	Follows up with referred participants & supports & motivates them throughout the 12 week programme. Links with referring health professionals.
Green Steps Facilitator (GSF)	Position & role description advertised in partnership by HSE West / Donegal Sports Partnership. Recruited as an employee in partnership by HSE West / Donegal Sports Partnership.	Trained & experienced physical activity professionals who lead the Green Steps. They have received tailored training relative to the Green Steps & the needs of Green Prescription participants.
Health Professional	Programme marketed to health professionals by the Programme Coordinator & the SW. Lunch time presentations & information packs were used for programme marketing to encourage health professional involvement.	Identifies suitable participants for the Green Prescription, explains programme, offers a prescription & refers participants to the programme by linking with SW. GPs & nurses were the only health professionals involved in the programme during the course of the evaluation.
Referred participant	Recruited through health professional referral. Promotional leaflets & posters were also used to advertise the programme in primary health care centres.	Participants referred into the programme by a health professional (i.e. they received a Green Prescription). Entered the programme at the Green Steps stage.
Self-referred participant*	Recruited by self-referral – *contacted SW directly* by telephone after seeing programme advertised. Phone number for SW was available from the Community Leader & was also advertised through local media as part of programme promotion (on promotional leaflets & posters in local meeting venues / meeting places, in local papers & on local radio).	Community members who self-referred into the Green Steps programme (have not received a referral from a health professional but believe they are in need of additional support & a more gradual approach to physical activity engagement).
Community Walker* (CW)	Community members were invited to participate in the Community Walks through various forms of programme advertisement including word of mouth promotion, promotional leaflets, posters in local venues & meeting places, church bulletins, & adverts in local newspapers & on local radio.	A member of the community who joined the community walks (were not referred by a health professional & *did not attend* the Green Steps Programme). CWs have *no contact with the SW*.
Community group (CG)	Programme marketed to the CG by the Programme Coordinator & the DO. Face-to-face meetings & information packs were used for programme marketing.	Structured CGs, such as Family Resource Centres (FRCs) and Community Development Projects (CDPs). Responsible for the establishment & sustainment of the Green Prescription & Community Walks in their local community.
Community Leader (CL)	The CG were responsible for electing the CL. Usually an employee of the community group.	Key role is to manage & support the programme as part of their everyday role.
Walking Leader (WL)	CGs were responsible for the recruitment of volunteer WLs. Position was advertised in local media & internally among existing volunteers of the CG.	Volunteer role. All WLs received training in Walking Leadership & First Aid. Primary role is to lead the walks in a safe & inclusive manner.

*Note the difference between Self-Referred participants and Community Walkers - participants were referred to as "self-referred" if they contacted the supported worker and joined the programme at the Green Steps stage. Participants who did not contact the support worker and did not attend the Green Steps Programme but did participate in the Community Walks were referred to as "community walkers".

HSE
(Health Promotion Department)
Leadership, Coordination and Support

Sources of Support and Assistance:
Local Sports Partnership
Local Road Safety Group
Local County Council
Coilte
Rural Recreation
Irish Heart Foundation

Community

Need to have:
●Structured Community Group who will provide a dedicated Community Leader
●Need to be willing to commit to the programme and take ownership of their role

Role includes:
●Recruitment & Support of Walking Leaders
●Establishment of **Community Walks** (with support of Development Officer)
●Promotion and Advertisement
●Commitment to sustainability

Central Partnership

Buy in and Support of both the local Community and local Health Professionals is a key requirement

Local Health Professionals

●Need to be willing to commit to the programme and take ownership of their role

Role Includes:
●Referral of suitable participants
●Must have 10 participants for referral in order for Green Prescription programme to run in local area

Community Walks (8 Weeks)

●Open to all community members who wish to become more active as well as graduating Greensteps participants
●Led by trained volunteer Walking Leaders
●Buddying system
●Graded in intensity to meet different needs
●Varied walk routes
●Run 4 times throughout the year

Greensteps (4 Weeks)

●Indoor, controlled environment
●Targeted at referred/Self-referred participants in need of a gradual approach to physical activity
●Facilitated by trained instructors
●Tailored low-level physical activity
●Use of motivational tools e.g. stepcounters and physical activity diary

Support Worker

●Consistent participant motivational support over 12 weeks
●Telephone and face-to-face contact
●Liaises with referring health professional
●Sign-posts participants to other health improvement programmes as needed e.g. Quality of Life / Chronic Disease Management Programmes

Figure 3.1: Key Elements of the Green Prescription Programme Model

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Referral process

A health professional identifies a suitable patient using the set referral criteria (based on their health conditions, physical ability, and age) for the programme. The referral criteria also stipulate that a patient must be motivated to change /become more physically active in order to be suitable for referral. The health professional explains the programme to the patient *and* if they agree to participate in the programme, the health professional issues them with a Green Prescription slip, asked them to sign a "contract of commitment" to increase their physically activity levels and refers them onto the Green Steps programme. The patient's details are then forwarded on by the health professional to the support worker. The support worker subsequently contacts the participant and encourages them to attend the Green Steps Information Session. Individuals can also self-refer onto the programme by contacting the support worker directly. The Green Steps Information Session takes place one week before the commencement of the Green Steps and its purpose is to inform participants about what the programme entails and introduce participants to each other. The support worker also helps participants to develop realistic expectations of change for the 12-week programme during this session and motivates participants to set achievable physical activity goals. (Refer to Appendix B for a diagrammatic overview of the Green Prescription Programme participant journey).

Green Steps programme

The Green Steps is a 4-week indoor low-level physical activity programme. It is aimed at participants with a very low level of physical fitness, who lack physical activity knowledge and skills and who require extra motivational support to get started. This programme is open to both health professional referral (e.g. a GP, nurse or other) and self-referral. During this programme participants receive support, advice and physical activity instruction in a small group setting with other referred and self-referred participants. All exercises are firstly demonstrated to participants and where necessary participants receive one-to-one physical activity instruction. The purpose of the Green Steps is to slowly introduce participants to a physical activity setting for one hour per week over the four weeks, increase participants' knowledge and skills regarding physical activity, increase participants confidence in their ability to engage in physical activity and increase their levels of mobility. A trained exercise specialist (Green Steps

facilitator) delivers this programme. Participants also receive a step counter and a physical activity diary at the start of the Green Steps as motivational prompts. The physical activity diary has information and tips on increasing physical activity levels, diagrams and step-by-step explanations of all exercises thought within the Green Steps and also has physical activity logs for participants to record their levels of physical activity (e.g. daily step counts) over the 12-week programme.

The Green Steps acts as a transition to the 8-week leader led Community Walk, which is open to all members of the community. The Green Steps is designed to run three times per year.

Support Worker

A support worker links with the participants through the Green Steps and Community Walks, and also acts as a link to the referring health professional. The support worker motivates and encourages participants to set and meet goals and sustain regular physical activity. The support worker provides participants with emotional, appraisal and informational support to help participants meet their goals. The support worker provides this support to participants by telephone, text and face-to-face meetings (which take place during the Green Steps and Community Walks). If required the support worker also signposts participants to other local health improvement programmes, e.g. The Quality of Life programme. The other on-going responsibilities of the support worker include linking with the health professional practice (to provide information on patient progression) and linking with Green Steps facilitators and walking leaders.

Community Walks

The 8-week community-based walks are the second element of the programme. Volunteer walking leaders, who have undergone Irish Heart Foundation Walking Leadership Training and basic First Aid training, lead the walks each week. Participants are also matched with support buddies where possible. The walks are designed to be graded in intensity to accommodate a range of fitness levels. The walks are open to any member of the community looking to become more active and / or meet new people, as well as participants who have completed the Green Steps programme. Referred participants are encouraged to continue attending the community walks to maintain their

new physically active lifestyle. The community walks are designed to run 4 times a year (on a rotating cycle of 8 weeks of walking, followed by a 4 week break) in order to ensure the development of a sustainable programme. The development officer provides on-going support to the community groups throughout the year.

Follow-up

The support worker contacts referred participants 3 months post programme completion to follow-up on current status and provide encouragement and support where needed. (Refer to Appendix B for a diagrammatic overview of the Green Prescription Programme participant journey).

3.4 Policy Context

In theory the Green Prescription programmes aims, ethos, comprehensive structure, social ecological and community development approach, and particularly its focus on intersectoral collaboration, make the programme relevant to a wide range of recent strategies and policies from varied governmental departments. Examples of congruent policies and strategies that contain objectives / proposals / recommended actions that are supported within the Green Prescription programme are summarised in Table 3-2. It should be noted many of the objectives and recommendations of the following policies and strategies overlap.

However it is important to clarify that the Green Prescription Programmes relevancy to current policy can not be substantiated until the programme is proven to be feasible to implement, acceptable, effective and cost-effective. For example it can not be claimed that the Green Prescription Programme supports the achievement of targets set out by the National Cardiovascular Health Policy (2010-2019), such as the target of increased physical activity levels, until the programme is actually proven to be *effective* in increasing physical activity levels.

Table 3-2: How the Green Prescription Programme aligns with Governmental Policies

Name of policy/strategy	Relevant aims / actions / proposals outlined in the policy / strategy	Examples of Aligning Green Prescription Aims, Activities and Approaches
Healthy Ireland - A framework for Improved health and Wellbeing (2013-2025)	✓ Recognised the broad determinants of health and wellbeing in an social ecological context ✓ Outlined the responsibility of all sectors, groups and organisations in health improvement ✓ Advocated the need for collaborative partnerships ✓ Highlighted the importance of social interaction, connectedness and community involvement as a keystone to building strong communities	✓ Uses a social ecological approach ✓ Programme is delivered in partnership across sectors – HSE, Community sector, Primary care, Sports sector, Local Authorities and Local Government, Environmental sector, Private sector ✓ Uses a community development approach to implement and sustain the programme. ✓ Provides opportunities for social interaction and community involvement through inclusive community walks and volunteer opportunities (walking leaders)
HSE Framework for Action on Obesity (2008-2012)	✓ Outlined that the HSE needed to proactively engage and support other sectors in addressing the obesogenic environment ✓ Recommended sustained health professional led interventions in primary care and community settings	✓ Aims to reduce obesity levels by promoting increased physical activity ✓ Programme is delivered in partnership across sectors – HSE, Community sector, Primary care, Sports sector, Local Authorities and Local Government, Environmental sector, Private sector ✓ Local Health professionals help to promote and deliver the Green Prescription programme via patient referral
National Cardiovascular Health Policy (2010-2019)	✓ Proposed targets included a prioritizing of actions promoting increased physical activity, reductions in levels of overweight and obesity ✓ Stated pivotal role of primary care and intersectoral partnerships in achieving these targets	✓ Aims of the Green Prescription programme include increasing the physical activity levels of individuals and communities ✓ Local Health professionals help to promote and deliver the Green Prescription programme via patient referral ✓ Programme is delivered in partnership across sectors – HSE, Community sector, Primary care, Sports sector, Local Authorities and Local Government, Environmental sector, Private sector
HSE Chronic Illness Framework (2008)	✓ Relayed the need for primary care to form strong partnerships with the community to meet health goals of minimising and managing the impact of chronic disease. ✓ Outlined that the HSE needed to work in partnership with communities to strengthen community action, support development of community based resources and enhance community health	✓ Provides opportunities for primary care based health professionals to work in direct partnerships with community organisations enabling referral of patients with chronic diseases to community based physical activity programmes as a disease treatment option ✓ Uses a community development approach to increase community capacity to implement and sustain community based physical activity programmes
The Strategic Framework for Health Promotion (2011)	✓ Advocated a settings approach to health promotion, declaring the health services and community as priority settings ✓ Aimed to build capacity within the community and the voluntary sector to	✓ The primary health care setting and the community setting form the two core settings of the Green Prescription programme – Primary health care for the referral of participants, Community for the delivery of the programme

Name of policy/strategy	Relevant aims / actions / proposals outlined in the policy / strategy	Examples of Aligning Green Prescription Aims, Activities and Approaches
	identify and address health promotion priorities at community level	✓ The Green Prescription programme provides a bridge between the primary care and community setting ✓ As explained previously the Green Prescription programme utilises a community development approach and aims to increase community capacity
The National Countryside Recreational Strategy (2006)	✓ Acknowledged the value of countryside recreation in improving quality of life and delivering health, social and economic benefits	✓ Advocates the benefits of physical activity in the natural environment – "green exercise" ✓ Community Walks take place in countryside locations and outdoor environments
A Vision for Change – Report of the Expert Group on Mental Health Policy	✓ Recommended mental health promotion should be available for all to enhance protective factors and decrease risk factors for developing mental health problems ✓ Recommended that a comprehensive range of medical, psychological *and social therapies* relevant to the needs of services user should be made available as part of an effective community based mental health service	✓ The Green Prescription programme accepts mental health referrals ✓ Green Prescription and Green Exercise programmes are recognised as an effective means of promoting mental health; thus fitting the description of a community-based *social therapy*
Smarter Travel – A Sustainable transport future (2009-2020)	✓ Acknowledged the promotion of walking is "pivotal" to achieving national health goals such as increasing physical activity levels and reducing chronic disease. ✓ Set out to encourage a culture of walking within communities ✓ Outlined plans to invest in practical measures to support and encourage walking	✓ Promotes and supports community-based walking and the development of community-based walking programmes

3.4.1 Irish Policy in Relation to Exercise Referral

The Health Service Executive (HSE) in Ireland first demonstrated their support of the idea of exercise on referral when they piloted a GP exercise referral programme (GPERP) in a small number of counties in the year 2000 (DOHC 2003). This pilot programme was extended to a small number of other counties between 2003-2008; and subsequently in 2009 the GPERP was rolled out nationwide (DOHC 2003; National Nutrition Surveillance Centre 2011). Within this programme suitable patients are referred from their primary health care professional to a specially trained exercise professional based in a leisure facility for a 12-week tailored exercise programme (i.e.

the Irish GPERP fits the description of an ERS (refer to Table 2-4, p. 48). To date the evidence base supporting the national GPERP in Ireland is weak, particularly as the national GPERP has never being formally evaluated (National Nutrition Surveillance Centre 2011). Furthermore as reported in the literature review (Chapter Two) the current consensus on similar ERS models within the UK is not very positive, with key systematic reviews raising concerns over the effectiveness of these schemes (NICE 2006; Pavey et al. 2001[a&b]).

Recently (exact date unknown) a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis of the GPERP outlined the need for a new national framework for exercise referral in Ireland (National Exercise for Health Referral Framework 2014). Unfortunately the results of this SWOT analysis have not being published precluding any further discussion of its findings. This new national framework for exercise referral is currently being developed (National Exercise for Health Referral Framework 2014).

3.5 Conclusion

This chapter has provided a detailed description of the Green Prescription Programme model and has detailed how the Green Prescription Programme aligns with current governmental policies and strategies. The next chapter details the methodology and methods that the researcher used to conduct the evaluation of the Green Prescription Programme.

Chapter Four: Methods

4.1 Introduction

This chapter describes in detail the methods used within this evaluation study. This chapter begins by outlining the aims and objectives of this study; following this it provides a rationale for the type of evaluation study conducted and the evaluation design used. A detailed description of the evaluation framework used to guide this evaluation study is then provided. Following this, a detailed description of each of the quantitative and qualitative activities and methods employed during of the evaluation is provided. Ethical considerations relating to this evaluation study are also discussed in this chapter.

4.2 Aims & Objectives

Aims: To conduct an evaluation of the pilot Green Prescription and Community Walks programme

Objectives:

1. To determine the feasibility and acceptability of implementing the programme using both qualitative and quantitative inquiry
2. To determine the impact of the programme on the participants including the impact on physical activity levels, stage of physical activity adoption and mental wellbeing using both quantitative and qualitative inquiry
3. To determine the impact of the programme participation on the referring health professionals and community groups involved
4. To make recommendations on the future development of the Green Prescription and Community Walks programme

4.3 Overview of Evaluation, Types of Evaluation & Evaluation Designs

Evaluation refers to a formal process of judging the "value" of something (Nutbeam and Bauman 2006). In relation to health promotion programmes evaluation has been more specifically defined as "*the systematic examination and assessment of features of an initiative and its effects, in order to produce information that can be used by those who have an interest in its improvement or effectiveness*" (WHO European Working Group on Health Promotion Evaluation 1998). An evaluation of a health promotion programme aims to determine the extent to which that programme has achieved its desired health outcomes (if at all), and also aims to assess the contribution of the

different processes that were used to achieve those outcomes (Nutbeam and Bauman 2006). Experts in the field of health promotion have described evaluation as an integral part of any health promotion programme, and emphasise the importance of ensuring that evaluation is "built" into a programme forthwith at the planning stage (Nutbeam and Bauman 2006). Programme evaluation should then continue throughout the programmes development and implementation and maintenance stages (Nutbeam and Bauman 2006, p. 19).

According to Nutbeam and Bauman (2006, p.19 & p.30) there are three main types of programme evaluation, namely formative evaluation, process evaluation and impact / outcome evaluation. Depending upon the stage in a programmes cycle a different type of evaluation is required. Formative evaluation is the first stage of programme evaluation and usually occurs during a programme's planning and development stages. Formative evaluation involves determining the relevance of the identified health problem and aims to define the feasibility and acceptability of different types of programmes / intervention methods to address the identified health problem (Nutbeam and Bauman 2006, p. 2 & p. 34). The "*purpose of formative evaluation is to … define the elements likely to be effective in [a] programme*" and thus to be effective formative evaluation should always involve "*consultation with stakeholders and / or with members of the population who are the target for the programme*" (Nutbeam and Bauman 2006, p. 34). Pre-testing and pilot-testing (i.e. a pilot study) is also used in formative evaluation and "*involves trying out some of a project's parts before it is launched in full*" (Roberts et al. 2009). The programme is often refined following the findings of the pilot study before it is launched in full. At the end of formative evaluation the key materials and methods that will form the programme / intervention will have been identified (Nutbeam and Bauman 2006, p. 34).

The next stage in programme evaluation is process evaluation. Process evaluation involves monitoring the implementation of the programme and assesses the extent to which the programme was delivered as planned (Nutbeam and Bauman 2006, p. 2 & p. 31). Process evaluation encompasses a broad range of activities, including monitoring activities that assess the reach, participation, adoption and utilisation of the programme and encompasses activities that assess the short-term impact / outcomes of the programme (Nutbeam and Bauman 2006, p. 41).

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> Process evaluation identifies whether target groups were exposed to and participated in the programme and whether stakeholders and partners were engaged in it [i.e. the reach and adoption of the programme]. It also encompasses assessment of the short-term impact of an intervention (Nutbeam and Bauman 2006, p. 41).

Process evaluation also encompasses activities that assess the delivery of a programme − i.e. whether or not the programme was delivered using the materials and methods as designed (also known as programme fidelity) (Nutbeam and Bauman 2006, p. 43). Finally process evaluation includes activities that assess the context in which the programme was implemented (e.g. social context, environmental context, political and policy context) to explore the reasons *why* the programme was implemented the way it was (Nutbeam and Bauman 2006, p. 43). This could include examining the barriers and facilitators to programme implementation, examining reasons why the programme may have been delivered differently than planned etc. According to Nutbeam and Bauman (2006, p. 41) the main *"aims of process evaluation are to understand how the programme worked, what happened in 'real life' and how people reacted to it"*. Process evaluation is essential to inform future programme development and refinement, and also *"provides the foundation for the subsequent evaluation of programme effectiveness"* (Nutbeam and Bauman 2006, p. 112).

Impact / outcome evaluation is the final stage of programme evaluation and is concerned with describing the effects of a programme. It aims to determine whether the programme successfully achieved it goals and objectives − put simply it aims to determine whether the programme was effective or not (Nubeam and Bauman 2006, p. 2 & p. 31). The set of procedures and tasks that are used to examine the effects (impacts / outcomes) of a programme is called the *evaluation design*. The evaluation design should be as rigorous as possible to enable the evaluators to be as confident as possible that any of the changes that were observed at the end of a programme were actually *caused b*y the programme (Nutbeam and Bauman 2006, p. 53).

Experimental evaluation designs are widely acknowledged to be the most scientifically rigorous and provide the strongest evidence of effect (Nutbeam and Bauman 2006, pp. 55-58). Randomised Controlled Trials (RCTs) are the "gold-standard" in experimental evaluation designs. A RCT refers to an evaluation design in which a study population are randomly assigned to either receive an intervention or

receive a control (i.e. half of the study population are randomly selected to receive the intervention, while the other half are randomly selected to receive a control e.g. control participants may not receive any intervention at all). Every individual in the study population has an equal chance of receiving the intervention, or not. Baseline measurements are taken of both the intervention and control participants. Follow-up measurements are subsequently taken of both the intervention and control participants upon programme completion. This helps to ensure any changes observed in the intervention participants but not in the control participants were actually caused by the intervention (Nutbeam and Bauman 2006). However experimental evaluation designs are also complex and expensive, and thus are most commonly used within *research studies* rather than for evaluations of real-life public health programmes (Roberts et al. 2009).

Research studies differ from evaluations of real-life programmes in that they tend to be well funded (Roberts et al. 2009). Furthermore within research studies the intervention and the intervention setting is tightly controlled by researchers who ensure that the intervention is delivered in a standardised way (Roberts et al. 2009). Generally research studies aim to determine the effect of an intervention under "ideal" settings, and tend to rely on quantitative measurements to demonstrate effectiveness (Roberts et al. 2009). In contrast real-life programmes are often constrained by tight financial budgets, and are delivered in real-life settings which mean that the implementation and delivery of the programme cannot be tightly controlled (Roberts et al. 2009). As a result real-life programmes tend to produce "*more varied results and require a more pragmatic approach*" than that offered by experimental designs (Roberts et al. 2009). In particular it has been suggested that experimental designs such as RCTs are often inappropriate for assessing community-based health promotion interventions:

> community-based programmes are often more complex than RCTs, typically, RCTs evaluate a specific single intervention and its effects on specified outcomes. By contrast, community programmes often have multiple elements, complex partnerships and may be less amenable to strictly scientific evidence generation. (Roberts et al. 2009)

It is important to clarify however that experimental designs are still the optimal type of impact / outcome evaluation design to generate robust evidence of effects, and thus where possible the impacts / outcomes of real-life programmes should ideally be evaluated through experimental evaluation designs (Nutbeam and Bauman 2006).

Pre-experimental evaluation designs are another type of impact / outcome evaluation design. Pre-experimental evaluation designs (such as pre-post study designs, where participants are measured at baseline and then are measured again upon programme completion to compare for any changes) are less rigorous than experimental designs. Pre-experimental designs are unable to provide strong / compelling evidence that any changes observed from baseline to programme completion were actually caused by the programme itself (Nutbeam and Bauman 2006, p. 65). However pre-post study designs are still useful to provide an *estimate* of the effect of an intervention and are a common evaluation design when evaluating the impact / outcomes of pilot programmes. (However it is important to remember that programme effectiveness can only be truly demonstrated through controlled experimental research designs (Roberts et al. 2009)).

> …this simple evaluation design [referring to pre-post study design] does give some estimate of change, and is often used in pilot studies to estimate the likely effect of an intervention (Nutbeam and Bauman 2006, p. 65)

Ideally health promotion programmes should include all three types of evaluation (formative, process and impact / outcome); however in practice funding constraints often limit the extent of programme evaluation (Nutbeam and Bauman 2006, p. 31). Furthermore according to Nutbeam and Bauman (2006, p. 31) not all programmes require the same intensity of evaluation.

> In practice, time and attention are not necessarily divided equally among these evaluation types. Pilot programmes need mostly formative work, while field studies in real-world settings tend to emphasise process evaluation. Health promotion interventions that are set up as research studies, or large-scale expensive interventions, warrant greater investment in impact / outcome evaluation … which may require technical design and statistical support

4.4 Choice of Evaluation Type and Evaluation Design

For this evaluation of the Green Prescription Pilot Programme formative and process evaluation were primarily used, with a lesser focus on impact / outcome evaluation. The emphasis on formative, and more so on process evaluation, was deemed most appropriate as this programme was in a state of continual development and refinement whilst being in the early stages of implementation as a pilot study (it's first 1-2 years) during the timeframe of the evaluation (THCU 2007; Nutbeam and Bauman 2006; Roberts et al. 2009). A pre-experimental, pre-post study evaluation design was

also used to estimate the likely effects (impacts / outcomes) of the Green Prescription Programme (Roberts et al. 2009). The researcher acknowledges that the use of a *pre-post study design* meant this evaluation *was unable to draw any definite conclusions* about the effects (impacts / outcomes) of the Green Prescription programme. Although an experimental evaluation design would have been preferable to generate more rigorous evidence of effect; a pre-post design was considered a more realistic evaluation design considering this was an evaluation of a pilot programme, with a limited budget and strict timeframe available for programme evaluation (Robert et al. 2009; Nutbeam and Bauman 2006, p. 83). The complexity of the Green Prescription Programme (being a real-life, community-based programme with multiple elements and complex partnerships) also meant it was less amenable to the strictly controlled requirements of experimental evaluation designs such as RCTs (Roberts et al. 2009).

> 'Best practice' in health promotion evaluation will always require consideration of the 'optimal against the possible' in evaluation design. There is no single approach that represents the best evaluation design for all purposes. The best approach in health promotion evaluation will vary, depending on the context and setting of the programme, the resources and time available, and the expressed needs of the stakeholders for evidence of programme effectiveness. (Nutbeam and Bauman 2006, p. 83)

A mixed-methods approach, comprised of both qualitative and quantitative methods, was used to conduct this evaluation. There are many ways of conducting an evaluation and thus the choice of what methods to use within an evaluation design is dependent on a number of key factors including the philosophical worldview assumptions of the researcher, the personal experiences of the researcher and the research issue to be addressed within the study (Creswell 2009, pp.5 - 20). Creswell (2009) suggests the researcher should explicitly state how these factors affected their *choice* of methods when explaining the research / evaluation design. Thus the researcher will now explain how the researchers own philosophical assumptions and personal experiences, in addition to how the aims of this evaluation study, led to the adoption of a mixed methods evaluation design for this study.

To begin a brief explanation of "philosophical worldview" is provided. "Philosophical worldview" (also referred to as "paradigm" and "epistemological" and "ontological" position) has being defined as "*a basic set of beliefs that guide action*" (Guba 1990 cited in Creswell 2009, p. 6). Various worldviews exist, including the

positivism, interpretivism and pragmatism, and depending on the worldview of the researcher a different evaluation / research design is likely to be used. The positivist view is based on determinism (the belief that all outcomes are the result of antecedent causes) and empiricism (the belief that knowledge comes from experience and observation), and believes that human behaviour and social actions can be analysed in the same way as natural sciences (Creswell 2009, p. 7; Snape and Spencer 2003; p. 1-23). Those who espouse a positivist worldview generally believe research should involve: the use of quantitative, scientific methods and statistical enquiry, the creation of and testing of hypotheses, determining the causes of outcomes, and predicting the relationship between variables. Remaining objective and avoiding the potential for bias within the research by utilising valid and reliable research methods are an essential part of positivism worldviews (Creswell 2009, p. 7; Snape and Spencer 2003, p.22). Conversely the interpretivist view is that scientific methods are not appropriate for investigating human and social behaviour, but rather places emphasis on human interpretations of the world (Snape and Spencer 2003, p. 23). Interpretivists believe that answers to a research question cannot be derived through quantitative evidence but rather believe that in order to understand an issue of interest the issue must be explored and understood through the perspectives of the participants (Snape and Spencer 2003, p. 23). Those who espouse an interpretivist worldview believe research should involve the use of qualitative methods. Interpretivists also believe findings of research are influenced by the researchers own interpretations and values, thus making it impossible to conduct objective research (Snape and Spencer 2003, p. 17).

Pragmatism is an alternative worldview. Pragmatism is the general philosophy underpinning the mixed methods approach and best describes the worldview of the researcher. The pragmatic worldview is not committed to any one philosophical stance, believing that researchers should not limit their research by only using research methods that are philosophically consistent (Snape and Spencer 2003, p. 21). Unlike the positivist and interpretivist worldviews, pragmatism does not believe there is one "best method" to understand or answer a research problem (Creswell 2009, p. 10; Snape and Spencer 2003, p.15). Rather the pragmatic researcher "*emphasizes the research problem and use(s) all approaches available to understand the problem*" (Creswell 2009, p. 10). Espousing a pragmatic stance provided the researcher with the freedom to utilise both quantitative ("scientific") and qualitative ("non-scientific") methods within the

evaluation design. This enabled the researcher to use a variety of different research methods and techniques that best aligned with the research purpose and provided the best understanding of the research problem (Snape and Spencer 2003, p. 15; Creswell 2009, pp. 10-11). The researcher acknowledged that the outcomes of the research (particularly the qualitative research) could possibly be influenced by the researchers own interpretations of the results. As a result the researcher ensured all qualitative instruments (focus group and interview topic guides) were reviewed and critiqued by two health promotion professionals before use, and pilot interviews and focus groups were also conducted to obtain an external critique of topic guide questions. During the analysis of qualitative data a selection of transcripts were independently coded by three researchers to ensure validity and transparency. Similarly the potential for researcher bias to influence quantitative collection was limited within this study by the use of validated, standardised instruments and the use of standardised protocols for the collection of quantitative data.

The choice of a mixed methods evaluation design was also influenced by the research questions of this study (the research issue to be addressed). The researcher believed a mixed methods approach was *required* to conduct a comprehensive evaluation of the Green Prescription programme, and adequately address the research questions. For example quantitative data collection was required and used to *objectively determine the impacts* of the programme on participants (however the researcher acknowledges that determination of the impacts of this programme was limited by the use of a pre and post study design, which are liable to threats of internal validity). Quantitative data collection was also required for some elements of the process evaluation e.g. determining the reach of the programme and the attendance rate of participants. Qualitative data collection was required to *understand* the *process* of programme development and implementation, and to *gain an understanding* of the feasibility and acceptability of establishing, implementing and participating in the programme from the *perspective* of various programme stakeholders. Qualitative data collection was also required to *explore* the impacts of the programme on participants in greater detail (from the perspective of participants), and was used to elaborate, clarify, complement and expand the quantitative results (Green, Carcicelli and Graham (1989) cited in Creswell and Plano Clark 2011).

The choice of a mixed methods design was also influenced by the researcher's academic background (personal experience), as the value of mixed methods research had being emphasised within the researchers academic discipline (Health Promotion). Furthermore the choice of a mixed method evaluation design was influenced by the increasing evidence base that suggests mixed methods research minimises the weaknesses inherent in each method and increases the strength, completeness, validity, applicability and utility of evaluation results (CDC Evaluation Research Team 2008; Guion et al. 2011; Creswell 2009). Also it has being suggested that mixed methods research is a promising strategy for identifying best practices in programme implementation (Besculides et al. 2006).

> A mixed-methods approach strengthens evaluation research because no single method is without weakness or bias. Quantitative data … may be objective, but they often lack the depth needed to elucidate how and why a program works. Qualitative data can enhance understanding of program implementation and operation, but are considered less objective. By combining the two research can be both objective and rich. (Besculides et al. 2006, p.2)

Within mixed methods research the qualitative and quantitative components are often referred to as two separate "strands" of the research. It is important to determine when planning the evaluation design the level of priority that will be given to each strand within the research study, the level of interaction that will take place between these strands and the timing of this interaction, and finally it is important to determine how both strands will be mixed within the research (Creswell and Plano Clark 2011, pp. 64-67).

Within some mixed methods studies both the qualitative and quantitative strands are given equal emphasis, while within other studies more emphasis is placed on one strand over another (Creswell and Plano Clark 2011, p. 65). Within this evaluation study the qualitative strand of the research was given the most emphasis, and the quantitative strand is used in a secondary role. This was mainly because the programme was in an early stage of development and implementation thus qualitative formative and process evaluation was deemed most beneficial and appropriate to ensure the programme was feasible, acceptable and being implemented as planned. In terms of the level of interaction of each strand within this study and the timing of this interaction, both the quantitative and qualitative methods / strands were often *collected concurrently* during the evaluation. For example focus groups and interviews with programme participants

were usually conducted on the same day as post programme quantitative data collection. Finally it remains important to specify where and how the qualitative and quantitative strands were mixed during this evaluation study. As explained by Creswell and Plano Clark (2011, p. 66):

> Mixing is the explicit interrelating of the study's quantitative and qualitative strands and has been referred to as combining and integrating …. We conceptualise mixing occurring at four possible time point during a study's research process: interpretation, data analysis, data collection, and design

Within this study the mixing of the quantitative and qualitative strands occurred during *interpretation* (i.e. within the Discussion Chapter (Chapter 6) of this thesis). The researcher kept the qualitative and quantitative strands separate / independent during the analysis and presented both strands separately during the results chapter (Chapter 5). Then the researcher combined the results from the qualitative and quantitative strands together in the discussion to draw "*conclusions or inferences that reflect what was learned from the combination of results from the two strands of the study*" (Creswell and Plano Clark 2011, p. 67).

4.5 Evaluation Framework

The evaluation framework used to guide this evaluation was developed from two different evaluation frameworks used in previous pilot studies − the translation formative evaluation framework used in the assessment of the "get healthy" programme presented by O'Hara et al. (2013) and the evaluation framework used in the SHAPE intervention (based around the core concepts of Feasibility, Acceptability and Impact) presented by Rajaraman et al. 2012. Together these frameworks were considered appropriate for the evaluation of the pilot Green Prescription and Community Walks programme as they were specifically developed to evaluate pilot programmes in the formative and implementation stages of development (O'Hara et al. 2013; Rajaraman et al. 2012). Both frameworks also aimed to assess programmes' potential for scale-up from a small-scale intervention to a population-wide intervention - known as "translational formative evaluation" (O'Hara et al. 2013). As the evaluation framework proposed by O'Hara et al. (2013) did not provide a mechanism for the collection of evidence of effect (impact / outcome evaluation), the addition of the framework proposed by Rajaraman et al. (2012) was necessary as it included short-term impact /

outcome approaches. The selection of stakeholders to involve in the evaluation was also guided by the Center for Disease Controls "how to guide" on planning and implementing health programme evaluations. The CDC states three main groups of stakeholders should be engaged in the evaluation, namely (1) those involved in the programmes operations e.g. programme management, staff and partners; (2) those affected or served by the programme e.g. participants, community members; and (3) those who are intended users of the evaluation results – stakeholders in this group are often the same as those involved in programme operations but may also include funding agencies etc (USDHHS. 2011, p.13) .

The evaluation framework used can be seen in Figure 1. It consisted of four separate stages (O'Hara et al. 2013). The first two stages "*Stage 1: synthesis of evidence*" and "*Stage 2: environmental and situational analysis*" were conducted and outlined as part of the literature review in Chapter two; while the fit of the programme in relation to governmental policies and strategies was outlined in Chapter three as part of the programme description. This methodology section outlines how the second two stages of the evaluation "*Stage 3: mixed methods research with the target audience*" and "*Stage 4: consultation with key stakeholders and experts*" were developed and implemented. As described previously mixed-methods research formed an integral component of the overall evaluation (See Figure 4.1 and Table 4.1). Table 4.1 provides a breakdown of each stage of the evaluation and the evaluation activities that were conducted at each stage. The results section details the results from stages 3 and 4.

Stage 1: Synthesis of Evidence – Review of Evidence base for Primary Care Based Physical Activity Interventions

Stage 2: Environmental & Situational Analysis – Profile of physical inactivity in Ireland. Examination of how current governmental policies and strategies align with the aims and objectives of the Green Prescription Programme

Pilot of the Green Prescription programme

Stage 3: Mixed-Methods Research with the Target Audience using quantitative and qualitative inquiry to answer the following research questions: Is the Green Prescription and Community Walks Programme Feasible and Acceptable to Implement? What is the Impact of the programme on participants? What is the Impact of the programme on the referring health professionals and community groups involved? What are the Recommendations for the future development of the programme?

Stage 4: Consultation with Key Stakeholders & Experts – Qualitative inquiry with a selection of other key stakeholders and experts to collect information for the following information research questions: Is the Green Prescription and Community Walks Programme Feasible and Acceptable to implement (key stakeholders perceptions)? What are the Recommendations for the future development of the programme (perceived opportunities to enhance the programme)?

Refinement, Upscaling and Roll-out of the Green Prescription and Community Walks programme

Figure 4.1: Evaluation Framework for the Green Prescription Programme (adapted from "Translation Formative Evaluation Research Stages", O'Hara et al. 2013)

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Table 4-1: Overview of each stage of the evaluation and the activities conducted within each stage   (adapted from O'Hara et al. 2013 and Rajaraman et al. 2012)

Stages of the Evaluation	Research Activities
1. Synthesis of Evidence	• Narrative review of empirical evidence & literature on physical activity interventions initiated/implemented within primary care • (Refer to the Literature Review in Chapter 2 for the findings of the "Synthesis of Evidence")
2. Environmental & situational analysis	• Analysis of demographic & risk factor profile of target population • Analysis of situational context in which Green Prescription programme would be operating & how it aligns with Government priorities and policies • (Refer to the Literature Review in Chapter 2 & to the Policy Context outlined in Chapter 3 for the findings of the "Environmental and Situational analysis)
3. Mixed methods research with target audience to determine:	Note target audience refers to both those served/affected by the programme (referred participants, self-referred participants, community walkers) *& those involved in the programmes operations* & intended users of the evaluation findings (Programme Coordinator, Development Officer, health professionals, community groups, support worker, Green step facilitators, walking leaders)
i. Is the Green Prescription and Community Walks Programme Feasible to Implement?	Indicators of feasibility – Ease of Recruitment; Participation rates & Reach (is the programme reaching its target participants); Target audience support for programme; Ease of implementation – do those involved in the programmes operations have the resources & capabilities (skills; knowledge; money, person power) to deliver the programme; Is the programme being delivered as planned; Barriers & Facilitators to implementation *Determined by:* *Quantitative activities* • Analysis of programme records – Number of referrals; Reason for referral; Attendance • Characteristics of those reached (Demographic profile, physical activity levels, health indicators) *Qualitative activities* • Qualitative evidence of programme feasibility collected from focus groups & interviews with target audience
ii. Is the Green Prescription and Community Walks Programme Acceptable to Implement?	Indicators of acceptability - Is the programme thought to be adding value/ meeting needs; Are target audience satisfied with the programme & its different components *Determined by:* *Qualitative activities* • Qualitative evidence of programme acceptability collected from focus groups & interviews with target audience
iii. What is the Impact of the Green Prescription and Community Walks Programme?	Indicators of impact- Changes in the clinical indices, physical activity levels, stages of change, mental wellbeing & quality of life scores of participants; Target audiences perceptions of impact; Other key stakeholders and experts perceptions of impact *Determined by:* *Quantitative activities* • Pre-Post comparison of waist circumference, weight, Body Mass Index • Pre-post comparison of blood pressure & resting heart rate • Pre-Post comparison of physical activity levels & Stage of Change • Pre-Post comparison of mental wellbeing levels *Qualitative activities* • Qualitative evidence of impact from interviews & focus groups
iv. What are the Recommendations for the Future Development of the programme?	• Key recommendations emerging from qualitative and quantitative findings
4. Consultations with Other Key Stakeholders & Experts:	Other key stakeholders included intended users of the evaluation findings, e.g. Programme Coordinator, Partners & potential funding agency. Aim of the consultation was to answer the following research questions: • Is the programme Feasible and Acceptable to Implement? • What are the Recommendations for the Future Development of the programme? *Determined by:* *Qualitative activities* • Qualitative evidence of programme feasibility, programme acceptability, potential impact of the programme, and perceived opportunities to enhance the programme collected from individual interviews with other key stakeholders

The remainder of this chapter provides a detailed description of each of the quantitative and qualitative activities and methods employed during stages 3 and 4 of the evaluation. The quantitative and qualitative methods are discussed separately for the purposes of clarity in the following sections.

4.6 Ethical Considerations

Full ethical approval was sought and granted for the research by the Irish College of General Practitioners (ICGP) (who provided ethical approval for all research involving health professional referred participants) and the Research Ethics Committee (REC) at Letterkenny General Hospital (who provided approval for all research involving self-referred community members / community walkers). (Refer to Appendix Z for copies of both ethics approval letters).

All individuals who participated in the evaluation did so by informed consent (refer to section *4.7.1.2 Participant Recruitment* and section *4.8.5 Conducting Interviews and Focus Groups*), and were assured of complete anonymity and confidentiality. All data collected was coded, anonymised or pseudonymised as appropriate and stored on password protected computers. As a stipulation of the ethical approval granted by the ICGP a copy of all baseline and post-intervention physiological measurements obtained from referred Green Steps participants needed to be provided to the relevant referring health professional. This data was sent to the relevant health professionals within the week proceeding data collection by means of registered post.

4.7 Quantitative Methods

4.7.1 Sampling & Recruitment Procedure

4.7.1.1 Community Sites & Data Collection Plan

Quantitative data was collected as the programme was rolled out on a phased basis into 8 different communities in Co. Donegal. During Phase 1 it was rolled out into the communities of Clohan (rural) and Letterkenny (urban); during Phase two it was rolled out into Falcarragh (rural), Donegal Town (urban), Castlefinn (rural) and also ran once again in Cloghan; and finally during Phase 3 it was rolled out into the communities of Ballybofey (urban), Lifford (rural) and Dunfanaghy (rural). Thus over the course of the quantitative evaluation the programme ran 9 times in 8 communities.

The evaluation aimed to collect pre-programme (week 1), post-programme (week 12) and longer-term follow-up (3 months post programme completion) data from Green Steps participants in all of these community sites.

Table 4-2: Quantitative Data Collection Plan by Phase, Community Site and Period of Follow-up

Phase of Data Collection	Date	Community	Pre-programme measurements (WK 1)	Post-programme measurements (WK 12)	Longer-term follow-up measurements
Phase 1	April / May 2012	Cloghan (Rural)	✓	✓	✓
		Letterkenny (Urban)	✓	✓	✓
Phase 2	Aug / Sept 2012	Falcarragh (Rural)	✓	✓	✓
		Donegal Town (Urban)	✓	✓	✓
		Castlefinn (Rural)	✓	✓	✓
		Cloghan (Rural)	✓	✓	✓
Phase 3	Nov / Dec 2012	Ballybofey (Urban)	✓	✓	✓
		Lifford (Rural)	✓	✓	✓
		Dunfanaghy (Rural)	✓	✓	✓

4.7.1.2 Participant recruitment

Only participants who entered the programme during the Green Steps (week 1) were recruited to participate in pre and post programme *quantitative* measurements. This included *both* health professional *referred* Green Steps participants and *self-referred* Green Steps participants. (Green Steps Participants were recruited into the programme mainly via referral from local health professionals and a number of participants also self-referred into the Green Steps programme after hearing about it in their local community).The reasons for only limiting the recruitment of participants to only those who were present on week 1 of the Green Steps was to ensure that all participants recruited to the evaluation had the opportunity to participate in the full 12 week programme. All participants underwent screening and risk assessment by their health professional and by the Green Steps Facilitators before being enrolled into the programme.

Attempts were also made to collect quantitative pre-post programme data (including physical activity levels and levels of mental wellbeing) on *community walkers* (who entered the programme at the Community Walks stage of the programme); however for numerous reasons this did not prove possible. (*Attendance roll data* was collected for community walkers however which is explained further in section *4.7.2.1 Analysis of Programme Records*).

Recruitment of Green Steps participants into the evaluation study was initiated by the support worker who verbally briefed all Green Steps participants about the purpose of evaluation during a participant support meeting which took place one week prior to the commencement of the Green Steps programme. The researcher was introduced to Green Steps participants on the first day of the Green Steps. At this point the researcher reminded participants about the evaluation and provided each participant with an information sheet. The researcher also provided clarification on the processes of the evaluation to participants as needed. The researcher informed participants that their participation in the evaluation was voluntary. Participants who agreed to participate were asked to sign a consent form, and were also provided with a copy of the consent form to take home. (Refer to appendices C and D for copies of participant information and consent forms).

Participant Inclusion Criteria

The main inclusion criteria guiding programme/evaluation study recruitment were that participants needed to be sedentary or not sufficiently physically active enough to gain health benefits. Health professional-referred participants often displayed conditional disease factors that had the potential to be reduced by becoming more physically active, e.g. obesity, high cholesterol, high blood pressure, depression. Health professional-referred participants were also required to have stated a desire or readiness to become more active in order to be deemed suitable for referral.

It was assumed self-referred participants and community walkers were already in a stage of readiness to become more active as they had proactively sought to take part in the programme. Self-referred participants and community walkers were not required to justify their reasons for wanting to take part in the programme / study, every person who volunteered to participate was accepted provided it was safe for them to do so (i.e.

provided they had met the conditions set out in the Physical Activity Readiness Questionnaire (PAR-Q) form (refer to Appendix E)).

Individuals were excluded from taking part in the programme / study if they had an unstable medical condition where exercise was an identified risk factor, if they had physical disabilities which precluded walking and for whom participation in physical activity would have put them at greater risk than those without a disability. All self-referred participants and community walkers were required to fill out the internationally recognised PAR-Q (See Appendix E). In a review of the literature this was recommended as the appropriate screening tool for adults of all ages (Goodman et al. 2011). This questionnaire clearly stated participants needed to get medical clearance from their GP if they have any presenting factors which may pose a health risk when engaging in physical activity. Thus any individuals who presented with any possible health risk factors were excluded until medical clearance was granted.

4.7.2   Instruments & Procedures used in Quantitative Data Collection

The British Heart Foundations (BHF) toolkit for the evaluation of exercise referral schemes (BHF 2010) and the National Obesity Observatory's (NOO) "*Standard Evaluation Framework (SEF) for Physical Activity Interventions*" (Cavil et al. 2012) helped to guide the choice of variables / indicators chosen for evaluation study.

4.7.2.1 Analysis of Programme Records

The programme records that were analysed for the purpose of the evaluation were the reason for patient referral, the total number of referrals and the participant attendance records. The BHF's toolkit for the evaluation of exercise referral schemes (BHF 2010) and the NOO's "*Standard Evaluation Framework for Physical Activity Interventions*" (Cavil et al. 2012) recommended that collecting data on the reason for patient referral, the number of referrals and participant attendance is "*essential*" when conducting a process evaluation of an exercise referral programme / physical activity intervention.

Attendance records (Number of Participants Recruited and Patterns of Participation)

The purpose of collecting attendance record data to determine total programme reach (total number of participants recruited / participant uptake of the programme) and to determine the patterns of programme participation. All participants (referred, self-

referred and community walkers) of the Green Prescription and Community Walks programme were required to sign their name on an attendance sheet at the beginning of each weekly session. During the Green Steps component of the programme the Green Steps facilitators were responsible for ensuring each participant signed in each week, while during the Community Walks it was the responsibility of the walking leaders on duty. These attendance records were requested from each of the Green Prescription programmes within the 9 communities.

Number of referrals

The purpose of collecting information on the number of participants referred was to analyse health professional support for the programme. At the time of the evaluation there was no structured system in place for recording the total number of patients each health professional had referred onto the programme. The number used to quantify the total number of referrals to the programme in this study was based on the number of referred participants who were present on the first week of the Green Steps programme (i.e. baseline).

Reason for referral

The purpose of collecting information on the reason for patient referral was to analyse the most common reasons why participants were referred to the programme. The researchers initial plan was obtain a copy of the "reason for referral" form from the Green Prescription support worker. As part of the referral process each referring health professional was to send through the "reason for referral" form to the support worker. However the support worker informed the researcher that in the majority of cases they had not received a written "reason for referral" form but rather had been informed verbally of the reason for patient referral over the phone from the health professional. The support worker had not kept a detailed written record of the reason why each patient was referred. Consequently it was necessary for the researcher to directly contact each referring health professional to obtain the reason for referral of each referred participant present on the first week of the Green Steps (39 participants in total). Each health professional was sent a letter explaining why the "reason for referral" was being sought, along with a simple "reason for referral" form (a separate form was provided for each patient) (refer to appendices F and G for copy of the letter sent to health professionals and the reason for referral form). A stamped addressed envelope was also provided for the return of the form. In the case of a health professional not returning the

reason for referral form within a two week period, another letter was sent. The reason for referral of the 39 referred participants was requested from the 11 referring health professionals.

Pre-study measurements were conducted at baseline (week 1 of the programme) and post study measurements were conducted upon completion of the programme (week 12), and again at longer-term follow-up (3-months post-programme completion).

Rationale for Variables Chosen

Pre- and post-programme measurements of the following variables were conducted to determine the impact of programme participation on participants:

• Weight	• Waist Circumference	• Body Mass Index (BMI)	• Blood Pressure
• Resting Heart Rate (RHR)	• Physical Activity Levels	• Stages of Change for Physical Activity	• Mental Wellbeing Levels

These variables were chosen as the literature on evaluation suggests the collection of pre-post programme measurements of these *particular* variables is "*essential*" and / or "*desirable*" when aiming to conduct a comprehensive evaluation of an exercise referral programme or physical activity intervention (BHF 2010; Cavil et al. 2012). The purpose of collecting baseline data of participants' weight, BMI, blood pressure and RHR to determine whether or not the programme was successful in reaching its target audience of overweight / obese individuals and participants with lifestyle diseases (e.g. high blood pressure). The purpose of comparing pre-post programme measurements of participants' weight, height, BMI, waist circumference, blood pressure and RHR was to measure any potential physiological changes due to programme participation (e.g. changes in blood pressure or BMI scores). It was acknowledged that *significant* changes in these physiological variables were unlikely to be observed during the course of the intervention however, particularly with regards to participants' weight, BMI and waist circumference (Cavil et al. 2012). (Note: In the context of this evaluation study blood pressure and RHR measurements were grouped under the heading of "cardiovascular risk factor measurements". Weight, height, BMI and waist circumference measurements were grouped under the heading of "anthropometric measurements").

Mental wellbeing has being shown to be related to physical activity levels (BHF 2010; Cavil et al. 2012). Thus collecting pre-post programme data to measure any

potential changes in mental wellbeing following participation in an exercise referral programme is recommended by the BHF's toolkit for the evaluation of exercise referral programmes (BHF 2010). Measuring any potential changes in participants' wellbeing was particularly important in the context of this evaluation as the Green Prescription programme had a specific aim to increase participants' mental wellbeing. Thus it was important to determine whether or not the programme was successful in achieving this aim.

Collecting data on participants' physical activity levels at baseline, and pre-post programme data on participants physical activity levels and motivation to engage in physical activity over the course of the intervention, is outlined as an essential basic requirement of any evaluation of an exercise referral programme / physical activity intervention (BHF 2010; Cavil et al. 2012). The purpose of collecting information regarding participants physical activity levels at baseline was to determine whether or not the programme was successful in recruiting its target audience of physically inactive individuals. The purpose of collecting pre-post programme data on participants physical activity levels, and stage of change for physical activity, was to determine whether or not the programme was successful in meeting its aims of increasing participants physical activity levels and increasing participants motivation to be more physically active.

In addition basic demographic information was also collected from Green Steps participants at baseline. The BHF's toolkit for the evaluation of exercise referral schemes (BHF 2010) and the NOO's "*Standard Evaluation Framework for Physical Activity Interventions*" (Cavil et al. 2012) recommended that collecting demographic information such as the sex, age and socio-economic status (SES) (or an appropriate proxy of SES) of programme participants is "*essential*" when conducting an evaluation of an exercise referral programme / physical activity intervention. The reason it is essential to collect this data is primarily to determine the reach of the programme being evaluated (BHF 2010; Cavil et al. 2012). The collection of this demographic data enabled the researcher to describe the characteristics of the sample under study in this evaluation; and furthermore it also enabled the researcher to compare the characteristics of the participants in this programme to the characteristics of participants in previous studies of a similar nature.

Cardiovascular Risk Factor Measurements (Blood Pressure & Resting Heart Rate)

Blood pressure *and* resting heart rate was measured to using an automatic blood pressure monitor and cuff (Make: Riester; Model: ri-champion®N). Participants were asked to sit down and relax for 5 minutes prior to measurement. The appropriately sized cuff was selected and fitted snugly to the participants' right arm, and participants rested their arm on a table at heart level. Participants were asked to remain quiet, keep both feet on the floor and breathe normally while the blood pressure reading was taken (See Appendix H for full protocol for blood pressure and resting heart rate measurement).

Blood pressure is the force of blood pushing against the walls of the arteries as the heart pumps blood. Blood pressure is measured as systolic and diastolic pressures, and is a measurement of the pressure in the circulatory system. "Systolic" refers to blood pressure when the heart beats while pumping blood. "Diastolic" refers to blood pressure when the heart is at rest between beats. Hypertension is abnormally elevated blood pressure (National Heart, Lung and Blood Institute 2012). Participants blood pressure readings were classified according to the categories for blood pressure levels in adults outlined by the National Heart, Lung and Blood Institute (2012) (refer to Table 4.3). It is important to note systolic and diastolic numbers may not be in the same blood pressure category. In this case, the more severe category (i.e. whichever number is highest – systolic or diastolic) is how the blood pressure reading is classified. For example, if the systolic number is 160 and the diastolic number is 80, this is classified as stage 2 hypertension. If the systolic number is 120 and the diastolic number is 95, this is classified as stage 1 hypertension (National Heart, Lung and Blood Institute 2012).

Table 4-3: Categories for Blood Pressure Levels in Adults

Category	Systolic (mmHg)		Diastolic (mmHg)
Normal	Less than 120	and	Less than 80
Prehypertension	120-139	or	80-89
Stage 1 Hypertension	140-159	or	90-99
Stage 2 Hypertension	160 or higher	Or	100 or higher

(Source: National Heart, Lung and Blood Institute, 2012)

Participants resting heart rate was also recorded by the blood pressure monitor. The resting heart rate is the number of times the heart beats when the body is completely at rest and indicates the cardiac efficiency of an individual. A normal resting heart rate for

adults' ranges from 60 to 100 beats a minute (Laskowski 2012[b]). Generally, a lower heart rate at rest implies more efficient heart function and better cardiovascular fitness (Laskowski 2012[b]).

Anthropometric Measurements

Height, Weight & BMI Measurement

Height was measured in metres and centimetres to the nearest 0.1cm, using a free standing stadiometer (Lesicester Height Measure). Weight was measured in kilograms to the nearest 0.1kg, using a Seca 875 Digital Weighing Scales (maximum capacity 200kg). (Refer to Appendix H for full protocols).

Participants body mass index (BMI) was then calculated using the following formula – BMI= ((Weight in Kg)/(Height in m^2)). Body Mass Index was used to assess whether an individual was underweight, a healthy weight, overweight or obese. The World Health Organisations (WHO) BMI Classification threshold cut-off points were used to define the BMI categories of "normal", "Overweight", "Obese" and "morbidly Obese"(WHO 2006). (Refer to Table 4-4).

Table 4-4: International Classification of adult underweight, overweight and obesity according to BMI

Classification	BMI(kg/m^2)
	Principal cut-off points
Normal range	18.50 – 24.99
Overweight	≥25.00
Pre-obese	25.00 – 29.99
Obese	≥30.00
Obese class I	30.00 – 34.99
Obese class II	35.00 – 39.99
Morbidly Obese	
Obese class III	≥40.00

(Source: adapted from WHO 2006)

Waist Circumference

Waist circumference was measured to the nearest 0.1cm using a Seca 201 Ergonomic Circumference Measuring Tape. Waist Circumference was measured by placing the tape horizontally across the unclothed abdomen, half way between the hip

bone and the lowest rib (approximately 5 cm (2 in) above the belly button) at the end of gentle expiration, with the participants in a standing position (refer to Appendix H for full protocol). Waist circumference was used to assess the degree of abdominal obesity. A high waist circumference is a known risk factor for many diseases including heart disease and type 2 diabetes. Table 4-5 depicts the waist circumference classifications utilised to segregate participant measurements.

Table 4-5: Classification of Waist Circumference Measurements

Gender	Healthy	Increased Health Risk	High Health Risk
Men	Less than 37 Inches	Higher than 37 Inches	Higher than 40 Inches
Women	Less than 32 Inches	Higher than 32 Inches	Higher than 35 Inches

(Source: Nutrition & Health Foundation (NHF) 2013)

Measurements of Participant Demographics, Physical Activity Levels and Mental Wellbeing

A 6-page questionnaire booklet (refer to appendix I for a copy of all the questionnaires contained within the questionnaire booklet) was designed that consisted of five self-report questionnaire instruments (1. basic demographic information questionnaire, 2. International Physical Activity Questionnaire Short Form, 3. Warwick Edinburgh Mental Wellbeing Scale, 5. WHO (Five) Well-being Index, 6. Stages of Change for Physical Activity Scale) and participants were asked to answer each questionnaire in sequence.

Basic Demographic Profile Data

Basic demographic information was requested on the first page of the questionnaire booklet. Participants were asked to give their name and their mother's maiden name (for identification purposes in the instance of two participants having the same name); they were also asked to state their gender and mark the age bracket category that applied to them. Finally participants were asked to mark whether or not they were entitled to a medical card or GP Only card. In Ireland, entitlement to a full medical card (also termed General Medical Services (GMS) eligibility) is primarily based on a means test, with medical cards generally only granted to those on low incomes (and individuals with certain disabilities and illness however) (Whelton et al. 2007). Although not a definitive measure, entitlement to a medical card has been used in previous studies as a measure of socio-economic status and health status; with those who are entitled to a medical card

broadly ranked within the lowest socio-economic categories (Whelton et al. 2007; Smith and Normand 2009). Although ideally participants would have been assigned to a socio-economic class or grouping on the basis of their income / occupation / work status (Public Health Alliance Ireland 2004), it was not deemed acceptable or appropriate to request this level of information from participants within this evaluation study. Previous Irish research does support the use of medical card status as a good indicator of socio-economic class, thus providing the rationale for the use of medical card status as a proxy of socio-economic class in this evaluation study (Kelleher et al. 2002; Public Health Alliance Ireland 2004):

> GMS eligibility is highly correlated at individual and regional level with measures of deprivation such as socioeconomic status, education level, tenure and number in household. (Kelleher et al. 2002)

> GMS status is an independent predictor not just of lifestyle factors and morbidity but also a powerful proxy for real disadvantage as it continues to be a powerful predictor of poor health even when other social factors are taken into account. (Public Health Alliance Ireland 2004)

International Physical Activity Questionnaire Short Form (IPAQ-SF)

Participants physical activity levels (pre and post programme) were measured according to the IPAQ-SF which, together with the IPAQ Long Form, is the most widely used physical activity questionnaire (van Poppel et al. 2010). The IPAQ-SF is designed to elicit information on respondents' physical activity levels over the previous seven-day period. The specific types of activity that are assessed are walking, moderate-intensity activities and vigorous-intensity activities. The researcher chose to use a generic measure of physical activity levels, rather than utilising a tool that assessed walking activity only, as the researcher anticipated that participation in the Green Prescription Programme could stimulate participants to become more active in general. The questions in the IPAQ-SF are structured to provide separate scores on walking, moderate-intensity and vigorous-intensity activity. The IPAQ-SF also asks a question regarding the amount of time spent sitting during the previous seven days, to assess respondents' sedentary behaviour.

Physical activity scores for the IPAQ-SF were computed as per the "*Guidelines for Data Processing and Analysis of the International Physical Activity Questionnaire*" (IPAQ 2005). Computation of the total score for the IPAQ-SF required summation of the duration (in minutes) and frequency (days) of walking, moderate-intensity and vigorous-intensity activities. The IPAQ-SF sitting time question was computed

independently as recommended in the scoring guide. The IPAQ scoring guide recommends that the physical activity scores collected through the IPAQ should be expressed as MET-Minutes per week[9]. It should be noted the American College of Sports Medicine recommends that adults need to engage in at least 500 – 1,000 MET-Minutes of physical activity per week in order to gain health benefits (U.S. Department of Health and Human Services 2008). 500 MET-Minutes per week is approximately equivalent to 150 minutes of moderate intensity physical activity per week, which is the minimum recommended amount of physical activity as per current National and International guidelines (U.S. Department of Health and Human Services 2008; Department of Health and Children, HSE 2009). The IPAQ also allowed computation of the total number of minutes participants spent engaged in physical activity per week.

It is important to evaluate the psychometric properties of a physical activity questionnaire prior to its use (Ainsworth et al. 2012). Evaluating the psychometric properties of questionnaire means checking whether or not a questionnaire is *valid, reliable* and *sensitive to change. Validity* can be defined as the accuracy or precision of an instrument / questionnaire, i.e. validity refers to whether or not a questionnaire measures what it intends to measure (Ainsworth et al. 2012). There are various ways to assess validity. Examples of commonly investigated aspects of validity include construct validity, face validity and content validity. Construct validity is defined as the "*validity of … a measurement tool that is established by demonstrating its ability to identify or measure the variables or constructs that it proposes to identify or measure*" (Mosby's Medical Dictionary 2009 cited in The Free Dictionary by Farlex 2014). For example if a questionnaire / instrument proposes to identify the number of minutes an individual spends walking per day, construct validity refers to the actual ability of that questionnaire to measure the walking minutes per day. The judgement on the construct validity of an instrument "*is based on the accumulation of correlations from numerous studies using the instrument being evaluated*" (Mosby's Medical Dictionary 2009 cited

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[9] MET (metabolic equivalent) is a common method of expressing the energy cost or calorie expenditure of different physical activities, e.g. resting, walking, jogging or running. One MET is the rate of energy expended when an individual is at rest. A 3.3 MET activity (such as a brisk walk) uses 3.3 times more energy than the body would use while at rest. So for example if an individual does a 3.3 MET activity for 30 minutes (e.g. if they went for a 30 minute brisk walk), they would have done 3.3 X 30 minutes = 99 MET minutes of physical activity. If they went for a 30 minute brisk walk 6 days a week, they would have done 99 MET minutes per day X 6days per week = 594 MET minutes per week. (The Cooper Institute 2012; U.S. Department of Health and Human Services 2008)

in The Free Dictionary by Farlex 2014). Content validity refers to how accurately the items within a measurement tool /questionnaire represents the various aspects of the specific construct / concept in question. In other words, do the questions really assess the construct in question, or are the responses by the person answering the questions influenced by other factors? (Education Portal 2014). Face validity can be described "*as a sense that the questionnaire looks like it measures what it was intended to measure. Were the questions phrased appropriately? Did the options for responding seem appropriate?*" (Institute for Work and Health 2007). A questionnaire is described as having high face validity when the purpose of the questionnaire is obviously apparent / clear to the respondent. *Reliability* refers to the stability of a measure, which means it refers to the "*extent to which each time a questionnaire is used, and for each person it is used for, it will measure the same thing*" (Nutbeam and Bauman 2006, p.87). A questionnaire that is s S*ensitivity to change* refers to the ability of a questionnaire to capture changes in physical activity behaviours over time (Ainsworth et al. 2012). Ideally a questionnaire should be proven valid, reliable and sensitive to change before use (Ainsworth et al. 2012). Unfortunately however with regards physical activity questionnaires few, if any, the proven ability to demonstrate validity, reliability *and* sensitivity to change (Ainsworth et al. 2012; van Poppel et al. 2010).

With regards to the IPAQ Long and IPAQ-SF both have been found to have acceptable measurement properties across a variety of settings (Marshall and Bauman 2001). The results obtained by use of the IPAQ-SF are also comparable to the results obtained by use of the IPAQ Long (Marshall and Bauman 2001), with the IPAQ-SF generally found to be more acceptable and usable to investigating researchers and respondents (Marshall and Bauman 2001; Papathanassiou et al. 2009). The IPAQ-SF has demonstrated high reliability properties in adult populations (ranging from 0.66 to 0.81) and has shown high repeatability values for total and vigorous activities and good repeatability values for moderate and walking activities (Lee et al. 2011; Papathanassiou et al. 2009).

Very few physical activity questionnaires have the proven ability to demonstrate sensitivity to change (Ainsworth et al. 2012). There is considerable debate regarding the IPAQ's ability to detect changes in physical activity behaviour over time (i.e. its sensitivity to change) (Ainsworth et al. 2012). The IPAQ was originally developed for

use in surveillance settings, rather than in intervention settings and thus was not originally subjected to tests for its sensitivity to change (Ainsworth et al. 2012). In spite of the lack of evidence supporting the IPAQs sensitivity to change, it has been commonly used within intervention studies (Ainsworth et al. 2012). Although the research base is not very strong, in recent years some research has been conducted assessing the IPAQ within intervention settings and there is some limited evidence to suggest the IPAQ is sensitive to change (Bertheussen et al. 2012). Bertheussen et al. (2012) conducted a validation study to compare the ability of two physical activity questionnaires (one being the IPAQ) to detect changes in the self-reported physical activity levels of cancer survivors following participation in a 12-week physical activity-focused rehabilitation programme. Results of this study showed the IPAQ to have a moderate ability (effect size for sensitivity to change was 0.42) to detect changes in physical activity behaviour (Bertheussen et al. 2012).

With regards to validity, a recent validation study by Moghaddam et al. (2012) reported evidence supporting the face, content and construct validity of the IPAQ. However like other self-report physical activity questionnaires the IPAQ has previously been criticised regarding its validity. In a systematic review of the reliability and validity of physical activity questionnaires Helmerhorst et al. (2012) found that although the majority of questionnaires (including the IPAQ) have acceptable reliability the validity of questionnaires is moderate at best. It is important to note that there is no "gold-standard" self-report physical activity questionnaire – in a systematic review of 85 physical activity questionnaires, including the IPAQ, by van Poppel et al. (2010) no one questionnaire or type of questionnaire was found superior and therefore the authors concluded no one questionnaire could be recommended above the others. Thus although the IPAQ-SF is by no means an "ideal" measure of physical activity levels it has been found to be as valid and reliable as other widely used self-report measures of physical activity (Marshall and Bauman, 2001; Craig et al. 2003; Qu et al. 2004; Mannocci et al. 2012).

A common analysis method used to demonstrate questionnaire validity is to correlate self-reported physical activity data with data from an objective measurement device, both of which are obtained over exactly the same time period (this is known as concurrent validity) (Lee et al. 2011). Like concurrent validation studies of other self-

report physical activity questionnaires, the majority of concurrent validation studies on the IPAQ-SF have only found a small correlation between the IPAQ-SF and other objective measures of physical activity (Lee et al. 2012). Primarily these concurrent validation studies have found that the IPAQ-SF tends to overestimate the amount of reported physical activity compared to an objective device (Lee et al. 2011). Ideally an objective measure of physical activity would have been used for this study however this was not feasible for many reasons (including lack of time, funding and other resources). Thus it was decided to use a self-report physical activity questionnaire as the next best option to measure physical activity levels, while remaining cognisant of the limitations of self-report instruments. The IPAQ-SF was used as it has been found to be feasible to administer and convenient to combine with other questionnaires (Lee et al. (2007) cited in Mannocci et al. 2013) and previous respondents' have found it acceptable and relatively easy to understand (Marshall and Bauman 2001). A systematic review on the IPAQ-SF concluded that the "*proven reliability [of the IPAQ-SF] shows it can be used with care in repeated measures studies*" (Lee et al. 2011); however the researcher does acknowledge the limitations of using the IPAQ with small sample sizes. The researcher also acknowledges the limited evidence base supporting the IPAQs ability to *detect change* in intervention studies. However as the literature suggested this was common limitation of physical activity questionnaires in general (Ainsworth et al. 2012) and as the researcher could not identify an alternative physical activity questionnaire that had proven sensitivity to change the IPAQ-SF was used. (See Section "*4.7.3.1 Pre-Programme Data Collection Procedure"* for information on the dissemination of the questionnaires).

Stage of Change for Physical Activity

Participants attitudes towards and motivation to engage in physical activity was measured using a version of the five-item "stage of change" instrument for physical activity (developed and modified by Marcus et al. 1992). This instrument presented participants with 5 statements relating to their current exercise behaviour and intentions and asked participants to tick the statement that best applied to them. These statements correlated with 5 stages of change (pre-contemplation, contemplation, preparation, action or maintenance) and thus a participant's current stage of change could be identified depending on the statement they ticked. The validity of this instrument has been well established by Marcus et al. (1992[b]). Furthermore the kappa index of

reliability for the stage of change instrument has been reported as .78, suggesting the stage of change instrument is highly reliable / stable over time (Marcus et al. 1992[b]).

Subjective mental wellbeing was measured using the positively-worded, self-completed, 14 item Warwick-Edinburgh Mental Well-Being Scale (WEMWBS), which has been shown to be a valid and reliable and is widely used (Stewart-Brown et al. 2011). The items within the WEMWBS cover hedonic (subjective experiences of happiness and life satisfaction) and eudaimonic perspectives (psychological functioning, positive relationships with others and self-realisation) (NorthWest Public Health Observatory 2012). Participants are presented with a number of statements relating to their subjective well-being and are subsequently asked to rate them along a likert scale, e.g. participants are asked to rate the following statement "I've been feeling useful" on the following scale "none of the time", "rarely", "some of the time", "often", "all of the time". Each statement is assigned a score which correlates with mental wellbeing levels. The minimum scale score is 14 (representing poor wellbeing) and the maximum is 70 (representing a high level of wellbeing).

Studies testing the WEMWBS have found the distribution of scores to be near normal, with no floor or ceiling effects. It has shown good test-retest reliability (0.83) and the scale has been found to differentiate between different population groups in an expected way, e.g. U-shaped relationship for age and lower mental wellbeing scores for lower socio-economic classes (Stewart-Brown et al. 2011; NorthWest Public Health Observatory 2012). The WEMWBS has also been found to be sensitive to change in psychiatric populations (Stewart-Brown et al. 2011). In development validation studies WEMWBS shows good content validity with student samples and Scottish population samples. WEMWBS has also demonstrated good construct validity and it has shown high correlation with other mental health and well-being scales (e.g. Satisfaction with Life Scale, WHO-Five Well-being Index). It has shown high internal consistency with a Cronbach's alpha of 0.87 (NorthWest Public Health Observatory 2012; Clarke et al. 2011). Furthermore in tests with respondents the WEMWBS was found to be received positively and was considered comprehensible, and acceptable (Clarke et al. 2011). The mean population score for the WEMWBS has been reported as 50.7 (Stewart-Brown et al. 2008). "*Best estimates*" suggest that if the WEMWBS scores changes by 3 to 8

points between "before" and "after" time points this can be considered a meaningful change in mental wellbeing. For example if the WEMWBS score increased by 3 points from pre programme to post programme this suggests that mental wellbeing meaningfully improved over the course of the programme (Putz et al. 2012). The WEMWBS is free to use but permission must be sought before use. Permission for use was sought by email on the 10.02.2012 and permission was granted for use (again by email) on the 13.02.2012 (Refer to Appendix I (1)).

WHO (Five) Quality of Life Index / Well-Being Index

The WEMWBS was further complimented by use of the WHO-Five Well-Being Index. The WHO-Five Well-being Index is a positively-worded, participant-friendly short scale for the measurement of the psychological wellbeing dimension of health-related quality of life (Bech 2004). It has the same format as the WEMWBS with participants presented with statements that they subsequently rate on a likert scale, and each statement is assigned a score. A raw score of 0 represents worst possible quality of life and 25 represents best possible quality of life.

Its psychometric properties have been found to be acceptable both when used as a screening instrument for depression and when used to measure quality of life of different population groups (Bech 2004). It has shown to be a valid and reliable measure of emotional functioning and a good screener for depression (Bonsignore et al. 2001; Henkel et al. 2003; Bech 2004). It has shown a high internal consistency with a Cronbach's alpha of 0.82 (de wit et al. 2007). Studies have found the WHO-Five Well-being Index to have good sensitivity (ranging from 89% to 93%) and moderate to good specificity (ranging from 64% to 86%) (Henkel et al. 2003; de wit et al. 2007; Allgaier et al. 2013). Furthermore the WHO-Five Well-being Index has also been shown to have a high degree of acceptability and applicability in tests among different population groups (Bech 2004). General population studies have indicated that the mean percentage score of the WHO-Five is around 70 (which is the equivalent of a raw score of 17.5) (Bech 2004).

Pilot Testing of the Questionnaire Instruments

The questionnaire booklet was pilot tested with a group of participants (all females aged from 30-44 years) attending an unrelated physical activity programme in a local disadvantaged community. The group of participants reported no problems regarding

the layout and did not feel the questions contained within the questionnaires were too intrusive. However a number of participants reported minor issues with regards comprehension of some questions within the IPAQ-SF instrument which resulted in the addition of some instructions to the IPAQ-SF instrument to aid clarification. A note was also included on the bottom of each page of the questionnaire booklet to inform respondents to "please turn over" onto the next page, as some respondents in the pilot study had commented that it would be "easy to miss a page".

Use of Incentives

On the front page of the questionnaire booklet all participants were:

- Informed of the purpose of the questionnaires and that they would be asked to complete the same questionnaire booklet again on the final day of the programme
- Reminded to answer the questions as honestly as they could
- Informed that if they completed the survey at baseline *and* follow-up *and* participated in at least 5 of the organised walks they would be in with the chance of winning a cash prize of €100 (this was a once off cash prize that could be won by one participant only). This was used as an incentive for participation.

4.7.2.3 Structured Telephone Interviews with Study Non-Completers

All participants who were present at baseline (and completed baseline physical measurements and questionnaire pack) but were not present at the 12-week follow-up were classed as study "non-completers". The researcher attempted to contact all non-completers by telephone to obtain the reason for non-completion/drop-out. A structured interview schedule, which contained a sequence of questions and space for filling in the respondents answers, was developed for this purpose (refer to appendix J). If a participant did not answer on the first phone call they were called again later that day or on the next day. If participants did not answer the phone after three telephone call attempts they were classed as "lost to follow up". The majority of successful telephone interviews with non-completers lasted approximately 5 to 10 minutes.

4.7.3 Quantitative Data Collection Procedure for Green Steps Participants

Table 4-6: Quantitative data collection measures and timing of their collection

Data Collected	Pre-Programme (Week 1)	Post-Programme (Week 12)	Longer-term Follow-up (3 months Post Prog. Completion)
Number of Referrals	✓		
Reason for Referral	✓		
Anthropometric Measurements			
Height	✓		
Weight	✓	✓	✓
BMI	✓	✓	✓
Waist Circumference	✓	✓	✓
Other Cardiovascular Risk Factors			
Blood pressure	✓	✓	✓
Resting Heart Rate	✓	✓	✓
Physical Activity Levels			
IPAQ-SF	✓	✓	✓
Stages of Change	✓	✓	✓
Mental Wellbeing			
WEMWBS	✓	✓	✓
WHO (Five) Index	✓	✓	✓
Attendance Records (attendance of Green Steps participants *and* Community Walkers)		✓	
Structured Telephone Interviews with Non-Completers		✓	

Table 4-6 provides an outline of the various points at which quantitative data was collected during the evaluation. The procedure of how pre, post and long-term follow-up data were collected is detailed below.

4.7.3.1 Pre-Programme Data Collection Procedure

Pre-Programme data collection took place on week 1 of the Green Steps programme (Refer to Table 4-6). A small number of participants entered into the Green Steps programme after week 1, but no data was captured on these participants.

Arrangements were made to arrive at the community centre/hall 15 minutes early to prepare it as needed for data collection (e.g. set up equipment, ensure tables and chairs are in position etc.). The support worker and Green Steps Facilitator were also present on week 1 of the Green Steps and they welcomed participants on arrival and invited them to sign the attendance form. After a brief information session on the purpose of the evaluation, all participants willing to participate in the evaluation were recruited into the study by informed consent (refer to section "*4.7.1.2 Participant recruitment*"). The

questionnaire booklet was disseminated to each willing participant and an explanation of each of the questionnaire instruments was provided. Sheets providing examples of "moderate" and "vigorous" activities were also disseminated to aid participants when filling in the IPAQ-SF instrument (refer to appendix I). The Green Steps Facilitator in attendance and the support worker were also on hand to help answer any questions relating to the questionnaires (the Green Steps Facilitators and support worker were previously issued with a training pack on each of the questionnaires and how they should be filled out). Once each participant was confident in filling in the questionnaire booklet, one participant at a time was invited to a separate room within the centre/hall to complete the physical measurements. As explained previously a standardised method of taking measurements was followed. Questionnaire booklets were also briefly examined at this point to ensure participants had not left blank spaces. Once all baseline data collection was complete and all questionnaire booklets were collected from participants the Green Steps Facilitator commenced the physical activity session.

4.7.3.2 Short-term Follow-up (12-Week Follow-up)

12-week follow-up measurements took place on the final day of the community walks (week 12). The same location (community centre / hall) was used as for baseline data collection. One week prior to the 12-week follow-up the walking leaders responsible for leading the walks were contacted and asked to remind each of the Green Steps participants who completed baseline measurements at week 1 (and were still attending the programme) that post-programme measurements would be completed the following week.

Where feasible arrangements were made to have these participants arrive one hour prior to the arranged community walk so follow-up data collection did not interfere with their attendance on the walk. At week 12 follow-up the physical measurements completed at baseline were repeated and participants filled in a second duplicate questionnaire booklet as completed at baseline.

4.7.3.3 Longer-term Follow-up

Longer-term follow-up data collection took place 3 months post programme completion (which was 6 months post programme initiation). All participants who had completed both pre- and post-programme measurements were invited to attend the long-term follow-up. Dates and times that suited the participants were offered to encourage

attendance. The same community centre/hall that was used for pre and post programme data collection was used for the long-term follow-up also. In situations whereby the participants were still attending the community walks arrangements were made to conduct the follow-up assessments on the morning of the walk. However in the majority of cases participants were met on an individual basis, as different dates and times suited each participant.

4.7.4 Quantitative Data analysis

4.7.4.1 Data Storage

All baseline and post-intervention physiological measurements and questionnaire data obtained from Green Steps participants were coded (pseudonymised) and subsequently encrypted onto a password protected computer. Data codes were held separately thus individual data was not readily identifiable in the data management system. (Refer to Appendix K for protocol on Green Steps participants' data coding procedure). Pseudonymised hard copies of participant data (including consent forms) was stored and filed in a locked cabinet. Data was labelled according to the data collection time point (whether the data was collected during phase 1, 2 or 3 *and* whether it was baseline, 12-week follow-up or long-term follow-up measures) and location (i.e. what community the participants were from).

4.7.4.2 Data Entry

All coded data was initially entered into Microsoft Excel (2010). Entered data was rechecked numerous times and compared to the original file to check for cases of human error. Separate spread sheets were created for each data collection instrument. Data cleaning was also carried out in Microsoft Excel. The data from the IPAQ-SF and WEMWBS were cleaned by following the scoring and cleaning guidelines developed for each instrument. Once all physical measurement and questionnaire data were cleaned they were imported into the Statistical Package for Social Sciences (SPSS) Version 20 for Windows.

4.7.4.3 Data analysis

All coded data relating to programme records (attendance data, reason for referral data, and reason for drop-out data) were analysed within Microsoft Excel (2010). All physical measurements and questionnaire data (baseline, 12-week follow-up and long-

term follow-up) were analysed within SPSS Version 20 for Windows. Both descriptive and inferential statistics were conducted on the data.

Descriptive statistics (e.g. frequencies and percentages) were produced to describe the basic features of the research. Means and standard deviations were produced for parametric data (participants' systolic and diastolic blood pressure scores; resting heart rate; waist circumference; weight; body mass index; WEMWBS scores and WHO (Five) Wellbeing Index scores). The mean is a measure of central tendency, which means that it is "*a single value that attempts to describe a set of data by identifying the central position within that set of data*" (Laerd Statistics 2013[a]). The mean is computed by dividing the total of all values in a data set, by the number of values. The mean is the most common and best general purpose measure of the mid-point (around which all other values cluster) of a set of values. As advised within statistical literature the mean was only used when in instances where the data set was normally distributed and when there were no extreme outliers present (these are characteristics of parametric data) (Laerd Statistics 2013[a]). As the mean is prone to distortion by the presence of outlying values (Laerd Statistics 2013[a]) it does require the use of a measure of distortion; and the standard deviation was the measure of distortion used.

The median is another valid measure of central tendency, which was used in instances where it was not appropriate to use the mean. Specifically the median was used within data sets that were not normally distributed and that had extreme outliers present that would skew the mean value (characteristics of non-parametric data). Medians were produced for non-parametric data sets, namely IPAQ-SF scores for physical activity levels and daily sitting time. The interquartile range, which is a measure of dispersion or spread within a data set, was used in conjunction with the median value to provide an indication of how well the median value actually represented the data set (Laerd Statistics 2013[b]).

Paired samples t-test were used to evaluate and compare differences between baseline and 12-week follow-up for parametric data sets, namely participants' systolic and diastolic blood pressure scores; resting heart rate; waist circumference; weight; body mass index; WEMWBS scores and WHO (Five) Wellbeing Index scores. The reason paired samples t-tests were used for comparing those data sets was because those

data sets met the following assumptions: (1) the dependant variable was measured on a continuous scale, (2) there were no extreme outliers within the data sets and (3) the differences between the pairs were normally distributed (Laerd Statistics 2013[c]) (it is necessary for data sets to meet these assumptions in order for t-tests to be used). The Wilcoxon Signed Rank Test was used to evaluate and compare differences between baseline and 12-week follow-up scores for data sets that were non-parametric and did not meet the three aforementioned assumptions for the paired-sampled t-test. Specifically the Wilcoxin Signed Rank Test was used to compare differences between the baseline and 12-week follow-up for the IPAQ-SF data for physical activity levels and daily sitting time.

A repeated measured Anova test is an extension of the paired samples t-test and is used to investigate changes in mean scores over three or more time points (Laerd Statistics 2013[d]). For this evaluation the repeated measures Anova was used to compare differences between participants mean scores at baseline, 12-week follow-up and longer-term follow-up for parametric data that sets that were normally distributed and measured on a continuous scale (namely systolic and diastolic blood pressure scores; resting heart rate; waist circumference; weight; body mass index; WEMWBS scores and WHO (Five) Wellbeing Index scores). The Friedman test was used to compare scores across these 3 time frames for (not normally distributed) non-parametric data (namely IPAQ-SF data for physical activity levels and daily sitting time). In the case of statistically significant results from the Friedman Test a Wilcoxin Signed Rank test with a Bonferroni correction was conducted as a post-hoc test to determine where significant differences occurred. The level of significance was set at $p \leq 0.05$ for all tests.

4.8 Qualitative Methods

4.8.1 Methods of Qualitative Data Collection

Individual interviews and focus groups were used in order to obtain reliable, comparable data that were relevant to the research objectives. According to Gill et al. (2008) interviews and focus groups are the most common methods of data collection used in qualitative healthcare research. Interviews have been defined as "*discussions, usually one-on-one between an interviewer and an individual [the interviewee], meant to gather information on a specific set of topics. Interviews can be conducted in person or over the phone*" (Harrell and Bradley 2009). Interviews are useful to explore the

views, experiences, beliefs and/or motivations of individuals regarding a specific topic / phenomenon; and provide rich, detailed accounts of individual experiences (Gill et al. 2008). Individual interviews have been described as the "*undisputed gold-standard of qualitative data collection methods*" (Lambert and Loiselle 2008). However focus groups are becoming an increasingly common data collection method as they allow a greater range of experiences to be documented and are generally lower cost than individual interviews depending on the number of participants involved (Lambert and Loiselle 2008).

Focus groups "*are dynamic group discussions used to collect information*", and these group discussions are guided, monitored and recorded by a facilitator (Harrell and Bradley 2009; Gill et al. 2008). A focus group is essentially a group interview of people who share similar interests or common characteristics (CDC Evaluation Research Team 2008). Focus groups can be successfully conducted with as little as three participants and as many as 14 participants (Gill et al. 2008). Although focus groups share common features with less structured interviews (Gill et al. 2008), due to the fact a focus group involves a group of people it is important they are conducted carefully to ensure each participant has equal opportunity to respond to questions and voice their own opinions. It is also important to ensure that all participants within a focus group are comfortable expressing their views and opinions openly with each other in order for a focus group to successfully generate useful information (Gill et al. 2008). Focus groups are useful for generating information on collective views and the meanings that lie behind those views (Gill et al. 2008). Focus groups can also be useful for generating a "*rich understanding of participants' experiences and beliefs*" (Gill et al. 2008) and as focus group interactions can often accentuate participants similarities and differences they can provide information about the *range* of perspectives and experiences (Lambert and Loiselle 2008).

According to Gill et al. (2008) there are three main types of research interviews: structured, semi-structured and unstructured. Structured interviews are interviews in which a list of predetermined questions are asked, with little or no variation and with no scope for follow-up questions to participant responses that warrant further elaboration. Although relatively quick and easy to administer the fact they only allow for limited participant responses is a distinct disadvantage when "in-depth" information is required

(Gill et al. 2008). Contrariwise, unstructured interviews are performed with little or no organisation and do not include predetermined questions (apart from perhaps the initial opening question). Unstructured interviews usually start with an opening question and will then progress based, primarily, upon the initial response. Although very useful for generating "in-depth" information on the topic of interest, unstructured interviews are usually "*very time-consuming and can be difficult to manage, and to participate in, as the lack of predetermined interview questions provides little guidance on what to talk about*" (Gill et al. 2008). The most commonly used interview format in healthcare research is the semi-structured interview format. Semi-structured interviews consist of several key questions that help to define the areas to be explored and to guide the discussion, but also allow the interviewer or interviewee to diverge in order to pursue an idea or response in more detail (Gill et al. 2008). The semi-structured interview format was used during this evaluation for both individual interviews and for focus groups. Semi-structured interviews are advantageous in that they allow the interviewees to express their own views and perspectives in their own terms (Cohen and Crabtree 2006).

> The flexibility of this approach [semi-structured interview format], particularly compared to structured interviews,… allows for the discovery or elaboration of information that is important to participants but may not have previously been thought of as pertinent by the research team. (Gill et al. 2008)

4.8.1.1 Integration of Individual Interviews and Focus Group Data

The use of individual interview data collection methods and focus group data collection methods were integrated throughout this evaluation; and similarly an integrative approach was also used in data analysis (i.e. both individual interview data and focus data were combined in data analysis). The rationale for combining both methods was based on both pragmatic reasons (e.g. in instances where it didn't suit an individual to attend a focus group they were offered an interview instead) and for the purpose of achieving data completeness (Lambert and Loiselle 2008). This practice of integrating interview data collection methods and focus group data collection methods is becoming increasing common within qualitative healthcare research and "*is advocated as a strategy to achieve more comprehensive understandings of phenomena*" (Lambert and Loiselle 2008). Lambert and Loiselle (2008) conducted research on, and presented a critical reflection of, the practice of combining the two data collection

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methods (both at the data collection and data analysis stage) and reported the following in support of this practice:

> Although focus groups and individual interviews are independent data collection methods; their combination can be advantageous to researchers as complementary views of the phenomenon may be generated.
>
> Individual interviews and focus groups … may be combined for the purposes of data completeness and / or confirmation. When seeking data completeness it is assumed that each method reveals different parts of the phenomenon of interest (complementary views) and contributes to a more comprehensive understanding (expanding the breath and / or depth of findings). For example individual interviews may be used to explore personal experiences whereas focus groups may be used to examine opinions and beliefs about the phenomenon.
>
> When performed rigorously, the integration of individual interviews and focus group data [both at the data collection and analysis stage] is a productive strategy that leads to an enhanced description of the phenomenon's structure and its essential characteristics.

In combination the use of semi-structured interviews and focus groups facilitated the retrieval of in-depth information on the perceptions, attitudes and experiences of the target audience and other key stakeholders involved with the programme. While the focus groups were very useful in generating a catalogue the wide range of participant and stakeholder experiences, the individual interviews contributed a more detailed and in-depth account of these experiences (Lambert and Loiselle 2008).

In addition the information collected through interviews and focus groups with programme participants also helped to supplement, elaborate and substantiate the quantitative data that was collected and thus allowed a fuller interpretation of the quantitative data (CDC Evaluation Research Team 2008).

> Qualitative methods, such as interviews [and focus groups], are believed to provide a 'deeper' understanding of social phenomena than would be obtained from purely quantitative methods, such as questionnaires. (Gill et al. 2008)

4.8.1.2 Ensuring Qualitative Data Validity

To ensure the validity of research findings multiple sources of information (data triangulation) were used. This means interviews and focus groups were conducted with a wide range of individuals and groups within target audience (target audience included both the programme participants and those involved in implementing and delivering the programme) and also with a selection of other key stakeholders and experts. Validity in qualitative research refers to whether the results of the research are trustworthy, whether

the results accurately reflect the situation and the participants' opinions and thoughts, and whether they are *certain* in the sense that the research findings are supported by evidence (Guion et al. 2011; Krueger and Casey 2009). Using multiple sources of information helped to ensure greater validity of the research findings by analysing the research questions from multiple perspectives and allowing a more comprehensive view of the programme under evaluation (Guion et al. 2011).

4.8.2 Development of Interview & Focus Group Topic Guides

Development of focus group and interview topic guides was guided by a literature review and key research questions. Following the guidance of Krueger and Casey (2009) on the qualities of good interview questions the researcher aimed to develop questions that would evoke conversation, that used words the interview participants would use when talking about the issue, that were easy to say, that were clear, that were short, that were open ended, that were one-dimensional and that had a clear, well-thought out direction. All interview and focus group schedules were reviewed and critiqued by two health promotion professionals with prior experience of conducting qualitative research (the researcher's thesis supervisors). The schedules were then pilot tested with acquaintances of the researcher to ensure they were easily understood.

The focus group and interview topic guides for programme participants were also pilot tested in a mock focus group with a selection of staff from within the Institute of Technology where the researcher is registered. At the end of the mock focus group the participants provided the researcher with feedback on the questions contained within the topic guide. All topic guide questions were deemed easy to understand and no changes were recommended. At the end of the mock focus group the participants also critiqued the researcher's interview style and made suggestions for improvement.

All interview and focus group schedules were developed with an aim to uncover the opinions, attitudes and experiences of the target audience and key experts with regards to the feasibility, acceptability and impact of the Green Prescription and Community Walks programme. The schedules were also developed with an aim to obtain information on how the programme could be improved (recommendations).

4.8.3 Sampling & Recruitment Procedure & Data Collection Time Plan

4.8.3.1 Community Sites

Qualitative data was collected from participants who participated in the programme in the communities of Cloghan and Letterkenny (Phase 1); Falcarragh, Donegal Town and Castlefinn (Phase 2) and Ballybofey, Lifford and Dunfanaghy (Phase 3). Although not an original part of the evaluation plan, qualitative data was also collected from a small number of participants who participated in the programme during a later stage of the Green Prescription programme roll out and implementation (Phase 4 of programme rollout), from the communities of Cloghan and Donegal Town. The purpose of collecting qualitative data during Phase 4 rollout was to gather information regarding participants' perceptions and experiences of the support system which had been revised and refined during Phase 3 of the programme rollout. (No *quantitative* evaluation was conducted during Phase 4).

Qualitative data was also collected from referring health professionals, community leaders and walking leaders (who were involved in programme delivery and implementation) within the communities of Castlefinn, Cloghan, Dunfanaghy, Falcarragh, Letterkenny, Ballybofey and Donegal town.

4.8.3.2 Stakeholders Sampled

In contrast to the quantitative data collection where programme participants were the only stakeholder group sampled, there were many different stakeholders sampled in terms of the qualitative data collection. The different stakeholder groups sampled for the qualitative data collection detailed in Table 4-7.

Table 4-7: The Different Stakeholder Groups Sampled for the Qualitative Data Collection

Stakeholders Sampled	
1. **Programme Participants**	Consisted of : *i.* **Referred** and **self-referred** participants (entered the programme at week 1 of the **Green Steps** and participated in the full programme) *ii.* **Community Walkers** (who participated in the Community Walks only)
2. **Referring Health Professionals**	
3. **Community Leaders**	
4. **Walking Leaders**	
5. **The Green Prescription Team members**	Consisted of: i. Green Prescription Development Officer ii. Green Steps Facilitators iii. Green Prescription Support Workers
6. **Other Key "Experts" and Stakeholders**	Consisted of: i. Green Prescription Programme Coordinator ii. Donegal Sports Partnership Coordinator iii. The National Lead on Obesity, HSE / Head of Health Promotion Dublin North East

4.8.3.3 Sampling &Recruitment of Programme Participants

The recruitment of referred and self-referred Green Steps participants to the programme was discussed earlier within section "*4.7.1.2 Participant recruitment*" under quantitative methods. Community walkers were recruited to the Community Walks programme by various means, usually after hearing about the programme by word of mouth within the local community. A media campaign, consisting of print (parish newsletters, poster boards, local newspapers) and electronic media (radio and television advertisement), was also used to raise awareness of and recruit local community members to the Green Prescription and Community Walks programme.

It was decided to recruit as many Green Steps participants and Community Walkers as possible from each phase of the programme for a number of reasons. Firstly the programme was in a constant state of development from one phase to the next thus results from Phase 1 would not necessarily reflect results from Phase 2 and Phase 3; thus warranting interviews and focus groups to be conducted with participants from all

Phases. Also as part of the process of formative evaluation, which calls for continuous evaluation and refinement of programmes as they are being developed and implemented (Stetler et al. 2006) findings from interviews in Phase 1 were used to instigate changes and improvements in Phase 2, and similarly findings from Phases 2 and 3 were used to instigate changes and improvements in Phases 3 and 4 respectively. Each round of qualitative data collection with programme participants was also important to determine if the changes and improvements made as a result of the qualitative feedback from previous phases were in fact producing the desired effects. Interviews and focus groups with Green Steps participants and community walkers took place on the final day of the Community Walks programme (week 12).

Purposive and convenience sampling was used to recruit participants. Purposive sampling involves selecting participants who fit a specific purpose or description (e.g. all Green Steps participants referred by a health professional), while convenience sampling involves selecting participants based on certain inclusion criteria and their accessibility and proximity to the researcher (Cottrell and McKenzie et al. 2011)) e.g. any Community Walkers who happened to be present on the final day of the Community Walks.

The researcher contacted all Green Steps participants by telephone during week 11 and invited the participants to participate in an interview / focus group the following week (week 12 – the final week of the programme) (purposive sampling). As the researcher did not have contact details for the community walkers, the researcher asked the walking leaders from each of the community walking groups to ask all community walkers present on week 11 of the programme if they would be willing to participate in a focus group on the last day of the Community Walks (week 12), for the purpose of programme evaluation (purposive sampling). Any community walkers who were present on week 12 but had been absent on week 11, were asked on the day if they would be willing to participate in a focus group (convenience sampling). All participants were informed participation in interviews / focus groups was voluntary. All participants who were willing to participate in the focus groups / interviews were asked to return to the community centre/hall immediately after the community walk for the commencement of the interviews / focus groups. Refer to Appendix L for a copy of the interview / focus group topic guides for programme participants (the separate interview

/ focus group topic guides are provided for both referred and self-referred Green Steps participants (who completed both the Green Steps and the Community Walks) *and* community walkers).

Depending on the *number* of participants *present* on the day of data collection (final day of the community walks (week 12)) *and willing* to participate, either individual interviews and/or focus groups were conducted (detailed in Table 4-8). In general focus groups and interviews were conducted after the walks and after the post programme quantitative data collection was completed with Green Steps participants.

Table 4-8 provides an overview of:

- The breadth of qualitative data collected from programme participants across each phase and community site included in the evaluation
- The type of participants (whether Green Steps participants or Community Walkers) recruited from each phase and community site and the sampling method used in each   instance
- The qualitative method of data collection utilised across each phase and community site
- The number of participants recruited to participate in focus groups and interviews within each of the communities across the different phases.

Table 4-8: Overview of Qualitative Data Collection with Programme Participants (Conducted on the final day of the programme (week 12))

Phase & Date of Data Collection	Community	Type of Participants Sampled	Sampling Method	Method	No. of participants Recruited
Phase 1 April / May 2012	Cloghan	• Green Steps Participants (Referred & Self-referred) • Community Walkers	Purposive & Convenience	Focus group (Combined both Green steps & Community walkers)	4
	Letterkenny	• Green Steps Participants (Self-referred) • Community Walkers	Purposive & Convenience	Focus group (Combined both Green steps & Community walkers)	11
Phase 2 Aug/Sept 2012	Falcarragh	• Green Steps Participant (Referred)	Purposive	Individual Interview	1
	Donegal Town	• Green Steps Participant (Referred)	Purposive	Individual Interview	1
	Castlefinn	• Green Steps Participants (Self-referred) • Community Walkers	Purposive & Convenience	Focus group (Combined both Green steps & Community walkers)	8
Phase 3 Nov/Dec 2012	Ballybofey	• Green Steps Participants (Referred) • Community Walkers	Purposive & Convenience	Individual Interviews with Green Steps Participants (x3)	3
				Focus Group with Community Walkers	9
	Lifford	• Green Steps Participants (Referred but dropped out week 4) • Community Walkers	Purposive & Convience	Individual interviews with Green Steps Participants (x2)	2
				Focus Group with Community Walkers	6
	Dunfanaghy	• Green Steps Participants (Referred and Self-referred) • Community Walkers	Purposive & Convenience	Focus Group with Green Steps Participants	5
				Focus Group with Community Walkers	5
Phase 4 April 2013	Donegal Town	• Green Steps Participants (Referred)	Purposive	Individual Interviews (x2)	2
	Cloghan	• Green Steps Participants (Referred)	Purposive	Individual Telephone Interviews (x 2)	2
Total					**59**

Individual interviews were also conducted with the Green Steps participants who presented for long-term follow-up of quantitative measures to qualitatively assess the long-term impacts of programme participation (refer to appendix M).

Table 4-9: Overview of Qualitative Data Collection with all Other Stakeholders (Excluding Programme Participants)

Community	Population of Interest	Sampling Method	Method	No. of participants recruited
Cloghan	Health Professional	Purposive	Individual Telephone Interview	1
Letterkenny	Health Professional	Purposive	Individual Telephone Interview	1
Falcarragh	Health Professional	Purposive	Individual Telephone Interview	1
Dunfanaghy	Health Professional	Purposive	Individual Telephone Interview	1
Castlefinn	Community Leader	Purposive	IndividualTelephone Interview	1
Dunfanaghy	Community Leader	Purposive	Individual Interview	1
Falcarragh	Community Leader	Purposive	Individual Interview	1
Ballybofey	Walking Leader	Purposive	Focus Group	4
Donegal Town	Walking Leader	Purposive	Individual Interview	1
Letterkenny	Walking Leader	Purposive	Individual Interview	1
N/A	Green Prescription Team Members:			
	• Green Steps Facilitators	Purposive	Individual Interviews	2
	• Support Workers	Purposive	Individual Interviews	2
	• Development Officer	Purposive	Individual Interview	1
N/A	"Expert" Stakeholders:			
	• Programme Coordinator	Expert (Type of Purposive)	Individual Interview	1
	• Donegal Sports Partnership Coordinator	Expert (Type of Purposive)	Individual Interview	1
	• National Lead on Obesity, HSE	Expert (Type of Purposive)	Individual Interview	1
Total				**21**

Recruitment of Health Professionals to the Evaluation

Purposive sampling was used to recruit a small purposive sample of health professionals to the evaluation. The Green Prescription Programme Coordinator emailed a number of health professionals (8 in total) asking them would they be willing

to participate in a short telephone interview with respect to their perception of / experience of their involvement with the Green Prescription programme. Health professionals who had previously referred patients to the programme *and* health professionals who had declined involvement with the programme were emailed. Four of the health professionals emailed agreed to participate (all of these health professionals had previously referred patients to the programme) and the coordinator informed each health professional the researcher would be in contact. The researcher subsequently rang the 4 health professionals in question and arranged a suitable date and time for the interview. Brief individual interviews were conducted with the 4 health professionals (3 GP's and 1 nurse). Refer to appendix N for the health professional interview schedule. 3 of these health professionals had recently referred patients to the programme, and 1 had referred patients in the past but had not referred any recently. All of these interviews were conducted via telephone and took place following the completion of quantitative and qualitative data collection with programme participants.

Recruitment of Community Leaders to the Evaluation

Purposive sampling was used to recruit a small, representative sample of community leaders (who had the primary responsibility for the development and running of the Community Walks within their community). As above the Green Prescription Programme Coordinator emailed a number of community leaders (4 in total) and asked them would they be willing to participate in an interview with respect to their involvement in the Green Prescription and Community Walks programme. All community leaders emailed agreed to participate. The researcher rang each of the community leaders to arrange a time and date for interview. Two community leaders stated they were available for a face-to-face interview, and the other 2 stated they were available for a telephone interview. One of the community leaders was subsequently not contactable at the agreed interview time and after three failed further attempts to contact was excluded from the study. In total 3 individual interviews were conducted with community leaders from 3 different communities. 2 of these interviews were conducted face-to-face and one was conducted via the telephone. Refer to appendix O for community leader interview schedule. These interviews took place within the same week as long-term follow-up with Phase 3 Green Steps participants.

Recruitment of Walking Leaders

Purposive sampling was used to recruit walking leaders from different community walks groups. Walking leaders were responsible for leading the community walks in a safe and inclusive manner. The researcher rang a number walking leaders (6 in total) to ask them would they be willing to participate in a focus group. All were willing to participate but 2 where not flexible with regards to their availability. The focus group was arranged for a time and date that suited the majority – in total 4 walking leaders participated in the focus group. The focus group took place within the same week of the 12-week follow-up with Phase 3 programme participants. Refer to appendix P for walking leader interview topic guide.

To improve the sample size of walking leaders the Community Walks Development Officer rang a number of walking leaders within other community walks group and asked them would they be willing to participate in a focus group. Only two of the walking leaders contacted agreed to participate (each from different walking groups) and thus individual interviews were conducted with each of these walking leaders. Both of these individual interviews took place the morning after a scheduled community walk and were conducted during the same week as the long-term follow-up with Phase 3 Green Steps participants.

Recruitment of Green Prescription Team Members

Purposive sampling was used to recruit Green Prescription Team members. The Green Prescription team consisted of the Community Walks Development Officer, Support Workers (a new support worker was recruited at the end of Phase 3 replacing the previous support worker – interviews were conducted with both support workers), and two Green Steps facilitators. The Green Prescription Programme Coordinator asked each member of the Green Prescription team if they would be willing to take participate in an interview to describe their experience of involvement in the Green Prescription programme. All members of the team agreed to participate in interviews. The researcher subsequently contacted each member of the team personally and arranged a suitable time and date for interview. Interviews were conducted face-to-face with the exception of one interview with a Green Steps Facilitator which was conducted via telephone. All these interviews were conducted following the completion of all quantitative and qualitative data collection with programme participants (with the exception of the

interview with the initial support worker which was conducted during Phase 3). Refer to appendices Q, R, S for interview topic guides for Green Prescription Development Officer, support worker, and Green Steps Facilitators respectively.

Recruitment of "Expert" Stakeholders

Expert sampling (recruitment of individuals with known skill, experience and expertise relevant to the issue under research), which is a type of purposive sampling, was used to recruit "expert" stakeholders in relation to the Green Prescription and Community Walks programme model. The expert stakeholders selected were the Green Prescription and Community Walks programme Coordinator, The Donegal Sports Partnership Coordinator and the National Lead on Obesity, HSE / Head of Health Promotion Dublin North East in Ireland. (Note the National Lead on Obesity within the HSE was also the Head of Health Promotion within Dublin North East).

The Green Prescription Programme Coordinator directly invited the Donegal Sports Partnership Coordinator and the National Lead on Obesity, HSE / Head of Health Promotion Dublin North East to participate in interviews to elicit their perception of the Green Prescription and Community Walks programme. Both agreed to participate and face-to-face interviews were subsequently arranged. The Green Prescription Programme Coordinator had herself commissioned the evaluation of the Green Prescription and Community Walks programme and thus volunteered to participate in an interview.

The interviews with "expert" stakeholders were the last to be conducted and took place following the completion of all quantitative and qualitative data collection with programme participants. Refer to appendices T, U, V for copies of the interview topic guides for the Green Prescription programme Coordinator, The Donegal Sports Partnership Coordinator and the National Lead on Obesity, HSE / Head of Health Promotion Dublin North East in Ireland.

4.8.4 Limitations to the Sampling & Recruitment Procedure

As only individuals who *chose* to participate in the interviews and focus groups were recruited to the evaluation, the recruitment procedure may be limited by self-selection bias (Lund Research 2012). Since these individuals volunteered to participate in the interviews / focus groups, it is possible the decision to participate may reflect some inherent bias in the traits of these individuals (Lund Research 2012), e.g.

programme participants who had positive perceptions of the programme may have been more inclined to participate. Similarly health professionals who had more positive perceptions of the programme may have been more inclined to participate etc. As a result, the sample of individuals (from each of the stakeholder groups) who took part in the evaluation may not accurately represent of the whole groups they come from (e.g. the views of the programme participants who took part in the interviews / focus groups may not necessarily be representative of the views of the programme participants that were not interviewed etc).

4.8.5 Conducting the Interviews & Focus Groups

All participants who agreed to participate in the interviews / focus groups were provided with a written information sheet on the day and signed a consent form (refer to appendix W). All participants were provided with a copy of the consent form to take home. Focus groups and interviews were recorded on digital recorders and all were moderated by the researcher (with the exception of one focus group which was moderated by an external moderator).

Interviews and focus groups with programme participants were often restricted with regards to the amount of time available to conduct them. Although the majority of programme participants were informed one week in advance to allocate at least one hour to participate in the interview / focus group the following week, most participants arrived to the interview / focus group stating they could not stay for longer than half an hour. As a result many of the interviews and focus groups with programme participants were rushed, and more often than not some questions within the interview schedule had to be omitted. In general, interviews and focus groups with programme participants lasted between 25 to 45 minutes.

Telephone interviews with health professionals had to be kept short as they were all conducted during the health professionals' lunch hour, and generally lasted between 10 to 15 minutes. In general all other interviews and focus groups (with community leaders, walking leaders, members of the Green Prescription Team and "expert" stakeholders) were unrestricted with regards to time and commonly lasted between 45 minutes to one hour.

At the end of each interview and focus group interviewees were asked to verify summary comments to help ensure validity (Krueger and Casey 2009).

4.8.6 Qualitative Data Analysis

4.8.6.1 Interview & Focus Group Transcripts

Audio recordings from interviews and focus groups were anonymised and subsequently transcribed verbatim in partnership between the researcher and an external party who was bound by confidentiality. All transcripts were checked and rechecked for potential transcription errors and to help ensure consistency and accuracy (Dresing et al. 2012; Braun and Clarke 2006). Thematic analysis was used to identify themes and subthemes within the data set. As explained in section *4.8.1.1 Integration of Individual Interviews and Focus Group Data*, all data collected through both the individual interviews and the focus groups with the various stakeholders was combined (integrated) together for data analysis as advocated by Lambert and Loiselle (2008). Braun and Clark (2006, p. 6) describe thematic analysis a "*method for identifying, analysing and reporting patterns (themes)*" across the qualitative data (interviews and focus group transcripts). It organises and describes the data set in rich detail and is used to interpret the research topic. Specifically a theme represents a concept that "*captures something important about the data in relation to the research question and represents some level of patterned response or meaning within the data set.*" (Braun and Clark 2006, p. 10). A hybrid approach was utilised for theme development using both inductive (themes generated organically from the data, not by predetermined ideas/theory) and deductive (e.g. themes generated by the research questions and evaluation framework) thematic analysis to interpret the data (Fereday and Muir-Cochrane 2006). Although there is "*no one way to conduct thematic analysis*" (Bran and Clarke 2006, p. 17), a series of systematic steps were followed throughout for transparency and to ensure rigour (validity, reliability and trustworthiness) within the qualitative findings (Morse et al. 2002; Fereday and Muir-Cochrane 2006; Braun and Clarke 2006). These steps were primarily guided by Braun and Clarke (2006), with some guidance also sought from Dierckx de Casterlé (2012) and are discussed below.

Step 1: Familiarisation with the data set

Transcripts were re-read a number of times in order to become familiar with the data set and its breadth and depth of content (Braun and Clarke 2006). Upon the second

reading of the data set key phrases, words and passages were noted. Initial thoughts and reflections were noted alongside the text (rudimentary analysis) (Dierckx de Casterlé 2012). These notes formed an initial list of ideas relating to the concepts contained within the data set (Braun and Clarke 2006).

Step 2: Generating Initial Codes

This step involved the production of initial codes from the data set (Braun and Clarke 2006). At this point only a selection of transcripts were selected for coding (8 in total) (due to the large number of transcripts to be analysed (48 in total) it was decided it would be most feasible and efficient to generate initial codes from a smaller selection of transcripts – these initial codes were then used as a guide for the coding of the entire data set). Codes identified interesting features of the data (potential themes), and the process of organising data into meaningful groups was initiated (Braun and Clarke 2006). Coding at this stage was inductive and a large number of initial codes were generated for each transcript.

Step 3: Searching for Themes

This stage of the analysis involved a process of sorting the large list of initial codes generated in Step 2 into potential themes. As suggested by Braun and Clarke (2006) visual representations were manually drawn in the form of mind maps to help sort different codes into themes, e.g. all the codes that related to a similar concept (theme) were mapped around that concept (theme) (refer to appendix X for mind map diagram). Both main themes and subthemes were created from the initial codes. At the end of Step 3 a collection of "candidate" themes and subthemes had been created, and the extracts of data that related to each of these themes and subthemes were grouped under each theme (Braun and Clarke 2006).

Step 4: Reviewing Initial Themes &Defining & Naming Initial Themes

During this step the candidate themes were further developed. As suggested by Braun and Clarke (2006) themes that did not have enough data to support them were scrapped, while themes that contained varied data were broken down into separate, individual themes that had more meaning. Similarly some themes and subthemes that upon reflection were related to a similar concept were collapsed into each other to form a single theme. The aim of reviewing the themes at this point was to ensure that all the coded data assembled under each theme had a "coherent pattern" or meaning (Braun and Clarke 2006) (e.g. all the data coded under one theme referred to a similar

idea/concept and could be readily relatable to that theme). Coded data that was not readily relatable to its theme heading were reorganised under a more suitable theme (in some cases a new theme was created) or if upon reflection the coded data was believed to hold no real meaning in relation to the research question it was discarded from the analysis. The resulting list of themes that were generated at this point were then named and definitions explaining what each theme represented were developed to form a "coding manual".

At this point copies of the selected transcripts that had been coded and themed were given to two other researchers (thesis supervisors), along with a copy of the coding manual that contained the names and definitions of each theme. Subsequently, the two other researchers independently themed the selected transcripts using the name and definitions of the themes within the coding manual as a guiding template. This tested the validity of each theme and the definitions applied to them. Following this the three researchers compared the themes and subthemes that they had individually applied to the selection of transcripts. Discrepancies among the individually applied themes, and overlap or vagueness of the theme names and definitions were discussed and remedied by mutual consensus and the coding manual was refined as needed. This process of cross-checking themes and definitions helped to ensure validity and transparency.

Step 5: Importing Data into Nvivo

The resulting themes and subthemes generated during Step 4 were used to create preliminary themes and subthemes in the computer software programme for qualitative analysis NVIVO 9. (It should be noted in NVIVO themes and subthemes are called parent nodes and child nodes respectively). Following this the entire data set of transcripts were imported into NVIVO. The transcripts from the different stakeholder groups were grouped into separate "source" files within NVIVO.

Each transcript in the entire data set was then re-read within the NVIVO program. As each transcript was studied any text that matched the themes and subthemes generated during Step 4 were coded accordingly (inductive coding). New themes (i.e. themes that did not fit within the themes and subthemes generated during Step 4) also emerged as the data set was read (inductive coding) and studied in its entirety, which were subsequently added to the preliminary list of themes. Once a new theme or

subtheme was found, the previous transcripts were also checked for the presence of that theme or subtheme – this forward-backward movement of checking for themes within and between different data sets is known as "constant comparison" (Dierckx de Caslerlé 2012). This process was repeated until the entire data set of transcripts had been inductively coded into themes and subthemes. At this point a process of deductive coding was initiated. Any inductively coded themes and subthemes that were readily relatable to the key research questions within Stage 3 of the evaluation framework (refer to Figure 4.1, p. 112) were deductively recoded under the themes of "Feasibility and Acceptability", "Programme Impacts" and "Programme improvement and development" (depending on what theme they were readily relatable to). For example the inductively coded theme "Referral component" became a subtheme under "Feasibility and Acceptability".

It should be noted the transcripts from the interviews with the "expert" stakeholders were coded and themed separately from the transcripts from all of the other stakeholder groups. Transcripts from "expert" stakeholders were primarily coded deductively according to the research questions within Stage 4 of the evaluation framework (i.e. coded according to the themes of "Acceptability", "Feasibility" and "Perceived Opportunities to enhance the programme model"). (Refer to Figure 4.1 p. 112 for the evaluation framework).

Step 6: Refinement & Definition of Final Themes & Subthemes

During this final step all of the themes and subthemes generated during Steps 4 and 5 were further refined and defined. The core meaning of each theme and subtheme was identified, and all collated data extracts contained under each theme were revised to ensure they had a coherent meaning and were readily relatable to the theme heading (similar to the process used during Step 4). Again as in Step 4 inconsistent data extracts were either reorganised under a more suitable theme or excluded from the analysis.

During this step the "story" that each theme told about the data was considered in relation to key research questions of the evaluation (Braun and Clarke 2006) – e.g. each theme was considered in relation to the story it told about the feasibility, acceptability and impact of the Green Prescription programme, and recommendations for the future development of the programme. The final coding manual, containing the identified

themes, subthemes, definition and exclusions of themes and subthemes, and examples of transcript extracts, is provided in the appendices (refer to appendix Y).

Nvivo allowed the themes and subthemes generating from the entire data set to be analysed separately for each population of interest – e.g. all themes relating to the "impact" of the Green Prescription programme could be examined separately for the "impact" on programme participants, "impact" on health professionals, and "impact" on community groups. For the purposes of clarity this format of interpreting findings separately from each of the stakeholder groups is maintained throughout the results section of this report.

4.9 Conclusion

This chapter has outlined the aims and objectives of this evaluation study and has described in detail and methodology and methods used to conduct this study. The next chapter presents the results from this mixed methods evaluation study.

Chapter 5: Results

5.1 Introduction

This chapter presents the results from the evaluation, and is divided into two different sections. The first section presents the results from "Stage 3" of the evaluation, which was "Mixed Methods Research with the Target Audience". As previously explained within Chapter 2, the quantitative and qualitative results are presented separately. The quantitative results are presented first, followed by the qualitative results.

In the second section of this chapter the results from "Stage 4" of the evaluation, "Consultation with Key Stakeholders and Experts" are presented.

5.2 Stage 3: Mixed Methods Research with the Target Audience

This section is divided into two subsections. The first subsection covers the quantitative results, and the second subsection covers the qualitative results.

The quantitative results examine the following:
- Programme reach
- Patterns of participation
- Baseline data (the demographic information; reason for referral; waist circumference; BMI score; blood pressure readings; and physical activity levels of all participants present at baseline)
- Programme Impact (examines the short-term and longer-term impact of programme participation with regard to cardiovascular risk factor indicators, anthropometric measurements, physical activity levels and mental wellbeing).

5.2.1 Stage 3 Quantitative Results

5.2.1.1 Programme Reach

Programme reach was determined by analysing the weekly attendance roll records. Based on these records 194 individuals participated in the programme during the course of the evaluation. This figure represents the total number of participants who were referred by a health professional (referred participants) and self-referred participants.

Figure 5.1 provides a breakdown of number the number of participants recruited to the programme during each component of the programme over the course of the evaluation. Although all Green Steps[10] participants were to enter the programme during week one of the programme; this did not happen. In total 55 participants entered the programme during week one of the Green Steps component (39 health professional referred participants and 16 self-referred participants); 19 self-referred participants entered the programme during weeks 2-4 of the Green Steps; and 120 self-referred participants entered the programme during the Community Walks [11] component (Community Walkers). Due to the fact a number of attendance rolls from the community walks components could not be located; the total number of community walkers is likely to be greater than the 120 reported.
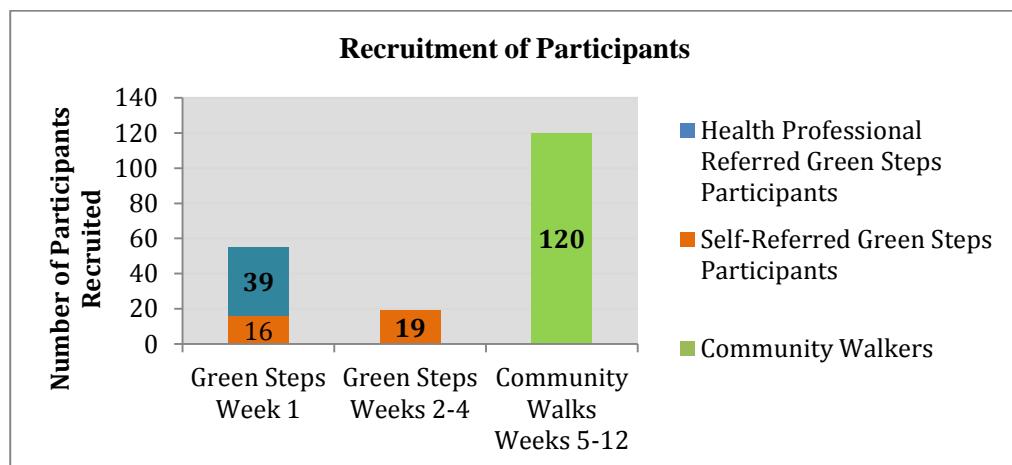
Figure 5.1: Recruitment of Participants – Numbers Recruited and Stage of Recruitment

The programme attracted a higher number of females to males - 77% (n = 149) of the participants were female, and 23% (n = 45) were male. When this was further broken down by the categories of recruitment, female recruitment consistently outnumbered male recruitment – 36% (n = 14) of participants referred by a health professional were male while 64% (n = 25) were female; 80% (n = 124) of self-referred participants were female while 20% (n = 31) were male.

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[10] Recap: Green Steps is a 4-week indoor programme, targeted at referred/self-referred participants in need of a gradual approach to physical activity. The Green Steps are facilitated by trained instructors and consists of tailored, low-level physical activity

[11] Recap: Community Walks are open to all community members who wish to become more active as well as graduating Green Steps participants. The Community Walks are led by trained volunteer walking leaders, and are graded in intensity to meet different abilities.

5.2.1.2 Patterns of Programme Participation

Patterns of participation were determined by analysing only the attendance data from programmes with a complete set of attendance rolls (complete sets of attendance roll data was available for 6 out of the 9 programme runs; 3/9 of the programme runs had incomplete attendance roll data). On average referred and self-referred participants who entered at the Green Steps stage attended 5.4 weeks of the 12 weeks offered. Figure 5.2 provides a breakdown of the number of weeks referred[12] and self-referred[13] Green Steps participants attended the programme; it can be seen that the majority of these participants attended the programme for between 3 and 6 weeks.
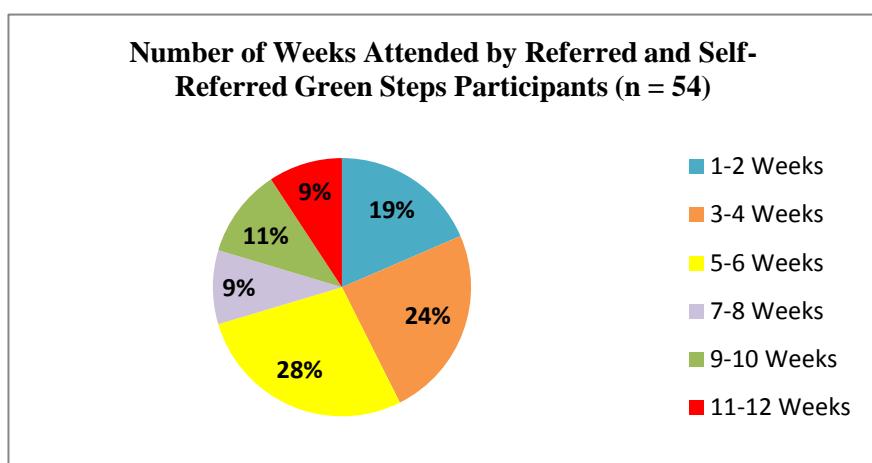
Figure 5.2: Breakdown of the number of weeks Green Steps Participants attended the programme

On average Community Walkers[14] attended 2.8 walk sessions out of the 8 walk sessions offered. Figure 5.3 provides a breakdown of the number of walks community walkers attended; it can be seen the majority of community walkers attended between 1 and 4 community walks.

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[12] Recap: Referred participants were referred to the Green Prescription Programme Support Worker by their health professional and joined the programme during the Green Steps stage.

[13] Recap: Self-referred participants self-referred to the Green Prescription Programme by contacting the Support Worker directly and joined the programme during the Green Steps stage.

[14] Recap: Community Walkers joined the Green Prescription Programme at the Community Walks stage. Community Walkers were not referred to the programme, had no contact with the Support Worker and did not attend the Green Steps Programme.
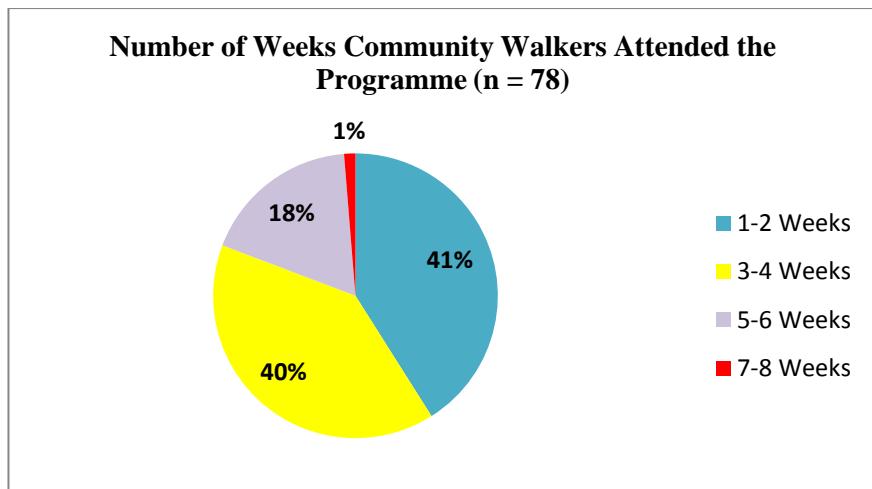
Figure 5.3: Breakdown of the number of weeks Community Walkers attended the programme

5.2.1.3 Quantitative Evaluation Recruitment & Completion Rate

Table 5-1: Breakdown of Data Collection by Phase, Community and Number of Participants

Phase of Data Collection	Community	# completing Pre-programme measurements (Wk 1)	# completing Short-term follow-up measurements (Wk 12)	# completing Longer-term follow-up measurements (3 months post programme completion)
Phase 1	Cloghan	4	1	1
	Letterkenny	8	5	0
Phase 2	Falcarragh	7	1	1
	Donegal Town	4	1	1
	Castlefinn	5	2	2
	Cloghan	9	0	0
Phase 3	Ballybofey	4	3	2
	Lifford	3	0	0
	Dunfanaghy	11	6	4
Total		**55**	**19**	**11**

(Note: # stands for "Number")

As can be seen from Table 5-1, a total of 55 referred and self-referred Green Steps participants were recruited into the programme on the first day of the Green Steps across the three phases. Pre programme (baseline) data measurements were obtained for all these Green Steps participants. Attempts were also made to collect quantitative data on self-referred participants who entered the Green Steps post week one and on community walkers; however for numerous reasons this did not prove possible.

Out of the 55 Green Steps participants recruited into the study at baseline 19 were also present on the final day of the Community Walks programme (week 12), and short-term follow-up data measurements (12-week follow-up) were obtained for these 19

participants. Thus a complete set of pre and post programme data (short-term follow-up) was obtained for 19 Green Steps participants in total. As can be seen in table 5-1 in two communities, Cloghan in Phase 2 and Lifford in Phase 3, post programme data collection was not completed on any participants. This was because the Community Walks programme failed to be sustained in Cloghan during Phase two thus no participants completed the programme, while in Lifford the timing of the Community Walks programme did not suit the Green Steps participants resulting in none of these participants completing the programme either.

Out of these 19 participants who completed short-term follow-up data collection, 11 were available for and participated in the longer-term follow-up measurements (3 months post programme completion).

5.2.1.4 Baseline Data for Green Steps Participants

This section details the baseline (pre-programme) data collected for the 55 participants present on week 1 of the Green Steps programme. This pre-programme data also provided an additional indication of programme reach as it allowed an analysis of characteristics of those referred and self-referred.

Demographic Information

The average age of Green Steps participants (referred and self-referred) was 60.5 years (SD = 15.5). Again there were a higher number of females (65%; n = 36) to males (35%; n = 19). 62% (n = 34) of participants were in receipt of a full medical card; 7% (n = 4) were entitled to GP only card; 18% (n = 10) were not entitled to a medical card; and 13% (n = 7) participants did not provide information on medical card entitlement.

Reason for Referral

The reason for referral was sought (from the 11 referring health professionals) for all 39 participants who were referred into the programme. In total 9 out of the 11 health professionals contacted returned the reason for referral forms. This meant the reason for referral was obtained for 33/39 of the referred participants. Participants were found to be referred for a broad range of reasons, the most common being overweightness (n=20), diabetes (n=13) and high blood pressure (n=13). The majority of participants (24/33) were referred for more than one reason, e.g. a participant may have been

overweight *and* had high blood pressure and thus *both* reasons were stated as the reason for referral (refer to Figure 5.4).
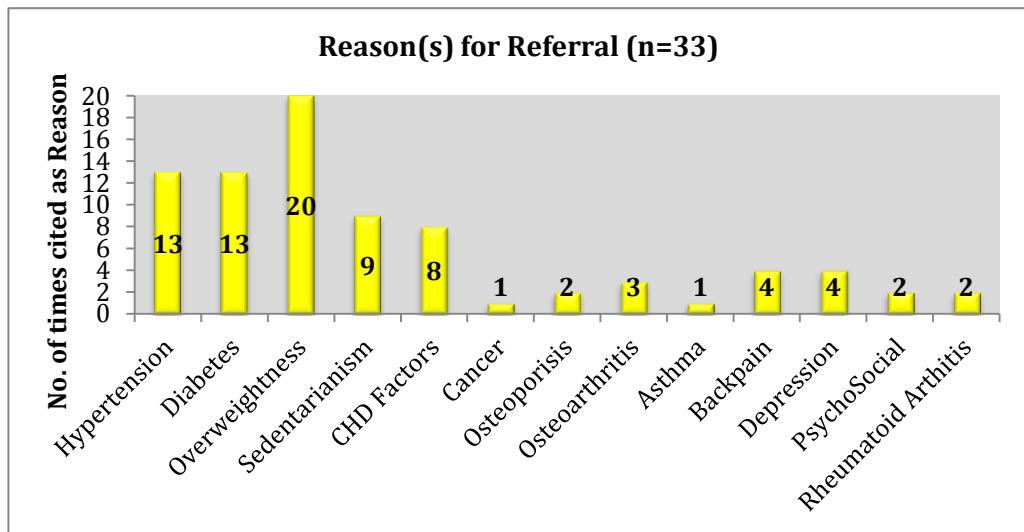
Figure 5.4: Reason for Referral of Health Professional referred participants

Health Status of Participants present at Baseline

The majority of participants present at baseline (n = 55) displayed indicators of disease risk. 78% (n = 43) had a waist circumference measurement that placed them in a "high health risk" category (Figure 5.5). The majority of participants were either overweight (33%; n = 18), obese (40%; n = 22) or morbidly obese (20%; n = 11) (Figure 5.6). The majority of participants also had elevated blood pressure readings; 44% (n = 24) of participants had a blood pressure reading that placed them in the "stage 1 hypertension" category; and 16% (n = 9) of participants had a reading that placed them into the "stage 2 hypertension" category (Figure 5.7).
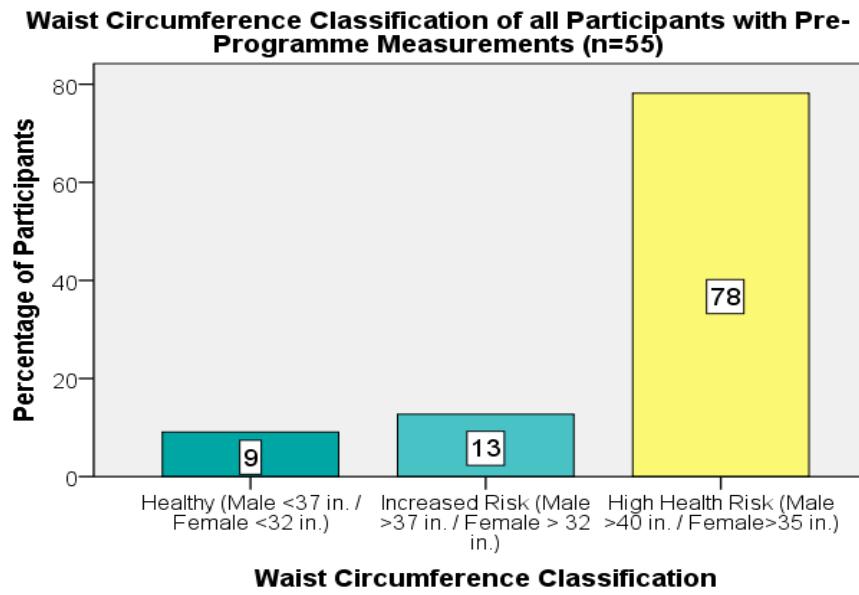
Figure 5.5: Percentage of participants in each waist circumference category at baseline
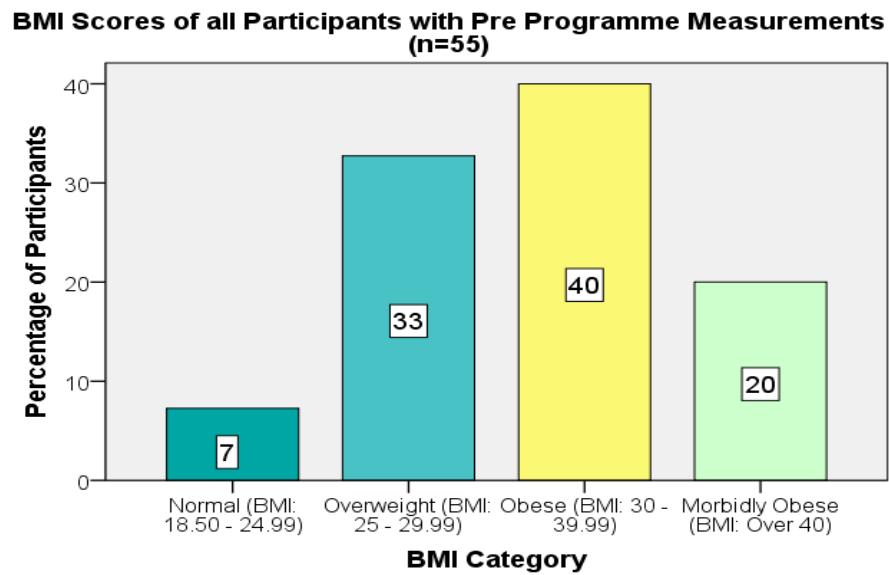
Figure 5.6: Percentage of participants within each BMI category at Baseline

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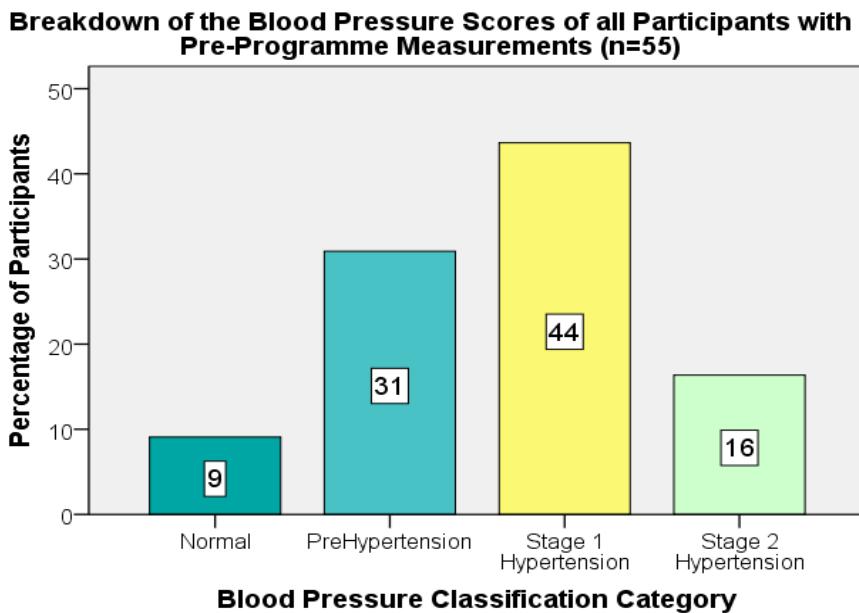
Figure 5.7: Percentage of participants within each blood pressure category at baseline

Mental Wellbeing Scores of Participants present at Baseline

The mean Warwick Edinburgh Mental Wellbeing Scale (WEMWBS) score for the 55 participants present at baseline was 51 (SD = 10.8). The mean WHO (Five) Wellbeing Index score was 13.7 (SD = 6.4).

Physical Activity Level of Participants Present at Baseline

At baseline the 55 participants reported engaging in a median of 537 MET minutes of physical activity per week (IQR = 1792). 53% (n = 29) of participants reported engaging in more than 500 MET minutes of physical activity per week; while 47% (n = 26) of participants reported engaging in less than 500 MET-minutes of physical activity per week. (The Advisory Committee Report on the Physical Activity Guidelines for Americans stated that adults need to engage in at least 500 MET minutes of physical activity per week in order to gain health benefits (U.S. Department of Health and Human Services 2008)). The median total number of minutes participants spent engaging in physical activity per week at baseline was found to be 150 (IQR = 410). With regards to participants reported Stage of Change at baseline, 22/55 (40%) participants reported being in a stage of "contemplation", 12/55 (22%) reported being in the "preparation" stage, 8/55 (14%) reported they were in the action stage and 11/55 (20%) reported they were in the "maintenance" stage (Figure 5.8).

Number of Participants within each category of the Stage of Change for Physical Activity at Baseline (n = 55)

Pre-Contemplation	Not regularly physically active and don't intend to be so in the next 6 months
Contemplation	Not regularly physically active but thinking about starting to do so in the next 6 months
Preparation	Do some physical activity but not enough to meet the description of regular physical activity
Action	Regularly physically active but only began in the last 6 months
Maintenance	Regularly physically active and have been so for longer than 6 months

Figure 5.8: The Stage of Change of Participants at baseline

5.2.1.5 Evaluation Non-Completers – Reason for Non-Attendance

As explained previously in section "*5.2.1.3 Quantitative Evaluation Recruitment & Completion Rate*," out of the 55 participants who completed baseline (pre-programme) measurements, 19 completed short-term follow-up measurements. This section of the report provides information relating to evaluation / programme non-completers (i.e. those that did not complete short-term follow-up (n = 36)). The researcher initially contacted the programme Support Worker to determine if the 36 study non-completers had actually dropped out from the programme, or were just unable to attend week 12. It transpired however that the Support Worker had not followed up with the participants who had stopped attending the programme; thus it was not possible to accurately determine the number of programme drop-outs. (It should be noted that as full attendance roll data was not available for all non-completers it was not possible to accurately gauge drop-out rates from the attendance roll data either).

The researcher then attempted to contact all 36 non-completers to obtain the reasons for non-attendance / drop-out. 26/36 non-completers were successfully contacted (Figure 5.9); with the remainder of participants failing to answer three telephone calls / had wrong numbers. The majority of successfully contacted non-completers (19/26) had stopped attending the programme between week 1 and week 6 and had not returned. During the follow-up telephone calls participants were asked the reasons why they had stopped attending the Green Prescription Programme. All questions asked during the follow-up telephone calls were open-ended and participants were not prompted when providing responses to questions. Participants generally reported multiple reasons for drop-out/ non-attendance (Figure 5.9). The most commonly cited reason was ill health (Health Reasons). The majority of participants were keen to point out that their non-attendance / drop-out was not the fault of the programme itself.
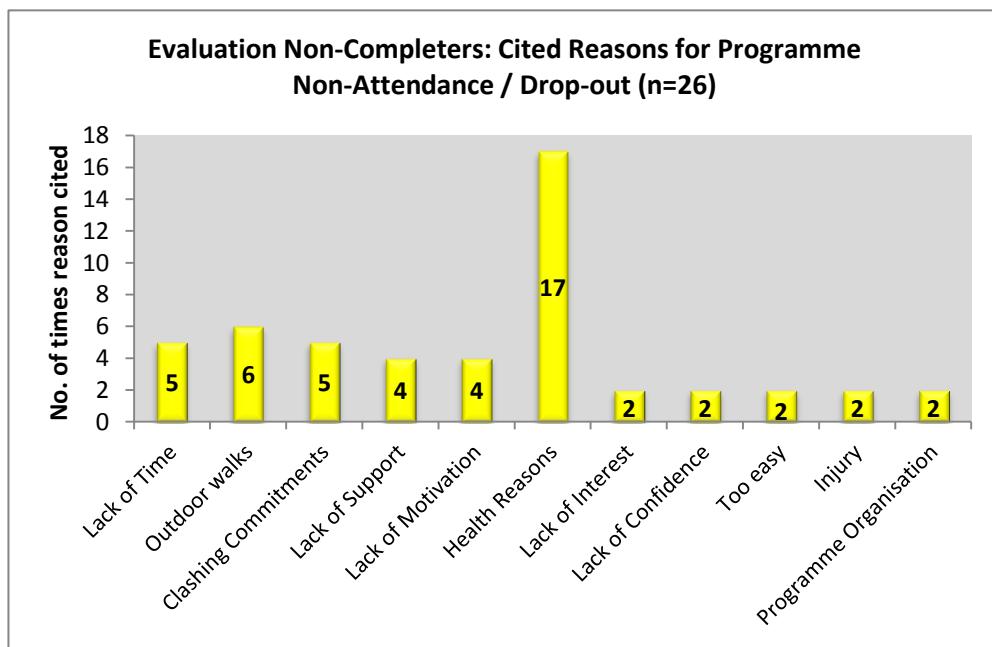
Figure 5.9: Reasons Evaluation Non-Completers Stopped Attending the Programme

5.2.1.6 Short-Term Programme Impact

Participants' pre-programme measurements (taken at baseline) were compared with post programme measurements conducted on week 12 to determine the short-term impact of the programme (short-term follow-up). Within this section an overview of the characteristics of participants who did complete the short term (n = 19) follow-up is provided; followed by results in relation to the impact of the programme on

anthropometric measurements, cardiovascular risk factor indicators, physical activity levels and mental wellbeing scores. Results relating to the short-term impact of the programme should be interpreted with caution due to the pre-experimental, pre-post evaluation design utilised and given the small sample size of participants completing pre and post programme measurements. As pre-post study designs are relatively weak designs (in comparison to experimental designs) they "*do not provide compelling evidence*" that any observed changes were actually caused by the programme being evaluated (Nutbeam and Bauman 2006, p. 65).

Demographic information of Participants who completed short-term follow-up

The mean age of participants who completed short-term follow-up (n = 19) was 56 years (*SD* = 20.7), with a greater number of females (58%; n = 11) than males (42%; n = 8). The majority of these participants were entitled to a medical card (74%; n = 14).

Impacts on anthropometric measurements and cardiovascular risk factor indicators at Short-Term Follow-up

Table 5.2: Overview of the Impact on Anthropometric measurements and Cardiovascular Risk Factor Indicators

Cardiovascular Risk Factor Indicators	n	Pre (WK 1) *M* (*SD*)	Post (WK 12) *M* (*SD*)	Mean Difference	95% CI	Significance level (Paired Samples t-test)
Systolic Blood Pressure (SBP) (mmHg)	19	134.6 (19.2)	126.1 (18.1)	↓8.5	(1.39, 15.66)	*p* = .022
Diastolic Blood Pressure (DBP) (mmHg)	19	77.7 (14.4)	76.4 (12.6)	↓1.3	(-2.77, 5.39)	*p* = .507
Resting Heart Rate (RHR) (BPM)	19	77.2 (14.0)	77.3 (17.0)	↑0.1	(-8.12, 7.80)	*p* = .967
Anthropometric Measurements						
Waist Circumference (WC) (In.)	19	41.2 (6.2)	41.1 (6.2)	↓0.1	(-.49, .76)	*p* = .666
Weight (Kg)	19	93.6 (16.0)	93.2 (16.6)	↓0.4	(-1.28, 2.12)	*p* =.609
Body Mass Index (BMI) (Kg/m2)	19	33.2 (7.0)	33.0 (7.1)	↓0.2	(-.46, .76)	*p* = .606

*P <.05; *M* = Mean; *SD* = Standard Deviation; *CI* = Confidence Interval

There was a statistically significant decrease in the mean systolic blood pressure (SBP) score from pre programme (*M* = 134.6 mmHg) to post programme (*M* = 126.1 mmHg), (*t* (18) = 2.512, *p* = 0.02). The mean decrease in the systolic blood pressure score was 8.5 mmHg with a 95% confidence interval ranging from 1.39 to 15.66 (Table 5-2 and Figure 5.10).

A positive mean difference was also observed for diastolic blood pressure from pre programme (M = 77.7 mmHg) to post programme (M = 76.4 mmHg), however this difference was not found to be statistically significant (p = .507) (Table 5-2).

A minimal, non-significant mean difference was observed in participants resting heart rate (RHR) from pre programme to post programme (p = .967) (Table 5-2).
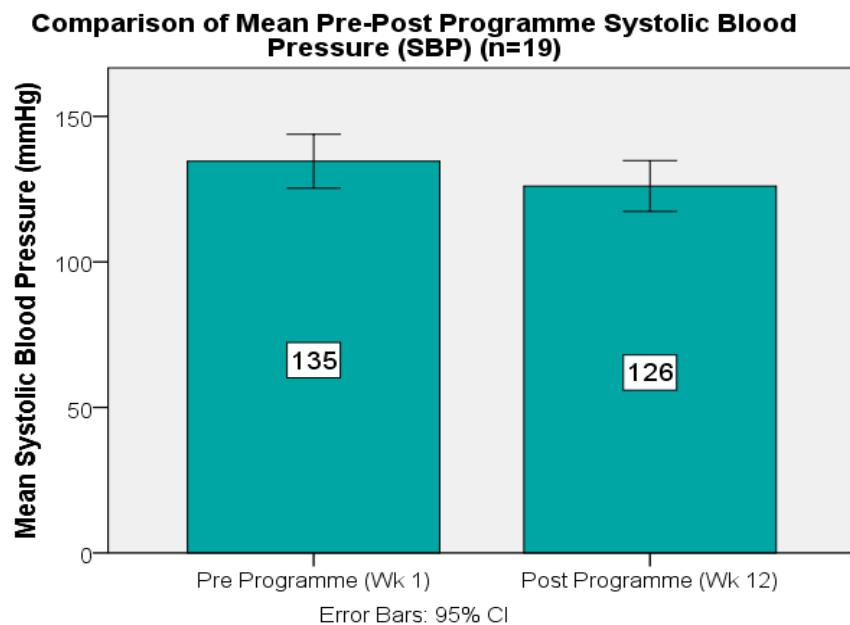
Figure 5.10: Pre-Post Programme Comparison of the mean SBP score

Minimal, non-significant positive differences were observed for participants mean waist circumference measurements (p = .666); weight (p = .609); and body mass index (BMI) scores (p = .606) from pre programme to post programme (refer to Table 5-2).

Impacts on Physical Activity Levels at Short-Term Follow-up

An increase was observed from participants' median pre programme MET minute score (Mdn = 438, IQR = 1278) to participants' median post programme MET minute score (Mdn = 537, IQR = 521) (Figure 5.11). A Wilcoxon Signed Rank test indicated that this difference was not statistically significant (Z = -.501, p = .616).

(The Advisory Committee Report on the Physical Activity Guidelines for Americans stated that adults need to engage in at least 500 MET minutes of physical activity per week in order to gain health benefits (U.S. Department of Health and Human Services 2008). This 500 MET minute threshold is denoted with a red line on Fig. 11).
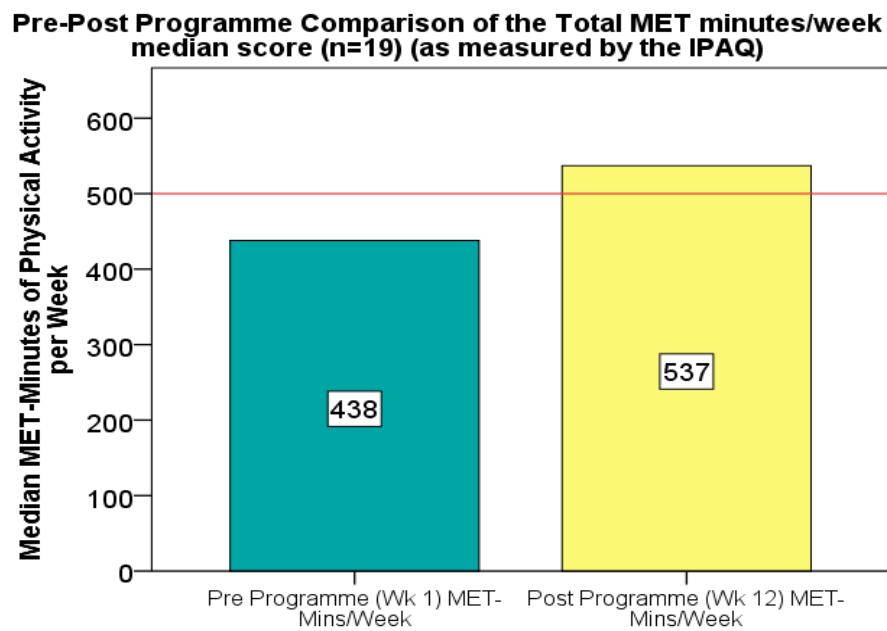
Figure 5.11: Pre-Post Programme Comparison of Median MET minutes/Week score

An increase was also observed in the median number of total minutes participants spent engaged in physical activity per week from pre programme (*Mdn* = 120, *IQR* = 290) to post programme (*Mdn* = 150, *IQR* = 160). A Wilcoxon Signed Rank test indicated that this difference was not statistically significant (*Z* = -.675, *p* = .499) (Figure 5.12).
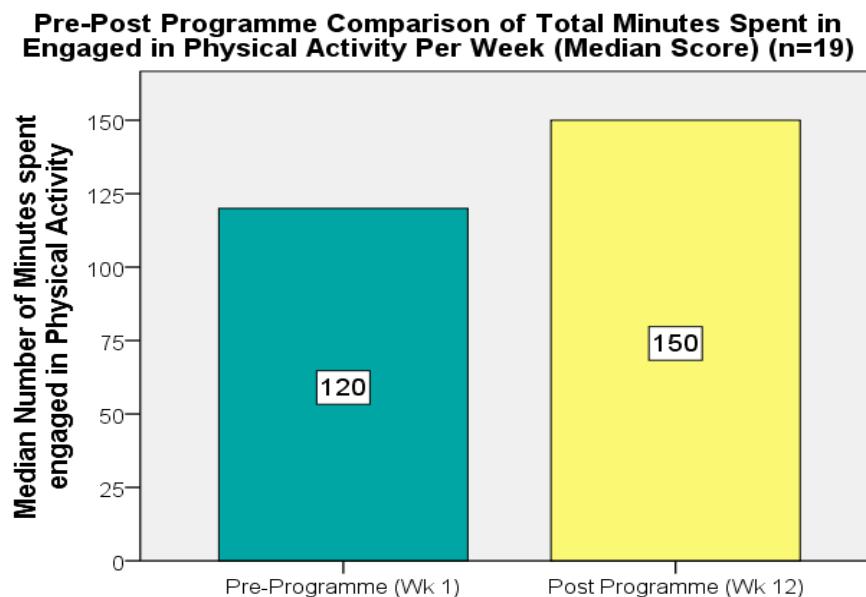
Figure 5.12: Pre-Post Programme Comparison of Median Total Minutes of Physical Activity/Week score

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The IPAQ-SF also collected information on the amount of time spent sitting down each day as a measure of sedentariness. For the sitting question 'minutes' was used as the indicator to reflect time spent in sitting; rather than "MET minutes" which would suggest an estimate of energy expenditure (IPAQ 2005). A decrease was observed in the median number of minutes participants sent sitting per day from pre programme (*Mdn* = 240, *IQR* = 180) to post programme (*Mdn* = 180, *IQR* = 180); a median decrease of 60 minutes per day. A Wilcoxin Signed Rank Test revealed this result was statistically significant (Z = -3.636, p = 0.001) (Figure 5.13).

Figure 5.13: Pre-Post Programme Comparison of Median Programme Daily Sitting Time Scores

Impact on Stages of Change for Physical Activity at Short-term follow-up

A pattern of progression through the Stages of Change (SOC) for physical activity was observed from pre programme to post programme. Pre programme results showed the majority of participants were in the "pre-contemplation" or "contemplation" stage, while post programme results showed the majority of participants were in the "preparation" or "action" stage (Figure 5.14).

Pre-Post Comparision of the Stage of Change for Physical Activity Score (n=19)

Pre-Contemplation	Not regularly physically active and don't intend to be so in the next 6 months
Contemplation	Not regularly physically active but thinking about starting to do so in the next 6 months
Preparation	Do some physical activity but not enough to meet the description of regular physical
Action	activity
Maintenance	Regularly physically active but only began in the last 6 months
	Regularly physically active and have been so for longer than 6 months

Figure 5.14: Pre-Post Programme Comparison of the number of participants within each SOC category

Impacts on Mental Wellbeing at short-term follow-up

A statistically significant increase in participants (n = 19) mean mental wellbeing score, as measured by the Warwick Edinburgh Mental Wellbeing Scale (WEMWBS), was observed from pre-programme ($M = 52.5$, $SD = 9.7$) to post-programme ($M = 56.4$, $SD = 8$), ($t(18)=-2.556$, $p = .020$). The mean increase in the WEMWBS score was 3.9 with a 95% confidence interval ranging from 7.095 to .694 (Figure 5.15).

Pre-Post Programme Comparison of Mean WEMWBS Score (n=19)

Error Bars: 95% CI
Note: The maximum WEMWBS score is 70 (representing good mental wellbeing) and the minimum score is 14 (representing poor mental wellbeing)
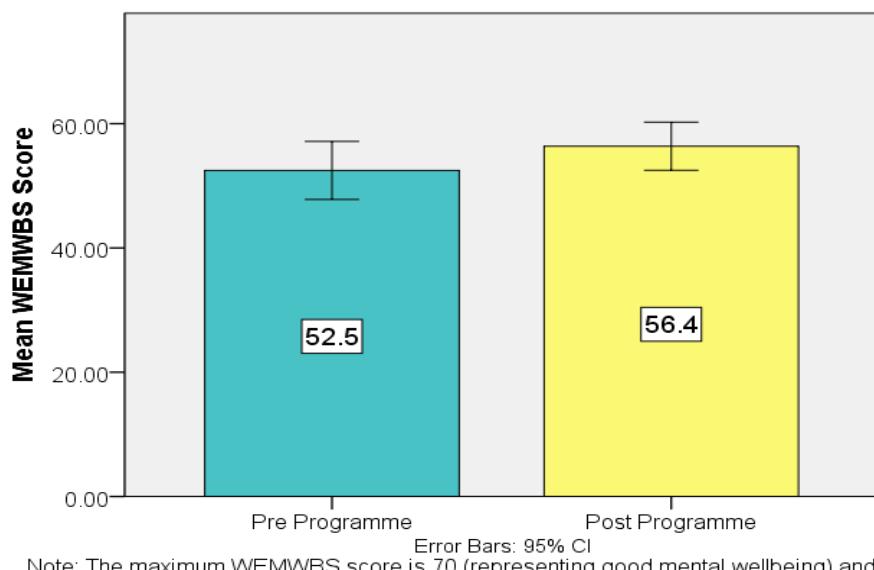
Figure 5.15: Pre-Post Programme comparison of Mean WEMWBS Scores

A statistically significant increase in participants mean mental wellbeing and quality of life score, as measured by the WHO (Five) Wellbeing Index, was observed from pre-programme ($M = 14.7$, $SD = 6.4$) to post programme ($M = 17.8$, $SD = 4.6$), ($t(18)$=-3.042, $p = .007$). The mean increase in the WHO (Five) Wellbeing Index score was 3.1 with a 95% confidence interval ranging from 5.339 to .977 (Figure 5.16).

Pre-Post Comparison of Mean WHO (Five) Wellbeing Index Scores (n=19)

Note: The maximum WHO (5) Wellbeing Index raw score is 25 (representing best possible wellbeing) and the minimum score is 0 (representing the worst possible wellbeing)

Error bars: 95% CI
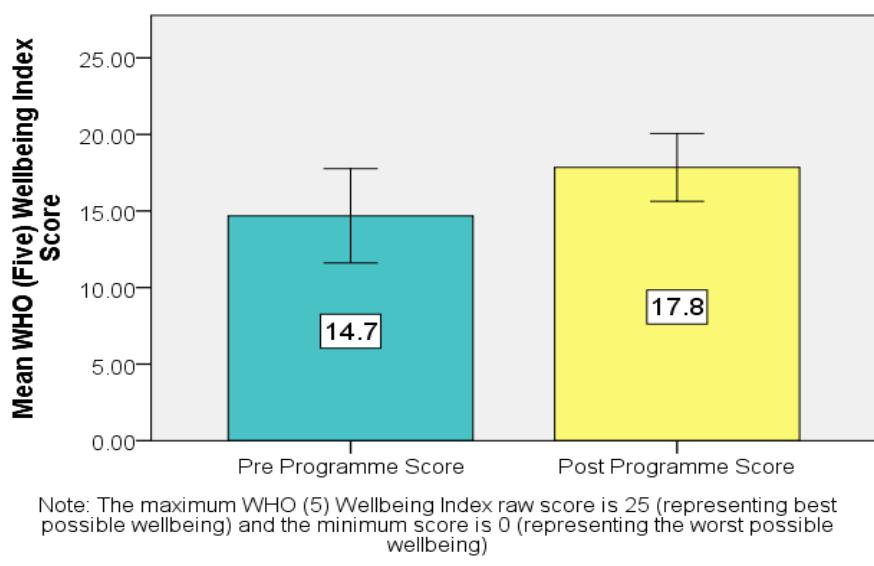
Figure 5.16: Pre-Post Programme Comparison of Mean WHO (Five) Wellbeing Index Scores

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This section of the report compares participants' cardiovascular risk factor indicators, anthropometric measurements, physical activity levels and mental wellbeing scores across from pre programme (week 1) to post programme (week 12) to longer-term follow-up (3 month post programme completion). Only data from participants who completed all three points of data collection (n = 11) are presented in this section. These quantitative results should be interpreted with caution given the small sample size.

Table 5-3: Overview of the Longer-Term Impact on Anthropometric measurements and Cardiovascular Risk Factor Indicators

Cardiovascular Risk Factor Indicators	n	Pre (WK 1) *M* (*SD*)	Post (WK 12) *M* (*SD*)	Longer-term (3 Mth Post) *M* (*SD*)	Significance Level (One-way Repeated measures Anova[a])
Systolic Blood Pressure (SBP) (mmHg)	11	141.8 (20.7)	129.5 (21.4)	135.7 (22.7)	*p* = .063
Diastolic Blood Pressure (DBP) (mmHg)	11	76.5 (17.4)	74.5 (13.7)	75.8 (16.6)	*p* = .751
Resting Heart Rate (RHR) (BPM)	11	72.4 (13.5)	77.7 (17.4)	75.4 (16.1)	*p* = .432
Anthropometric Measurements					
Waist Circumference (WC) (In.)	11	43.1 (6.2)	42.8 (5.9)	42.8 (5.6)	*p* = .833
Weight (Kg)	11	96.5 (16.5)	97.1 (16.7)	97.5 (17.5)	*p* = .400
Body Mass Index (BMI) (Kg/m2)	11	33.2 (6.2)	33.4 (6.1)	33.5 (6.5)	*p* = .464

*P < .05; [a] All repeated measures ANOVAs had a Sphericity Assumed Correction; *M* = Mean; *SD* = Standard Deviation

Longer-term Impacts on anthropometric measurements and cardiovascular risk factor indicators

Mean SBP decreased from pre programme to short-term follow-up, and increased again at longer-term follow-up. Mean SBP remained lower at longer-term follow-up than at pre programme however. A repeated measures ANOVA determined that the mean SBP did not differ statistically significantly between time points (although differences were approaching significance) (F (2, 20) = 3.186, p = .063) (refer to Table 5-3).

Similarly mean DBP decreased from pre programme to short-term follow-up, and increased again slightly at longer-term follow-up. However DBP remained lower at longer-term follow-up than at pre programme. A repeated measures ANOVA determined that the mean DBP did not differ statistically significantly between time points (F (2, 20) = .291, p = .751) (refer to Table 5-3).

Mean RHR increased from pre programme to post programme, and decreased again from post-programme to longer-term follow-up. A repeated measures ANOVA determined that the mean RHR did not differ statistically significantly between time points (F (2, 20) = .876, p = .432) (Table 5-3).

Mean waist circumference decreased from pre programme to post programme, and remained unchanged from short-term follow-up to longer-term follow-up. A repeated measures ANOVA determined that the mean waist circumference measurements did not differ statistically significantly between time points (F (2, 20) = .184, p = .833) (Table 5-3).

Mean weight increased slightly from pre programme to post programme to longer-term follow-up. A repeated measures ANOVA determined that the mean weight measurements did not differ statistically significantly between time points (F (2, 20) = .959, p = .400) (Table 5-3).

Very little change was observed in participants mean BMI score from pre programme to post programme to longer-term follow-up. A repeated measures ANOVA determined that the mean BMI score did not differ statistically significantly between time points (F (2, 20) = .798, p = .464) (Table 5-3).

These results suggest that participation in the Green Prescription programme does not produce longer-term significant impact on participants' blood pressure, heart rate, waist circumference, weight or BMI. However these results should be interpreted with caution given the small sample size.

Table 5-4: Overview of the Longer-Term Impact on Physical Activity Levels

Physical Activity Score	N	Pre (WK 1) *Mdn* (*IQR*)	Post (WK 12) *Mdn* (*IQR*)	Longer-term (3 Mth Post) *Mdn* (*IQR*)	Significance Level
IPAQ (MET-Minutes/Week)	11	330 (1062)	495 (434)	547.50 (1440)	*p* = .152
IPAQ (Total Minutes/Week)	11	100 (290)	150 (160)	150 (430)	*p* = .257
Daily Sitting Time Score					
IPAQ (Minutes/day)	11	240 (300)	180 (180)	180 (120)	Pre to Post: *p* = .005 Pre to Longer-term: *p* = .526 Post to Longer-term: *p* = .526

*P <.05; *Mdn* = Median; *IQR* = Interquartile Range

The median MET minute score for this group of participants increased from pre programme (*Mdn* = 330) to post programme (*Mdn* = 495) to longer-term follow-up (*Mdn* = 547.50). However the Friedman Test indicated that there was not a statistically significant difference in the median MET minute score across the three time points χ^2 (2, n = 11) = 3.762, *p* = .152 (refer to Table 5-4).

The median number of total minutes participants spent engaged in physical activity per week increased from pre programme (*Mdn* = 100) to post programme (*Mdn* = 150), and this increase was sustained at longer-term follow-up (*Mdn* = 150). However the Friedman Test indicated that there was not a statistically significant difference in median total physical activity minutes across the three time points χ^2 (2, n = 11) = 2.714, *p* = .257 (Table 5-4).

The median number of minutes participants spent sitting per day decreased from pre programme (*Mdn* = 240) to post programme (*Mdn* = 180), and this decrease was sustained at longer-term follow-up (*Mdn* = 180). The Friedman Test indicated that there was a statistically significant difference in participants daily sitting time scores between time points χ^2 (2, n = 11) = 11.526, *p* = .003. Post-hoc testing using Wilcoxin Signed Rank tests with Bonferroni correction (alpha value 0.17) revealed a statistically significant difference between participants pre programme (week 1) and post programme (week 12) sitting time scores (*Z* = -2.825, *p* = .005); and between participants pre programme to longer-term follow up (3 months post programme completion) sitting time scores (*Z* = -2.11, *p* = .035) (refer to Table 5-4). There was no

significant difference between participants daily sitting time scores from post programme to longer-term follow up ($p = .526$) (refer to Table 5-4). This suggests that participation in the Green Prescription programme elicits a statistically significant decrease in daily sitting time scores immediately post-programme completion, and this statistically significant decrease is sustained in the longer-term (although sitting time is unlikely to decrease further post programme completion).

Longer-term impacts on The Stage of Change for Physical Activity

At pre-programme the majority of participants were either in a stage of "contemplation (5/11) or "preparation" (3/11). By short-term follow-up there was evidence of progression as the majority of participants were in the "action" stage (8/11). However by longer-term follow-up there was some evidence of regression, as 5 participants regressed from a stage of "action" back to "contemplation" or "preparation" (refer to Figure 5.17).

Pre-Contemplation	Not regularly physically active and don't intend to be so in the next 6 months
Contemplation	Not regularly physically active but thinking about starting to do so in the next 6 months
Preparation	Do some physical activity but not enough to meet the description of regular physical activity
Action	Regularly physically active but only began in the last 6 months
Maintenance	Regularly physically active and have been so for longer than 6 months

Figure 5-17: Comparison of the number of participants within each SOC category at Pre (week 1), Post (week 12) and Longer-term follow-up (3 months post programme completion)

Longer-term Impact on Mental Wellbeing Levels

The mean Warwick Edinburgh Mental Wellbeing Scale (WEMWBS) score increased from pre programme (*M* = 57.4, *SD* = 8.5) to post programme (*M* = 60.3, *SD* = 5.0) to longer-term follow-up (*M* = 59.9, *SD* = 7.9). However a repeated measures ANOVA with a Sphericity Assumed Correction determined that the mean WEMWBS score did not differ statistically significantly between time-points (F (2, 20) = .844, p = .445).

Participants mean WHO (Five) Wellbeing Index Score increased from pre programme (*M* = 17.4, *SD* = 6.6) to post programme (*M* = 18.8, *SD* = 5.0), and increase was maintained at longer-term follow-up (*M* = 18.3, *SD* = 5.4). However a repeated measures ANOVA with a Sphericity Assumed Correction determined that the mean WHO (Five) Wellbeing Index Score did not differ statistically significantly between time-points (F (2, 20) = .983, p = .391). These results suggest participation in the Green Prescription programme may elicit longer-term improvements in participants' mental wellbeing, but these results are unlikely to be statistically significant.

5.2.2 Stage 3 Qualitative Results

The qualitative results are presented using the key themes and subthemes that emerged from the thematic analysis of the transcripts from the interviews and focus groups conducted with the target audience. Table 5-5 details the key themes and subthemes that are to be presented.

Table 5-5: Stage 3 Qualitative Results - Key Themes and Subthemes

Themes	Subthemes	Overview of Content
Programme Vision		• Vision for the programme
Feasibility and Acceptability		
	1. Recruitment 2. Referral Component	• Recruitment of health professionals, community groups, walking leaders and programme participants • Participant and health professional perceptions of referral
	3. The Green Steps Component	• Implementation and delivery of the Green Steps • Perspectives and experiences of Green Steps Facilitators and participants
	4. The Transition from the Green Steps to the Community Walks	• Factors affecting the transition from the Green Steps to the Community Walks

	5. The Community Walks Component	▪ Setting up and Sustaining of the Community Walks
		   o Facilitators and Challenges
		   o Recommendations
		   o Programme integration into community group practice
		▪ Implementing the Community Walks
		   o Factors affecting perceptions of success and satisfaction
		   o Facilitators and Challenges
		   o Stakeholder recommendations going forward.

	6. Factors affecting Participant Attendance and Adherence	▪ Factors negatively impacting on participant attendance and adherence to the programme
	7. The Support System	▪ Effectiveness ▪ Participant and support worker perceptions
Programme Impacts		▪ The impacts of the programme on the participants, communities and health professionals involved

The Green Prescription Programme Coordinator strived to "*develop a programme that…used nature as a source and resource for health and wellbeing*", while addressing key issues such as obesity, physical inactivity and mental health. It was believed a green exercise programme, with a referral component, had the potential to improve both "*physical*" and "*mental*" health, while also offering "*social*" benefits. The initial vision for the programme was a "*community-based*", "*outdoor walking*" programme that was "*accessible*", "*sustainable*" and low-cost, and that also provided opportunities for socialisation and "*skill*" development.

The New Zealand founded "Green Prescription" programme model was used as a guiding framework for programme development, along with the key concepts of partnership working and community development. The programme aimed to recruit local health care professionals and local community development groups as key programme partners. The role of local health care professionals was to refer patients to the programme, while the role of local community groups was to establish and implement the walking groups. The establishment of an "*equal partnership*" between health professionals and community groups was envisioned as one of the essential factors determining the success of the model.

The Programme Coordinator aimed to ensure community groups developed a strong sense of programme "*ownership*", thus the use of a "*community development*" and empowerment approach was viewed as vital. Enabling community ownership was also deemed to be the most feasible method of implementing and sustaining the programme due to the limited capacity of the public sector to fund physical activity initiatives: "*if we want to have a sustainable programme then we need to have a community development approach*" (Programme Coordinator). Community groups' position of influence within their local communities, in addition to their unique knowledge of their local communities – in terms of local needs, resources and community members – was also viewed essential to the successful implementation of the programme.

Recruitment of Key Programme Partners

The recruitment of key programme partners (local health professionals and community groups) was initially led by the Programme Coordinator. The process of recruiting community groups presented few challenges, as community groups were very keen to buy-in to the programme. Where possible, structured community groups such as Local and Community Development Programmes (LCDPs) or family resource centres, were recruited to lead the programme within each community. The Programme Coordinator believed these groups were a natural fit as they had access to required community resources, were likely to have an experienced community development worker on staff who could act as a community leader for the programme, and also had a remit around community health. This proved to be a good philosophy as the community groups themselves later relayed that the good fit between the aims and ethos of the Green Prescription Programme and that of their own, in terms of health and community engagement, had encouraged them to get involved with the programme: "*We had always… saw 'Community Health' …as … part of our core business…we thought, okay, it fits with what we do*" (Community Leader no. 3). The Health Promotion Departments previous experience of working with local communities was useful in identifying which community groups were most likely to have sufficient capacity to implement the programme. The presence of an existing good working relationship between the Programme Coordinator and the local community groups was also found to facilitate the process of community recruitment: "*I knew the community development programmes for a number of years so I had built up a lot of trust with the local communities… it was an open door policy for me really*" (Programme Coordinator).

In contrast the process of health professional recruitment presented a number of challenges. The first of these challenges involved identifying local GPs as no collective database existed detailing the location of health surgeries or contact details for the health professionals. Other practical challenges included finding time in busy health surgery schedules for marketing the programme to GPs and nurses. Both of these were described as "*expected challenges*" and proved surmountable. However the process of obtaining health professional buy-in proved more arduous at times. Although many health professionals were keen to get involved in the programme, the Programme

Coordinator described how "*some GPs...were not interested and did not see their role at all on the programme*". This was a somewhat "*unexpected*" challenge as the Programme Coordinator had "*thought there'd be a little bit more of an open door in recognizing an accessible programme in the local area where they could refer their patients into*". This sense of apathy was later reflected in an interview with one GP who questioned the need for health professional involvement in the programme: "*I am not sure why you need the GP's to be honest...people could just self-refer*" (Health Professional no. 2). The cause of this apathy was related to the perceived difficulties of integrating the programme into everyday practice, where time and resource constraints were already prevalent burdens.

In contrast the health professionals who had been keen to engage with the programme described how their main motivations for involvement were driven by patient needs. These health professionals believed there was a need for the structure and support offered by the Green Prescription programme for patients in need of increasing physical activity levels. Previous attempts to encourage patients to engage in physical activity had failed due to the wide variety of practical and personal barriers faced by patients e.g. a lack of exercise facilities in rural communities and low levels of patient motivation; and it was believed this programme could help address these issues.

> we did see that exercise which we commonly recommend was very difficult for people to achieve...there were no real structures around it...and certainly people just saw huge barriers to it... it was a suggestion of something that might work and it also looked like it might work in a rural setting which is unusual 'cause many things don't   (Health Professional no. 1)

Other factors that had motivated health professionals involvement with the programme included: (1) that it provided them with an alternative form of treatment to offer patients aside from drugs, and (2) the perception the programme had the potential to be "*effective*" while being "*easy ...to take part in*" (Health Professional no. 3).

The community groups believed there was a need for the programme within their communities. The community groups relayed that the programme had come "*at an ideal time*" as it was felt there was a conscious need for "*affordable health and affordable fitness*" (Community Leader no. 2) options within the community setting. In some instances community members had previously expressed a specific desire to get involved in green activities: "*there was a need for it because we would support the*

active age group … and quite a number of them were keen to do some kind of exercise outdoors" (Community Leader no. 1). The potential of the programme to facilitate social interaction and cohesion within the community had also been a key factor motivating the involvement of one community group.

Recruitment of Walking Leaders

Community groups were responsible for the recruitment of volunteer walking leaders from the local community. The development officer briefed community groups on what qualities they should look for when recruiting walking leaders, these qualities included *"natural leadership"*, *"good team player"*, *"good social skills"*, *"fun"*, *"adaptable and flexible"*, confident, knowledgeable about the local community and empathetic as well as having a love for walking. The development officer admitted these qualities were *"a hard mix to get"* in one individual, however all community leaders reported they encountered *"no challenges in recruiting walking leaders"*. Walking leaders were commonly identified from within existing volunteer bases, from within other community group-based programmes and on some occasions through open advertising within the local community. Individuals who volunteered as walking leaders were motivated by a love for walking and a desire to help others within their community. Many individuals had also pursued becoming a walking leader as an avenue for community involvement and for socialisation purposes.

Walking leaders were believed to be crucial to the success of the programme; with both the community leaders and development officer referring to how as they enabled the programme to be implemented on a limited budget by acting in a volunteer capacity: *"we couldn't run the programme without the walking leaders…everyone else is coming through in a professional role … the walking leadership level that's all volunteer…they are the pinnacle"* (Development Officer).

Recruitment of Programme Participants

The two main channels by which participants were recruited to the Green Prescription programme were via health professional referral and self-referral (which included both self-referred Green Steps participants and Community Walkers). Participants could join the programme either during the Green Steps programme (which was primarily aimed at referred participants but also accepted self-referrals) or during the Community Walks. Although participants had been successfully recruited to the

programme across all communities, the overall recruitment rate was less than anticipated.

Referral

Referred participants were recruited to the Green Prescription Programme primarily through active approaches. Active approaches describe a recruitment method in which participants are directly contacted / invited to participate in the programme (for example by referral, through a phone call, face to face invitation, or by word of mouth) (Foster et al. 2011). Referred Green Prescription Programme participants were firstly *referred* to the programme by their health professional after a *face-to-face consultation* and following this referred participants were *directly contacted by telephone* by the Green Prescription Support Worker to further encourage participation (all active recruitment approaches). It should be noted some passive recruitment approaches were also used in an attempt to recruit referred participants. Passive approaches refer to recruitment methods which require a potential participant to make the first contact with the programme (for example posters, leaflets drops, newspaper advertisements, radio advertisements) (Foster et al. 2011). The passive approaches used to recruit referred participants were promotional posters and leaflets placed in primary health care clinic waiting rooms. However these passive approaches appeared to have very little impact in terms of encouraging patients to *request* a referral to the Green Prescription Programme from their primary health care professional.

Health professional referral was found to be a key factor that had motivated referred participants to uptake the programme. Referred participants relayed how they placed a lot of trust in the recommendations of their GP/nurse, as they felt they had a unique understanding of their health history and thus knew what would benefit them. As a consequence referral was considered much more persuasive than seeing a general advertisement for the programme.

> She [my nurse] decided on it; I thought well you know best … because she knows exactly how I am with regards my weight and health and everything else (Female Referred Participant)

> I don't know if advertisements in a newspaper or anything at all is going to do it…like I needed the push from the doctor especially to go and do it (Male Referred Participant)

However participants' experiences of the overall process were mixed. Some participants felt very well informed about the programme at the time of referral: *"we got all the information we needed; it was definitely explained very well at the time"*.

However others found the explanation of the programme "*vague*" with some participants stating "*I...feel I didn't know enough about it*". In some instances the knowledge of health centre staff re the programme was also questioned: "*the staff in the...health centre didn't know anything about it ...[regarding] where you go with the form or what you do or...there's kind of a blankness about it* (Female Referred Participant). In addition the majority of participants had not been issued with a "green prescription" slip at the time of referral (which was a key component of the referral procedure); with health professionals more likely to make verbal recommendations instead. There was also some evidence that health professionals had referred unsuitable patients to the programme (i.e. patients who did not match the set referral criteria). For example, both Green Steps facilitators (GSFs) and walking leaders reported a number of patients that had been referred onto the programme could actually not participate due to mobility issues and subsequently these participants later dropped out of the programme

> one person…dropped out…it just wasn't the right program. The doctor forwarded him to the program but it didn't suit him, he was…very frail… he had ligament damage in his legs; you know this is a walking program (GSF no. 1)

Overall there was widespread belief that GPs/nurses had not referred as many participants as they could *and* that health professionals needed to be more proactive in promoting the programme during patient consultations to increase the recruitment rate: "*there is a lot of people that would benefit from being sent out with a prescription I just think they [GPs] need to push it a lot more on their side*" (Community Walker). Similarly many referred participants stated "*there must be more people like me*".

Health professionals confirmed that the numbers of patients they had referred to the programme was indeed less than optimal. Health professionals *did believe* the Green Prescription Programme had the potential to benefit a wide range of conditions and there *was* a general agreement among health professionals that a *high percentage* of their patient base were suitable for referral onto the programme.

> I think a shocking number [of my patients] would fit the criteria for referral… those chronic disease type patients … would represent perhaps 50% of our work... maybe … a third of those would be eligible - that's an awful lot of the patients that we see (Health Professional no. 1)

However due to a variety of challenges the number of patients health professionals had referred onto the programme was considerably less than the overall number who were eligible. The primary challenges affecting patient referral were time constraints

and competing demands during patient consultations: *"we are so busy dealing with acute stuff... [we have a] very short time for consultation [it's a] busy time… that's the main problem"* (Health professional no. 2)**.** GPs also referred to other external barriers to referral. For example GPs stated that increased patient presentations coupled with decreasing resources and person-hours, meant they had less time and resources available to dedicate to patient referral. In addition GPs relayed how they already felt overburdened with the various other health promotion initiatives they are asked to support throughout the year. The referral process itself was also deemed too *"time-consuming"*. Health professionals questioned the necessity of some of the referral requirements such as collecting patient health data for the referral form and getting patients to sign a contract of commitment, along with other administrative duties: *"there was too much (paperwork)…one sheet would have been fine"* (Health Professional no. 3). Other factors that impeded referral included health professionals *"forgetting"* about the programme during consultations; health professionals not feeling accomplished in the referral procedure; and a lack of patient interest (or a perceived lack of interest).

> we're not [referring as many patients as we could] maybe because…I am still not good at it and maybe because…we feel that people won't or aren't ready to engage (Health Professional no. 1)

Health professionals made a number of suggestions they believed would make the programme more successful from their perspective. Firstly they requested a simplified referral pathway with less administration and easier contact with the support worker. They also suggested that programme coordinators should provide them with *"constant encouragement"* and reminders throughout the year to prevent them from forgetting about the programme (Health Professionals no. 1 & 4). Some health professionals also believed the provision of desk-based prompts to remind them to refer patients during consultations would be helpful: *"having something on our desk to remind us about the programme and… having some sort of … card that you could give to patients for them to ring about it…would be useful"* (Health Professional no. 4). It was also felt there was a need to make it easier for patients to enter the programme; with health professionals advocating self-referral options and the involvement of other health practice staff: *"we always forget the power of front desk staff … there's no real reason why they can't be involved – in encouraging, in providing the information, in offering it"* (Health

Professional no. 1). With regards potential concerns about patient safety GP's were keen to point out they believed *"the risk levels are tiny"* (Health Professional no. 1).

Most health professionals, despite encountered challenges, remained very supportive of the programme. These health professionals expressed a keen desire to remain involved with the programme and had already taken some steps to integrate the Green Prescription into routine general practice. They displayed promotional material within their clinics and were in the process of setting up structured referral pathways. They acknowledged this was a work in progress, and it wasn't yet where it needed to be: *"we have it stitched into some structures like our diabetic review structure ...and we need to do more like that"* (Health Professional no. 1).

Recruitment of Self-Referrals (Self-Referred Green Steps Participants & Community Walkers)

Self-referred participants were mainly recruited through passive approaches, with various forms of programme advertising having been used to raise local awareness of the programme and recruit self-referred participants. The programme coordinator initially marketed the programme in local and national media (including on local radio stations, local newspapers and on a well-known national television programme). The community groups also marketed the programme at local level, by placing posters and distributing promotional leaflets in their own premises, and in local shops and meeting places. Community groups also advertised the programme on local parish bulletins and community newsletters. Community groups also used some active approaches to recruitment, for example they used *word-of-mouth* advertising to encourage local community members to participate in the Green Prescription Programme.

However in spite of the apparent success of the wide range of publicity methods used, health professionals and some members of the Green Prescription team believed the programme had being insufficiently publicised within local communities: "*I think it is absolutely not publicised enough… a lot of people don't know about it"* (GSF no. 2). Some participant's also suggested the methods of advertising used may not have been suitable to reach all members of the target audience, and that there was a need for greater diversity in the ways in which the programme is advertised in order to increase recruitment. Suggested methods of advertising included social media campaigns, a

dedicated "Green Prescription Programme" website, information events, and use of participant testimonials.

In addition some community groups reported they had experienced difficulties in recruiting the "right type" of community walkers. They had viewed sedentary community members/ beginner walkers as the main target group for the Community Walks as they believed these individuals were most "in need". However in reality the walks often attracted active individuals who were already experienced walkers. Consequently it was felt the Community Walks should instead be marketed as a "strolling walk" to attract the target group.

> it's attracting the people that we want to encourage… I think that's one of the biggest challenges…if it was advertised again I would like to see it advertised as …[a] strolling group rather than [a walking group], and maybe that way it might encourage those that don't walk to come out knowing that it's not a challenge – or fast [walking] (Walking Leader)

The timing of the programme was another perceived barrier to recruitment. The fact only one walk took place per week was believed by many participants to be too "*restrictive for people*" who may have wanted to join. An increase in the number of days the programme took place per week was suggested as the solution to this barrier.

5.2.2.3 The Green Steps Component

Participants were generally very positive about the Green Steps describing it as "*well delivered*", "*fun*", "*a good work-out*", "*suited to everybody*" and "*excellent*". In addition participants evidently believed the GSFs had performed their role to a very high standard as they described them as "very *professional*" and "very *good at their job*".

GSFs described how the majority of referred participants were very unfit and had little or no experience of participating in physical activity. Thus the Green Steps was structured to act as a "*bridging programme*" to take participants from complete inactivity to a stage where they could "*feel confident*" in their ability to participate in an outdoor group walk. Classes were group-based and designed to gradually increase in intensity over the four weeks. Participants appreciated the gradual approach of the Green Steps and confirmed that it had effectively prepared them for the Community Walk. They relayed how the Green Steps helped them to build their confidence and motivation, and overcome "*shyness*" about "*mixing with other people*".

> It was very well organised in that it was balanced, it started quite slowly and it was well explained into what was going to happen and basically…because it was a slow start it gave you confidence and got you motivated (Male Referred Participant)

Although set physical activity plans had been designed for the Green Steps programme, the GSFs said that they commonly tailored these plans to suit the capabilities of different participants: "*there's no way that a class can be conducted by what's written down on the page…you have to be able to…vary it for different people… but generally keep to the main track of the class*" (GSF no. 2). GSFs also ensured each class had a pressure-free ethos, and advised each participant to heed their physical limits. This individualised and understanding approach was highly valued by programme participants.

> She [the GSF] didn't push you… she understood our complaints you know… she said sit down if you feel like sitting down that's all part of…the Green Steps…if you can do so much good, and go as far as you can with it (Female Referred Participant)

Participants were satisfied with the exercises taught within the Green Steps programme describing them as "*very practical*" and "*simple*" to learn. The instructional method used by the GSFs was also an important contributor to participants' level of satisfaction. Participants positively referred to how GSFs explained the purpose of each exercise ("*you'd discover different parts of your body that the exercise was good for*"), repeated instruction as often as necessary, and taught exercises in an inspiring manner that appeared to increase participants' self-efficacy.

> [the GSF] made it clear that the exercises … were easily attainable, that they weren't something for athletes…that with a bit of practice anyone could do them…she also…would talk about the fact… that she wasn't perfect… it made it more accessible (Male Referred Participant)

GSFs described how the majority of referred participants presented with low levels of motivation and low confidence, and various different health conditions. Given these vulnerabilities, the GSFs relayed how in addition to physical activity instruction their role required them to build a strong rapport with participants and provide them with high levels of interpersonal support. They aimed to support participants through constant encouragement and motivation, a "*friendly*" and "*personal*" approach, a "*kind*" and caring manner, having a "*positive attitude*", being "*patient*", listening to participants concerns, making classes entertaining and fostering the formation of bonds between group members.

> I wasn't just an…instructor but I had to be … somebody they could come in to that they would enjoy the class, that would know their names and … who was really going to motivate them and encourage them to come back (GSF no. 2).

> They…talk to you about their ailments…[you're] a counsellor, a facilitator…an agony aunt…You are gelled into everything for them 4 weeks … you're dealing with people who need that (GSF no.1)

This overall approach utilised by the GSFs appeared key to the successful implementation of the Green Steps. The friendly and personal style of the GSFs made for a more enjoyable and relaxed exercise environment, and obviously enhanced the participants experience of the Green Steps: "*it wasn't just all exercise, exercise, exercise…She [GSF] made you feel relaxed and she chatted to you and she had the craic with you…she was brilliant*" (Referred Female Participant). The interpersonal support provided by GSFs was also a crucial source of motivation and encouragement for participants; helped them to overcome feelings of apathy and fostered ongoing attendance.

> if you came in with a kinda attitude that you couldn't be bothered … she [GSF] says: 'Don't give up!'; [she]…gave me the encouragement to keep going (Female Referred Participant)

Many participants also inferred that the relationship they had formed with the GSFs increased their sense of commitment to the programme and made them feel more obliged to complete it: "*if you build up a relationship with somebody like Mary* [GSF] you're not going to let her down*" (Female Referred Participant). (*name changed)

On occasion, however, GSFs felt they "*didn't know enough about*" referred participants presenting at the Green Steps programme. Although they acknowledged they had been made aware of participants physical ailments, they believed more detailed information on the emotional or psychological state of participants could help them perform their role more effectively by enabling them to provide extra support to participants where necessary. GSFs gave examples of participants who they later found out had depression, were recently bereaved or who were extremely anxious about attending the programme and stated "*if I knew a little bit more I might just have been able to handle things maybe better in the class*".

Participants had also been provided with step counters and physical activity diaries as motivational prompts upon initiation of the Green Steps; however the efficacy of these prompts varied. The majority of participants admitted to only filling in the physical activity diary "*for the first few weeks*" during the Green Steps, with only a very small number of participants continuing to use them until the end of the programme.

Some participants also questioned the accuracy of the step counters, but in general the step counters appeared to have the desired effect: "*I was walking all-round the house or…to somebody else's house, where you'd normally drive, you'd do it deliberately to get the mileage up*" (Male Referred Participant).

Although not a widespread issue, some groups raised concerns in relation to the facilities provided for the Green Steps. In two communities the rooms provided for the Green Steps were considered "*too small*" by GSFs and participants: "*we had a very small room and it wasn't good… there were no windows in it; the location is very important*" (GSF no. 2). The accessibility of some of the venues was also an issue for participants with mobility issues. However the Development Officer admitted this was a challenging issue to solve as these were the only facilities the community groups in question had access too: "*You're really in the laps of the communities when you're out working with the groups and … their…[ability] to access community halls*" (Development Officer).

In conclusion, although the general perception of the Green Steps was very positive, some stakeholders were of the opinion that the programme was still in some need of further development: "*It was a work in progress … because it was a pilot program … when you're starting something new; you're always going to have trial and error periods. It will take at least up to 3 years for you to develop a program properly*" (GSF no. 1).

5.2.2.4 Transition from Green Steps to the Community Walks

The transition from the Green Steps to the Community walks had been identified, by the Development Officer and the GSFs, as a potentially challenging time. A lot of coordination was required to create a smooth flow between the Green Steps and the Community Walks in relation to timing; participant handover from the GSFs to the walking leaders; and to ensure there was consistency in exercise instruction between GSFs and walking leaders.

> getting the flow from the Green Steps to the walking group is essential … you've got to get your time slot right, you've got to get your venue right, you've got to get your exercise and you got to get the right walk leaders and that's very difficult (GSF no. 1)

The Support Worker also referred to this transition stage as an important time for the provision of participant support, as participants had to adjust to new leaders and a new physical activity environment.

5.2.2.5 The Community Walks Component

Setting up & Sustaining the Community Walks

The community groups had the primary responsibility for the setup and sustainment of the Community Walks, with support and expertise provided by the Programme Coordinator and the Development Officer. The role of the community groups included the appointment of a dedicated community leader; recruitment of walking leaders; programme promotion; provision of facilities and resources (venue for meeting pre and post-walks, refreshment facilities etc); identification and auditing of walk routes; management of and provision of ongoing support to walking leaders; and inclusion of the Green Prescription programme as part of their programme and event management list, among other responsibilities.

Facilitators & Challenges Encountered

Community leaders spoke positively about the community development approach used which increases their sense of satisfaction in their role and fostered a sense of programme ownership.

> I went with [the Programme Coordinator] to meet practice nurses and GPs…at the beginning to promote the idea so we were actually invited in; which was great actually for our local connection. It was great for the doctors to see that we were there with the HSE worker (Community Leader number 3)

> The communities have kind of said to me that it's the first time they feel that they're part of a developing programme and they feel…they have ownership of it (Programme Coordinator)

All Community leaders reported feeling well-equipped to fulfil the duties of their role. They attributed this to the fact they were already experienced in supporting developing community initiatives as part of their everyday job. Community leaders felt having prior experience meant they knew how to provide "*momentum*" to the developing programme and were aware of all the "*little things [that] make a difference*" in terms of making a programme successful. Community Leaders reported few challenges in terms of accessing required facilities, resources or in the recruitment of walking leaders: "*when you're in the community capacity you're used to recruitment, you're used to…the development side of things*" (Community Leader no. 2). Some

community leaders also believed the fact they were well-known and trusted within their community was advantageous as it encouraged participation of community members who were hesitant about joining the programme.

Support provided by the Health Promotion Department within the HSE in Co. Donegal

Community leaders spoke positively about the partnership they had formed with the Programme Coordinator and Development Officer (both the Programme Coordinator and the Development Officer were based within the Health Promotion Department). They stated they had felt well-supported throughout programme development reporting regular contact and communication.

> it took off quickly here … we had a lot of support from the programme coordinator and the development officer…[the Development Officer] was so involved …and…would be constantly in touch with us through emails and giving us a wee phone just to see how things are going. (Community Leader no. 1)

Just as the presence of an existing good relationship between the Programme Coordinator and the community groups had facilitated the process of community recruitment; it also facilitated the formation of strong partnerships and on-going communication as the programme was developed: "*it was just easy…because…there was a good relationship there to start*" (Community Leader no. 3). Community leaders also relayed how having a shared objective of health improvement facilitated the formation of a strong partnership with the Health Promotion Department**:** "*we're all one big team trying to achieve the same thing*" (Community Leader no. 1).

Health Professional Support

The strength of the partnership between community groups and local health professionals was, in many ways, measured by whether or not health professionals actively referred patients to the programme. Thus as a result of the earlier reported challenges in obtaining health professional buy-in and the less than optimal referral rates; the strength of the partnerships formed between community groups and health professionals varied by community. Some community groups perceived their partnership with local health professionals as strong, as they had received many referred participants onto the programme. However other community groups questioned the equality of the partnership they shared with health professionals as they had received no *or* few referrals onto the programme. In fact some community groups reported low health professional support as one of the biggest challenges they had faced.

> we did the sales pitch with the doctors early on and I don't know if there was an opportunity or the resources to keep that pressure on....And that I think was the weakness in the programme, that we should have got the commitment [from the GPs] (Community Leader no. 3)

Community groups stated that increased health professional support was crucial to ensure the longer-term feasibility of the programme, and believed the Health Promotion Department needed to invest more time in securing the commitment of health professionals. Although Community Leaders were happy to play a supporting role in the recruitment of health professionals, they did not feel they should have any direct responsibility for it. Furthermore they stated they did not have the time or resources to do so.

Resources & Funding

Community groups had not received direct funding from the Health Promotion Department for the establishment of the Community Walks programme; and challenges relating to the availability of resources and funding were a prevalent concern among community leaders. They relayed how the capacities of community organisations were "*stretched*" due to recent governmental cutbacks, and this directly affected their ability to invest in and commit to projects. Community leaders referred directly to the challenge of implementing the Green Prescription programme on this limited capacity. For example they referred to the demands of providing on-going support for walking leaders, the financial costs of providing refreshments for participants and of providing heating and lighting within the hall for the Green Steps programme. As a consequence Community Leaders relayed a need for some financial support from the Health Promotion Department to facilitate the implementation of the programme and ensure longer-term sustainability.

> For this programme to work there should be a small matching investment....That does actually make a difference, it enables groups to put on the heating, have the tea and biccies and whatever else you need to do...I would say loudly back... a hundred euro would have gone...a long way for a community group (Community Leader no. 3)

Programme integration into Community Group Practice

In general community groups had embraced their involvement with the programme and there was evidence to suggest the programme had become integrated within some of the community organisations. For example in some of the communities, a weekly on-going community walks programme had been successfully established and the programme was advertised as part of the community group's regular activities. Some

community groups also talked about plans to develop "spin-off" walking programmes aimed at different target groups to extend the reach of the programme. In addition most community leaders were engaged in activities to try and ensure the sustainability of the programme. They spoke about their efforts to keep the walking groups "*invigorated*" through, for example, "*constant*" advertisement, targeted recruitment of new members and conducting informal evaluation of the walk group each week "*to see what can we do better, how can we get more people*" (Community leader no. 2). However there was a general belief among community groups that the Health Promotion Department had the overriding responsibility for the programme and its future development. This was in contrast to the Health Promotion Departments expectation that community groups would take ownership of the programme.

> I think it [improvements/developments within the programme] should be initiated by the HSE definitely because they are technically governing the programme – with the support of definitely the people on the ground (Community Leader no. 2)

Implementing the Community Walks

Walking leaders were responsible for implementing the Community Walks. The general perception of the Community Walks, among both participants and walking leaders, was very positive; although both stakeholders did outline some areas in need of further development. Walking leaders in particular had often found their role to be more "*challenging*" than expected.

The following section details the key results in relation to the implementation of the Community Walks programmes, factors affecting perceptions of success and satisfaction and stakeholder recommendations for the development of the programme.

Structure & Organisation of the Walks

Firstly the structured approach of the walks, in that they were led by trained walking leaders, monitored attendance, and took place on a set day at a set time, was found to be an important factor contributing to participants sense of satisfaction with the programme and motivated participant attendance.

> it was well organised…,you started exactly on time, finished exactly on time,…and the progress was monitored and basically it motivated you that you didn't want to [stop attending]…every Wednesday at 6.30pm I was definitely there and I knew I would be home within an hour and a half (Referred Male Participant)

Other key factors affect participants' sense of satisfaction with the walks were the pace at which the walks were led and the walk routes chosen. Referred and self-referred participants varied with regards fitness and ability level. To accommodate the range of abilities, walking leaders had been advised to grade walks in intensity and to split the walking group up into "fast" and "slow" cohorts. Within most groups these strategies had been implemented successfully they were very well received by participants, who stated they "*liked the way that everyone was accommodated*".

> it was balanced for everyone … because you can go at whatever pace you like, you can be at the front, the middle or the back and if you're at the back then there's people to look after you, wait for you and then the others kind of do a second take…and everyone comes home together (Male Referred Participant)

> We had a flat route for a few times 'til we built up our confidence and then we went up the hill, then …around the town….everybody was kinda brought on gradually (Male Self-Referred Participant)

However some walking groups had not been as successful in accommodating the needs of mixed ability groups. For a variety of reasons, including an insufficient number of walking leaders per walk group and walking leader inexperience, some walking leaders had found it too "*difficult*" to split groups into fast and slow cohorts; so instead led all participants within the one group at the one pace. In these instances participants capable of walking at a faster pace, or longer distances, felt "*held back*" and did not enjoy the walks as much: "*I find outside we're not walking far enough or even fast enough*" (Male Self-Referred Participant).

Overall participants were very happy with the walk routes: "*they're nice and idyllic and they're safe*" (Male Referred Participant); and participants especially appreciated when they were involved in the process of choosing routes. However some participants who had not been involved in the process of choosing routes expressed disappointment with the routes chosen and the fact they had not been consulted. Similarly a common thread throughout all the groups was the need to vary the walk routes regularly otherwise walkers admitted to getting "*bored*". However in many communities the number of potential walk routes available was often limited due to environmental factors and safety concerns, e.g. lack of or broken footpaths, poor lighting in rural areas, and high traffic volumes: "*There are lots of other places that we'd like to go but the roads are busy*" (Walking Leader).

Like the GSFs, walking leaders noted the majority of participants were lacking in confidence and motivation and required high levels of social support. Walking leaders described various methods they used to support participants including: providing constant "*encouragement*"; a "*friendly*" and "*positive*" attitude; empathising and engaging with participants; encouraging participants to mix; and ensuring each walk had a relaxed, fun and pressure-free atmosphere.

> the walkers they come first…you want them to enjoy the walking…you talk…look at the scenery…point out different things… and I would always give them encouragement (Walking Leader Interview 1)

This overall approach used by the walking leaders was evidently very successful in motivating and supporting participants:

> Mary* and John* were mostly my [walking] leaders and [they were] excellent… Like John* really pushed me to go three kilometres last week … But he entertained me all the way…and I thought I can't believe it I've just done 3K! (Female Referred Participant)(*names changed)

> I was always the slowest…but…what I felt good about it was there was no pressure to keep up with people (Female Referred Participant).

Many references were made to how walking leaders "*boosted*" participants on days when they felt like they "*couldn't be bothered*" or were struggling out on the walks. Participants had found it particularly "*helpful*" and motivating that walking leaders did not appear to be "*just going through the motions*" but rather seemed "*very enthusiastic*" about their role: "*they would make a point of talking to you and encouraging you… just showing an interest rather than just performing a function…they do seem genuinely interested in encouraging people*" (Male Referred Participant). The fact walking leaders were volunteers had also acted as a motivator to attendance as participants felt they would have been "*letting them down*" by not turning up each week: "*And the people who volunteer… to be quite honest when I wasn't coming I felt I was letting people down because they are of their own time when they could do other things or walk at a faster pace than tipping along with me*" (Female referred Participant).

Overall walking leaders felt *they* were "*doing as much as we can*" to support participants, however many believed more needed to be done to keep participants motivated *outside of walk days*:

> they need somebody else to work with them and motivate them … I can motivate them when I have them…but it's getting them there…when they're out they love it … and they're definitely

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coming back next week – but they don't. It's whatever happens along the … week (Walking Leader Interview 1)

Social Support Offered by Other Participants

…there was just a feeling of real interaction, the social aspect… there's always lots of chat. In fact I'd say the difficulty we have is getting them to go home! (Walking Leader Number 3)

The importance of the role played by other group members with regards participant motivation, attendance and levels of satisfaction with the programme could not be overestimated. Many self-referred community members / community walkers had been motivated to come to the walks initially by the prospect of meeting new people and "*making new friends*". The friendships formed with fellow participants was also an incentive for participants to adhere to the programme: "*when you have company you will go you'll walk ... it ties you to go ... I have to go here on a Tuesday night to walk to meet up with these girls*" (Female Community Walker). Participants also relayed how the social aspect of the walking group made fitness seem less of a chore and more of an enjoyment: "*when you're walking in a group you don't notice the time as much or you're not as focused on trying to get fit…you're enjoying the conversation and your walks over before you realise…it*" (Female Community Walker). Participants were particularly positive about the informal buddy system (where walkers of similar abilities were matched together on walks) referring to how it allowed them to directly support and encourage each other (however it should be noted that not all walking groups were found to use a buddy system).

Safety

Many tangible measures had been put in place to ensure safety on the walks, including ensuring walk leaders completed First Aid training and ensuring all walk routes were pre-vetted for potential safety issues. It was also ensured that there was sufficient walking leaders present on every walk so that at least one walk leader could lead the group from the front while another walk leader acted as "sweeper" to ensure no participants got left behind at the back of the group. In addition a designated walking leader took a First Aid kit and a mobile phone on every Community Walk in case an adverse event arose. In the case an adverse event did arise during the Green Steps or Community Walks, Green Steps Facilitators and all walking leaders were required to write a report detailing the incident. All walking leaders reported being "*very conscious of [participant] safety*" at all times during each walk. It was evident from participants

responses that feeling safe and well looked after was a very important factor that had contributed to participants overall sense of satisfaction with the programme.

However some walking leaders expressed concern with the limited amount of information they had received with regards referred participants' health status. (As lay members of the local community they had been provided with little or no information on the health status of referred participants for confidentiality reasons). Some walking leaders explained how a lack of awareness of participants health conditions had made them fearful of "*pushing participants too much*" on the walks as they were concerned for participants safety. They believed they should be provided with basic information on the health status of participants (e.g. advised if participants' were asthmatic or had a heart condition) as a safety precaution; which in turn would make them feel more confident within their role.

Suggestions for the Future Development of the Community Walks

Although all walking leaders were in agreement that the walking leadership training was crucial and had been extremely helpful in preparing them for their role; they had encountered unanticipated challenges (such as the aforementioned difficulties in managing mixed-ability groups and concerns over participant safety) during the implementation of the programme. Community groups suggested there was a need for the Development Officer to provide more direct support to the walking groups and the walking leaders, for example by conducting more frequent on-site visits, to help groups manage these unanticipated challenges. Walking leaders suggested "*refresher*" walking leadership-training courses, as well as additional training such as First Aid and natural history training, were required to further improve skills and competencies and enable walking leaders to make the walks a more enjoyable experience for participants. Many walking leaders also advocated for increased opportunities for networking with walking leaders from other groups as a means to learn from the experiences of other groups.

Walking leaders also felt there was a need for a more structured approach in relation to the management of walking leaders *and* in relation to how different walking leaders carried out their role. For example, it was believed there was a need for more consistency in the way different leaders conducted pre and post walk activities; led walks; and for better organisation and management of walking leader rotas. In addition

some walking leaders referred to a need to develop better channels of communication, especially in instances of walking leader or participant absenteeism on walk days. An increase in walking leader numbers was also outlined as a key requirement to ensure the proper implementation of the walks and to ensure existing walk leaders don't get burnt-out: "*We would need to get more [walking leaders] trained up…because it's not fair…the same people have to do it all the time*" (Walking Leader Focus Group). Obviously the number of walking leaders available also restricts the number of walks that can be offered to participants also.

The Development Officer was in the process of addressing many of these requirements. By the end of data collection many new volunteers had been trained up as walking leaders; a "walking leader's network" had been developed; and plans were in place to increase the training opportunities for walking leaders.

Encouragingly, despite encountered challenges, all walking leaders stated they had reaped a lot of enjoyment from their role and all interviewed said they planned to continue as a walking leader.

5.2.2.6 The Support System

Participants regularly referred to the importance of having a definite and consistent form of support in order to maintain attendance: "*You wouldn't be inclined to do it unless you were getting … encouragement and you had people telling you God you're getting better this week, that's all motivation" (*Male Referred Participant). Although participants received support from many different sources – including the GSFs, walking leaders and each other – the support system mainly revolved around the role of the support worker. The specific responsibilities of the support worker role (according to the job description for the support worker post) were to: act as the initial link between the referring health professional and the Green Steps programme; to provide ongoing support and encouragement to participants throughout the 12 week programme (via telephone calls and face-to-face contact) to help participants set and meet physical activity goals; to signpost participants to other community supports where necessary; and to provide referring health professionals with feedback on participant progress at the end of the programme. An additional responsibility of the support worker role was to follow-up with participants who dropped out of the programme, which required the

support worker to liaise with the GSFs and walking leaders. Finally the support worker role also included following-up with participants 3 months post programme completion to check if participants have maintained their active lifestyle and provide additional support if necessary.

Over the course of the evaluation, particularly in the early stages, the efficacy of the support system was found to vary, with some participants reporting a lack of contact with the support worker: "*there would have been very little contact after the first week or two*" (Male Referred Participant). The reasons for this were varied but were mainly attributed to the fact the support worker role was limited to a half day working week, which was deemed insufficient to fulfil the requirements of the role: "*all the referrals, everything, came at the one time and all the calls had to be made and it was really unmanageable*" (Support Worker no. 1). The support worker also referred to the practical difficulties of trying to phone and reach all participants within the constraints of a half day, whereby participants often would not answer the phone when called: "*the main difficulty for me was getting people when you were trying to phone them*" (Support Worker no. 1).

A breakdown in communication also meant there was "*confusion*" and a lack of clarity regarding the role responsibilities of the support worker and the Green Steps facilitators, with each believing the other was responsible for participant follow-up during the Green Steps component. There was also confusion regarding who was responsible for the follow-up of participants who dropped out at the Community Walks stage. Over all this meant that many participants who dropped out of / stop attending the programme were not followed up. Not only did this mean that participants who dropped out did not feel supported, it also meant the reasons *why* participants dropped out went unknown.

> nobody ever bothered [to contact me after I missed a few weeks], nobody ever said "you're missed, you're not there, what happened?" (Female Referred Participant, Dropped out week 5)

As a result the support system was restructured and the support worker role revised. The support worker role was increased to a two day working week (a different support worker was hired –Support Worker no. 2), and clear guidelines were set in place regarding role responsibility and participant follow-up. This resulted in a more effective

system. The programme coordinator and the GSFs believed the revised support system was "*more structured*", "*effective and efficient*" and allowed for greater accountability. Furthermore referred participants who entered into the programme after the introduction of the new structure, by contrast, gave very positive accounts of their contact with the support worker and said they had received "*encouraging*" calls "*most weeks*".

> he (support worker) called a few times to make sure that I was happy…with…the way the groups were being led, what we were doing and our targets … he couldn't have done anything else! (Female Referred Participant)

These participants also relayed how the support worker had played an important role in motivating them to attend each week, with supportive telephone calls acting as effective prompts for programme attendance: *"when you get that phone call every week just it motivates you to go"* (Referred Male Participant). Although the attendance of the participants who entered the programme after the restructuring of the Support Worker role was not directly monitored by the evaluation, feedback from the Programme Coordinator suggested participant adherence had much improved.

Although not directly the role of the support worker, a number of participants, in addition to some community leaders and one of the support workers, believed the current programme structure did not provide adequate support for participants who wanted / needed to make dietary changes (in addition to increasing their physical activity levels). The need for the programme to make provisions to ensure participants are adequately supported in their efforts to develop healthier eating habits emerged as a consideration for future programme development.

> when I joined the Green Prescription I thought there would be…somebody doing a weight or diet programme but then that never materialised…it would have been a more holistic type of [programme] you know…. I do think…if you even had a dietician coming to talk…about…weight…it might have motivated people more (Female Referred Participant)

> I also think it would be great if there was some… link in with particularly with dietetics in primary care because a lot of them [participants] would have articulated their need and desire for some talks on diet, on healthy diet and whilst I say if it's brought up I will certainly address it but I will also stress that I'm not a dietician but you know. (Support Worker no. 1)

Support Workers Perceptions & Experience

Reaffirming participants' statements, the support worker perceived their role to be very important in terms of influencing participants to take up and adhere to the programme.

[participants] might not be confident enough…their self-esteem might be that low that they are thinking God I couldn't [join the programme], yet if someone rings them and has a chat with them….and say's 'listen it's on in the Vestry at… such a time' they will…come along (Support Worker no. 2)

there was a lady today and if I hadn't phoned her this morning she wouldn't have come today…those people…you…need to…be pushing to stay with it (Support Worker no. 2)

The support worker relayed how he tailored the provision of support depending on participants' reason for up taking the programme, motivation levels and attitudes towards physical activity.

if I feel that they are …[driven by] goal setting I would use that...whereas someone who wouldn't be into…stuff like that you look for other ways…trying to find out what other benefits they're getting…getting them to see the benefits of it that they mightn't see otherwise (Support Worker no. 2)

The support worker had identified "*first couple of weeks of the walk*" as a particularly crucial time that participants were in need of high-level support as they adjusted to a new setting and new leaders. Overall the support worker aimed to contact participants regularly, believing participants needed "*a minimum*" of "*five*" support phone calls over the 12 weeks. However a key challenge experience by the support worker was lack of time. Although the role of the support worker had been increased to a two day working week in the restructured support system, the responsibilities of the support worker had also been increased. Additions to the support worker role after the introduction of the restructured support system included promotion of the programme to health professionals and health professional recruitment. These additional responsibilities had not being included in the job description for the support worker role (as outlined at the start of this section). The support worker reported having found it very challenging to fulfil all the role requirements within the limits of a two-day week.

I can see the effectiveness of chasing up with participants, the benefit of it…and doing the other stuff, linking with … health professionals, kind of takes away from that. I find time wise in 2 days I don't have enough time to do the whole lot…I can't do as many phone calls as I'd like…it's hard to get the time to kind of link in with the [walking] leaders to find out right how is everyone today or you know anyone not come today. (Support Worker no. 2)

The support worker further questioned the feasibility of being able to provide an acceptable system of support, within the constraints of a 2 day working week, as increasing number of participants are recruited into the programme. Concern was expressed that the quality of support offered to participants could suffer in this instance. A further increase in the number of working days for the support worker role was believed necessary in order to fulfil all the duties it currently entailed. However the

support worker believed it would be more feasible to streamline the support role so it mainly entailed patient support and follow-up only, with liaison with health professionals limited to "*short and simple*" feedback on patient progress. The support worker did not believe it was feasible for the support worker role to continue to include the promotion of the programme to health professionals and health professional recruitment.

> I would like to see the support worker very much sticking with the support side of things, so that they would link with the walking leaders, link with the fitness instructors [GSFs] and link with the participants and that would be it (Support Worker no. 2)

The background of the support worker may also be an important issue for future consideration. Both support workers employed within the programme came from a health care background – support worker no. 1 was a nurse, while support worker no. 2 was a counsellor and active mental health professional. Although not directly mentioned within qualitative results, it is likely that previous experience of working with people with high support needs was an advantage within the support role (from both the perspective of the support workers and the participants they were supporting). It is also possible health professionals were more encouraged to refer patients, and pass on patient health information, to support workers who had medical knowledge and prior experience of working with individuals with physical and mental health difficulties.

5.2.2.7 Factors Affecting Participant Attendance & Adherence

The main factors that were found to negatively affect participant attendance could be broadly grouped into personal barriers, environmental factors and timing issues. Common personal barriers included health and mobility problems, bereavement, lack of transport and clashing personal commitments. The support worker was keen to point out these were "*relevant reasons*" which affected participant attendance that did not signify a problem with the programme itself. Lack of participant confidence and low motivation levels were perhaps the most prevalent individual challenges; mentioned consistently by health professionals, support worker(s), GSFs, walking leaders *and* participants themselves.

> lack of motivation for exercise, lack of motivation for being in a place where they didn't know people and…to be somewhere at a certain time, absolutely… motivation was a big issue with them (GSF no. 2)

> I would be easily put off coming but that [has] got nothing to do with the [group], the groups lovely, it's just that I'm lazy about coming to it…I lack motivation (Referred Female Participant)

Common environmental factors affecting participant attendance included bad weather and seasonal changes in lighting. Interestingly some participants had dropped out of the programme at the end of the Green Steps simply because they did not want to participate in an outdoor programme. Community Walks in rural areas also stopped during the winter months as lack of lighting infrastructure meant it was too dangerous to walk on roads. It was suggested that an indoor option was needed, as an alternative to the Community Walks, for winter months and poor weather days.

Finally there were many references to how the timing of the programme directly affected participant attendance, e.g. programmes that took place during the day meant that potential participants who worked during the day could not attend: *"I would have liked to have joined [the community walk] …but the times did not suit"* (Female referred participant, dropped out week 4).

5.2.2.8 Impacts of the Green Prescription Programme

Impacts on Participants

> it…had a huge effect on [my] health, mental health, positivity … and [I] feel … confident of exercise and see the benefits of exercise … you don't realise how well you're gonna feel after it (Male Referred Participant)

There was a definitive consensus the programme had helped break down many barriers traditionally associated with physically activity. Both participants and health professionals commented on how it *"reintroduce[d] the idea of exercise"* and provided motivation to *"get started"* again.

> it was … a great motivation to get me started again…with this old osteoporosis [I thought] 'oh sure I'm useless now I'm not going to be able to do anything' … But it give me a bit of encouragement to … know that I could do it (Female Referred Participant)

Participants also reported an increase in fitness and mobility levels, and there was evidence to suggest the programme had spurred on participants to increase their physical activity levels outside of the community walks too: *"I loved everything about it! Because it got you fit and got you going again and it put me back into my walking again and I walk every morning now"* (Female Referred Participant). In accordance with this some participants also relayed that the programme had helped to create a change in their *"mind-set"* to make physical activity more of a *"priority"* within their

everyday lives.

Both referred participants and self-referred participants alike also spoke of the positive effects the programme had on their health and wellbeing. Reductions in blood pressure and weight, improvement in asthmatic conditions, better control of diabetes, improved sleep patterns and circulation, and reduced reliance on medications were all cited.

> It's easier on our medication I don't have to take as much at all… I find my lungs a lot better (Self-referred Female Participant)

> I lost a bit of weight which I was glad… And … it helped me… sleep at night. I was a worst of a sleeper… [but]…when I was out walking I could sleep 'til the morning (Female Referred Participant)

Many participants were referred to the programme with comorbidities, such as a physical *and* a mental health problem, and in these instances these participants often described how they experienced an overall improvement in their health and wellbeing.

> It's helping…with my diabetes sugar levels and they're kind of stabilising now. Mood wise it was good … like I would have depression as well so I just was like "right I have to go every week" and it made me go up and get up off me bum and get out (Female Referred Participant)

Participants often attributed mental health benefits with the fact the community walks took place outside and allowed the opportunity for socialisation with others. Some participants drew associations between being in the presence of nature and the reduction of depressive symptoms and the relief of stress: "*It's very good for to clear the mind…you kind of lose yourself and just your surrounded [by nature]…it's absolutely just divine… and that does you the world of good*" (Self-referred Female Participant).

Many participants also reported an increase in confidence as a result of programme participation, which came from both meeting new people and becoming more physically active. Finally the programme was associated with a vast range of positive social effects such as the formation of social links and networks. Participants relayed how they had reaped much enjoyment from meeting new people and making new friends: "*my benefit [was]…meeting these…girls here… it was kinda social on my behalf 'cause I wouldn't go out very much…so I was looking forward to coming in here every week to meet up*" (Female Referred Participant). Significant importance was

attached to conversations with fellow walkers, sharing problems, and being a "listening ear". Both health professionals and participants also remarked how the programme provided people with a "*sense of belonging*" and boosted self-esteem as they met "*like-minded*" people with similar health problems.

> there was one woman…she couldn't walk very far and didn't participate in any exercise …she went along and there was a lot of people in the same situation, she felt she wasn't the only one…it just helped with her whole self-esteem (Health Professional no. 3)

Longer-term Impacts of Programme Participation on Participants

Interviews were carried out with 11 participants three months post programme completion to determine the longer-term impacts of programme participation. In some communities the Community Walks were ongoing, but in other communities the Community Walks had stopped temporarily. In the communities where the Community Walks were ongoing most of the participants interviewed were still attending the walks each week, and two of these participants had since progressed to become walking leaders. These participants stated they were "*more active now*" as a result of the Green Prescription programme, and furthermore had noticed an increase in their fitness levels and mobility: "*I notice quite a lot [of difference in my fitness] now, I used to be ... very slow at walking [and] I go walking…very fast now I'm surprised really*" (Male Self-Referred Participant). A number of participants also reported a number of crossover benefits of programme participation, such as improved eating habits. These participants also reported that participation in the programme had caused a long-term change in their attitude towards physical activity.

> I know that I would need to keep active - it learned me that because…for a few years there I walked nothing at all you know. I was lying about the house doing little odd jobs and they weren't taking much out of me but now I would have a different mind-set to the whole thing (Male Referred participant)

A number of participants reported they were no longer regularly active, and the researcher observed that the majority of these resided in the communities where the walks had stopped. These participants cited various reasons for their inactivity including illness, injury, lack of motivation and "*bad weather*" (most of the interviews were conducted during winter months). However these participants stated the Green Prescription programme had a lasting effect on them, especially in terms of raised awareness levels around the benefits of physical activity. These participants also stated that although they were not regularly active they were now "*thinking more about it*

...before we wouldn't really think about it ... but now that that is got into our head about walking I would find I would be thinking away about getting out" (Female Referred Participant). All the participants who were no longer regularly physically active also stated they would "*definitely*" re-join the walking group if it started up again.

Impact of the Programme on the Community Group & on the Community

Community leaders spoke about how the programme "*made a tremendous difference*" within the local community as it increased the opportunities for social interaction and provided an additional means of "*mobilizing*" community members to get involved in local activities. Community leaders also reported how the programme managed to engage otherwise "hard-to-reach" community members, thus opening the door for them to get involved in other community programmes that may be of benefit.

> The green prescription [walkers]...have been a great nucleus of people that we have been able to kind of identify, that may need support and help in other ways as well (Community Leader no. 1)

Taking part in the programme also provided community groups with a greater pool of resources to pull from for use in other initiatives, e.g. trained walking leaders also took part in sponsored pram pushes. A number of community groups also credited the Green Prescription programme as the catalyst that encouraged them to set up an on-going community Strollers group within the community: "*I honestly don't think we'd have been able to do the Strollers' group if we hadn't done the training and had that opportunity…the Green Prescription made that happen*" (Community Leader no. 3). Additionally communities gained a greater awareness of their own readily available resources and natural capital that could be used for health improvement:

> it's that awareness…around the benefits of health related activity in your own community, that you don't have to pay a fortune to necessarily access gyms…it made us more aware about our own natural capital (Community Leader no. 2)

Although not without their difficulties, the partnerships formed between community groups and health professionals improved their local connection and opened the door for on-going collaboration.

> Some GPs didn't even know those community projects were there, so there's been huge learning at the local level… and now we have found since then…some of the practice nurses have actually now gone and used the community resource centres for their antenatal classes – and they didn't even know they were there before (Programme Coordinator)

Finally community members who volunteered as walking leaders reported many

benefits from taking part, e.g. they felt more involved with their local community, had gained an increased knowledge of their neighbourhood, had improved their skill set and increased their fitness levels. However the most commonly cited benefit by community walking leaders was a sense of achievement and personal satisfaction from helping others to socialise, improve their health and wellbeing and increase their physical activity levels.

> It's great satisfaction to get somebody…else out walking. I mean if I seen one of them out on the road, I thought God its brilliant, it's great they're out…it all started from here (Walking Leader Interview 1)

Impact of the Programme on Health Professional Practice

There was unanimous agreement among health professionals that the program was beneficial, or at the very least had the potential to be beneficial. Health professionals valued that it offered a non-medication based treatment option. They also believed it filled a previous long-standing gap by providing them with a structured and supported physical activity initiative to which to refer patients, which was affordable and locally accessible. This was a treatment option which was not available to them previously:

> We have been spouting about the evidence for increased exercise for years and we're not delivering it so that's the big thing that it actually gives us – a mechanism whereby we can deliver something that we believe to be an important intervention (Health Professional no. 1)

Health professionals relayed how previous referrals had returned to them with positive feedback about the programme, having also gained health benefits. Witnessing these benefits provided health professionals with a sense of personal satisfaction. The potential longer-term benefits to primary care in general were also acknowledged in terms of reducing the number of repeat patients with conditions that can be solved by increasing physical activity levels.

> if the individual will continue ….having physical activity … it's very satisfactory on a personal level for us as GP's … and secondly you might prevent them … re-attending for problems that can be almost solved by physical activity (Health Professional 2)

5.3 Stage 4: Consultation with Key Stakeholders & Experts

Within this section the themes that emerged from the interviews with "key stakeholders and experts" are presented. Three themes emerged: Theme 1: Acceptability; Theme 2: Feasibility; and Theme 3: Opportunities to Enhance the Model. To recap interviews had been undertaken with the Green Prescription Coordinator, the Donegal Sports Partnership Coordinator (DSPC) and the National Lead on Obesity, HSE / Head of Health Promotion Dublin North East for the consultation stage. As previously explained the Green Prescription Coordinator was the existing Eco-Health Promotion Officer within the Health Promotion Department of the HSE in Co. Donegal. The Programme Coordinator was responsible for programme development, securing funding, recruitment and support of key partners and linking with all stakeholders. The Donegal Sports Partnership Coordinator had played a key supporting role in programme development and implementation, by providing physical activity expertise, providing trained physical activity personnel (GSFs) and sharing knowledge on community infrastructure and capacity in relation to physical activity. The Donegal Sports Partnership, like other Sports Partnerships, also worked on an ongoing basis with communities throughout the year to help build & strengthen capacities to implement & sustain physical activity programmes. The National Lead on Obesity, HSE / Head of Health Promotion Dublin North East had provided initial funding for the programme and was also recruited as an expert consultant during the evaluation.

The purpose of the consultation stage was to gain feedback on: the perceived and realised acceptability and feasibility of the programme; opportunities for enhancement of the programme model and its potential for national roll-out.

5.3.1 Acceptability

All those involved in the consultation stage viewed the programme positively. They believed the programme was very relevant as it "*hits on a need*"; with the aims of the programme also believed to be a good fit with many current governmental policies: "*it fits incredibly well with every [health] policy that you can think of in Ireland, and basically the policies are that we have to increase the level of physical activity among the people*" (National Lead on Obesity, HSE / Head of Health Promotion Dublin North East). Similarly the DSPC was keen to get involved with the programme as a supportive

partner as the aims of the programme were a good fit with those of the Local Sports Partnership organisations (LSPs).

> we're all trying to target the same people…and get them involved in physical exercise… the HSE would have the same ethos…there's no point with limited resources us duplicating this.. I think its value for money … and there's a bit of sharing in terms of information … there's a lot of positives (DSPC)

The Programme Coordinator also reported the Green Prescription programme model had "*proved to be a very valid way of working in partnership*" with primary care teams, local communities and local health professionals: "*it's being used in the primary care teams as an example of a collaborative way of working… it has been accepted … and acknowledged as a way of working and that it has involved the community*".

5.3.2 Feasibility

Collaboration & Partnership Working

The "*collaborative…partnership*" approach of the Green Prescription programme had proved to be a key facilitator in the implementation of the programme and was perceived to be an important facilitator going forward. Many benefits were attributed to working in partnership – it was felt it strengthened the programme, increased its reach, facilitated a pooling of resources, avoided duplication of effort and enabled different sectors to recognise and play a role in health improvement. A partnership approach was also deemed the best potential means of funding and supporting the programme: "*the more partners you have around the table the better…because everyone of us are offering… a limited amount of our resources to deliver the program … if we all work together…it makes it a better model*" (DSPC). The National Lead on Obesity, HSE / Head of Health Promotion Dublin North East also suggested national-level funding for the programme would most likely be "*a combination of funding rather than one stream of funding*" and "*could be pursued…under the Healthy Ireland Principles of Partnership*".

However key stakeholders also outlined a number of potential challenges in relation to the partnership approach in programme roll-out. The "*changing social and political arena*", funding cutbacks and other "*diminishing resources*" were acknowledged as potential challenges to obtaining the buy-in and support of community groups, health professionals and LSPs. The fact some communities may not have the infrastructure available to implement the programme was also highlighted by the HSE Lead on

Obesity as "*an obstacle…that … we have to be aware of*". In accordance with this it was believed there was a need for more "*work at ground level*" with communities to "*develop the infrastructure [and]…build up the capacities*" needed to implement the Green Prescription programme. The DSPC felt this could be one of the most influential means by which LSPs could support the implementation of the programme locally and nationally.

In addition, apathy among some members of the medical profession towards programme involvement was expected to be an ongoing challenge as the programme was rolled out. Recruiting the health professionals who believed in the programme, to act as champions, was believed to be the best way of increasing the acceptability of the programme among apathetic health professions: "*What GPs have been saying to me … is to work with the GPs who are interested in the programme … and the others will follow on*" (Programme Coordinator).

Steering Group Committee

A steering group with representatives from each of the key programme partners and other supporting organisations had been established to guide the development of the Green Prescription programme. The steering group was identified as a key facilitator to the development and implementation of the programme for many reasons, such as it enabled the "*input from each of the different sectors*", aided the sharing of information and the formation of good working relationships between partners, enabled the identification of barriers and formulation of solutions etc. Key stakeholders outlined the continued use of steering group committees as a key requirement to ensure the smooth implementation of the Green Prescription programme both regionally and nationally.

Recruitment & Retainment of GSFs & Walking Leaders

The recruitment of GSFs and walking leaders was referred to as a potential challenge in terms of programme roll-out. This challenge not only related to the recruitment of *sufficient numbers* of these physical activity personnel and the time, effort and resources required to train them; but also related to ensuring the "right people" were recruited.

> it's not just about training up people, it's about training the right people…. people that are going to buy into it… people that are going to stay with us… that whole commitment as well (DSPC)

The role played by community volunteers was also cited as something that needs to be managed carefully: *"you have to be realistic ... these people are giving their time to deliver the program, they're not being paid to do it so ... you have to work with them in that manner"* (DSPC).

Partnerships to Lead the Programme for Roll-out & Key Requirements

The current partnership structure of the Health Promotion Department, the Community Sector and Primary care, with additional support provided by LSPs and other governmental sectors, was believed to be "*the way forward*" in terms of national roll-out. The need for clear leadership to oversee all partnerships was cited as key: *"you do need a lead…one champion that will drive out the whole thing and keep ... the work [going] in terms of supporting the community groups and the GP's and keep everybody informed… and to sustain the groups ...[without] that the whole thing would die"* (DSPC). The Department of Health Promotion within the HSE was seen as "*best placed to lead*" out at an organisational level.

The continued use of a community development approach was also deemed "*vital*" *to* the successful roll-out of the programme, and thus it was suggested that future programme coordinators should have community development expertise. In addition to community development expertise, it was also deemed vital to have physical activity expertise within the programme. The development officer had a background in physical activity, and this expertise was found to be crucial in helping to set up and establish the community walks within the different communities. The provision of this physical activity expertise was suggested as another area where LSPs could provide support for the programme in future rollout (as it was acknowledged that not every region would be able to employ a designated Community Walks development officer).

> it's really important to have a level of physical activity expertise within the programme … because a lot of communities ask these kind of questions [with regards] the lengths of walks, types of walks, routes, the walking leadership programme and … physical activity people …are…very enabling in the way they work with communities (Programme Coordinator)

In addition it was also acknowledged that the programme will always require an intensive period of set-up support each time it is introduced to a new area, until it becomes embedded as normal practice for local health professionals and community groups: *"it [requires] a high intensive kind of support for it by the coordinator, a little*

bit of support by the medical practitioner, but once it becomes a system, like all systems, they run themselves" (National Lead on Obesity, HSE / Head of Health Promotion Dublin North East).

5.3.3 Opportunities to Enhance the Green Prescription Programme Model

Towards the end of the evaluation links were being formed with the hospital sector, other members of the primary care team and chronic disease management programmes with an aim to widen out the *"referral routes"* to the programme. It was also believed the programme could be improved by broadening its focus so that participants could be referred to *other physical activity options* other than just a walking group, depending on the interests and abilities of the participants.

Key stakeholders also suggested the Green Prescription Programme could be linked to nationally driven programmes. For example, it was proposed that the programme could be incorporated as a referral option under national Exercise Referral Programme (a new National Framework for Exercise Referral is currently being developed). In addition the Programme Coordinator felt the programme should be directly linked to the Chronic Disease Model. It was believed incorporating the programme into these nationally driven models would increase awareness levels of the programme, increase partner and participant confidence in the programme and would also be a good means of securing programme funding.

Finally the DSPC highlighted the importance of continual evaluation throughout each stage of programme development: *"Build it ... make it strong, ... evaluate it, make sure that it's happening well and then move into another community and hopefully over time ... people will get the message [the programme is] working ... and the GP's will probably have... more confidence in the programme as well"* (DSPC).

5.4 Conclusion

This chapter has presented the results from Stage 3 ("Mixed methods research with the target audience) and Stage 4 ("Consultation with Key Stakeholders and Experts") of this evaluation study. The quantitative results from Stage 3 described the reach (recruitment rate) of the programme; the patterns of participation of programme participants; the reasons for referral of referred participants; and the demographic profile, physical activity levels, mental wellbeing scores and health status of referred

and self-referred participants at baseline. The results regarding the short and longer-term impact of the programme for those participants who completed short-term and longer-term follow-up were also presented. The qualitative results from Stage 3 were presented using the key themes and subthemes that emerged from the thematic analysis of the transcripts from the interviews and focus groups conducted with the target audience. These themes described the vision for the Green Prescription programme, the feasibility and acceptability of the programme, the factors affecting participant attendance and adherence and also described the impact of the programme on participants; referring health professionals and community groups. Similarly the qualitative results from Stage 4 of the evaluation were described using the themes that emerged from the thematic analysis of the transcripts with "key stakeholders and experts". These themes described the perceived acceptability and feasibility of the programme (with a focus on the wider scale rollout of the programme); and also described perceived opportunities to enhance the programme model. The next chapter will interpret the results that have been presented.

Chapter Six: Discussion of Key Results

6.1 Introduction

This chapter will examine and interpret the key results that were presented in the preceding chapter and relate them to the secondary research that was presented in chapter 2 to form a discussion. As previously explained in Chapter 3 quantitative and qualitative results are integrated throughout this discussion.

6.2 Overview of Key Results

The initial vision for the Green Prescription programme was that of a community-based, green exercise referral programme, that provided opportunities for health improvement, socialization, and skill development, while been accessible to all. The mission was to use the New Zealand based Green Prescription programme as a guiding framework for programme development, and deliver the programme in partnership between the Health Promotion Department, local community groups and local health professionals whilst utilising a community development and capacity building approach. In general the evaluation found the programme was successfully delivered consistent with both vision and mission; however the evaluation also identified a number of areas within the programme that were in need of further development.

The results from the evaluation suggest the programme was successful in its social ecological approach and produced positive outcomes conducive to health and physical activity promotion at multiple socio-ecological levels. For example as well as resulting in numerous individual level benefits, it also had outcomes at an interpersonal level by creating social support for physical activity and facilitating the development of social networks; at an organisational level it created changes in practices relating to physical activity promotion among community groups and local health professionals; at a community level it facilitated the formation of health promoting partnerships and improved relationships between community groups and health professionals, in addition to improving social cohesion; while at an environmental level it promoted the benefits of outdoor activity, promoted use of local walk routes and improved the connection between community members and their environment.

The following sections will discuss the key results from the evaluation in relation to recruitment, set up, implementation and sustainability of the programme, the impact of the programme and the future rollout of the programme.

6.3 Recruitment

The implementation, delivery and success of the Green Prescription Programme relied on the recruitment of a series of different stakeholders including community groups, health professionals, a support worker, physical activity instructors (Green Steps facilitators) and volunteer walking leaders, as well as referred participants and self-referred participants. (Refer to Table 3-1 (p. 93) for an outline of each of the key stakeholders within the Green Prescription Programme and how they were recruited). This evaluation found that each of these stakeholders had been successfully recruited to the pilot Green Prescription Programme (although in some cases there was difficulty in recruiting certain stakeholders in the numbers anticipated).

Community groups were recruited to the programme with ease, spurred by the belief that there was a need for the Green Prescription Programme within their communities. As predicted by the literature the use of a community development approach; targeting of action-orientated, structured community groups (such as Local and Community Development Programmes (LCDPs) who had similar goals regarding community health improvement; together with the fact the Health Promotion Department had a pre-established, good relationship with the targeted groups also appeared to be key to the successful recruitment of community partners (Keenaghan et al. 2012; Edmonds 2003; Nguyên 2002; Cheadle et al. 2010; Milton et al. 2011). Volunteer walking leaders were also recruited with ease, again suggesting a high degree of support for the programme within communities.

As also anticipated from the literature review, the ease of recruitment of local health professional partners varied. Many health professionals were very keen to participate in the programme while some, like in other studies, were reluctant to engage (Jones et al. 2011; McKay-Brown et al. 2007; Persson et al. 2013). Keenness to engage with the programme was related to positive perceptions about the programme and its potential to fill a gap in service provision by providing a structured, supported physical activity referral option for patients; *and* the belief that a large proportion of their patient base were suitable for referral. Contrastingly reluctance to engage with the programme was

related to a belief that the programme was not a good fit with general practice and perception that integrating the programme into routine practice would be overly demanding. Similar barriers have been raised by GPs in other studies (Jones et al. 2011; McKay-Brown et al. 2007; CalderÓn et al. 2011). The lack of GP training in non-pharmacological methods, and the potential benefits of non-pharmacological methods of intervention, is also likely to be a root cause of apathy towards engagement in programmes like the Green Prescription (Persson et al. 2013). However, considering the "newness" of the Green Prescription programme, together with the fact this was the first time the health promotion department had attempted to form a partnership with the health professionals involved, it can also be expected that time will need to be invested to build health professionals trust both within the programme and within the partnership.

From the perspective of programme participants, there was a sincere belief that there was a great need for this programme within communities. Furthermore at least 194 participants were successfully recruited into the programme in total suggesting the programme was generally well supported across the communities. A wide range of active and passive approaches had been utilised to recruit participants to the programme (Foster et al. 2011). As explained previously active approaches describe a recruitment method in which participants are directly contacted / invited to participate in the programme (for example by referral, through a phone call, face to face invitation, or by word of mouth) (Foster et al. 2011). In contrast passive approaches refer to recruitment methods which require a potential participant to make the first contact with the programme (for example posters, leaflets drops, newspaper advertisements, and radio advertisements) (Foster et al. 2011). The active approach of health professional referral was only successful in recruiting 39 referred participants, which was less than anticipated. The wide range of passive and active recruitment methods utilised to recruit self-referred participants were undoubtedly much more successful; with a total of 155 participants recruited to the programme through self-referral routes (35 Green Steps participants were self-referred, as were the 120 Community Walkers). Thus the self-referral recruitment route was nearly 4 times more successful in recruiting participants to the programme in comparison to the health professional referral route. Interestingly however there was a common consensus that the recruitment rate of *both referred and self-referred participants* could have been higher. The two main factors affecting

participant recruitment were reported to be a low general awareness of the programme within communities and inadequate health professional support for the programme. These are challenges to ERS recruitment previously highlighted by Wormald et al. (2006).

Although marketing campaigns had been utilised to promote the programme within the communities involved numerous stakeholders seemed to be under aware of these promotional efforts. A similar finding was reported from a formative evaluation of a community-walking intervention in the UK; and suggests that the programme may not have been advertised using the appropriate channels (Milton et al. 2011). There was a stated need for ongoing programme promotion to increase participant recruitment, to include varied methods of advertisement and tailored advertisement to target the most sedentary community members. The importance of utilising multiple communication strategies for successful recruitment was previously outlined in the literature review (Nguyên et al. 2002). The literature also suggests the importance of ensuring that the content of advertisements is effective in encouraging programme uptake *and* ensuring that there is an adequate lead-in time (of at least a few weeks) to ensure the target audience is sufficiently exposed to the marketing campaigns (Milton et al. 2011). In addition the recent findings of Matthews et al. (2012) suggest that if the Community Walks are to be truly successful in recruiting *sedentary* community members the Health Promotion Department together with community group partners will need to be prepared to invest considerable time and resources into the recruitment process.

> effective walking programme recruitment…seems to require trained, strategic, labour intensive, word-of-mouth communication, often in partnerships, in order to understand needs and develop trust and motivation within disengaged sedentary communities….inadequate resources may compromise the sustainability of effective walking programme recruitment processes for such target audiences (Matthews et al. 2012)

In relation to health professional support for the Green Prescription Programme, this evaluation clearly shows there is an evident need to increase the referral rate from local health professionals. Time constraints and competing demands during consultations, GPs "*forgetting*" about the programme, GPs feeling unaccomplished in the referral procedure, the perception that the referral process was too time-consuming, along with other challenges were all described as impediments to referral. This finding is consistent with previous research (CalderÓn et al. 2011; Dugdill et al. 2005; Kerse et al. 2005;

Patel et al. 2011; Gribben et al. 2000; Persson et al. 2013). However encouragingly there was a general belief among health professionals that, given a simplified referral system and increased support from the health promotion department, the majority of these challenges were surmountable. Research has shown that simplifying the referral procedures to minimise the workload on GPs can substantially increase the number of physical activity prescriptions issued (Persson et al. 2010). There is also an evident need for health professional training to build competence both in relation to the referral procedure, the promotion of physical activity and to ensure physical activity promotion is seen as a priority in routine patient care (Horne et al. 2010; Dugdill et al. 2005; Persson et al. 2013). Some challenges, such as time constraints, are inevitable; however interestingly the administration of a Green Prescription has been found to be less time-consuming than starting a patient on a new medication in some cases - a fact, perhaps, which GPs should be made aware of (Wynard 2006 cited in Patel et al. 2011). Henceforth it is imperative that the health professional referral rate to the Green Prescription Programme continues to be monitored closely. If efforts to address the barriers to referral reported by health professionals do not subsequently result in an increase in the number of patients referred to the programme, then this will raise serious questions regarding the viability of the health professional referral route.

It is important to acknowledge however there still remains considerable ambiguity within the literature about what recruitment strategies (whether active or passive) are most effective in recruiting participants to walking interventions (Foster et al. 2011). A recent systematic literature review by Foster et al. (2011) that aimed to identify the impact, characteristics, and differential effects of various recruitment strategies to walking interventions, concluded that due to the heterogeneity of studies and inadequate reporting methods they were unable to identify what specific recruitment approaches were most successful. As a result Foster et al. (2011) suggested there was a need for more research to determine what constitutes effective recruitment strategies for different population groups. This emphasises the importance of ensuring *all* recruitment strategies (including both active *and* passive approaches) that are utilised within the Green Prescription Programme continue to be monitored and evaluated to determine their effectiveness. Findings regarding the effectiveness of different recruitment methods should then be disseminated to the wider research community so they can add to the current evidence base.

Intriguingly in contrast to other studies (Graham et al. 2005; Edmonds et al. 2003); no health professionals in this evaluation reported perceived patient risk or medico-legal concerns as a barrier to referral, with one GP stating "*the risk levels are tiny*". It is possible health professional's viewed the low intensity of this programme (essentially a strolling programme) as a low-risk option in comparison to a gym-based referral programme. The fact that no major adverse participant incidences were recorded over the course of the evaluation is perhaps a testament to the low-risk nature of the programme. However, it cannot be assumed that other health professionals will not perceive patient risk as a barrier, especially in the case of programme roll-out. Although there is evidence to suggest that the potential risks of engaging in physical activity are outweighed by the potential health benefits, there is some ambiguity about the potential risks of physical activity in patients with certain pre-existing conditions (Moore et al. 2011). Good practice would suggest the need to develop clear guidelines that address the issue of patient risk and medico-legal considerations for health professionals and programme coordinators (NHS 2001).The University of British Columbia have further developed the Physical Activity Readiness Questionnaire (PAR-Q), and have renamed it the PAR-Q+ and have also further developed the Physical Activity Readiness Medical Examination (PARmed-X) and renamed it the PARmed-X+, as screening tools to assess potential risks of physical activity engagement (Bredin et al. 2013). (The PARmed-X would have normally being used by health professionals to assess the physical activity readiness of patients who were deemed "at-risk" after answering "yes" to one or more questions on the PAR-Q (Bredin et al. 2013)). Both these revised instruments may provide a useful, evidence-based means of assessing patient risk prior to referral to the Green Prescription Programme, and thus the applicability of these instruments within an Irish context should be investigated.

Referral was without doubt an extremely influential factor in a participant's decision to uptake the programme; which is consistent with previous findings (Ashley and Bartlett 2001; Swinburn et al. 1998; Horne et al. 2010; Elley et al. 2007). However there were some indications of the need for improvement in the referral procedure; with some participants feeling ill-informed about the programme at referral and the majority of participants not being issued with a green prescription slip. Feeling ill-informed about what the programme entails may have resulted in some potential participants turning down the offer of referral. Similarly prescription slips are believed to enhance the

likelihood of participant adherence to the prescribed physical activity programme by acting as a contract of commitment (Elley et al. 2007; Swinburn et al. 1998; Persson et al. 2013); and thus it is possible participant adherence may have been improved if each patient had been issued a slip. It is evident there is a challenge to be overcome in refining the referral routine so that it imposes minimal workload on health professionals whilst still encompassing key elements needed for an effective referral system. These key elements include health professionals taking the time to explain the programme to patients, allay any fears patients may have about programme participation and the issuing of a written tailored prescription (Elley et al. 2007; Horne et al. 2010; Swinburn et al. 1998). Although health professionals advocated the role of other health practice staff in offering the programme it is questionable if participants would find the recommendations of front desk staff as influential as their GP/nurse. It has been argued that GP/nurses lend credibility to and legitimize the prescribed activity, as patients believe they have the authoritative knowledge on what is beneficial for health (Elley et al. 2007). However increased involvement of front desk staff in providing information and explaining the programme to patients following health professional referral should be encouraged. This could serve as positive reinforcement to potential participants and would also help address aforementioned challenges by ensuring participants receive all necessary information at the time of referral.

Baseline data collected from participants showed that the programme successfully reached target groups that have been identified in the literature as being more likely to be inactive, namely: older adults / people over 50 years of age (the average age of participants was 60.5 years); females (the majority of participants were female) and those from lower socio-economic classes (Armstrong et al. 2000; Morgan et al. 2008; IUNA 2011; Irish Sports Council 2011; Institute of Public Health 2011; Sun et al. 2013). As the majority of participants in this programme (71%) were entitled to a full medical card, this implies these participants were more likely to be within lower socioeconomic classes / groupings (Kelleher et al. 2002; Public Health Alliance Ireland 2004; Whelton et al. 2007; Smith and Normand 2009) (refer to section headed *Basic Demographic Profile Data (p.123)* within section *4.7.2.2 Pre-Post Programme Measurements*. The reasons for referral and health status of participants present at baseline also suggested the programme successfully recruited individuals with so-called lifestyle diseases. For example the most common reasons for referral were

overweightness, high blood pressure, diabetes and sedentary lifestyle; with the majority of individuals referred for comorbid conditions. In addition the majority of participants at baseline presented with "high health risk" waist circumference measurements and 93% were overweight or obese. Furthermore the majority of participants had abnormally elevated blood pressure readings (National Heart, Lung and Blood Institute 2012). The demographic profile, reasons for referral and health status of the participations recruited to this programme are consistent with other studies (Hanson et al. 2013; Pavey et al. 2011; Williams et al. 2007; Harrison et al. 2005; Lee et al. 2009; Gidlow et al. 2005; Hanson et al. 2013; (BHFNC Undated[b]).

The IPAQ-SF was used to measure the physical activity levels at baseline, while the SoC questionnaire was used to measure participants stage of change or readiness to increase physical activity levels. Both questionnaires produced somewhat unexpected results. For example totalled MET minute scores from the IPAQ-SF suggested 53% of participants were already achieving the minimum recommended amount of physical activity per week at baseline (at least 500 Met-minutes per week) (U.S. Department of Health and Human Services 2008). One possible explanation for this is that many of the participants were in fact sufficiently active upon joining the Green Prescription programme. However this is unlikely given the reasons for referral and the fact the majority of participants displayed indicators of disease risk. Results from the SoC questionnaire also provided further evidence to disprove the IPAQ-SF results as only 35% of participants reported being in a stage of "action" or "maintenance" at baseline. (It would be expected that if 53% of participants were meeting the physical activity recommendation as suggested by the IPAQ-SF results then similarly 53% of participants would report being in a stage of "action" or "maintenance"). This suggests that the IPAQ-SF overestimated participants' physical activity levels; an issue that has been identified in previous studies (Sebastião et al. 2012; Heesch et al. 2010).

Although precautions had been taken to explain the instrument to participants before they filled in their answers, many participants still expressed confusion regarding the different sections of the questionnaire and also found recall of physical activity difficult. Again these issues have been identified in other studies (Matsudo et al. 2001; Heesch et al. 2010). Heesch et al. (2010) proposed that many of the errors that commonly occur when the IPAQ is being completed could be minimized by modifying the language,

format and instructions on the IPAQ. Examples of proposed modifications included "*stating in the instructions at the beginning of the questionnaire and for each activity domain that activities already reported for one domain should not be reported again for another*" and "*offer strategies for determining the frequency and duration of activities*". However any modifications would need to be tested before they can be used to determine whether the proposed changes result in improvements in the accuracy of the data collected for both younger and older adults (Heesch et al. 2010). In general the results of the evaluation suggest the need for alternative methods of assessing participants' physical activity levels are needed. As current research suggests there are limitations with the validity and accuracy of all self-report physical activity questionnaires and that no one physical activity questionnaire could be recommended above others (Helmerhorst et al. 2012; van Poppel et al. 2010); it is likely that an objective measure (e.g. using accelerometers or pedometers) of physical activity would provide the most valid and accurate results in the case of future research. However the feasibility of using an objective measure of physical activity levels obviously depends on the funding available for future research.

However, refocusing on the aforementioned results from the SoC questionnaire (namely that 35% of participants reported being in a stage of "action" or "maintenance" at baseline) it must be acknowledged that these results do imply that some participants were already physically active upon joining the programme. This suggests some participants may have joined the programme solely for social reasons or perhaps because they wanted additional support to maintain their physically active lifestyle. The SoC questionnaire also provided other interesting results. For example, only 22% of participants reported being in the "preparation" stage, which would be the expected stage of change for individuals starting a new exercise regime, as individuals in this stage are intent on increasing their physical activity levels within the immediate future (i.e. they are ready to change) (Marcus et al. 1998; Rhonda et al. 2001). Conversely 40% of participants reported being in the "contemplation" stage; this is generally a stage when people are not ready to participate in action-orientated programmes (Zimmerman et al. 2000; Marcus et al. 1992[b]). This finding suggests some participants were inappropriately recruited to the programme, as the programme was designed for individuals who were ready to change but required support and motivation to do so.

In general the Green Prescription programme was successfully established and implemented within the majority of communities. The programme was integrated into existing community structures (e.g. pre-existing local community groups; local health centres) and utilised existing community assets (e.g. local facilities, walkways, community members as volunteers). These are key factors that are likely to have contributed to its success to date and may also be crucial in promoting its sustainability (NSW Premier's Council for Active Living 2008). The use of a community development approach was definitely welcomed by community groups, who appreciated and felt empowered by being actively involved in the programme development and in the decision-making process. The community groups were very willing hosts to the programme, viewed it as a valuable addition to the community and wanted the programme to be successful. In general community groups experienced few challenges in setting up the programme and felt well equipped to fulfil role requirements. It would seem the fact community groups were action-orientated, experienced, well established and trusted within their communities acted as key facilitators to the establishment of the programme within communities and encouraged participant uptake of the programme (Nguyên et al. 2002; Milton et al. 2011). Consistent with the literature, the presence of a good personal relationship between the community groups and the programme coordinator aided the development of a strong partnership (Cheadle et al. 2010). Consistent with best practice guidelines (Nguyên et al. 2002), the health promotion department provided the community groups with consistent support; which included information, advice and training in relation to setting up, organising and managing the walking groups. This was not only a key requirement for an effective on-going partnership, but was also crucial for the successful establishment of the programme considering the majority of community groups had no prior experience of organising a walking group. In particular the Development Officers background in physical activity and expertise in relation to developing physical activity initiatives proved invaluable in facilitating community groups to set up the Community Walks.

This evaluation did not aim to assess the overall costs associated with programme setup and implementation, nor did it aim to assess the cost-effectiveness of this programme. The researcher acknowledges this is a weak point of this evaluation as good

practice would suggest that resource assessment and economic analysis should form an integral component of an evaluation of any new health promotion intervention (THCU 2007; Tilson 2006; Powell et al. 2013). As it is the total costs of this programme from a public health expenditure perspective, and the cost effectiveness of this programme, remain to be determined and should be priority areas for future research. It is particularly important that a comprehensive economic evaluation is conducted before any steps are taken towards a wide-scale roll-out of the Green Prescription Programme (Powell et al. 2013). However it is important to clarify that a full economic evaluation of the Green Prescription Programme cannot be undertaken until it is *proven* that the Green Prescription Programme is effective in meeting its aims of increasing the physical activity levels, improving the mental wellbeing levels and improving the disease risk indicators of its participants. As explained previously in *section ?Types of Evaluation and Evaluation Designs* a rigorous experimental evaluation design will be necessary to provide robust evidence of the impacts / outcomes of the Green Prescription Programme.

> Economic evaluation involves identifying, measuring and valuing both the inputs (costs) and outcomes (benefits) of the intervention (Hughes et al. 2008)

> Economic evaluation is an essential component of [a public health] intervention evaluation. Intervention evaluation involves two measures; (i) the health effects or effectiveness of the intervention (impact / outcome measures), and (ii) the value or efficiency of the effects (economic evaluation). Knowing the outcomes or effects of an intervention is essential for economic evaluation to be undertaken (Hughes et al. 2008)

What is clear from the evaluation results at this point, however, is that the community development and organizing approach utilised for the implementation of the Green Prescription Programme made this a low-cost and accessible programme to participate in from the participant perspective. However it was also clear that the implementation of the programme was somewhat resource intensive for the community groups involved. There were costs to be met in terms of supporting the volunteerism efforts of community groups and walking leaders, in addition to the weekly financial costs of implementing the programme incurred by community groups that cannot be overlooked. Evidently the success of the Green Prescription programme within communities is likely to depend on the readiness, resources and capacity of the host community group. Notably within this evaluation a number of community leaders expressed genuine concerns about their ability to sustain the programme without some

financial assistance from the HSE thereby highlighting a current weakness within the programme. This concurs with findings from an evaluation of a similar community-walking initiative in the UK, which highlighted lack of capacity and lack of resources as a key challenge to the sustainability of the programme (Milton et al. 2011). Previous studies have suggested the provision of small grants may be important to help community coordinators establish community walks programmes (Nguyên et al. 2002). Similarly research on social prescribing schemes has highlighted the need to address the resource implications faced by the community organisations when designing schemes (Brandling and House 2007; Edmonds et al. 2003; Keenaghan et al. 2012). Likewise it is evident that the HSE also needs to address the resource implications faced by community groups involved with the Green Prescription programme. These factors should also be considered in future research assessing cost-effectiveness.

The strength of the partnerships formed between community groups and local health professionals varied by community; with some groups not feeling very well supported by health professionals having received no or few referrals onto the programme. This in many ways is not surprising as the literature suggests that establishing an effective partnership between health professionals / primary care and community organisations is a challenging process (Edmonds 2003; Middleton et al. 2012; Lester et al. 2008). Barriers to partnership formation between the sectors include differences in priorities, culture and working practices, and not having sufficient time to make and maintain new working relationships (Edmonds 2003; Middleton et al. 2012; Lester et al. 2008). However in order for the programme to be successful as a physical activity *referral* programme it is essential efforts are made to strengthen the partnership between community groups and health professionals in communities where it is weak. Evidence from social prescribing initiatives outlines joint ownership of schemes and a good relationship between community organisations and health professionals as *key requirements* for effective programmes (Edmonds 2003; Brandling and House 2007; Keenaghan et al. 2012). Improving the referral rate from health professionals is the first step to improving the relationship between health professionals and community groups; which is likely to be achieved by simplifying the referral system as discussed previously. Other means of improving the relationship between community groups and health professional partners include developing a shared understanding of goals and

expected outcomes and establishing regular contact (Keenaghan et al. 2012; Edmonds et al. 2003).

Participants' perceptions and experiences of the Green Prescription programme were generally very positive and they were keen to relay how the programme had benefited them. The evaluation identified a number of key factors that were related to high levels of participant satisfaction within the programme, and thus programme success. These factors included: consistency in relation to programme timing and delivery; clear leadership; clear evidence of safety procedures being in place; the provision of *consistent* support and encouragement; a fun and social atmosphere; friendly and personalized physical activity instruction; physical activity plans\walks that took a graduated approach and suited each participants needs and capabilities; varied walk routes; and the opportunity for participants to influence programme delivery. The majority of these factors had also been previously identified in the literature as contributors to programme success (Wormald and Ingle 2004; Elley et al. 2007; Wormald et al. 2006; Hanlon et al. 2010; Bayly and Bull 2001). Encouragingly it was evident that these factors had been successfully integrated into the majority of community programmes (throughout both the Green Steps and Community Walks).

However within a minority of communities some participants *were* slightly critical of the way the community walks had been implemented; with the main sources of dissatisfaction being repetitive walk routes, not being consulted on walk routes, and walk routes not being graded according to different abilities. In particular fitter participants reported feeling "*held back*", bored and unchallenged in instances where they had to walk at a slow pace with less fit participants. Allowing participants to influence programme delivery encourages on-going participation and creates a sense of programme ownership among participants (Hanlon et al. 2010) and thus should be encouraged within all the walking groups. Similarly the need to vary walk routes and grade them according to participant ability has previously been outlined by Ashley and Barlett (2001) as key to maintain participant attendance; and thus should be standard practice within all groups. It is seems logical to suggest that fitter walkers will be more inclined to drop-out of the Community Walks programme if efforts are not made to ensure the walks match their ability level. However to make this possible there is an

evident need for an increase in walking leader numbers and additional walking leader training within some of the communities.

Participants regularly praised the knowledge, professionalism, leadership and interpersonal skills of the GSFs and walking leaders; all of which are key factors affecting participant adherence and programme success (Wormald et al. 2006; Hanlon et al. 2010). Interestingly the majority of participants did not differentiate between the GSFs who were in a paid, professional role and the volunteer walking leaders, either in terms of the delivery of the programme or the support provided. This provides support for the feasibility of utilising lay volunteers to deliver this programme and also provides support to previous studies suggesting programmes delivered by laypersons and peers can be as effective as professionally delivered interventions (Kassavou et al. 2013; Martin Ginis et al. 2013).

For various reasons, including the lack of systematic follow-up of programme non-attenders on the part of the support worker in the early stages of the evaluation in addition to incomplete attendance roll data, it was not possible to accurately determine the rate of participant dropout from this programme. This represents a gap in the evaluation results and clearly points to the need for closer monitoring of participant attendance and adherence within the programme. From the attendance roll data that was available it was shown that on average referred and self-referred participants who entered the programme at the Green Steps stage attended 5.4 weeks out of the total 12; with just under 30% of participants attending 7 or more sessions. This is relatively consistent with attendance rates of an ERS reported by Taylor et al. (1998) where on average participants attended just under half of the physical activity sessions offered. The attendance patterns of community walkers was relatively consistent with previous research (Coleman et al. 2011), with the majority sporadically attending between 1 and 4 walks out of the total 8 Community Walk sessions. It is evident that the attendance rate for this programme could certainly be improved. Higher attendance rates have been reported in some other studies (SØrensen et al. (2008) cited in Pavey et al. 2011[a]). Efforts to improve programme attendance / adherence should focus on addressing the key *challenges to attendance* cited by participants while promoting *facilitators to attendance*. For example, means of addressing the restrictive timing of the Green Steps and Community Walks programmes should be explored to improve programme

accessibility. In addition considering study non-completers cited "health reasons" as the main barrier to programme attendance; this suggests a need to explore participants' perceptions of the pros and cons of physical activity engagement in relation to existing health conditions. Previous research suggests many people *perceive* that engaging in physical activity will exacerbate their health condition (Patel et al. 2012; Patel 2010, p. 124); and it is possible that many of the participants referred to this programme with pre-existing conditions had similar fears which led to their drop-out / low attendance. This again suggests the need for referring health professionals to take the time to allay patient fears regarding physical activity engagement prior to referral (Horne et al. 2010). If this is not possible given the time constraints faced by GPs, this is possibly a role that could be fulfilled by clinic nurses or the support worker. Interestingly it has also being acknowledged that chronic health conditions can act as both a motive and barrier to physical activity engagement (Patel 2010, p. 222). For example while the primary aim of engaging in physical activity may be to improve a health condition, the presence of that condition may actually *limit the ability to engage* in physical activity (Newsom and Kemps 2007 cited in Patel 2010, p. 223). This again highlights the need for health professionals to carefully assess the capabilities of patients prior to referral.

However, perhaps the most crucial factor affecting participant adherence, and indeed the overall effectiveness of this programme, is the level of support that is provided to participants. Consistent with the literature (Elley et al. 2007; Patel et al. 2012; Jones et al. 2005; Williams et al. 2007; Moore et al. 2011), low levels of confidence and motivation were among the most predominant challenges faced by referred participants in this programme, with many stakeholders, including the participants themselves, referring to the high support needs of participants. Encouragingly both the GSFs and walking leaders appeared competent in the provision of high levels of interpersonal support, with comments from participants clearly suggesting they had acted as "significant others" by motivating participants and encouraging adherence (Elley et al. 2007; Wormald and Ingle 2004). However the effectiveness of the support worker role varied during the early stages of the programme. Insufficient time for the support worker to fulfil duties of the role, in addition to inadequate communication with other members of the Green Prescription team, resulted in inadequate participant follow-up, which negatively impacted on participant adherence. An increase in support worker hours and the division of a

standardized protocol for participants' follow-up resulted in a more effective system. Consistent with a vast array of previous research (Patel 2010, p. 214; Elley et al. 2003; Elley et al. 2007; Kolt et al. 2006; Hilsdon and Thorogood 1996; Isaacs et al. 2007; Lombard et al. 1995; Gillis et al. 2002) participants consequently described how the regular follow-up and frequent telephone prompting from the support worker acted as a "cue to action" thereby promoting programme attendance. Thus a key-learning outcome from the evaluation is the need for the support system to have a clear structure and provide for *regular contact* with participants (both face-to-face and telephone). The support worker fulfils a vital role by acting as the link between the referring health professional and the programme, and remains the primary consistent source of support for participants throughout the 12 week programme. Other studies on Green Prescription programme and Social Prescribing initiatives have described the role of the support worker / facilitator as key to ensure participants actually initiate the physical activity programme after being referred, to promote ongoing programme attendance and to ensure programme success (Elley et al. 2007; Patel 2010, p.214; Keenaghan et al. 2012). Considering the support worker outlined time constraints as an on-going challenge within the role, it remains important to determine whether the role of the support worker can be acceptably and effectively delivered within the constraints of the two-day working week as the participant base increases.

Previous research on ERS has also emphasised the importance of ensuring the design and delivery of schemes are theoretically based to ensure they are successful (Riddoch et al. 1998 cited in BHF 2010). Although the Green Prescription programme *appeared* to be influenced by individual behaviour change theory in terms of its design and implementation; programme literature, referring health professionals and programme staff and volunteers did make any *explicit* references to the use of individual behaviour change theories. Lack of explicit references to behavioural change theory within exercise referral schemes is a common issue (Pavey et al. 2011[a]), and represents an area in need of further development within the Green Prescription programme. When it is not known which specific behaviour change theories were applied to guide the content of the intervention, it is thus difficult to determine how intervention content is related to intervention effectiveness (or non-effectiveness) (Bird et al. 2013). It needs to be explicitly clarified what behavioral change theories (if any) were used to guide the content of the Green Prescription programme. Furthermore, as has been suggested by

previous research (Riddoch et al. 1998 cited in BHF 2010), it is recommended that both referring primary care professionals, physical activity leaders and support workers should be trained in relevant *theory-led behaviour change techniques* to ensure they can competently and successfully motivate participants. Furthermore although the GSFs and walking leaders involved in this programme were comfortable with and competent in providing high levels of interpersonal support, it cannot be assumed the same would apply to all future physical activity leaders (Moore et al. 2011). Thus these results suggest the need to incorporate specific skills training relating to the provision of interpersonal support within GSF and walking leader training as previously advised by Moore et al. (2011).

The support and companionship offered by other programme participants had also played a crucial role in terms of facilitating programme uptake and adherence, consistent with previous research (Bayly and Bull 2001; Hanlon et al. 2010; Moore et al. 2011; Schmidt et al. 2008). This emphasises the importance of *continuing* to provide a physical activity environment that fosters social interaction and the formation of social bonds between participants (Thurston and Green 2004; Moore 2011). The use of "buddy systems" should be strongly encouraged within all groups as direct peer support is known to enhance participants' self-efficacy and levels of motivation (Martin Ginis et al. 2013).

Furthermore as discussed previously, it should also be ensured that only participants who are ready to change are recruited onto the programme. Considering 40% of participants were only "contemplating" change upon joining the programme, in many ways it is not surprising that low confidence and low motivation were such prevalent challenges affecting programme adherence. Individuals who are only "contemplating" change generally have low-levels of self-efficacy, are ambivalent about changing and thus are less likely commit to a physical activity plan (Zimmerman et al. 2000; Marcus et al. 1992). As suggested by the TTM participants in "pre-contemplation" and "contemplation" are likely to require stage-matched interventions, e.g. interventions that aim to raise their awareness of the importance of physical activity, to move them to a stage of "preparation" before they are suitable for referral to the Green Prescription programme (Cancer Prevention Research Center, Undated). It is possible that if efforts are made to ensure only participants who are ready for change are recruited to the

programme the issue of low patient motivation will be less prevalent; and furthermore the programme may be more successful in effecting increases in participants physical activity levels (Ogilvie et al. 2007).

The evaluation also identified a number of other areas in need of further development within the programme. For example the community walks were affected by a number of environmental and infrastructural challenges, e.g. poor weather affected participation rates, high traffic volumes and / or a lack of footpaths or broken footpaths in some communities reduced the number of potential walk routes available; while a lack of lighting in rural areas meant the walks had to cease during winter months. These are common barriers to physical activity in rural areas and have been cited in other studies (Elley et al. 2007; Hanlon et al. 2010); however it is possible that many of these challenges could be overcome by collaboration with local authorities to improve community walkability. Bayly and Bull (2001) previously reported on how a local community walking group successfully collaborated with local authorities to improve community walkability. An indoor physical activity programme should also be developed as an alternative to the outdoor walks for winter months and bad weather days to encourage ongoing participant attendance.

Walking leaders and GSFs also made a number of suggestions in relation to the development of their respective roles. For example both GSFs and walking leaders felt they should be provided with more information on referred participants (e.g. participants health status and / or emotional state), to facilitate them in their role and as a safety precaution. While ensuring participant safety is paramount, there are obvious ethical considerations in relation to providing GSFs and walking leaders with personal participant information. Ensuring participants right to privacy and confidentiality is essential (Professional and Operational Standards for Exercise Referral 2011). GSFs and walking leaders need to be made aware that they can only be provided with personal information on participants *if* the participants themselves consent to this. Walking leaders also outlined a need for an increase in walking leader numbers, additional training in relation to the walking leader role (to further improve competencies); a more structured approach to the management of walking leaders; and increased opportunities for networking with other walking leaders. Walking leaders and walking group directors in previous research related to the development and

sustainment of community-based walking clubs have expressed similar needs (Nguyên et al. 2005; Nguyên et al.2002). The importance of providing walking leaders with sufficient training, ongoing support in relation to the management of walking groups, and of establishing a walking leader's network was also previously outlined in the literature review (Nguyên et al.2002; Nguyên et al. 2005; Chau 2007). Encouragingly the Community Walks Development Officer had addressed many of these needs by evaluation end. This proactive approach to addressing stated needs is likely to promote a sense of satisfaction among walking leaders and may also foster a greater commitment to the walking leader role. There was already evidence of this as all walking leaders stated they were very happy within their role and planned to remain as a walking leader for the foreseeable future.

6.5 The Impact of the Green Prescription Programme

6.5.1 Impacts on Participants

In general the results suggested participants who completed the Green Prescription programme gained evident benefits in terms of increased physical activity levels, physical health and mental wellbeing in addition to social benefits. However there is a need to interpret the results regarding the quantitative impact of the programme cautiously for two main reasons. Firstly the pre-experimental, pre-post study design is liable to threats to internal validity and thus can only provide weak evidence of effect (Robson et al. 2001; Nutbeam and Bauman 2006, pp. 64-65). This means it cannot be interpreted with certainty that any changes that were observed from pre-programme to post-programme were actually caused by the programme itself (Nutbeam and Bauman 2006, p. 65). Secondly the small sample size of participants completing both pre and post study measurements (n=19), and the smaller sample size of participants completing pre, post and longer-term follow-up (n=11), precludes drawing strong or broad conclusions about the short or long-term effectiveness of the programme (Hackshaw 2008).

6.5.1.1. Short-term Impacts

Physical Activity Levels

There was a general consensus among participants, health professionals, community leaders, walking leaders, GSFs and the support workers that the programme had helped to break down barriers associated with physical activity participation and increased the

physical activity levels of participants. Participants' also self-reported increased motivation to engage in physical activity; improved self-efficacy regarding ability to engage in physical activity; and also referred to a change in their attitudes towards physical activity whereby being physical active was now seen as more of an everyday priority, as a result of programme participation. These qualitative findings were, to some degree, confirmed and reflected in the quantitative data, as the median daily sitting time of this cohort of participants reduced significantly by 60 minutes per day by programme end. In addition the majority of participants also showed a progression through the SoC at short-term follow-up, which corroborated with participants' self-reports of improved self-efficacy and motivation to engage in physical activity during the focus groups and interviews.

However there was no statistically significant change in the median number of total minutes participants spent engaged in physical activity per week by programme end and similarly there was no statistically significant change in the median MET minute physical activity score for the group of participants per week by programme end (although increases in both median scores were observed neither were statistically significant). The lack of statistical significance means that it is possible any increases in the median physical activity scores may have occurred by chance, rather than as a result of programme participation (Institute for Work and Health, 2005). This is a surprising finding considering the abundance of aforementioned *qualitative* data suggesting participants had increased their physical activity levels *as a result* of programme participation. Due to this apparent conflict within the qualitative and quantitative results it is important to consider the small sample size upon which the quantitative results are based, as it is possible the sample size was simply too small to detect a significant difference in the median scores (which has been reported as a common issue within studies) (Sexton et al. 2008). Thus it is possible results may have reached statistical significance (and thus corroborated with qualitative findings) if the sample size was larger (Brown et al. 2013; Sexton et al. 2008)); however this can only be confirmed through further research involving a larger sample size of participants.

It is also possible that determination of the impact of this programme on physical activity levels was limited as a result of the apparent over-reporting of physical activity levels through the IPAQ-SF at baseline, as previously discussed. Over-reporting was

less likely to have occurred at follow-up, as the researcher had more time to explain the instrument in greater detail to participants in a one-to-one situation. Thus potentially over reporting of physical activity levels at baseline combined with a truer estimation of physical activity levels at follow-up, resulted in a smaller change in physical activity levels than may have been observed otherwise. Previous research has reported increases in participant physical activity levels and reductions in daily sitting time following completion of green exercise referral programmes, EOPs and Green Prescription programmes (Hanson et al. 2013; Wilson 2009; Yerrell 2008; Kallings 2008; SØrensen et al. 2010; Leijon et al. 2008; Swinburn et al. 1998). The ability of ERS and EOPs to move participants through the SoC has also previously been reported by Lamb et al. (2002), Williams et al. (2007) and Kallings (2008). It is important to remember even small increases in physical activity can produce considerable health benefits (Wen et al. 2011).

As a point of note the non-statistically increase in the median weekly physical activity score to more than 500 MET minutes per week at programme end, suggests the programme *may* have been successful in helping some programme completers meet the physical activity guideline (The Physical Activity guidelines for Americans (2008) recommend adults to engage in a minimum of 500 Met minutes per week). However this can only be confirmed through future experimental research.

The significant reduction in daily sitting time observed in this evaluation (a median decrease of 60 minutes per day from pre- to post-programme) may be a particularly important finding. This is because accumulating evidence suggests that reducing daily sitting time may be as important as increasing levels of moderate and vigorous exercise in terms of reducing chronic disease (Laskowski 2012[a]; Healy et al. 2008; Owen et al. 2009). Sitting time is now known to be a risk factor for the development of chronic disease and metabolic risk factors, and for premature mortality (Laskowski 2012[a]; Hamilton et al. 2007; Katzmarzyk 2010). There is also convincing evidence to suggest that the more time people spend sitting per day, the more likely they are to develop metabolic risk factors *irrespective* of whether or not they are achieving the recommended amount of physical activity (Laskowski 2012[a]; Healy et al. 2008; Owen et al. 2009; Laskowski 2012[a]; Hamilton et al. 2007; Katzmarzyk 2010). Additionally evidence suggests individuals who do not meet the recommended physical activity

guidelines *and* spent large proportions of their day sitting are at *greater risk of disease*, in comparison to individuals who do not meet the physical activity guidelines *but* do spend large proportions of their day engaged in *non-exercise activities* (such as housework, standing, cooking) rather than sitting (Hamilton et al. 2007; Katzmarzyk 2010). Thus logic follows that any programme that has the ability to decrease sitting time (by for example increasing the amount of time participants spend engaged in non-exercise activities per day e.g. standing, walking, doing housework), has the *potential* to result in important health benefits for its participants (irrespective of the programmes ability to help participants meet recommended physical activity levels).

However there are a number of reasons to interpret the findings of this evaluation in relation to the significant median reduction in participants daily sitting time cautiously. Firstly the evidence base supporting the *independent* effect of sedentary behaviour on health, while convincing, is immature (Hamilton et al. 2007; Katzmarzyk 2010). Further research from rigorous, experimental intervention trials is needed to strengthen the current evidence base (Hamilton et al. 2007; Katzmarzyk 2010). Secondly the dose-response relationships between sitting time and health outcomes are presently unknown (Katzmarzyk 2010), thus it is not possible to gauge the clinical importance of the 60 minute reduction in median daily sitting time observed in this evaluation. Thirdly it must be acknowledged that the pre-post evaluation design utilised for this evaluation means that it cannot be determined with confidence that it was participation in the Green Prescription programme that actually caused the observed reductions in daily sitting time. This means that the observed reduction in median daily sitting time may have been caused by other factors unrelated to the Green Prescription Programme, e.g. seasonal changes in lighting from pre-programme to post-programme may have meant people were spending more time outside in the garden rather than sitting indoors.

On a similar note it was beyond the scope of this evaluation to distinguish what *specific aspects* of the programme (if any) may have been responsible for the observed decreases in daily sitting time, self-reports of increased physical activity levels and self-reported improvements in exercise self-efficacy. However it is possible that these improvements were the result of a combination of factors such as the support workers use of goal setting strategies and provision of *ongoing support* that was *tailored* to match participants stage of change; the *tailored instruction of physical activity* provided

by GSFs and walking leaders (Elley et al. 2007). Literature would also suggest that the various other forms of companionship, support and encouragement offered to participants throughout this programme also influenced increased physical activity levels and self-efficacy (Partnership for Prevention 2008).

Cardiovascular & Anthropometric Measurements & Perceived General Health

A significant reduction in the mean systolic blood pressure score of 8.5 mmHg; in addition to a small, non-significant reduction in the mean diastolic blood pressure score of 1.3 mmHg, was observed at short-term follow-up. Qualitative evidence confirmed these results as participants also self-reported blood pressure reductions. This is consistent with previous findings reported by Lee et al. (2009) regarding a "before and after" cohort study on a 10 week ERS in the UK, whereby systolic blood pressure reduced by an average of 4 - 7mmHg and diastolic blood pressure reduced by an average of 2- 4mmHg. Previous studies on Green Prescription programmes in New Zealand have also reported reductions in blood pressure (Elley et al. 2003). The health benefits of lowering blood pressure are well accepted (Lawes et al. 2004; Cook et al. 1995). Even small reductions in SBP are beneficial, however larger reductions do appear to have greater benefits, for example there is evidence to indicate "a 10 mmHG reduction in systolic blood pressure is associated with a reduction in the risk of stroke by approximately one third" (Lawes et al. 2004). Similarly small reductions in diastolic blood pressure, achieved on a population wide scale, could result in substantial decreases in the prevalence of hypertension, coronary heart disease and stroke (Cook et al. 1995).

The researcher does acknowledge, however, that due to the pre-post study design of this evaluation it is not possible to directly attribute reductions in the mean blood pressure score to participation in the Green Prescription Programme. Other potential explanations for the reductions in the mean blood pressure score include natural variation in participants' blood pressure (British Hypertension Society 2010). In addition many of the participants were elderly, which could be of consequence as many elderly individual have arrhythmias and stiff (poorly compliant) arteries, which can contribute to the *variability* of blood pressure measurement (Frese et al. 2011). Other factors such as medications, anxiety, time of day, background noise, room temperature, and stimuli such as food, alcohol, caffeine and nicotine can also cause variability in blood pressure readings (Frese et al. 2011). It was not possible for the researcher to

control these factors within the evaluation design, thus making them a potential cause of blood pressure score variability. It is also possible that a lower blood pressure reading was recorded for participants at post programme as a result of participants being more comfortable with having their blood pressure measured by the researcher within the context of the evaluation setting. As participants had previously met the researcher at the stage programme follow-up and knew what to expect (with regards programme measurements etc), it is possible they were less anxious which may have acted to reduce their blood pressure reading.

No change was observed in average RHR of participants in this study, although this has been reported from previous studies (Williams et al. 2007). A decrease in RHR would have denoted improved heart function and improved cardiovascular fitness (Laskowski 2012[b]), and thus would have been a desirable outcome of programme participation. While RHR is easily measurable, it is subject to high variability and is affected by many factors including the method of measurement, the environmental conditions at the time of measurement, the resting period before measurement and the number of measurements taken (Palatini 2009). Thus although a standardized protocol was followed each time RHR was measured, it is possible that uncontrollable factors (e.g. participant nervousness) may have affected RHR measurements in this study, obscuring possible impacts. Admittedly however this is unlikely considering RHR measurement did not change from pre to post. Similarly no significant quantitative changes in mean scores were found across the range of anthropometric measurements taken (BMI, waist circumference, body weight) at 12-week follow-up. However some participants did *self-report* reductions in weight as a result of programme participation during interviews and focus groups. Previous reviews of and studies on ERS and Green Prescription programmes have found quantitative evidence of significant reductions in waist circumference, central obesity, weight and BMI of participants at follow-up (Taylor et al. 1998; Williams et al. 2007; Lee et al. 2009; Kallings et al. 2008). Again it is possible the small sample size of participants completing both pre and post programme measurements was the reason for the lack of quantitative change observed in this evaluation (Brown et al. 2013; Sexton et al. 2008); the aforementioned studies all had considerably greater sample sizes. However another plausible reason for the lack of quantitative changes observed in this study is that the Green Prescription programme did not directly attempt to change participants dietary habits; it is well accepted that

increasing physical activity levels alone has a very small effect on reducing body weight without dietary change (Fox and Hillsdon 2007; Wareham et al. 2005; Laskowski 2012[a]; King 1994).

> It is important that the effects of exercise alone on the rate of weight loss not be oversold, since for many individuals weight loss through exercise training without appropriate dietary change will be far slower than that occurring when the two strategies are combined (King 1994, p. 1408)

It has been suggested that individuals would need to engage in as much as 60 minutes of moderate intensity physical activity per day to significantly reduce body weight and abdominal obesity (waist circumference) in absence of calorific restriction (Ross and Janssen 2007, p. 188). This is substantially more physical activity than the participants of this evaluation study were engaging in by programme end (on average participants reported engaging in a total of 150 minutes of physical activity per week). Since weight loss is likely to be a goal for many participants joining the Green Prescription programme (and also considering it was the most common reason for referral of participants); it would appear to be pertinent to ensure the programme encourages and supports participants to make dietary changes as well as increasing their physical activity levels. This view was supported by the qualitative results of this study as a number of programme participants and the programme support worker believed the programme could be improved by incorporating the support of a dietician to guide and support participants who aim to improve their eating habits.

Qualitative data collection also provided evidence of an improvement in the perceived general health of participants. Referred and self-referred participants and community walkers all cited improvements in asthmatic conditions, better control of diabetes (blood sugar control), improved sleep patterns, improved circulation and reduced reliance on medications, as well as generally "feeling better" in themselves. Improvements in general health and physical functioning have also being reported from previous studies and reviews on ERS and green exercise referral programmes (Lee et al. 2009; Williams et al. 2007; Wilson 2009; Yerrell 2008; Peacock et al. 2007). Some studies were able to quantify improvements in general health through the use of general health questionnaires, such as the SF-12v2TM and the SF-36 (e.g. Wilson 2009 and in some studies reported by Williams et al. 2007). The use of quantifiable measures of general health could be considered for future studies to further compliment and strengthen these qualitative findings.

Significant improvements in participants' mental wellbeing scores were observed at short-term follow-up for both the WEMWBS and WHO (Five) Wellbeing Index. The mean WEMWBS score increased by 3.1 points which *may,* according to WEMWBS practice-based user guide, demonstrate a "meaningful" improvement in participants' mental wellbeing over the course of the programme (Putz et al. 2012). However it is important to note that "*it is impossible to be precise about how much change in WEMWBS is considered 'meaningful', best estimates range from 3 to 8 WEMWBS points difference between 'before' and 'after' time points .... [however as these are only estimates] changes in .... score[s] should be interpreted with caution*" (Putz et al. 2012). Nonetheless interviews and focus groups with participants and health professionals provided further confirmation of the psychological benefits of the programme; with participants reporting an improvement in feelings of wellbeing, reduction in depressive symptoms, increased feelings of self-esteem and improved self-confidence.

These results are consistent with a vast amount of other studies that have also reported quantitative and qualitative evidence of improvements in mental health, wellbeing and quality of life following ERS, green exercise referral, EOP and Green Prescription programme participation (Wilson 2009; Yerrell 2008; Williams et al. 2007; Lee et al. 2009; Murphy et al. 2012; Issacs et al. 2007; Pavey et al. 2011[b]; Kallings 2008; Elley et al. 2003; Kerse et al. 2005; SØrensen et al. 2010; Wormald and Ingle 2004; Wormald et al. 2006; Peacock et al. 2007). Improvements in mental wellbeing were often attributed to the fact that walks took place in the outdoor environment and provided the opportunities for social interaction, again corroborating previous findings by Peacock et al. (2007). Participants in this study appeared to find being outdoors and viewing pleasant scenery restorative, epitomised in remarks such as "*it's very good to clear the mind*". Previous research has produced evidence to support the restorative and stress-relieving effects of physical activity in the natural environment (Hansmann et al. 2007; Hartig et al. 1991); suggesting the possible advantage that group-based, green exercise programmes have over indoor-based physical activity interventions. Based on these results, and supported by previous literature, it would seem fair to suggest that the Green Prescription programme could have a significant role to play in the treatment of certain mental health conditions such as depression. With regards to this, it is of note

that very few GP/nurses in this evaluation reported referring participants for mental health reasons, thus perhaps suggesting a need to increase awareness among health professionals of the potential benefits of referral for this cohort of patients.

Closely linked with mental health benefits, participation in the Green Prescription programme was also associated with many social benefits, such as increased opportunities for social engagement, formation of new friendships and facilitating a sense of belonging among participants. The programme appeared to promote a sense of social inclusion among participants as references were made to how they met like-minded individuals with similar health problems. These findings are congruent with literature regarding the social benefits of green exercise referral programmes and community based walking programmes (Wilson 2009; Peacock et al. 2007; Bayly and Bull 2001; Sinnett et al. 2011; Ashley and Barlett 2001). The importance of the social aspects of the programme should not be underestimated, as from the perspective of the participants the social benefits appeared to be as important if not more important than the physical benefits.

Presumably the benefits gained and perceived by the participants who took part in this evaluation (all programme completers) were key factors that motivated their adherence to the programme (Elley et al. 2007; Hanlon et al. 2010). It is possible however that the other participants, including programme non-completers, who did not complete follow-up measurements or take part in interviews and focus groups, may have gained and/or perceived *fewer* benefits of programme participation. If participants did not perceive or gain benefits from programme participation they may have been more inclined to drop-out. It is also possible that the programme may have affected the mental or social health of programme drop-outs *negatively*. For example, some participants may have found exercising in a group context anxiety provoking which may have led to their drop-out from the programme. These possibilities suggest the need for further research on the perceptions of programme non-completers towards the programme and on the impact of the programme on programme non-completers.

6.5.1.2 Longer-term impacts

Longer-term impacts are based on the results from the 11 participants who completed measurements across the three time points (pre-programme, post-programme and 3

months post programme completion). Qualitative data obtained at longer-term follow-up revealed that in some areas the community walks programme had stopped temporarily, while in other areas the walks programme was ongoing.

For this cohort of participants, a non-statistically significant increase was observed in the median MET minute physical activity score from pre-programme through to longer-term follow-up; and similarly an non-statistically significant increase was also observed in median total number of minutes per week participants spent engaged in physical activity from pre-programme to longer-term follow-up. It is possible the lack of statistical significance is a consequence of the fact that some participants had actually reduced their physical activity levels at the same time others had increased theirs, which combined with the small sample size would have resulted in a lack of statistical power for detecting any meaningful change. It is acknowledged that "*a small sample size may result in a lack of statistical power for detecting meaningful effects*" (Brown et al. 2013, p. 2). Similar to the pattern observed at short-term follow-up, longer-term follow-up provided further evidence re the ability of the Green Prescription programme to effectively reduce the amount of time participants spend sitting per day. The median daily sitting time for this cohort of participants significantly decreased by 60 minutes from pre-programme to post programme, and this decrease was sustained at long-term follow-up. These results are consistent with a number of other studies reporting increases in physical activity levels and significant reductions in daily sitting time scores among participants of EOP programmes at long-term follow-up (Kallings 2008; Lawton et al. 2008; Elley et al. 2003). Longer-term increases in physical activity levels and reductions in daily sitting time scores concurred with a self-reported change in mind-set among some participants towards the importance of a physically active lifestyle following programme participation.

However consistent with the fact that some participants admitted they had reduced their physical activity levels since programme completion, there was evidence of some regression within the stages of change at longer-term follow-up. Relapsing back to an earlier stage of change is not unusual, as it often takes individuals numerous attempts before successfully adopting and maintaining a physically active lifestyle (ACSM 2006; p. 546). However interestingly it was the participants from areas where the community walks programmes had stopped who tended to report that they had reduced their

physical activity levels since programme completion. Conversely the researcher observed the participants who resided in areas where the walks were ongoing tended to report they were regularly physically active. These findings appear to suggest that the continuation of the walks programme is necessary for participants to remain physically active. It is likely that participants were less motivated to go walking in absence of the walking group, especially considering that participants had previously emphasized that the company offered by other walking group members as a key factor motivating physical activity adherence. Thurston and Green (2004) have also previously stressed the importance of ensuring continuity within ERS to allow participants sufficient time to form a physical activity habit. Encouragingly, however, all individuals who reported reduced physical activity levels since programme completion also stated that the programme had *increased their awareness of the importance of physical activity* and, as a result, they were *thinking about* being active a lot more now. Thus it is possible that participation in the Green Prescription programme will be a catalyst for future attempts to increase physical activity levels for these participants.

Other results observed at longer-term follow-up included a trend towards sustained improvements in mean mental wellbeing scores, corroborating previous findings by Isaacs et al. (2007) and Lawton et al. (2008). An interesting trend was also observed with regards mean BP scores; with the largest decreases observed immediately post programme completion, with mean scores increasing again from post-programme to longer-term follow-up. This in many ways is not surprising considering a number of participants had reduced their physical activity levels following programme completion as discussed above. However despite this mean BP scores remained lower at longer-term follow-up than at baseline, with the mean systolic BP score demonstrating a trend towards statistical significance. This is consistent with the results of Elley et al. (2003) where a non-statistically significant trend towards a reduction in the mean blood pressure score of Green Prescription participants was also observed at long-term follow-up. Again it is possible that with a larger sample size statistically significant results may have been observed with regards long-term changes in mental wellbeing and BP scores (Brown et al. 2013; Elley et al. 2003). Similar to what was observed at short-term follow-up, there was a lack of evidence to suggest that this programme effected long-term changes in participants RHR, BMI, waist circumference or weight.

Based on these results it is not possible to draw any strong conclusions regarding the long-term effectiveness of the Green Prescription programme. An outcome evaluation with a more rigorous design (ideally an experimental design), with a larger sample size and longer period of follow-up is necessary to determine the merit of the statistically significant reductions in daily sitting time scores and the apparent trend of reduced BP scores and improved mental wellbeing.

6.5.2 Impact on Health Professional Practice

There was a high degree of support for the programme among the health professionals interviewed and most were very keen to remain involved, concurring with previous reports of positive health professional feedback towards green prescribing outlined by Patel et al. (2011) and Gribben et al. (2000). Like the GPs in the study by Patel et al. (2011) the GPs involved in this evaluation believed patients needed support to initiate and maintain a new physical activity regime, and they felt this programme provided this support. Although the National GP Exercise Referral Scheme had been established within Ireland prior to the introduction of the pilot Green Prescription programme, this national scheme mostly relies on the availability of leisure centres and requires participants to pay a fee (GP exercise referral programme, Undated). Many of the communities involved in this study were not within close proximity to leisure centres, and GPs referred to this, in addition to the costs of attending leisure-centre based schemes as prominent barriers to patient referral. Health professionals believed the Green Prescription programme helped to fill this gap in service provision by providing a structured and affordable physical activity referral option for patients that was accessible even in rural areas.

As GP training is largely based in pharmacology, it has been suggested the non-medical approach of exercise prescribing is likely to be a prominent reason why this method commonly encounters scepticism and resistance from health professionals (Persson et al. 2013). However the health professionals *who took part in* this programme clearly valued that the Green Prescription provided a non-medical means of treating many health conditions, concurring with previous findings by Patel et al. (2011). In the long-term it was believed the programme has the potential to reduce the number of repeat presentations from patients with "lifestyle" related illnesses. There is evidence to support this belief from research on social prescribing initiatives, wherein

more efficient use of statutory services, as well as changes in prescription and attendance behaviours have been reported as outcomes of programme participation (Keenaghan et al. 2012). In a time when primary care clinics are stretched to capacity (IMO 2013) this can only be welcomed.

However it was evident that the health professionals were still only getting accustomed to being involved with the programme. Promotion of, and referral to, the programme was not yet embedded as part of their everyday working practice, although steps were being taken to integrate the programme into routine care. The prospect of GPs assuming full ownership of the participant referral process appeared unlikely; most health professionals appeared to view the programme as an initiative they were taking part in and thus were relying on the health promotion department for on-going leadership.

It is acknowledged this evaluation may provide a slightly biased view of health professional perceptions towards the Green Prescription, considering all health professionals interviewed had previously referred patients onto the programme and were generally supportive of the aims and ethos of the Green Prescription programme. Clearly not all health professionals viewed the programme so positively considering the difficulties encountered in obtaining GP buy-in. Although attempts were made to interview GPs who refused to engage with the programme, these attempts proved unsuccessful. Future research is clearly needed to understand how health professionals who resist involvement perceive the Green Prescription programme.

6.5.3 Community Groups

Community groups stated a wide range of benefits of programme participation. For example the community leaders, walking leaders and participants alike spoke about how the programme successfully mobilized the participation of local community members including those community members that were identified as "hard to reach" (thereby promoting social inclusion); fostered the development of social ties among community members; facilitated social cohesion; *and* helped those involved gain a "sense of belonging" and a sense of community. It was also evident that the programme promoted individual and community empowerment, which is likely to be a key benefit of the community development approach used to establish the programme (Draper et al. 2009). Considering that Fulbright-Anderson and Auspos (2006) reasoned that

participation in local activities, the development of social ties among community members, a sense of community, social cohesion and empowered individuals and community organisations are all precursors and products of social capital; it can therefore also be assumed that this programme enhanced social capital within communities. These findings also echo those from previous studies on green exercise referral programmes, community-based walking programmes and social prescription programmes (Peacock et al. 2007; Bayly and Bull 2001; Sinnett et al. 2011; Chau 2007; Nguyên et al. 2005; Keenaghan et al. 2012; South et al. 2008). In addition the programme also strengthened the connection between community groups and the local health professionals involved. In fact in many of the communities this was the first time the community groups and local health professionals had ever worked together. Strengthening the working relationship between primary care and local community is outlined as a key objectives in numerous governmental health policies (refer to Table 3-2, p. 98), thus it is encouraging that the Green Prescription programme appears to offer one potential means of meeting this objective.

The Green Prescription Programme also resulted in a number of "spill over" benefits within the participating communities. For example the newly formed alliances between local community groups and health professionals led to collaboration on other community-based health initiatives. Participation in the programme also left community groups with resources – such as knowledge/expertise and trained walking leaders - that were redirected into other community initiatives. Thus it was evident that although involvement in the programme was somewhat resource intensive for the community groups, community capacity was ultimately strengthened as a result of taking part. These findings add support to previous assertions by Nguyên et al. (2002, p. 494) that partnerships formed within community settings *"allow for the betterment of human and material resources already in the environment"*.

There were clear indications that the programme had become integrated within some of the communities. The majority of community groups were actively engaged in activities aimed towards programme sustainability and had taken steps towards programme ownership. However, like the health professional partners, community groups were also relying on the health promotion department to provide them with direction, as they viewed them as the central leader and decision maker.

6.6 Looking to the Future – Programme Rollout

The key stakeholders and experts involved in the consultation stage were very positive about the programme and considered it timely and relevant in relation to national priorities and governmental policies to increase physical activity levels. As supported by the literature, the use of a partnership and community development approach and the use of a steering group committee were considered key facilitators to the successful implementation of the programme (Butterfoss et al. 1993; Bayly and Bull 2001; Middleton et al. 2013 NSW Premier's Council for Active Living 2008; Draper et al. 2009; Cheadle et al. 2010; Keenaghan et al. 2012). Key stakeholders were particularly enthusiastic regarding the partnership approach of the Green Prescription model, believing partnership working to be a valid and appropriate means of funding and supporting the programme.

However key stakeholders also predicted a number of potential challenges to the roll-out of the programme. For example, it was anticipated that some communities would not have sufficient infrastructure or capacity to implement the programme. This highlights the need for programme coordinators to conduct comprehensive community mapping before attempting to introduce the programme into a new area. In instances where this mapping process finds communities are lacking in the capacity to implement the programme, programme coordinators should work in partnership with LSPs and the communities themselves to help build community capacity prior to attempting to establish the programme within these communities. In addition key stakeholders also expected that within some communities health professionals would be reluctant to engage with the programme. The suggested solution to this problem was to enlist eager health professionals to act as programme "champions" and encourage programme uptake among their peers; this is a strategy that is well supported within the literature (FHI 2010) and should be encouraged. The enlistment of individuals who are already considered influential among their peers to act as champions is likely to produce the most successful results (FHI 2010). In addition, reiterating the views of community groups and health professionals', key stakeholders also acknowledged that resource constraints posed by the political and economic climate in which the key partner organizations are operating in, are likely to act as challenges to programme buy-in. It has previously been acknowledged that organisations concerns over funding and long-term sustainability can influence decisions to engage with schemes and health-based

coalitions (Constantine (2007) cited in Brandling and House 2007; Butterfoos 1993). Thus it is clear that concentrated efforts to secure funding for the programme are needed to encourage the buy-in of key partners and facilitate them in in the implementation of the programme.

The key stakeholders also anticipated some challenges in relation to the recruitment, training and retainment of sufficient numbers of physical activity personnel (GSFs and walking leaders) in terms of national rollout. Lessons could be learned from previous research on recruiting and retaining volunteer health walk leaders within a UK-based programme, which recommended the use of targeted recruitment strategies to recruit walking leaders; and also recommended that time be taken to vet interested individuals to ensure they are suitable and have a thorough understanding of the responsibilities of being a walking leader before they undergo training to ensure commitment (Howlett and Lukka 2000, P. 45-48). The importance of careful and realistic management of walking leader volunteers was also inferred by Howlett and Lukka (2000; p 42), as volunteers are likely to cease their role if they feel overburdened with responsibility, feel they had received insufficient training, or if they don't feel supported or appreciated.

Perceived opportunities to enhance the programme included linking the programme into nationally driven initiatives, broadening the referral routes and broadening the range of physical activities available for participants. Broadening the referral routes would obviously help increase the reach of the programme and also help overcome the barrier of low referral rates due to insufficient GP referrals. Thurston and Green (2004) have previously advocated the need for EOP schemes to provide a broad range of physical activity options for participants to promote adherence. This could be achieved by partnering with pre-existing physical activity programmes, e.g. community gardening programmes, within communities; and could also be achieved by linking the programme into the National Exercise Referral Scheme.

The current partnership structure of the Health Promotion Department, the community sector and primary care teams, with LSPs and other governmental sectors acting in a supportive capacity, was deemed satisfactory and appropriate for replication in national rollout. Echoing the earlier findings from health professionals and community groups, key stakeholders emphasized the vital importance of having strong central leadership (preferably from the Health Promotion Department) for the successful

rollout, implementation and sustainment of the programme. The importance of clear leadership within programmes has previously been advocated within the literature (Butterfloss et al. 1993; Middleton et al. 2013). The continued use of a community development approach, in addition to ensuring a level of physical activity expertise within the programme was also outlined as key. It is evident the rollout of the programme will require careful planning to recruit suitable personnel, with the required skills and expertise.

6.7 Conclusion

This chapter discussed the key results of the evaluation and related these results to previous research in the field. It relayed how the Green Prescription programme was successfully delivered consistent with its guiding vision. Following this it discussed how the evaluation results suggested the programme was generally feasible to implement and acceptable to those involved. However there were evidently key areas in need of further development within the programme and these were outlined, along with recommendations for improvement. Determination of the impact of the programme on participants was limited by the small number of participants completing pre and post programme measurements. However for those that did complete measurements a range of positive impacts were observed, many of which were consistent with previous research in the field. The key impacts of the programme on the health professionals and community groups involved were also discussed. Finally this chapter discussed the views of key stakeholders and experts in relation to the rollout of the programme, and made recommendations regarding how perceived challenges may be overcome. The next chapter will present the key conclusions from this evaluation study and outline recommendations for the development of the Green Prescription Programme.

Chapter Seven: Conclusion & Recommendations

7.1 Introduction

This chapter will provide a brief recap of the aim and research questions of this study; the findings of the literature review, the methodology used to conduct this study, and the key results of this study in relation to the research questions, and will make recommendations for the future development of the Green Prescription programme. In addition this chapter will outline the strengths and limitations of this study, and finally it will recommend areas for future research.

To recap the overarching aim of this study was to conduct an evaluation of the pilot Green Prescription programme in Co. Donegal. The research questions this evaluation study aimed to answer were as follows:

- Is the Green Prescription and Community Walks Programme feasible and acceptable to implement?
- What is the impact of the programme on the participants?
- What is the impact of the programme on the referring health professionals and community groups involved?
- What are the recommendations for the future development of the Green Prescription programme?

7.2 Conclusions

The Green Prescription Programme is a community-based walking on referral programme delivered in partnership between primary care, local community groups and the HSE. As the programme was in a state of continual development whilst being in the early stages of implementation (it's first 1-2 years) during the timeframe of the evaluation, an evaluation framework that consisted primarily of formative and process approaches, in addition to a number of short-term summative approaches was utilised to achieve this aim. The evaluation had four distinct stages. The first and second stages included analysing the current need for physical activity interventions within Ireland; conducting a synthesis of the evidence related to physical activity interventions initiated / implemented within primary care (including brief interventions, ERS and EOPs); in addition to considering how the Green Prescription programme aligns with current governmental priorities. The findings from these first two stages showed that there was

a definite need for effective physical activity interventions within Ireland. Previous research confirmed that a high proportion of the Irish population were insufficiently active, with sedentariness most prevalent among older age groups, females and those within lower socio-economic groups. Overweight and obesity was also found to be a steadily growing and costly problem within an Irish context. The research also suggested a significant proportion of chronic, non-communicable disease within Ireland could be attributed to physical inactivity. Conducting the literature review of the effectiveness of physical activity interventions implemented / initiated within primary care proved arduous. Differences in intervention structure, duration, intensity and study design, as well as the use of heterogeneous outcomes as measures of intervention success across studies, made direct comparison of intervention effectiveness challenging. The results from this extensive literature review produced conflicting evidence regarding the effectiveness of primary care initiated physical activity interventions. However a synthesis of the key findings from the literature review did generate some promising findings in support of the model of exercise on prescription proposed by the pilot Green Prescription programme, including its interdisciplinary approach and comprehensive structure. A review of recent and current governmental policies and strategies (reported in Chapter 3) also suggested the aims and objectives of the Green Prescription programme were a good fit with governmental priorities. However the literature review also identified gaps in the evidence base regarding the potential feasibility and acceptability of implementing the proposed programme.

The research questions outlined at the start of this study were achieved during the third and fourth stages of this evaluation, using both qualitative and quantitative methods of inquiry. The key results of this evaluation suggested the Green Prescription programme was delivered broadly as planned and was generally feasible to implement and acceptable to those involved. However the evaluation also identified a number of areas within the programme that were in need of further development to enhance programme reach, ease of implementation, effectiveness and future sustainability.

The programme was generally well received by all stakeholders who *took part* in the evaluation. Local community groups, community volunteers and health professionals were all successfully recruited as programme partners. Some challenges were encountered with regards health professional recruitment however, implying the need

for strategies that build health professional confidence in the feasibility, utility and benefits of the Green Prescription programme. All health professionals interviewed had successfully referred participants to the programme; although they had encountered challenges to referral which resulted in low referral numbers. Encouragingly however all health professionals interviewed believed these challenges could be overcome given a simplified referral system and increased support from the HSE.

Community group partners were very enthusiastic with regards their involvement with the programme, felt well-placed within their role and had encountered few challenges in setting up the programme. However there was a need to strengthen the partnership between community groups and health professionals in some areas; and additionally the evaluation identified the need for HSE to address the resource implications faced by community groups in order to make the programme sustainable in the long-term. In relation to the physical activity leaders, both the professional and volunteer physical activity leaders expressed a high degree of satisfaction within their respective roles and findings suggest they were highly competent in programme delivery. While needs had been identified in relation to the walking leader role the development officer had responded reflexively to address these needs and was successful in ensuring volunteers felt valued and appreciated.

It is important to note that several key factors appeared integral to the successful establishment and implementation of the programme within communities and health professional practices. These factors included partnership working, the utilization of existing community assets and structures, the use of a community-development approach, the employment of physical activity expertise, discernable central leadership and support from the HSE, and consistent communication between partners. The importance of each of these factors should be considered in the future development and roll-out of the programme. Additionally, in relation to partnerships, it is important to note that the evaluation findings suggest there is a need for clarity with regards to what organisational body holds the primary responsibility for the sustainability of the Green Prescription Programme. At present the findings suggest there is a degree of ambiguity among all three partners (the Health Promotion Department within the HSE, Donegal; the community groups; and the health professionals) with regards which partner is responsible for programme development and sustainability. The consultation with key

stakeholders and experts *suggests* that the Health Promotion Department within the HSE is best placed to assume the primary responsibility for managing the development and sustainability pathway, with support provided by the other partners.

In relation to participants, the programme was successful in recruiting participants through both health professional referral and self-referral routes. Encouragingly the programme was also successful in recruiting its target group, namely individuals with lifestyle diseases or at risk of lifestyle diseases and groups whom research suggests are more likely to be sedentary. However there was a perception within all communities that the rate of participant recruitment needed to be increased, particularly in relation to the number of participants recruited through health professional referral. Quantitative results confirmed that the programme had been nearly 4 times more successful in recruiting participants through self-referral routes (for which passive recruitment methods were mainly used) in comparison to the active recruitment approach of health professional referral. This raises questions over the viability of the health professional referral route. However it is possible that the recruitment rate of health professional referred participants could be improved by addressing the barriers to referral that were reported by health professionals. Potential methods of increasing the participant recruitment rate through *both* health professional referral and self-referral routes have been suggested within this thesis. However ongoing monitoring and comparison of the effectiveness of the different recruitment approaches (active versus passive approaches) is advised.

In general participants who took part in the evaluation expressed a high level of satisfaction with the programme and its many components. However the evaluation did identify several aspects of programme delivery affecting programme uptake, and participants' satisfaction with and adherence to the programme. A particularly important aspect of programme delivery that affected participants' satisfaction with and adherence to the programme was the level of support provided to participants. In the early stages of the evaluation the level of support provided by the support worker to participants varied, which appeared to contribute to the drop-out of some participants. Thus a key learning outcome from this evaluation is the need for the programme to provide a competent and consistent support system throughout all stages of the participant journey, from initial referral to programme end. These are findings which can be used to

further enhance programme delivery and guide programme roll-out. Although this evaluation was unable to accurately ascertain the participant attrition and completion rate within this programme; the results do suggest the programme attendance rate could be improved. This is likely to be achieved by maximizing the facilitators and minimizing the challenges to attendance that were identified during the evaluation.

Determination of the effect of the programme on participants was limited by the pre-experimental, pre-post study design and the small number of individuals completing pre and post programme measurements. However the combined qualitative and quantitative results of the evaluation do suggest the programme has the potential to increase the physical activity levels, reduce the daily sitting time, reduce the blood pressure scores and improve the physical and mental wellbeing of those who take part, at least in the short-term. Participants also self-reported improved self-efficacy and motivation to engage in physical activity, improved general health and a vast array of social benefits as a result of programme participation. Community groups and health professionals also gained numerous benefits from programme participation, which was further epitomised in their eagerness to remain actively involved in the programme.

Notably the results from the evaluation suggest the programme successfully produced positive outcomes conducive to health and physical activity promotion at multiple socio-ecological levels; producing outcomes at an individual level, interpersonal level, organisational level, community level and at an environmental level. Overall the results related to the impact of the Green Prescription programme suggest it was successful in achieving its initial vision. These findings also suggest the importance of taking a holistic view when assessing the outcomes and value of programmes like the Green Prescription, rather than just focusing on traditional individual-level variables as measures of success.

Importantly however this evaluation also clarified that there are some key areas of the Green Prescription Programme that are in need of further development. Based on the results of this evaluation the following recommendations are suggested to guide the future development of the Green Prescription programme.

1. Adequate time and resources need to be dedicated to participant recruitment by all key programme partners. Varied means of programme promotion, including word of mouth, are advised in order to raise general awareness levels of the programme and to ensure maximum reach of the target audience.

2. The HSE needs to devote sufficient time and resources to facilitate the buy-in of health professionals. Sustained programme marketing is also needed to raise health professionals' awareness of programme benefits and supportive health professionals should be enlisted to act as programme champions to promote the use of the programme among their peers.

3. Sufficient walking leaders need to be recruited before the commencement of the Green Prescription programme within a community.

Referral

4. The referral system needs to be simplified to make it more manageable from a health professional perspective but this should be balanced with ensuring participant needs are met at the time of referral. The potential benefits of developing an electronic-based referral system should be investigated.

5. Health professionals need to have a clear understanding of the programmes referral criteria to avoid the referral of unsuitable participants. Health professionals also need to determine patient's readiness to change before referral to the programme. A tailored training programme should be developed to improve health professionals' knowledge of behavioural change techniques and improve their confidence and competence in the Green Prescription referral procedure.

6. Health professionals should issue all patients with a Green Prescription slip at the time of referral, and endorse the benefits of programme participation in relation to the patients' health condition. All participants should be provided with sufficient information at the time of referral so they fully understand what the programme entails and are clear about what they are committing to. Enlisting

the help of front desk staff or clinic nurses to provide this information may prove a useful strategy to overcome the barrier of time constraints.

7. There is a need to increase awareness among health professionals regarding the potential benefits of referral to the Green Prescription programme for patients with certain mental health conditions such as depression and for patients who are socially isolated.

Programme Implementation & Participant Support

8. Sufficient resources and time need to be dedicated to ensure participants receive effective and consistent support throughout all stages of the programme. Frequent support phone calls and face-to-face support should be maintained. On-going monitoring of the support system is advised.

9. Future training plans for Green Steps Facilitators, walking leaders and support workers should incorporate specific skills training in relation to behavioural change techniques and the provision of interpersonal support to participants.

10. Participants should be encouraged to interact and socialize during the Green Steps and Community Walks to foster the formation of group bonds and encourage ongoing attendance. All community programmes should incorporate the use of "buddy systems".

11. Walk routes need to be varied regularly to avoid walkers getting bored and walking leaders need to ensure the walks cater for the various fitness abilities where possible.

12. Participants should be allowed the opportunity to influence programme delivery. Participants should be consulted on walk routes and the timing of the programme.

13. As weight loss is a goal for many participants, the programme should aim to support individuals in adopting healthier eating habits. This may be achieved by signposting participants to suitable programmes within the community or

incorporating healthy eating workshops within the Green Prescription programme.

14. Where possible an indoor physical activity alternative to the outdoor walks should be provided for bad weather days and for winter months to encourage participants to maintain the routine of coming to the programme each week.

15. The range of physical activities available to participants should be broadened as it cannot be expected one form of physical activity will appeal to all. It is possible this could be achieved by linking with other physical activity programmes already in existence within communities.

Working in Partnership

16. Efforts to develop effective partnerships between health professionals and community groups, and strengthen these partnerships where they are weak, should aim to establish a shared agenda; and develop a clear understanding of roles and responsibilities and the goals and expected outcomes within the partnership. Regular contact and communication between partners should be established. Any conflicts within the partnerships should be addressed promptly.

17. To increase the reach of the programme efforts to expand the referral routes into the programme (by expanding the range of health professional partners) should be sustained.

18. Health professionals should be provided with regular prompts and reminders about the programme throughout the year to encourage referral.

19. Community Groups need to be supported by the HSE in their efforts to implement and sustain the Green Prescription and Community walks programme. Ensuring the Community Walks can continue throughout the year is important so participants' are supported to maintain their physically active lifestyle. Compromises need to be reached in terms of financial assistance or other supports.

20. Walking leaders should be supported in their role, afforded the opportunity to network with walking leaders from other groups, and provided with ongoing training as required. A standardized system for the recruitment, management and support of walking leaders should be developed.

21. The volunteerism efforts of walking leaders should be acknowledged and efforts to ensure they feel supported valued and appreciated need to be maintained.

22. Collaboration with local authorities is needed to improve the walkability of communities, for example by improving the surface quality of footpaths and ensuring adequate lighting.

23. Clear, effective, central leadership to oversee all partnerships and coordinate the programme and its development is essential and must be maintained.

Programme Monitoring & Evaluation

24. Referral rates to the programme should be monitored, and monitoring should include the number of participants referred versus the number of participants who uptake the programme. Reasons why potential participants decline participation in the programme need to be clarified.

25. Rigorous monitoring of attendance records is required to allow accurate determination of participant attrition and completion rates in this programme.

26. A structured system for managing and following-up programme drop-outs needs to be instigated by support worker, GSFs and walking leaders.

27. Programme evaluation should be ongoing as the programme continues to be developed and refined. A rigorous impact / outcome evaluation utilising an experimental evaluation design and a larger sample of participants is necessary to produce robust evidence of programme effects and generalisable results.

28. The Green Prescription Programme should be costed as a matter of urgency, and a comprehensive cost-effectiveness evaluation of the Green Prescription

Programme should be completed if / when a rigorous impact / outcome evaluation *proves* the Green Prescription Programme to be effective in meeting its aims of increasing the physical activity levels, improving the mental wellbeing and improving the disease risk indicators of its participants.

Other Recommendations for Roll-out

29. Future programme coordinators should have community development experience and a previous history of working with community groups where possible as this was found to be a valuable asset in the formation of tight partnerships and smooth programme implementation.

30. Programme Coordinators should conduct comprehensive community mapping before introducing the programme into a new community to ensure local health care professionals and local community groups have sufficient capacity (and access to required infrastructure) to implement the programme.

31. Physical activity expertise is a key basic requirement to successfully set up and implement the programme within communities. In regions where it is not possible to recruit a dedicated Physical Activity Development Officer, partnerships should be formed with LSPs where available.

32. Clear criteria should be developed for the recruitment and selection of GSFs, Walking Leaders and the Support Worker.

33. Physical activity expertise is a key basic necessity for the successful and safe delivery of all components of the programme; and thus it is essential to ensure GSFs, Walking Leaders and Support Workers have adequate physical activity expertise.

34. A "how to" guide should be developed to aid future programme coordinators and partners in the development, implementation and sustainment of the programme to ensure a smooth and successful roll-out.

35. Clear guidelines that address the issues of patient risk and medico-legal considerations for health professionals, community groups and physical activity leaders should be developed.

36. Policy level changes are needed to encourage and support physical activity prescription in primary care. Health professional training needs to promote physical activity as a valid treatment option for patients so it is given the same priority as pharmacological interventions.

37. A national framework for exercise referral in Ireland needs to be developed to provide guidelines for exercise referral systems, including the Green Prescription Programme. This framework should set quality standards for exercise referral and address issues such as: patient referral criteria (and set guidelines for referral), required professional competencies, partnership working, medico-legal considerations and programme evaluation.

7.4 Strengths & Limitations to the Evaluation

7.4.1 Strengths

This study has a number of strengths, which are bullet-pointed below for clarity:

- Firstly, to the researcher's knowledge this is the first "real life" study, certainly within an Irish context, that has explored the feasibility, acceptability and impact of implementing a community-based, lay-led walking on referral programme, delivered in partnership between local health professionals and local community groups. This is also the first evaluation study of a GP exercise referral scheme in an Irish context. Thus this research represents an important contribution to knowledge.

- The use of a mixed method approach increased the strength and completeness of the study results and helped to minimise the weaknesses that are inherent to independent quantitative and qualitative approaches (CDC Evaluation Research Team 2008; Guion et al. 2011; Creswell 2009). The use of standardised questionnaires increased the likelihood of obtaining valid and reliable quantitative

data. The use of semi-structured interviews and focus groups allowed all programme stakeholders involved in the evaluation to voice their own views and experiences of the Green Prescription programme.

- A comprehensive interpretation of the feasibility, acceptability and impact of the Green Prescription programme was ensured by the wide range of stakeholders, and the large number of programme participants.

- The use of formative and process evaluation approaches within this study enabled the identification of problems and issues as the programme was being rolled out, and thus allowed programme coordinators to reflexively make changes to the programme, helping to inform and enhance programme development.

- The collection of outcome data also enabled the gathering of preliminary evidence of programme impact, and gave an indication of the programmes ability to reach its desired outcomes.

7.4.2 Limitations

There were also a number of limitations to this evaluation study that may have had an impact on study results. These are bullet-pointed below for clarity:

- The main limitation of this evaluation was the use of the pre-experimental, pre-post study evaluation design for the impact / outcome evaluation. Pre-post study designs are liable to threats to internal validity and provide weak evidence of effect, meaning it cannot be determined with certainty that any changes are actually due to the intervention itself (Robson et al. 2001; Nutbeam and Bauman 2006). Although a pre-post study design was considered the most realistic option in the context of this evaluation (due to the early stage of programme development and implementation and the limited funding and time available for evaluation) a more rigorous evaluation design should be considered for future impact / outcome evaluations of the Green Prescription Programme. Possibilities for future impact / outcome evaluation designs are provided in section *7.5 Recommendations for Future Research*.

- The small sample size of participants that completed both pre and post study measurements, and the even smaller sample size of participants completing longer-term follow-up, further weakened the results obtained from the pre-post programme evaluation, and further precludes drawing strong or broad conclusions about the impact of the programme (Hackshaw 2008).

- The uncontrollable factors in this real-life programme, such as less than optimal participant adherence, lower than expected rates of referral and inappropriate patient referrals by health professionals, may have diluted the magnitude of programme effect (Saturni et al. 2014).

- Participants who completed pre and post programme measurements and took part in focus groups and interviews may not be representative of the entire proportion of participation who took part in the Green Prescription programme. It is not known if participants who did not complete follow-up measurements gained any benefits. Similarly it is possible that the other participants who did not take part in the evaluation may not have had as positive perceptions of the programme as those that did take part. Nonetheless the results regarding the impact of the programme do provide an indication of the potential of the Green Prescription Programme should be used as a basis for a larger confirmatory evaluation study (Hackshaw 2008).

- The use of self-report questionnaires in this study is acknowledged as a potential threat to the validity of the results. To reduce the potential for inaccurate self-reports standardised, validated self-report questionnaires were used, in conjunction with standardised protocols for questionnaire distribution. Questionnaires were also explained to participants at the time of distribution and all participants were asked for honesty in the answers provided. Nonetheless issues were encountered, for example some participants had difficulty in recalling physical activity levels and difficulties in interpreting certain aspects of the questionnaires despite explanation. These aforementioned issues appeared to result in over reporting of physical activity levels when participants were filling in the IPAQ-SF. Practical difficulties were also encountered whereby some participants couldn't read the questionnaires as a result of forgetting their eyeglasses as home; in this case questionnaires were read out to

participants, however this may have resulted in participants responding with a socially desirable answer.

- The limited evidence base supporting the IPAQs sensitivity to change (i.e. its ability to detect changes in physical activity behaviours over time (Ainsworth et al. 2012)) is a particular limitation of the evaluation findings, as this suggests the IPAQ may not have had the ability to detect changes in physical activity levels from pre-programme to post-programme. However this is acknowledged to be a limitation of physical activity questionnaires in general (Ainsworth et al. 2012).

- In relation to the WEMWBS there is ambiguity within the literature over what constitutes an "important change" in WEMWBS score from pre-intervention to post-intervention (Putz et al. 2012; Maheswaren et al. 2012). It has been *estimated* that a change of between 3 and 8 points from pre-intervention to post-intervention may represent a meaningful change in mental wellbeing, however no *precise* guidelines exist regarding what constitutes a meaningful or clinically important change in WEMWBS score (Putz et al. 2012; Maheswaren et al. 2012). Thus it is important to interpret the statistically significant mean increase in WEMWBS score of 3.9 points from pre-programme to post-programme cautiously.

- It is possible that participants may have felt that they needed to portray positive perceptions of the programme during interviews and focus groups. In an effort to counteract this all participants were informed that both positive and negative feedback on the programme was appreciated.

- It is also possible that some other stakeholders involved in the evaluation, for example those employed by the programme such as GSFs or those who helped create the programme (Programme Coordinator), may have been overly positive in their descriptions of the programme.

> the interaction between an evaluator, linked to the trial of a scheme whose future hinged on positive findings, and professionals whose livelihood depend on its continuation, may have produced an understanding which portrayed the scheme in an excessively positive light (Moore et al. 2011, p. 11)

- Only a small number of health professionals (3 GPs and one nurse) took part in the evaluation, thus it cannot be assumed the views and experiences expressed by the health professionals in this study are generalisable to entire health professional population. In addition all of the health professionals who took part in the evaluation had previously referred patients (at least one or more) to the programme, suggesting these health professionals were supportive of the idea of physical activity on prescription. Thus it is acknowledged that this evaluation report mainly represents the views of health professionals who are supportive of the Green Prescription programme. Attempts were made to contact other health professionals who had refused to participate in the programme, however these attempts proved unsuccessful.

- Finally the timeframe for the completion of longer-term follow-up was limited to 3 months post programme completion in this study. Initially it was envisaged that another phase of long-term follow-up would be conducted 6 months post programme completion; however due to the very small cohort of participants completing the longer-term follow-up at 3 months post programme completion it was decided this would not have being an efficient use of resources. It is acknowledged that follow-up at three months post programme completion (in addition to the pre-experimental, pre-post study design and the very small sample size of participants completing this follow up period) may not give a very good indication of the long-term effects of the programme. Within the literature long-term follow-up is generally conducted between 6 months and 2 years post programme completion.

7.5 Recommendations for Future Research

There remains much scope for further research within the Green Prescription programme. Of particular importance is the need for a more rigorous impact / outcome evaluation study to generate robust evidence of programme effects, and generate generalisable results. As discussed previously in *Section 4.3 Overview of Evaluation, Types of Evaluation & Evaluation Designs* (Chapter Four), experimental evaluation designs, such as RCTs, are widely acknowledged to generate the most rigorous scientific estimates of programme / intervention effects (Nutbeam and Bauman 2006). (Refer to pages 103-104 for a description of what an RCT entails). Furthermore the

NICE guidelines (NICE 2006) recommend and advocate the use of RCTs to assess the impacts / outcomes of exercise referral programmes. Thus the feasibility of utilising a RCT evaluation design particularly to assess the impact of the Green Prescription Programme on participants physical activity levels, mental wellbeing and physical indicators (e.g. blood pressure, BMI, waist circumference etc) should be further explored. In addition alternative methods of measuring the impact of the Green Prescription Programme on participants' physical activity levels (instead of using the IPAQ instrument) should also be explored for future impact / outcome evaluation studies. In particular the feasibility of utilising objective measures of physical activity should be explored. For example accelerometers are an objective measure of physical activity that "*have been utilized in a variety of research settings and [are] proven to be both [a] reliability and valid assessment of physical activity in various populations ranging from children to older adults*" (Physical Activity Resource Center for Public Health 2014). It is possible that an objective measure of physical activity could have the advantage of helping to accurately determine the relative contribution (if any) Green Prescription Programme participation makes to participants overall physical activity levels (which is something the IPAQ was unable to in the context of this evaluation).

With respect to the above future research recommendation to utilise a RCT design to measure the impact of the Green Prescription Programme, the researcher does wish to acknowledge that there is debate within the literature regarding the feasibility and acceptability of utilising traditional RCT designs for evaluating real-life, complex, community-based health interventions (Roberts et al. 2009; Craig et al. Undated; Solomon et al. 2012). It has been suggested that the tendency of traditional RCTs to focus on individuals rather than communities, make them unsuitable for community-level interventions (Solomon et al. 2012). Cluster randomised controlled trials have been suggested as more suitable than traditional RCTs for the evaluation of community-level health programmes (Solomon et al. 2012). Cluster randomised controlled trials are also particularly useful for health promotion interventions that are designed to reach entire communities or primary health care clinics, as they ensure participants in the intervention arms and the control arms of the study are kept separate (thus ensuring control participants cannot be influenced by the intervention) (Nutbeam and Bauman 2006, p. 60). Within cluster randomised controlled trials "*the randomisation occurs at the level of groups or communities (i.e. clusters) [rather than individuals] which are*

randomly allocated [in parallel] to intervention or control conditions" (Nutbeam and Bauman 2006, p. 59). However critiques argue that cluster randomised controlled trials are often not practical, as usually it is not possible to deliver an intervention to many clusters [e.g. communities] at the same time (Solomon et al. 2012). Furthermore it is considered unethical to without an intervention that would do more good than harm from a proportion of participants (Solomon et al. 2012).

The stepped wedge cluster randomised controlled trial is a variation of the cluster randomised controlled trial that *may* be suitable for the future evaluation of the Green Prescription Programme (Solomon et al. 2012; Craig et al. Undated). The stepped wedge design *may* be particularly applicable for use in the case of the future roll-out of the Green Prescription Programme, as the design allows for whole populations to eventually receive the intervention but builds randomisation into the phasing of programme implementation and delivery (Craig et al. Undated). Within the stepped wedge design:

> The intervention is delivered sequentially to all trial clusters [i.e. groups of communities / groups of suitable participants within primary health care practices] over a number of time periods …. clusters effectively cross over from the control to the intervention group. The stage at which the clusters [i.e. communities] cross over is randomised. Outcomes are measured on the study participants in all clusters at every time period so that each cluster provides data points in both the control and intervention conditions. (Solomon et al. 2012)

Figure 7.1 provides an example of how the Green Prescription Programme could potentially be evaluated using a stepped wedge cluster randomised controlled design in the case of future roll-out. This example is adapted from a study protocol of a stepped wedge cluster randomised trial of a real-life, community-level physical activity intervention in rural southwest England (Solomon et al. 2012). Figure 7.1 shows how the Green Prescription Programme could be rolled out sequentially to a selected number of communities (and primary health care practices within those communities). For the sake of this example the selected number of communities could be all the villages / towns that have a primary care centre and a structured community group in existence within the provinces of Connaught and Munster. Communities would be randomly grouped together to form four different clusters (C1, C2, C3, C4). The evaluation could consist of data collection at 5 fixed time points (the 5 time points being baseline (T1) and following each of the intervention periods (T2, T3, T4, T5)). The period in which the communities / villages first receive the intervention would be randomly assigned.

The Green Prescription programme would be fully implemented in all of the towns / villages within Connaught and Munster by the end of the trial.
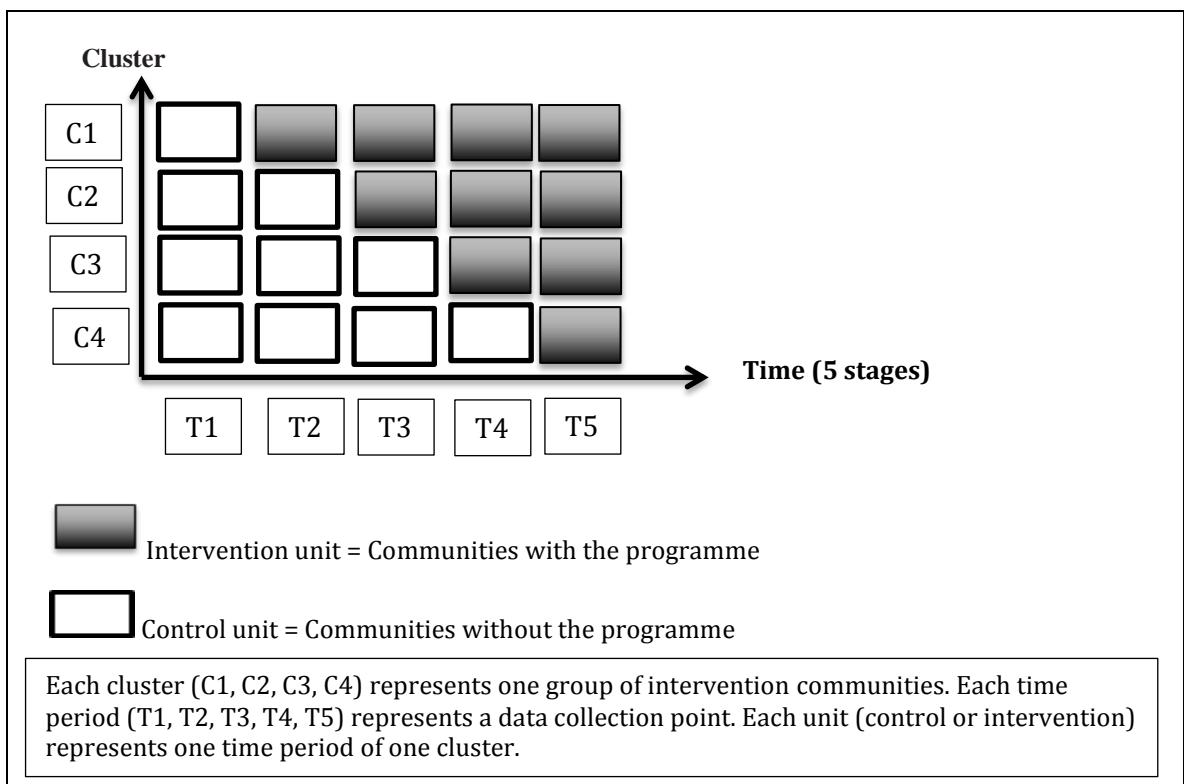
Figure 7.1: Example of how the Green Prescription Programme could be evaluated using a stepped wedge design (adapted from stepped wedge design within the study by Solomon et al. 2012)

There are obvious drawbacks however to the use of the stepped wedge design, including the high level of expertise needed to conduct such a study, the long trial duration and the high cost of conducting the evaluation (Craig et al. Undated). It is recommended that future researchers explore the advantages, disadvantages, feasibility and acceptability of a wide range of different experimental evaluation designs before conducting future impact / outcome evaluations of the Green Prescription Programme to ensure the most suitable design is chosen.

In addition to the need for rigorous impact / outcome evaluation of the effect of the programme on participants physical activity levels, the results of this evaluation also suggest the need for rigorous impact / outcome evaluation of the effect of this programme on participants' general health. This study found an abundance of qualitative preliminary evidence to suggest this programme positively impacted on participants' general health (e.g. improved physical health, improved mobility, improved social health etc), warranting the need for future quantitative research to be

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conducted to verify and strengthen these findings. General health surveys, such as the SF36 health survey questionnaire which has being proven to be valid, reliable and acceptable (Garrett et al. 1993), could be utilised to satisfy this aim. This survey assesses a range of health concepts, including (but not limited to) physical functioning, bodily pain, social functioning and perceived general health. Similarly future research should also be conducted quantitatively assess the impact of the programme on participants exercise self-efficacy, to verify the qualitative findings in this study.

Future research is also needed to determine the cost of Green Prescription programme investment verses the benefits of the programme (cost-effectiveness). A holistic approach should be utilised to assess costs (to include health professional time, investments from community groups, volunteer time, financial costs associated with physical activity training, financial costs of paying support workers, Green Steps Faciliators, the Development Officer and the Programme Coordinator) and to assess benefits (to include potential benefits in terms of increased physical activity levels, improvements in mental wellbeing and quality of life of participants, potential reductions in health-care utilisation etc).

There also remains a need for further research on the perceptions (positive and negative) of programme non-completers towards the programme; and for research on the potential impact (positive and negative) of the programme on programme non-completers. Gaining an understanding of the perceptions of programme non-completers towards the programme, and their experiences of programme participation, is important to determine how the programme can be improved and so barriers to programme completion can be minimised.

Men and younger age groups were under-represented within the programme, suggesting a need for further research to determine how male and younger participants could be attracted to the Green Prescription programme. It is possible other forms of activities or alternative methods of programme promotion are needed to attract these cohorts.

In addition, as this study only evaluated the feasibility and acceptability of the Green Prescription programme in one county in Ireland, it is recommended that a

similar *process evaluation* is conducted when the programme is piloted in another county. It is possible that health professionals, community groups and programme participants in different parts of the country will have different perceptions and experiences of the Green Prescription programme and may experience different facilitators and challenges to implementation.

Finally there is also a need for further research on the feasibility and acceptability of physical activity interventions that are delivered in partnership between primary care health professionals and community groups particularly within Ireland, as the researcher found no previous Irish research dealing with this area.

7.6 Conclusion

In conclusion this evaluation suggests the Green Prescription Programme has merit and is a potentially viable model for larger-scale rollout. Key findings suggested the programme was acceptable to all those involved and was generally feasible to implement. Programme participants, community leaders and health professionals self-reported many benefits of programme engagement, while also outlining key areas of the programme in need of further development. Determination of the quantitative impact of the programme was limited by the pre-experimental, pre-post programme design and the small sample size of participants completing post programme measurements. However the combined qualitative and quantitative results of the evaluation do suggest the programme has the potential to increase the physical activity levels, reduce the daily sitting time, reduce the blood pressure scores and improve the physical and mental wellbeing of those who take part, at least in the short-term. However there remains a need for a more rigorous impact / outcome evaluation study (utilising an experimental evaluation design and a larger sample size of participants) to generate robust evidence of programme effects, and to generate generalisable results.

The results of this evaluation provide a valuable contribution to the development of the Green Prescription programme and should be used to inform its future practice. This study has successfully identified current areas of weakness within the programme and highlighted opportunities to develop and refine the programme. In addition this study has identified key requirements for the successful implementation and roll-out of

the programme. This study has also identified potential challenges to programme rollout and suggested potential solutions to help overcome these challenges. This study concluded by detailing comprehensive recommendations for the future development of the Green Prescription Programme and highlighting key areas that should form a focus for future research.

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Appendices

Roles & Responsibilities	
Leadership	
HSE Health Promotion Department • **Programme Coordinator** • **Development Officer**	Primary leading body. Varied role included: • Introduction & marketing of programme to communities & health professionals • Community mapping & identification of community coordinators • Supporting communities & Health Professionals to develop & sustain the programme • Recruitment of Green Prescription Support Worker • Set up & management of steering group. committee • On-going evaluation & implementation of required changes
Donegal Sports Partnership	Collaborated with HSE to provide support as follows: • Provided expertise re set up & delivery of the programme • Shared knowledge on pre-existing walking groups & community capacity levels to inform community mapping process • Shared resources e.g. trained personnel to deliver Green Steps component (Green Steps Facilitators) • On-going work with communities to help build & strengthen capacities to implement & sustain physical activity programmes such as the Green Prescription
Key Grassroots Partners	
Health Professionals	• Responsible for the referral of participants onto the programme • In future will need to have a minimum of 10 participants ready for referral before a Green Prescription programme will run in their local community
Communities	Responsible for the development & sustainment of the programme in their local area (with support from HSE). Structured community groups, e.g. LCDPs, seen as best placed to act as community coordinators. Varied role included: • Appointment of Community Leader to support programme • Recruitment & on-going support of walking leaders • Mobilisation of required resources e.g. Green Steps venue • Identification of walk routes and establishment of Community walks • Programme advertisement & promotion • Identification and recruitment of community walkers • Linking programme into existing community activities
Linkages and Supports	
Quality of Life Programme	• Sharing of Resources • Signposting of participants between programmes where necessary
The Irish Heart Foundation	• Tailored Walking Leader Training programme
Coilte and Rural Recreation	• Provision of support re walking routes and trails
Donegal Road Safety Authority	• Provision of support re safety aspects of road walking

The Green Prescription Journey

Referral

Green Prescription – Provided by GPs, nurses, Allied Health Professionals who identify people in need of a structured supported community walking programme

- Inactive adult (over 18 yrs & doing less than 30 min moderate activity most days of the week)
- People living with a long-term illness and who are medically stable
- People who are ready to change

The Process

- Inform client about the Green Prescription
- Refer clients to the 12 week programme and encourage them to attend
- Encourage client to co-sign the Green Prescription contract
- Contact Support Worker with client details (with clients consent)

Support Worker

- Contacts referred client and talks them through the programme, times, dates etc
- Meets client pre Greensteps to provide programme overview, encourage & motivate, help set goals & provide group introductions
- On-going support and encouragement offered throughout the 12 week programme

12 Week Programme

a) **4 Week Greensteps – Stepping and Strolling programme**
- Indoor low level physical activity (chair-based stretches and flexibility exercises and walking-based activity) and motivational programme
- Delivered by trained and accredited facilitators (Greensteps Facilitators)
- Greensteps weekly challenges
- Motivational prompts – Walking activity diary and Stepometer
- Linkages to Quality of Life Programme

b) **8 Week Community Walk Programme**
- Led by trained Voluntary Walking Leaders (Irish Heart Foundation)
- Insurance, First Aid, Road Safety

Completion of the Green Prescription Programme

- Client advised to continue on local community walk to maintain physically active lifestyle
- Client informed of other health programmes in local area to support identified goals and self-management
- Support Worker contacts referring Health Professional re client progress
- Support Worker follows up with client 3 months post programme completion

Evaluation

Green Prescription Study: Participant Information Leaflet

You are being invited to take part in the Green Prescription research study carried out at your doctor's general practice by the Department of Applied Science, Institute of Technology, Sligo. Before you decide whether or not you wish to take part, you should read the information provided below carefully and if you wish, discuss it with your family, friends or GP. Take time to ask questions – do not feel rushed or under any obligation to make a hasty judgement. You should clearly understand the risks and benefits of participating in this study so that you can make a decision that is right for you – this process is known as Informed Consent.

You are not obliged to take part in this study and failure to participate will have no effect on your current or future care. You may change your mind at any time (before the start of the study or even after you have commenced the study) for whatever reason without having to justify your decision and without any negative impact on the care you will receive from your GP.

What is a Green Prescription?

A green prescription is a health professional's written advice to a patient to be physically active in the natural environment (green exercise), as part of the patients health and quality of life management. This programme involves the prescription of a supported healthy walk in your local community.

What does prescription in the Green Prescription programme involve?

If you think you are ready with some help to change your activity levels, then your GP will give you a prescription for Physical activity. You will get a phone call from the support person who will help you establish your goals and support and motivate you in getting active. This person will support you on a weekly basis for 12 weeks. There are local healthy walks organised to help get you active. Your GP will follow up with you after the 12 weeks.

What is the Green Prescription Study?

As the concept of a green prescription is new to Ireland this programme is part of an evaluation study. The study aims to let us know how successful the Green Prescription is for increasing physical activity and improving health.

What does participation in the study evaluation involve?

Participating in the programme involves having some measurements taken at the beginning and end of the walking programme (height, weight, waist measurement, heart rate and blood pressure) by a researcher from IT Sligo who is tracking the success of the programme. You will also be asked to fill out some questionnaires seeking information regarding your activity levels and also your feelings of wellbeing and quality of life at the start and later at 12 weeks and again after 6 months and 12 months. You may also be asked to fill out another questionnaire detailing your experiences of the programme or invited to an interview or group discussion about the programme.

Why should I take part?

The programme aims to support you getting active and there are many health benefits to being active including having more energy, better weight control, release of stress and reduced risk of certain diseases. The healthy walks also provide an opportunity to meet people and to have some fun in your local outdoor environment.

Are there any risks to taking part?

There are some risks to participating in physical activity. However the benefits of being active outweigh the risks of exercise participation. It is important that your doctor has given you clearance to exercise.

Who is running the Green Prescription Programme.

The Green Prescription Programme is a HSE programme. The National Taskforce for obesity has funded the programme.

Who is conducting the evaluation?

The evaluation is being conducted by researchers from the Institute of Technology, Sligo. They are Siofra Stirrat Azura Youell and Máire Mc Callion. A researchers have a background in physical activity and health promotion. They can be contacted directly via the details below.

Confidentiality

All information given by you is treated in the strictest confidence. It will be used exclusively for research purposes. Once the information is given to the researchers you will be assigned an ID number and the researchers will securely hold the coding information so your name is never revealed as part of the study.

What are your rights if you decide to take part?

If you decide to take part you may choose to withdraw from the study at any time. If there are questionnaires or interviews which you do not wish to participate in, you do not have to do so.

Your participation counts

Taking part in the Green Prescription study is entirely voluntary, however it is only by carrying out studies on new initiatives like this that we can better develop programmes to help make and keep people healthier, so we do encourage you to consider participating.

We hope that you can support us in this study and we would like to thank you in anticipation for your help.

Where can I get further information

Ann Marie Crosse Health Promotion Officer Health Promotion 1st floor St. Conals Letterkenny Co. Donegal *Tel* 074 91 04693 *Email* annmariecrosse@hse.ie	Máire Mc Callion Department of Applied Science Institute of Technology, Sligo Ash Lane Sligo *Tel* 071 9155222 ext 7247 *Email* mccallion.maire@itsligo.ie	Azura Youell Department of Applied Science Institute of Technology, Sligo Ash Lane Sligo *Tel* 071 9155222 ext 242 *Email* Youell.azura@itsligo.ie

Green Prescription Programme

Please tick the appropriate answer.

I confirm that I have read and understood the Participant Information Leaflet dated _____ attached, and that I have had ample opportunity to ask questions all of which have been satisfactorily answered. ☐*Yes* ☐*No*

*I understand that my participation in this study is entirely **voluntary** and that I may withdraw at any time, without giving reason, and without this decision affecting my future treatment or medical care.* ☐*Yes* ☐*No*

I consent to having specific measurements taken, which have been explained to me, for the purpose of this research. ☐*Yes* ☐*No*

I understand that my identity will remain confidential at all times. ☐*Yes* ☐*No*

I am aware of the potential risks of this research study. ☐*Yes* ☐*No*

I have been given a copy of the Patient Information Leaflet and this Consent form for my records. ☐*Yes* ☐*No*

FUTURE USE OF ANONYMOUS DATA:

I agree that I will not restrict the use to which the results of this study may be put. I give my approval that unidentifiable <u>data</u> concerning my person may be stored or electronically processed for the purpose of scientific research and may be used in <u>related or other studies in the future</u>. (This would be subject to approval by an independent body, which safeguards the welfare and rights of people in biomedical research studies – e.g. The Irish College of General Practitioners or The Research and Education Foundation at Sligo General Hospital). ☐*Yes* ☐*No*

Participant Name: _____

Participant Signature: _____

Date: _____

To be completed by the Principal Investigator or his nominee.

I, the undersigned, have taken the time to fully explain to the above patient the nature and purpose of this study in a manner that he/she could understand. I have explained the risks involved, the experimental nature of the treatment, as well as the possible benefits and have invited him/here to ask questions on any aspect of the study that concerned them.

Name: _____

Signature: _____

Date: _____

Are you ready to Walk?

If you are between 18 years and 69 years and planning to become more active than you are at present, this questionnaire will tell you if it would be wise to have medical advice before starting. If you are over 69 years check with your doctor anyway.

For most people**, physical activity** does not pose a hazard. The questions have been designed to identify the small number of people for whom it would be wise to have medical advice before starting:

1. Has a doctor ever said you have a heart condition?

   ☐ Yes   ☐

2. Do you feel pain in your chest when you do physical activity?

   Yes ☐   No ☐

3. Do you ever lose balance because of dizziness or ever lose consciousness?

   ☐ Yes   ☐ No

4. In the past month have you had pain in your chest when you were **NOT** doing physical activity?

   Yes ☐   No ☐

5. Do you have a bone or joint problem that could be made worse by a change in your physical activity?

   Yes ☐   No ☐

6. Do you know of any reason why you should not do physical activity?

   ☐ Yes   ☐ No

I understand that if I have answered yes to any of the questions above, I should have the consent of my doctor before taking part in this walking programme.

Signed _____

Date _____

Reason For Referral Form

Name:	Date of joining programme:		
D.O.B:	Gender:	☐ Male	☐ Female

Referral Reasons

☐ Hypertension	☐ CHD Factors	☐ Asthma	☐ Anxiety/Stress
☐ Diabetes	☐ Cancer	☐ Backpain	☐ Depression
☐ Weight Reduction	☐ OstEOPorosis		☐ Psycho Social
☐ Sedentary/Inactive	☐ Osteoarthritis		

Other:

IT Sligo
An Institiúid Teicneolaíochta, Sligeach

Siofra Stirrat
Room XXXXX
XXXXXXXXXX
IT Sligo
Ballinode
Co. Sligo
07/11/2012

DR. XXXXXX
XXXXXXXXX
XXXXXXXXX

Dr. XXXXXX,

My name is Siofra Stirrat and, as advised in previous correspondance, I am carrying out the evaluation of the HSE West pilot Green Prescription programme for Ann Marie Crosse. I am conducting this research in conjunction with fellow researchers Azura Youell and Maire McCallion who are also based in the Institute of Technology Sligo.

Ethical approval for the evaluation study has being granted by the Irish College of General Practitioners (ICGP) and as per ICGP recommendations we have being advised:

- All baseline (pre) and follow-up (post – even patient completes the programme) measurements obtained from all referred patients need be forwarded to the GP/health professional responsible for said patients care and initial referral onto the programme (for the purposes of your information for patient records). I trust you have already received this information.

- **The reason for referral of each patient attending the Green Prescription programme needs to be stated when reporting findings. To meet this requirement I have enclosed a simple form for you to indicate the reason for referral for each patient you referred onto the Green Prescription programme, along with a SAE for return to my address. Although I am aware it is some time since you referred said patient (s) I would be very grateful if you could provide me with the information required.**

My fellow researchers and I are covered under the IT Sligo's code of practice on confidentiality when handling all private and confidential data throughout the course of this evaluation study.

I really appreciate your time and help, as I am well aware you have a very busy schedule.

Kind regards,

Siofra Stirrat

www.itsligo.ie

IT Sligo, Ash Lane, Sligo, Ireland
T +353 (0) 71 91 55222

Waist Circumference Protocol

Equipment
- Anthropometric tape measure – Make and Model: seca 201 Ergonomic circumference measuring tape
- Data collection sheet

Set-Up
- Private area for taking measures (closed off from rest of group to accommodate confidentiality and for issues of privacy)

Instructions to participants
- Stand comfortably up straight facing tester.
- Ask participants to pull up and tuck their jumpers or top, and locate their naval/belly button so the researcher can see it clearly
- Ask participant to hold their arms out by their side
- Ask the participant to relax, breathe normally (abdominal muscles should not be contracted).

Procedure
- Place the measuring tape horizontally around the participants abdomen
- Place the tape measure half way between the hip bone and the lowest rib. This will be about 5 cm (2 in) above the belly button after gentle expiration; gently tighten the tape around the abdomen while ensuring not to compress the skin. Ensure the tape is level.
- Record measurement on data collection sheet to the nearest 0.1cm

Height Measurement

Equipment
- Free Standing Stadiometer–Leicester Height Measure (recommended by the Child Growth Foundation); made by Invicta Plastics Limited, Leicester
- Data collection sheet

Set-Up
- Construct stadiometer following instructions.
- Place it on a level, flat, hard surface with the stabilizing bar against a vertical surface such as a wall or door.

Instructions to participants and Procedure

Leicester Height Measure user guide to be followed as below

- Stand the subject to be measured on the "footprints", preferably barefoot, with his/her heels together and touching the backstop.
- Check that the legs are straight and position the buttocks and the shoulder blades touching the uprights. The shoulders should be relaxed and the arms placed to the side. Remove any headgear where appropriate.
- Position the head in the Frankfurt Plane with both hands having lowered the measuring arm firmly onto the head. The Frankfurt Plane is an imaginary horizontal line running between the earhole and the lower border of the eye. This will allow the full length of the subject from the crown to the feet to be measured.
- Ensure participants back is straight against the vertical measuring rods and ask them to look straight ahead.
- Read off the height to the last completed 0.01 centimetre at the red arrow pointing to the metric scale.
- Record measurement in the data collection sheet.

Weight Measurement

Equipment
- Digital Weighing scales– Make and Model: Seca 875 (Capacity 200kg)
- Data collection sheet

Set-Up
Ensure that:
- The scales are placed on a firm level surface.
- The scales are calibrated, and display zero before weighing the patient.
- No part of the weigh platform or is touching a fixed object such as a wall.

Instructions to participants and Procedure
- Ask patients to wear light garments only – remove heavy coats, belts etc
- Ask patient to remove items such as keys, money etc from pockets
- If the patient chooses to wear their shoes this should be recorded and consistency should be kept with repeat weight measurements
- Tap the scales on the side with your foot and wait approx 3 seconds for it to come on and settle to all zeros. It is now ready to be used.
- Ask patient to stand on the scales, with both feet fully on the weighing platform, heels towards the back edge, and their arms loosely by their side.
- Remain as still as possible with their head facing forward.
- Record weight to the nearest 0.1kg
- Ask patient to step down from the scale.

Note: Height and weight will be used to calculate Body Mass Index (BMI)
BMI = Weight (kg) / Height (m)2

Blood Pressure Measurement and Resting Heart Rate Measurement Protocol

Equipment
- Blood pressure monitor– Make: Riester; Model: ri-champion®N
- Different sized arm cuffs appropriate for use with make of blood pressure monitor
- Data collection sheet

Set-Up
- Private area for taking measures (closed off from rest of group to accommodate confidentiality and for issues of privacy)
- Table and chair placed next to table for participant to sit on (and to allow participant to place arm on table during blood pressure readings).

Instructions to participants and Procedure
- Sit down with back against chair and with feet flat on the floor
- Relax and breath normally
- Remove coat and jumper and roll up sleeve to expose right upper arm
- Ensure participant does not clench fist
- Put the cuff about 1 inch (2.5 cm) above the elbow. Wrap the cuff snugly around the arm. The blood pressure reading may not be correct if the cuff is too loose. Ask patient to rest arm on the table (so it is level with the heart).
- Inform patient not to speak or move and breathe normally while having their blood pressure taken.
- Turn on the blood pressure monitor, the cuff will inflate then deflate
- The patients systolic blood pressure, diastolic blood pressure and resting heart rate will be displayed on the blood pressure monitor screen. Write down all measurements on the recording form.
- Repeat if necessary (e.g. if a particularly high reading or inconclusive).
- Turn off the monitor and take off the BP cuff.

Patients Name_____

Green Prescription Baseline Measurements Form

Date:____/_____/_____   Location:_____

GP Name:	
GP Practice:	
Age:	
Gender:	MALE [ ] Female [ ]
Resting Heart Rate (BPM):	
Blood Pressure: (mmHg)	Systolic	Diastolic

Waist Circumference: (Inches)	
Weight (Kg's) :	
Height (Cm's):	

Measurements taken by: _____

Code: Gender/ Age/ Location/ Participant Number/ GP Initials

Participant Number: [   ]   Code: [   ]

Patients Name_____

Green Prescription Follow-up Measurements Form (12 wks)

Date:____/_____/_____   Location:_____

GP Name:	
GP Practice:	
Date of Birth:	
Gender:	MALE [ ] Female [ ]
Resting Heart Rate (BPM):	
Blood Pressure: (mmHg)	Systolic / Diastolic
Waist Circumference: (Inches)	
Weight (Kg's) :	
Height (Cm's):	

Measurements taken by: _____

Code: Gender/ Age/ Location/ Participant Number/ GP Initials

Participant no: [   ]   **Code**   [   ]

Green Prescription Survey

Thank you for taking the time to complete this survey. It will only take about 10 minutes.

Some points before you begin:

- The purpose of the following questions is to help provide us with information about your current physical activity levels, your health and wellbeing.

- Please answer all questions as honestly as you can – remember there is no right or wrong answer.

- You will be asked to complete this survey on the first day of joining the programme and again on the final day of the "Community Walks". The reason we ask you to complete a survey at the beginning and again at the end is so we can compare your answers before you took part in the "Green Prescription" programme with your answers after you took part. This information will help us evaluate if the "Green Prescription" programme is effective.

- **If you're not in you can't win!** As a **Thank You for your help** with the evaluation we are holding a **prize draw** at the end of the programme - The winner will have the choice of **a Sports voucher or cash prize to the value of €100**. To be in with a chance of winning:

    - **"Green Steps"** members must attend **all 4 Green Steps sessions and at least 5 Community Walks and complete the survey at the beginning and again at the end** of the programme.
    - **"Healthy Walk"** participants (those of you who only attended the outdoor walks) must attend **least 5 Community Walks and complete the survey at the beginning and again at the end** of the programme.

ABOUT YOU

Name:_____

What is your mother's maiden name _____

(This is simply in case somebody else has the same name as you so we know the difference)

Are you?   **Male** ☐   **Female** ☐

What age are you?

18 – 29   ☐
30 – 44   ☐
45 – 64   ☐
65+   ☐

Do you have a medical card?

Yes – full medical card   ☐

Yes – GP only medical card ☐

No   ☐

Physical Activity

We are interested in finding out about the kind of physical activities you do as part of your everyday life. The questions will ask you about the time you spent being physically active in the **LAST 7 DAYS. Please fill in the correct answer in the box provided.**

Walking

Think about the time you spent walking at work and/or at home, walking to travel from place to place, and any other walking that you have done solely for sport, exercise or leisure.

1. During the **last 7 days**, on how many days did you walk at a brisk pace for at least **10 minutes** at a time?

Days per week ☐

No walking ☐ skip to question 3 ➡

2. How much time did you usually spend walking on one of those days?

Hours per day ☐

Minutes per day ☐

Don't know/Not sure ☐

Moderate Physical Activities

Moderate activities refer to activities that take moderate physical effort and make you breathe **a little bit harder** than normal. Think **only** about those activities that you did for at least **10 minutes** at a time.

3. During the **last 7 days**, on how many days did you do moderate physical activities? **Don't include walking of any kind.**

Days per week ☐

No moderate physical activities ☐ skip to question 5 ➡

4. How much time did you usually spend doing moderate physical activities on one of those days?

Hours per day ☐

Minutes per day ☐

Don't know/Not Sure ☐

Vigorous Physical Activity

"Vigorous" physical activities take hard physical effort and make you breath **A LOT harder** than normal (**"huff and puff"**). Think only about those activities that you did for at least **10 minutes** at a time.

  5. During the last **7 days**, on how many days did you do vigorous physical activities?

Days per week

No vigorous physical activities   skip to question 7 →

  6. How much time did you usually spend doing vigorous physical activities on one of those days?

Hours per day

Minutes per day

Don't know/Not sure

Sitting

The last question is about the **time you spent sitting** on weekdays. This may include time spent sitting at home (e.g. while watching tv or reading) or at work.

  7. During the last **7 days**, how much time did you spend sitting on a week day?

Hours per day

Minutes per day

Don't know/ Not sure

Health and Wellbeing

The following questions will ask you about your wellbeing and your quality of life. The reason we are interested in finding out this information is to help us find out if taking part in "Healthy Walks" has any impact on your wellbeing.

Please circle the number that best describes your experience of each statement over the last 2 weeks

Statements	None of the Time	Rarely	Some of the time	Often	All of the time
I've been feeling optimistic about the future	1	2	3	4	5
I've been feeling useful	1	2	3	4	5
I've been feeling relaxed	1	2	3	4	5
I've been feeling interested in other people	1	2	3	4	5
I've had energy to spare	1	2	3	4	5
I've been dealing with problems well	1	2	3	4	5
I've been thinking clearly	1	2	3	4	5
I've been feeling good about myself	1	2	3	4	5
I've been feeling close to other people	1	2	3	4	5
I've been feeling confident	1	2	3	4	5
I've been able to make up my own mind about things	1	2	3	4	5
I've been feeling loved	1	2	3	4	5
I've been interested in new things	1	2	3	4	5
I've been feeling cheerful	1	2	3	4	5

WHO (Five) Well-Being Quality of Life Index

Please indicate for each of the five statements which is the closest to how you have being feeling over the last 2 weeks.

Example: If you have felt cheerful and in good spirits more than half of the time during the last two weeks, circle the number 3 in the first row.

Over the last two weeks………	All of the time	Most of the time	More than half of the time	Less than half of the time	Some of the time	At no time
I have felt cheerful and in good spirits	5	4	3	2	1	0
I have felt calm and relaxed	5	4	3	2	1	0
I have felt active and vigorous	5	4	3	2	1	0
I woke up feeling fresh and rested	5	4	3	2	1	0
My daily life has being filled with things that interest me	5	4	3	2	1	0
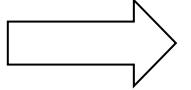
STAGE OF CHANGE

For activity to be regular it must add up to a total of 30 or more minutes of activity per day and you must do so at least 5 days per week. For example, you could take one 30 minute walk or take three 10 minute walks per day.

Physical activity includes activities such as brisk walking, jogging, cycling, swimming, OR any other activity, such as gardening, which makes you feel warmer and slightly out of breath. Which statement best describes how physically active you have been over the last 6 months?

☐ I am not regularly physically active and do not intend to be so in the next 6 months

☐ I am not regularly physically active but am thinking about starting to do so in the next 6 months

☐ I do some physical activity but not enough to meet the description of regular physical activity

☐ I am regularly physically active but only began in the last 6 months

☐ I am regularly physically active and have been so for longer than 6 months

Thank You very much for Your Help

Examples of everyday Moderate Activities

- **Walking, running, or climbing while playing with children**
- Bathing and dressing an adult
- **Moderate housework: scrubbing the floor or bathtub while on hands and knees**
- Hanging laundry on a clothesline
- **Sweeping an outdoor area**
- Washing windows
- **Moving light furniture**
- Swimming—recreational
- **Treading water—slowly, moderate effort**
- Ballroom dancing
- **Line dancing**
- Walking downstairs or down a hill
- **Pushing a power lawn mower**
- Hand washing and waxing a car

Examples of everyday Vigorous Activities

- Animal care: forking bales of hay or straw, cleaning a barn or stables
- **Vigorously playing with children—running longer distances or playing strenuous games with children**
- Carrying several heavy bags of groceries at one time
- **Heavy housework: moving or pushing heavy furniture**
- Pushing a nonmotorized lawn mower
- **Jogging or running**
- Skipping
- **Swimming—steady paced laps**
- Most competitive sports
- **Folk dancing—energetically**
- Walking and climbing briskly up a hill
- **Mountain climbing**

Frances Taggart

13/02/2012
To: siofra.stirrat@hotmail.com

Dear Siofra

Thank you for your registration form. We will be happy for you to use the WEMWBS for this.

The NHS Health Scotland website below will give access to the user guide and the questionnaire:

http://www.healthscotland.com/understanding/population/Measuring-positive-mental-health.aspx

The validation paper for ages 16 to 74 in the UK is available at:

Tennant R, Hiller L, Fishwick R, Platt P, Joseph S, Weich S, Parkinson J, Secker J, Stewart-Brown S. The Warwick-Edinburgh Mental Well-being Scale (WEMWBS): development and UK validation
http://www.hqlo.com/content/pdf/1477-7525-5-63.pdf

Best wishes

Frances

Telephone Interview Schedule for Study / Programme Non-Completers

Name of client:_____   **Location:**_____

Date of telephone interview:_____

1. **Reason for leaving programme: (Tick-boxes for interviewers use only - not prompted - tick the box that matches respondents self-professed answer; or if none of the tick boxes matches respondents answer, write the answer in "other reason" section)**

Lack of Time   ❑   Clashing commitments   ❑   Lack of motivation   ❑
Disliked programme   ❑   Didn't like certain parts of prog ❑   Ill-health   ❑
No transport   ❑   Lack of support   ❑

Explanation of above point:
_____
_____
_____

Other Reason:
_____
_____
_____

---

2. **How did you feel when your GP/Nurse first recommended the Green Prescription programme? (Prompts: How was the programme explained to you? Did you know what to expect from the programme or not?)**

_____
_____
_____

3. **How did you feel about the level of support you received on the programme? How do you feel about the support you received from the support worker? The level of support you received from the Greensteps facilitators? From the walking leaders?**

_____
_____
_____

4. **Did the time you spent on the programme have any effect on you? (Good or bad e.g. physical activity levels, your thoughts around physical activity or health etc)**

_____
_____
_____
_____

5. **How would you describe your physical activity levels currently?**

_____
_____
_____
_____

6. **What if anything would have encouraged you to remain on the programme?**

_____
_____
_____
_____

7. **Do you have any other recommendations to improve the programme?**

_____
_____
_____
_____

Protocol for data use and Coding

1. **Baseline Measurement Form.**
- The Baseline measurement form is photocopied.
- The photocopied form is forwarded to the patients GP via registered post.
- Each patient is given a code based on the following exact sequence
   - CODE: Gender/ Age/ Location/ Participant Number/ GP
- The code is put on the form in the code box.
- The patients name and the code are put on a spread sheet which is encrypted on computer and stored securely (this will form encrypted database once all names are added).
- The patients name is then removed from the form (cutting off the top) and name is destroyed.
- Original form (now without patients' name) is stored in locked cabinet.

2. **Follow-up Measurement Form.**
- The Follow-up measurement form is photocopied.
- The photocopied form is forwarded to the patients GP via registered post.
- The designated patient code originally assigned to that patient at Baseline is put on the form the code box (code will be taken from the secure encrypted database created above).
- The patient name is removed from the follow-up measurement.

3. **GP Measurement Form.**
- GP to forward GP referral form which contains reason for referral (medical condition etc.) and patient name to researcher via registered post.
- The designated patient code originally assigned to that patient at Baseline is put on the GP referral form (code will be taken from the secure encrypted database created above).
- The patients name will then be removed from the form.
4. Questionnaire form
- Referred Walkers
   - Questionnaire form for referred walkers consists of the International physical activity questionnaire (IPAQ), Warwick Edinburgh Mental Wellbeing Scale (WEMWBS), WHO (Five) Wellbeing Index, the Stages of Change (SoC) and some demographic information questions
   - Baseline forms will be disseminated and collected on Day 1 of the Greensteps programme.
   - The form will be coded by matching the name originally assigned to that patient at Baseline (code will be taken from the encrypted database).
   - The patients name will then be removed from the questionnaire form.
   - The same questionnaire form will be used to collect follow-up data on week 12 for the referred walkers on the final day of the community walks – with coding system as above.

Interview Topic Guide for Referred and Self-referred Participants who Completed Both the Green Steps and the Community Walks

Green Prescription Group

Pre-discussion Stage

- **Arrange Venue**
- **Welcome participants, greet at door.**
- **Serve refreshments**
- **Identify participants characteristics**
- **Manage seating (chairs in a circle)**
- **Administrative tasks - Name badges (sort out as ppl come in), consent forms ready, tape recorders set up, pens available, paper, debrief tool, Main issues debrief tool**

Introduce moderator	My name is Siofra and I am based in Sligo IT and I am doing my Masters in Health Promotion by carrying out the evaluation of the Green Prescription programme.
Introduce the research (purpose,. Orientation, use of the research)	The purpose of the chat we are going to have here today is to help me get an idea of your views and opinions about the Green Prescription programme. I am here to listen to your stories and thoughts about the programme. The Green Prescription programme is new to Ireland. This is a pilot programme taking place here in Donegal. The point of the evaluation is to see how effective the programme is, to identify what parts are working well and what parts need to be changed. As all of you have now first-hand experience of the programme you are the experts in this regard! Any information you can provide on your experiences of the programme is very valuable. The findings from our research will be written up into a report which will be used to assess if the programme should continue and what is the best structure for the programme.
Introductions of everyone in the room	For my sake let's do a quick round of introductions – say your name, where you're from and one place in the world you would love to travel to.
Assure confidentiality (Clarify meaning)	The information discussed is going to be analysed as a whole and none of your names will be used in the analysis of the discussion.
Confirm consent for participation	I am passing around a consent form now to request and receive your informed consent to participate in the research – while I would like you to participate everyone is free to opt out if you wish to do so and you are also free to opt out of answering any questions.

Seek consent for recording	I would like to record the discussion, simply because I don't want to miss any of your comments. It also means I can write exactly what you have said rather than just trying to recall it from memory. The only people with access to these will be myself and the other members of the research team and they will also be bound by confidentiality. If that is ok can we just get you to sign the consent form.
Outline group discussion process	I want the discussion to be informal, so there's no need to wait for me to call on you directly to answer a question…..I encourage you to respond directly to the comments other people make. If you don't understand a question, please let me know. I am here to ask questions, listen, and make sure everyone has a chance to share. If we seem to be stuck on a topic, I may interrupt you or move you on to another question as I am conscious of our timeframe here today. If I have not covered something you think is important we will give you an opportunity at the end to talk about things we might not have asked you about.
'Ground Rules'	First of all do any of you have any ground rules you think are important to set down at this stage for our discussion? I do ask that we all keep each other's identities, participation and remarks private. We hope you'll feel free to speak openly and honestly. - No right or wrong answers just your opinions - Respect others views - Give everyone an opportunity to contribute - OK to opt out - Talking one at a time - I ask you to speak up so everyone can hear.

Topic Guide

Aim: **Objectives:**	**To describe participants experiences of the Green Steps and Healthy Walks programme (Green Prescription)** 1. How the participants joined the Green prescription (process of referral/joining) 2. How the participants experienced the Green Steps programme 3. How the participants experienced the Healthy Walks programme 4. Aspects of the overall programme they found most supportive/motivating 5. The perceived effect the overall programme had on them as individuals 6. The barriers that participants encountered throughout the programme 7. Suggested improvements to the programme
Joining the Green Prescription programme	**1. Tell me about how you came to be on the Green Prescription programme? ▢** a. Thinking about when your doctor referred you was there any extra information about the programme that would have encouraged you that little bit more to attend? b. Was there anything that worried you about joining? c. Are any of you part of any other community group of any kind? d. Tell me about your experience with Phil the support worker
Experience of the Green Steps component	**2. Tell me about your experience of the Greensteps part of the programme ▢** **Prompts:** • In what ways if any did it spur you on to become more active? • What did you like about it (pace, indoors, activities) • What did you not like (indoors, activities, pace) • How did you feel about the pedometers and homework diary • How suitable were the activities for everyone in the group
Experience of the Healthy Walks component	**3. How did you find the switching from the Green Steps to the Healthy Walks? ▢** **Prompt:** • How well prepared were you after Greensteps • Indoors to outdoors

	• Time of walks verses time of Greensteps
	• Change of leaders
	
	4. Tell me about your experience of the walks □
	
	Prompts:
	    • What did you like (What made you turn up to on the weeks you came)
	    • What did you not like (If there were some weeks you didn't go walking with the group what stopped you from turning up? (Outdoors, weather, walking routes))
	    • How suitable were the walks for everyone in the group
	
	5. **What skills/qualities do you feel is important for Walking leaders to have?** □
	
	6. **If I was to tell you the name "Healthy Walk" was going to be changed to "Community Walk" do you think this would be a better or worse name?** □

Participants opinions regarding support and motivation	Thinking about the programme as a whole………
	
	7. **What parts of the programme did you find most helped you most?** □
	
	8. **Were there any person/people whose support you found particularly helpful/motivating?** □
	
	    • Your doctor/nurse
	    • Phil
	    • Finola/Maria
	    • Walking leader
	    • Family/Friends
	    • Community members
	    • Other walkers
	
	    a. **How did these individuals motivate you**? □
	
	9. **How do you think you can provide support for each other on the walks?** □
	
	10. **Can you think of anything that could be done within the community to support/encourage the Green Prescription programme?** □

Perceived effects of the programme	**11. From your own experience what have been the benefits of joining the Green Prescription programme?** □

	Prompts:
	- Social (e.g. meeting people, a social outing)
	- Mental (e.g. mood, stress levels)
	- Physical (e.g. **Change in activity levels**?, fitness levels, how they feel)
	- Other (e.g. health conscious, learn new skills e.g. stretches, posture)
	- In what ways, if any, has joining the Healthy Walks programme affected you as a member of the community? □ (e.g. thinking about community involvement, knowledge of the local area, met more people etc)
	12. **How do you plan on keeping up the walking group, if at all?** □
	13. **How do you plan, if at all, to keep an active lifestyle? Can you see any problems you might have in staying active?** □
Perceived drawbacks of the programme and areas for improvement	14. **What in your opinion could be done to stop people dropping out of the programme?** □
	15. **What suggestions, if any, have you for improving the programme** □
Opinion re cost of programme	16. **In your opinion would it be worth paying a small fee to join this programme? How much do you think it should cost?** □
Overall experience	17. **If you could sum up in a few sentences your overall experience of the Green Prescription programme what would you say?** □
Ending	**Closing round** There has being a lot discussed thank you all for your feedback it is vital to the continued improvement and success of the Green Prescription programme. This evaluation is being conducted to explore your views and opinions on the Green Prescription programme – how effective it is, what's working well, what you might change…is there anything we haven't covered you feel is important to bring up? If anyone has a query I am happy to try and answer them now or afterwards if you wish… I want to thank you again for your participation and to emphasise that your contributions are extremely valuable to the evaluation and that you will be provided with feedback on the evaluation when it's completed.

Interview Topic Guide for Community Walkers

Pre-discussion Stage

- **Arrange Venue**
- **Welcome participants, greet at door.**
- **Serve refreshments**
- **Identify participants characteristics**
- **Manage seating (chairs in a circle)**
- **Administrative tasks - Name badges (sort out as ppl come in), consent forms ready, tape recorders set up, pens available, paper, debrief tool, Main issues debrief tool**

Introduce moderator	Right so now that we are all sitting down and comfortable I will introduce myself properly - my name is _____ and I am based in Sligo IT and I am involved in carrying out the evaluation of the Green Prescription and Healthy Walks programme.
Introduce the research (purpose,. Orientation, use of the research)	The purpose of the chat we are going to have here today is to help me get an idea of your views and opinions about the Healthy Walks which you all have been attending each week for the last 2months. I am here to listen to your stories and thoughts about the walks. The Healthy Walks Programme is part of the Green Prescription programme – which is a new programme in Ireland that has been set up as a way of helping people to use walking and the outdoors as a way to improve their health. GP's and nurses can refer people directly onto an earlier part of the programme called "the Green Steps", which is a 4-week indoor programme to help people prepare for walking outside and once this 4 weeks is up they join everyone else in the community on Healthy Walks. This is a pilot programme taking place here in Donegal. The programme is being evaluated to see how effective it is, to identify what parts are working well and what parts need to be changed. As all of you have now first-hand experience of the "Healthy Walks" part of the programme you are the experts on it! Any information you can provide on your experiences of the walks is very valuable. The findings from our research will be written up into a report which will be used to assess if the programme should continue and what is the best structure for the programme.
Introductions of everyone in the room	For my sake let's do a quick round of introductions – say your name, where you're from and one place in the world you would love to travel to.
Assure confidentiality (Clarify meaning)	The information discussed is going to be analysed as a whole and none of your names will be used in the analysis of the discussion.
Confirm consent for participation	I am passing around a consent form now to request and receive your informed consent to participate in the research – while I

Seek consent for recording	would like you to participate I just want to highlight everyone is free to opt out if you wish to do so and you are also free to opt out of answering any questions. I would like to record the discussion, simply because I don't want to miss any of your comments. It also means I can write exactly what you have said rather than trying to recall your comments from memory. The only people with access to the recordings will be myself and the rest of the research team. If that is ok can we just get you to sign the consent form.
Outline group discussion process	I want the discussion to be informal, so there's no need to wait for me to ask you a question directly - feel free to respond directly to the comments other people make. If you don't understand a question, please let me know. I am here to ask questions, listen, and make sure everyone has a chance to share. If we seem to be stuck on a topic, I may interrupt you or move you on to another question as I am conscious of our timeframe here today. If I have not covered something you think is important I will give you an opportunity at the end to talk about things we might not have asked you about.
'Ground Rules'	First of all do any of you have any ground rules you think are important to set down at this stage for our discussion? I do ask that we all keep each other's identities, participation and remarks private. I want you to feel free to speak openly and honestly. - No right or wrong answers just your opinions - Respect others views - Give everyone an opportunity to contribute - OK to opt out - Talking one at a time - I ask you to speak up so everyone can hear.

Aim: **Objectives:**	**To describe participants experiences of the Green Steps and Healthy Walks programme (Green Prescription)** - How the participants joined the Healthy Walks programme - How the participants experienced the Healthy Walks programme - Aspects of the overall programme they found most supportive/motivating - The perceived effect the overall programme had on them as individuals - The barriers that participants encountered throughout the programme - Suggested improvements to the programme

Joining the Healthy Walks Programme
 	
10 minutes
	1. **How did you come to join the Healthy Walks Programme?** □
	
	Prompts (if needed):
	   • Where did you hear about them?
	   • What/who encouraged you to join?
	
	  a. Have you ever been part of a walking group before? □
	
	  b. What community groups, if any, are you involved in? □
	
	  c. If I was to tell you the name "Healthy Walk" was going to be changed to "Community Walk" do you think this would be a better or worse name for the walks? □

Experience of the Healthy Walks
 	
10 minutes
	2. Tell me about your experience on the Healthy walks □
	
	Prompts:
	   • What did you like (What made you turn up)
	   • What did you not like (If there were some weeks you didn't go walking with the group what stopped you? (Outdoors, weather, walking routes))
	   • How suitable were the walks for everyone in the walking group? (Pace, walking routes?) □
	
	  3. **How suitable were the walks for everyone in the walking group? (Pace, walking routes?)** □
	
	  4. **What skills/qualities do you feel is important for walking leaders to have?** □

	Thinking about the last few weeks you spent on the walks…….
Participants opinions regarding support and motivation 10 minutes	5. **What person/people, if anybody, gave you the most encouragement (e.g. to keep turning up each week, to push yourself that little bit harder while out walking etc)?** □ **Prompts:** • Walking leaders • Friends/Family • Other walkers • Community members • Other 6. **How did they encourage you?** □ 7. **How do you think you can provide support for each other on the walks?** □ 8. **Can you think of anything that could be done within the community to support/encourage the healthy walks group?** □
Perceived effects of the programme? 10 minutes	9. **From your own experience what have been the benefits of coming to the Healthy Walks?** **Prompts:** • Social (e.g. meeting people, a social outing) • Mental (e.g. mood, stress levels) • Physical (e.g. fitness levels, how they feel) • Other (e.g. health conscious, learn new skills e.g. stretches, posture) a. **Do you feel there have been any changes in the amount of physical activity you do since joining the walks?** □ b. **How do ye plan on keeping up the walking group, if at all?** □ 10. **In what ways, if any, has joining the Healthy Walks programme affected you as a member of the community?** □ (e.g. thinking about community involvement, knowledge of the local area, met more people etc)
Perceived drawbacks of the programme and areas for improvement 10 minutes	11. **What could be done to stop people dropping out of the walking group?** □ 12. **Any other suggestions for improving the walks?** □ **Prompts:**

	• Number of walks/week • Time of walks • Walk routes • Day trips
Overall experience 5 minutes	13. **If you could sum up in a few sentences your overall experience of the Healthy Walks programme what would you say?** □

Longer-Term Follow-up

Pre-discussion Stage

- **Arrange Venue**
- **Welcome participants, greet at door.**
- **Serve refreshments**
- **Identify participants characteristics**
- **Manage seating (chairs in a circle)**
- **Administrative tasks - Name badges (sort out as ppl come in), consent forms ready, tape recorders set up, pens available, paper, debrief tool, Main issues debrief tool**

Introduce the research (purpose,. Orientation, use of the research)	The purpose of this chat is to help me get an idea of how you have got on since you completed the Green Prescription programme and any afterthoughts you may have had about it. Any information you can provide is very valuable. The findings from our research will be written up as part of a report to show how valuable the Green Prescription programme was and if there is any way it could be improved.
Assure confidentiality (Clarify meaning)	The information discussed is going to be analysed as a whole and none of your names will be used in the analysis of the discussion.
Confirm consent for participation	I am passing around a consent form now to request and receive your informed consent to participate in the research – while I would like you to participate everyone is free to opt out if you wish to do so and you are also free to opt out of answering any questions.
Seek consent for recording	Like before to record the discussion, simply because I don't want to miss any of your comments. It also means I can write exactly what you have said rather than just trying to recall it from memory. The only people with access to these will be myself and the other members of the research team and they will also be bound by confidentiality. If that is ok can we just get you to sign the consent form.
Outline group discussion process	I want the discussion to be informal, so there's no need to wait for me to call on you directly to answer a question…..I encourage you to respond directly to the comments other people make. If you don't understand a question, please let me know. I am here to ask questions, listen, and make sure everyone has a chance to share. If we seem to be stuck on a topic, I may interrupt you or move you

	on to another question as I am conscious of our timeframe here today. If I have not covered something you think is important we will give you an opportunity at the end to talk about things we might not have asked you about.
'Ground Rules'	First of all do any of you have any ground rules you think are important to set down at this stage for our discussion? I do ask that we all keep each other's identities, participation and remarks private. We hope you'll feel free to speak openly and honestly. • No right or wrong answers just your opinions • Respect others views • Give everyone an opportunity to contribute • OK to opt out • Talking one at a time • I ask you to speak up so everyone can hear.
Aim: **Objectives:**	**To describe the participants experiences since completing the Green Prescription Programme** • The perceived effect the overall programme had on them in the long-term • The barriers that participants encountered throughout the programme since leaving the programme • Suggested improvements to the programme in hindsight

	1. **Tell me about how you have got along since completing the Green Prescription programme**□ **Prompt:** • Are still physically active/go walking? • If yes – how often do you go walking? • What have been the main challenges you have faced in continuing to be physically active? • Are you part of a walking group? 2. **From your experience has going through the Green Prescription programme last year has any lasting effect on you? (Good or bad)** **Prompts:** ▪ Socially (lasting friendships, know more people in the community, go to other groups as a result) ▪ Physically (continue to be physically active, do more physical activity) Mentally (More positive outlook, happier) ▪ Other (Think about health more, more inclined to go for a walk, would like to join a walking group etc)

Let's have a think about the Green Prescription in your community□

3. **How successful, if at all, do you think the Green Prescription programme was in your community? Explain your reason.**

4. **Do you know if there are Healthy Walks still continuing in your area?**
   a. If no:
      i. How do you feel about this? Have you any idea why the walks might have stopped?

   b. If don't know:
      i. How come you lost contact with the walking group? Is there anything that could have been done differently that would have encouraged you to keep going

   c. If yes:
      i. Are you still a part of the walking group?
      ii. If not still a part of the walking group – how come you lost contact with the walking group? Is there anything that could have been done differently that would have encouraged you to keep going?
      iii. Why do you think the community have been successful in keeping the walking group going?

5. **How would you expect to find out when/if the programme starts up again in your area?**

Prompts:
   - Someone should ring
   - Your GP
   - Advertisement
   - Other

6. **Do you know if there is much interest about the Green Prescription/ Healthy Walks programme in your community? Was it well known?**

7. **Can you think of anything that could be done within the community to support the Green Prescription programme/help it to be successful?**

	8. Have you been back to your doctor/nurse since you completed the Green Prescription programme? Was the programme mentioned during your visit? □ Prompt: • How supportive do you think they are of the programme if at all?
	9. Looking back at your time in the programme now how do you feel about it..□ • Is there anything you would have liked to have changed about the programme?□ • In what ways if any could the programme be improved to make it more effective for you? • How did you feel when the programme ended – sad/glad/what to stay involved? • Length of programme • If you were to describe the programme to someone else what would you say? Would you recommend it or not?□
Ending	**Closing round** There has being a lot discussed thank you all for your feedback it is vital to the continued improvement and success of the Green Prescription programme. This evaluation is being conducted to explore your views and opinions on the Green Prescription programme – how effective it is, what's working well, what you might change…is there anything we haven't covered you feel is important to bring up? If anyone has a query I am happy to try and answer them now or afterwards if you wish… I want to thank you again for your participation and to emphasise that your contributions are extremely valuable to the evaluation and that you will be provided with feedback on the evaluation when it's completed.

Interview Schedule for GP's / Nurses	
Motivations and beliefs	1. What motivated you to participate in the Green Prescription programme? 2. How influential, if at all, do you believe you are in terms of patient's physical activity behaviour?

Role and referral	3. What conditions do you refer to the Green Prescription programme?
	
	4. On average how many patients do you see per week that would fit the criteria for a referral to the Green Prescription programme?
	
	    a. What determines whether or not you will refer these patients to the programme?
	
	5. Describe the process by which you referred patients to the programme?
	
	    a. Prompts:
	        i. How did you introduce the programme to patients?
	        ii. Link with the support worker?

	6. What is your opinion regarding the paperwork for the Green Prescription programme? (Referral forms, Prescription pads etc)
	
	    b. Prompts:
	        i. Did you use them? Explain reasons for this
	        ii. Usefulness

Benefits of the Green Prescription programme	7. What do you feel, if anything, are the benefits to patients of referral to the Green Prescription programme? 8. What do you feel are the benefits of the programme? If any, for you as a GP/Nurse?

Challenges / Barriers	9. What were the main challenges / barriers you faced in the referral of patients to the Green Prescription programme?
	
	    a. Prompts:
	        i. How comfortable were you addressing patients about taking more exercise?
	        ii. Time

	iii. Patient attitude iv. Lack of knowledge about the programme v. Other

Looking to the future	10. Do you have any suggestions for improvement to the Green Prescription programme from a GP / Nurse perspective?
	
	    a. Prompts:
	        i. To enable the integration of the programme more smoothly into daily practice?
	        ii. Methods of feedback on patient progress
	
	11. What do you feel would be the most important aspects to include in a training programme for GP's/health professionals in the use of the Green Prescription?
	Prompts:

Interview / Focus group Topic Guide for Community Leaders

Community Leaders Interview	
Background, recruitment and Understanding	1. Describe your role within the community (aside from Green Prescription programme) 2. How did you become involved with the Green Prescription and Healthy Walks programme? Prompts: Who asked you/Did you ask? Did you feel it was something the community needed or not needed? 3. When you agreed to take on the role of community representative in your area how clear were you on a scale of 1 to 10 what your role would involve? (1 = Not clear; 10 = Very clear) - Would you have liked any more info?

Role, responsibilities and barriers encountered	4. What did your role as community leader for the Green Prescription programme involve?
	
	Prompts
	    a. What was the extent of your involvement?
	    b. How did you go about setting up the programme in your community?
	    c. What were your key responsibilities? (access to a hall, recruitment of walking leaders, walk routes, advertisement)
	    d. Did you feel you had enough support or would you have liked more support setting up?
	    e. What are your on-going responsibilities as a leader, if any? (Continued advertisement, word of mouth, liaising with walking leaders, developing walks)
	
	2. Describe your working relationship with the following as part of the GRx:
	
	    a. The Green Prescription Coordinator
	    b. The Green Prescription Development worker
	    c. The Walking Leaders –
	        i. What was your experience of recruiting walking leaders?
	        ii. In your opinion who has the biggest role to play in the programme week to week – yourself or the walking leaders, or do you play an equal role?
	
	5. What were the barriers/challenges you encountered in setting up the programme in your community? How did you overcome these

	barriers? a. Is there any on-going barriers/challenges?
Effect of programme on community	6. In your experience how has the Green Prescription / Community Walks programme affected the community? (Positive and Negative) Prompts iii. Effect on individual health – physical, mental iv. Effect on community health/ relationships/cohesiveness
Looking to the future	7. What needs to be done to ensure the programme is successful in the long-term? Prompts: I. Ways to improve it (encourage more younger ppl / led-on walks or programmes) II. What can be done to support it within the community (walk trails/fix footpaths/advertisement etc) III. What are the needs of Community Reps to make this happen?
	8. From your experience what are the key resources that a community needs to have in order to start up and run a successful Green Prescription Programme? (i.e. what are the key things that need to be readily available in a community before establishing a successful programme) Prompts: Insurance / hall / walking routes / people / community spirit/ cohesiveness / other
	9. What advice would you give to a community leader in another area who is about to implement a Green Prescription Programme?

WALKING LEADER INTERVIEW Topic Guide

AIM :	To describe the walking leaders role in the programme and
OBJECTIVES:	I. To outline the role and responsibilities of the walking leader. II. To explore the role of the walking leader as a source of support for walkers. III. To describe the skills which the walking leader employed. IV. To investigate how the walking leader linked with the referred patients, the community leader(s), community walkers and the support worker. V. To explore the potential safety concerns of the walking leaders regarding the walks and provide suggestions to reduce risk. VI. To explore the challenges which the walking leader encountered and come up with possible solutions to address these challenges. VII. To make recommendations for future groups on the role of walking leader and the structure and safety of the walks.

Role & Responsibilities	1. What made you decide to become a walking leader?
	
	2. Describe your role as walking leader?
	   a. What were your key responsibilities?
	   b. Was this role and responsibilities what you expected before starting to lead the walks? YES __ NO __
	   c. If no, what duties were you performing that you didn't anticipate? Do you think these duties should have been part of your role or can you identify somebody else who could carry out these duties effectively?
	   d. How do you feel about the level of responsibility your role demanded?
	
	3. How do you think your role / responsibilities were perceived by others? Did you think they might have had different expectations about your role? (Participants, Support Worker, Coordinator, Community Members)
	
	4. What sort of person do you think makes an effective walking leader?
	   a. What knowledge & skills do you think is required to be an effective walking leader?

Organisation / Operation of the Walks	5. Describe what usually happens on a typical walk?
	   a. How you organise participants
	   b. Did you find any difference between your role for the referred walkers and your role for the community walkers? – was there a

	difference in ability?
	c. Manage different walking abilities
	d. Length of walk
	e. What challenges / difficulties did you face in your role as walking leader?
	f. What could be done about these challenges in future to ensure more smooth running sessions?
	6. What sort of support did you receive in your role from participants / community members?
	a. Did community members volunteer for certain roles on walk night or were they appointed?
	i. Were there defining individual characteristics or skills which resulted in someone being appointed to a role? What were these?
	7. Describe the links between you and the community leader(s).
	8. Describe the relationship between you and:
	a. The Greensteps facilitators
	b. The support worker
The Walking Leader as a source of Support	9. Do you think the walking leader is viewed by participants as a source of support for walkers? In what ways?
	10. What did you do in the case of referred walkers dropping out of the walking group?
	a. What do you think your role should be in this situation?
	b. Do you have any ideas what could be done to stop people dropping out of the walks or be encouraged to return if they miss a week or two?
	11. Are there ways the walking leader could provide more [individual] support to participants, particularly referred patients?
Safety on the Walks	12. If you had concerns regarding safety on the walks at time, what suggestions would you make for increasing safety on the walks?
	a. What measures did you take to ensure participant safety on the

	walks?

Benefits of the walks	13. What, if anything, were the benefits of been a walking leader for you?
	
	    a. Did you learn any new skills?
	
	    b. In what ways if any did been a walking leader have any effect on you as a member of the community? (community involvement, socialisation, knowledge of local area?)

Sustaining the Walks into the Future	14. How important, if at all, do you think the walking leaders are in sustaining the walks? a. Do you think the walks would continue if the walking leaders were not there? 15. What determines if you will continue in your role as a walking leader? 16. Would you have any suggestions for a new walking leader starting off in another community?

Needs of Walking leader	17. Is there anything you feel needs to be done to help you as a walking leader?
	
	    a. Level of support
	
	    b. Training requirements

Green Prescription Development Officer Interview	
Recruitment	**1. How did you become involved with the Green Prescription Programme?**
Role, responsibilities and relationships	**2. Describe your role** Prompts: The Green Prescription Coordinator The Community Representatives The Walking leaders (Describe how you manage the recruitment, training, organisation re walk leading, and follow-up over the year of walking leaders) **3. How has your role changed/developed since you first joined the programme?** Prompts: Hours per week Responsibilities What was the reason for these changes? 4. Describe the on-going role of the Green Prescription Development Officer following the successful recruitment and retention of a group of walking leaders in a county? Prompts: Follow-up / Check-in Organising training events Change in No. of work hours/wk?
Walking leaders	5. How are walking leaders recruited? 6. Describe the process of training newly recruited walking leaders? Prompts: Official training Building confidence to lead walks 7. What do you see as the role of a walking leader? 8. How much interaction would you normally have with the walking leaders in any given area? (Prompt: Frequency of contact within a month)

	9. How do you keep track of the number of trained walking leaders versus the number of active walking leaders? Prompts: How many trained walking leaders are there versus how many active leaders are there currently? 10. What is your opinion on how best to retain trained walking leader volunteers? **11. What kind of person so you believe makes a good walking leader?** Prompts: Personality Skill set
	12. In your experience what are the main challenges / concerns expressed by walking leaders? **Prompts:** Timing of walks Some walking leaders more dedicated than others Level of commitment required Practical issues on the walks Safety concerns How do you overcome these barriers, if at all?
Walks	13. How do you keep track of attendance during the walks? 14. What is the protocol for dealing with client drop-out from the programme during the walks?
	15. What people in your opinion are most pivotal to the successful implementation and sustainment of the Green Prescription Programme? Prompts: Green Prescription Development worker
Challenges	**16. What were the main challenges / barriers you faced in your role?**

	Prompts:
	  • Recruitment of walking leaders
	  • Retention of walking leaders
	  • Communication issues (not getting feedback on issues from community reps /walking leaders)
	  • Programme drop out
	  • Facilities
	  • Timing issues
	  • Other
	
	 a. How did you overcome these barriers / challenges?
	
	 b. Can you think of anything that could be done to remove these barriers / make these challenges easier?

Looking to the future	**17. What do you think are key requirements / qualities for a Green Prescription Development Officer to possess?** Prompts: Background / Training Personal characteristics
	18. What advice would you give to a newly recruited Green Prescription Development Officer in another county? Prompts: What to expect Planning for success
	19. Do you have any recommendations for improving the programme?

Support Worker Interview	
Role and Responsibilities	**1. How did you become involved in the Green Prescription Programme?**

	2. Describe your role as support worker
	
	Prompts:
	• What are you main responsibilities?
	• Describe your interactions with:
	    o GP's/health professionals
	    o Referred Participants
	    o GreenSteps facilitators
	    o Walking leaders
	
	   a. How do you think you were perceived by the above?
	
	3. How clearly do you think your role was defined before you started in your job as support worker?
	
	Prompts:
	• Workload
	• Responsibility
	• Structure

	4. You took over the role of support worker recently……as someone coming in to the programme with fresh eyes how well did you feel the support system was working? **Prompts:** Referral pathway Client support and follow-up **Did you make any changes to the above? Please explain a little further**
Referred Participants	**5. How would you describe the typical patient that is referred to the Green Prescription Programme?** **Prompts:** • Physical fitness/ Confidence / self-esteem / Level of support needed / Co-morbidities
Support needs and barriers	**6. Describe the ways you provide support to patients?** **Prompts:** • Motivational methods

	• Phone calls
	• Face-to-face contact
	
	7. At what time(s) throughout the 12 week programme do participants need the most support?
	Prompts:
	    • E.g. initial referral, first 4 weeks, start of walks, during walks?
	    • What is the minimum level of support / contact you believe participants need throughout the 12 week programme
	    • Do some participants need more support than others? How do you deal with this?

	8. What were the key barriers reported by participants with regards:
	
	Prompts:
	    • Programme attendance
	    • Increasing physical activity
	
	9. What do you believe are the needs of the participants to help them remain physically active once the 12 week programme ends?
	
	Prompts:
	Personal motivation
	Long-term follow-up support
	Buddying system
	Continuation of the walking group
	Other

	10. What is your role regarding participants who stop attending the programme?
Perceived Benefits	**11. What in your experience are the benefits to participants of participating in the programme?** **Prompts:** Physical / Mental / Social / Medical / Other

Challenges Faced	**12. What are the key challenges you faced in your role?**
	
	Prompts:
	    • In linking with GP's
	    • In contacting patients

	• In motivating patients to attend the programme • In motivating patients to increase their physical activity • In liaising with other professionals/volunteers involved with the Green Prescription programme • Lack of time
Looking To The Future	**13. In your opinion what are the key skills/qualities that a support worker needs to possess?** **Prompts:** Background/training Personal characteristics
	14. Can you see the role of the support worker developing in any way? **Prompts:** Level of responsibility Signposting /linking to other programmes Liaisons with GP's / health professionals **Please explain this a little further…..**
	15. Would you have any opinions on ways the programme could be improved?

Green Steps Facilitators Interview	

Recruitment	20. How did you become involved with the Green Prescription Programme?
	
	 21. Describe your relationship with:
	     a. The Green Prescription Coordinator
	     b. The Green Prescription Development worker

Role, responsibilities and relationships	22. How would you describe your role?
	
	     a. What were your key responsibilities
	        i. During the Greensteps
	        ii. Community walks (Handover to walking leaders)
	
	 23. Describe your relationship with the Support worker
	 Prompts:
	 • How did you liaise with support worker
	 • Level of interaction
	 • What has been the change, if any, in your relationship with the support worker since the appointment of Bill?
	
	 24. Describe your relationship with the participants on the Greensteps programme?
	
	     a. Were you aware of the reason why individual patients were referred to the programme? How did this make you feel?
	
	     b. Do you think the participants saw you as a significant form of support? Explain this a little more…..(Were you expecting this?; In what ways did you provide support?)
	
	     c. What do you do if a client stops coming to the GreenSteps?
	
	 25. Describe your interaction with the walking leaders?

Effects	26. Thinking of the time you spent with participants, what effect do you think the Green Prescription programme had on them? (positive and negative) Prompts: Physically / Mentally / Socially / As a group
Challenges and Barriers	27. You worked closely with participants as part of your role……in your experience what were the main challenges patients faced during their time in the Greensteps?

	Prompts – In terms of:
	    • Barriers to turning up to the programme each week?
	    • Challenges during the classes themselves
	    • Challenges completing homework
	    • Progression to the outdoor walks
	
	28. Can you think of anything that could be done to help patients overcome these barriers?

	29. What were the main challenges / barriers you faced in your role?
	
	Prompts:
	    • Non-attendance / low attendance / drop out
	    • Age range of participants / diverse fitness abilities/ limiting illnesses
	    • Facilities
	    • Timing
	    • Other
	
	    a. How did you overcome these barriers / challenges?
	
	    b. Can you think of anything that could be done to remove these barriers / make these challenges easier?

Looking to the future	30. What do you think are key requirements / qualities for a Green Steps facilitator to have? **Prompts:** Background/training Personal characteristics
	31. What advice would you give to a newly recruited Greensteps facilitator? **Prompts:** What to expect Planning for success
	32. Do you have any recommendations for improving the programme?

Green Prescription Co-Ordinator	

Background and basis for the programme	1. Briefly describe your role within the health promotion department
	
	2. Why a "Green Prescription"?
	
	    a. Why physical activity in nature
	    b. Why use the community as a setting
	    c. Why engage primary care / health professionals

Role, responsibilities and relationships	3. Describe your role within the programme
	    a. Responsibilities (General)
	
	4. Describe your relationship with:
	    a. Green Prescription Development worker
	    b. Support worker
	    c. Greensteps facilitators
	    d. Community Co-Ordinators
	    e. Primary care
	    f. GP's / Health professionals

Planning and implementing
 	
Community Development approach
	5. Describe how you assess if an area is suitable to implement the Green Prescription programme
	    a. Mapping – what is involved in this?
	    b. Key resources needed
	
	2. How did you engage primary care and health professionals?
	
	6. Describe the process by which you implemented the Green Prescription programme in a community area
	
	7. Describe how you use a community development approach
	    a. On a scale of 1 to 10 (1 = Not important; 10 = Extremely important) how important do you believe utlising a community development approach is to the implementation of the programme? Explain

Green Prescription Team	8. Who are the key people / personnel needed to implement a Green Prescription programme?
	
	    a. Who are the key people in the Green Prescription team
	    b. Who are the key people in the community
	    c. In primary care
	    d. Who are other key partners
	    e. What makes these people so important
	
	9. What was the role of the steering group committee?

Steering group	a. How important was this role to the development of the programme. Explain.
Model Development	10. Describe the key changes in the programme model from its first development to the way it is today? a. Why did these changes comes about?

Sustainability	11. What do you believe are the key requirements to ensure the sustainability of the Green Prescription programme in an area? (Community ownership / primary care buy-in / other)
	
	12. What means, if any, have you put in place to ensure the sustainability of the Green Prescription programme?
	    b. Maintain community interest (Green Prescription newsletter)
	    c. Ongoing training walking leaders
	    d. Network developed for walking leaders
	    e. GP training in Green Prescription
	    f. Development of Green Prescription website

Challenges	13. Describe the challenges you have encountered during the roll-out of the Green Prescription programme within Donegal?
	    a. Support system
	    b. Green Prescription team workers/staff
	    c. Low referral numbers / Lack of GP interest or interest but lack of follow through on referral
	    d. Problems within community settings – no anchor person within some communities / facilities
	    e. High drop-out / poor adherance among participants
	    f. Lack of finance / funding
	    g. Other
	
	14. How have you dealt with the above challenges? (What have you put in place to overcome the above challenges?)

Funding	15. How has the Green Prescription programme been funded to date?
	    a. Source of Funding
	    b. Total amount it has cost
	
	16. In your opinion how has low level funding affected the implementation of the Green Prescription programme if at all? (Good or bad)
	
	    c. Willingness of community leaders/groups to take on the programme
	    d. Willingness of GP's to devote time to the programme free if charge
	    e. Necessity to recruit workers on a volunteer capacity?

Benefits and Success	17. What have been the benefits, if any, of implementing the Green Prescription programme in the various communities in Donegal?
	    g. From an individual perspective
	    h. From a community perspective
	    i. For you as a worker in health promotion
	    j. Partnerships formed / strengthened
	    k. Other
	
	18. In your opinion how successful do you believe the programme has been to date? Explain your answer

The Green Prescription Model	19. Briefly summarise the key elements of the programme model as it stands today
	
	20. How can you see the programme model developing in the future? (Vision for the programme)
	    l. Referral channels (other health professionals)
	    m. Type of physical activity on offer (e.g. gardening etc)
	    n. Other

Looking to the future	21. What qualities and background do you believe it is necessary for a Green Prescription co-ordinator to have? (county level)
	    o. Experience of working with communities
	    p. Experience of using a community development approach
	    q. History of successful programme implementation (make it easier to gain trust?)
	    r. Knowledge of working with health professionals (GP's/nurses etc)
	    s. Experience of applying for funding
	    t. Personal qualities – patience / enthuasism / communication skills / team work / organisation skills / leadership skills / other
	
	22. What advice would you give to a newly appointed Green Prescription co-ordinator in another county?
	    u. Locate programme champions
	    v. Build a good team
	    w. Only implement the programme in an area that already has all the key elements (community anchor, facilities, eager health professionals etc)

National roll-out: Structure, Leadership and Funding	23. How do you envisage the structure of the Green Prescription programme nationally 24. What body (or bodies) do you believe would be best suited to taking control of the programme and its roll-out nationally? x. What are your reasons for this? 25. What do you believe is needed to ensure the Green Prescription programme is successful nationally? 26. How much do you envisage it would cost on average to roll out the Green Prescription programme in one county? How do you envisage the Green Prescription programme is to be funded in future and for roll-out nationally?

Topic Guide Interview with Donegal Sports Partnership Coordinator	
Background	1. What is your role within the Sports Partnership?
	2. How would you describe the working relationship of the Donegal Sports Partnership with the Health Promotion Department here in Donegal?
	a. History of partnership working b. Level of interaction
	3. Did this relationship / your history have any influence on your decision to get involved with the Green Prescription programme? In what way?
Recruitment	4. What motivated you to get involved with the Green Prescription programme?

	a. Who contacted you
	    b. Opinion on the programme
	    c. How well, if at all, does the Green Prescription programme fit with the ethos and plans of the Sports Partnership?
	    d. Other

Role and Responsibilities	5. What has been the role of the Donegal Sports Partnership in the Green Prescription programme to date?

	a. Member of the Steering Group committee
	        i. How effective do you believe the steering group was?
	    b. Advice
	    c. Community mapping/profiling

	6. Have you any ideas on how the Sports Partnership and the Green Prescription programme can further develop their partnership / working relationship?

	a. Closer working relationship
	    b. Joined up programmes
	    c. Community mapping – list of trained walking leaders / established walking programmes
	    d. Sharing resources

Benefits and Challenges	7. In your opinion what is the potential benefit of a collaborative partnership between the Green Prescription programme and the Sports Partnership?
	
	   a. Benefits to the Green Prescription
	   b. Benefits to the Sports Partnership
	   c. Benefits to the community
	
	8. Can you envisage any potential challenges of a joint partnership between the Sports Partnership and the Green Prescription?
	
	   a. Challenges of working with the Health Promotion Department
	   b. Challenges of working with referred patients
	   c. Other

Learning from experience and Community Development approach	9. In your experience what are the key requirements in order to successfully implement a physical activity programme within the community setting?
	
	   a. Available resources within the community
	   b. Community anchor
	   c. Other
	   d. BEST MEANS OF ENSURING ATTENDANCE and ADHERANCE?
	
	10. In your experience how important, if at all, is the use of community development approach for the implementation of physical activity programmes within the community setting?
	
	11. In your experience what are the main challenges or barriers experienced when implementing physical activity programmes within the community setting?
	
	   a. How do you overcome these barriers?

Improvement and Sustainability	12. In your opinion what needs to happen for the Green Prescription to be sustained long-term?
	
	   a. In your experience of other physical activity programmes within community settings what promotes sustainability?
	
	   b. Can you think of any ways in which the programme could be improved?

Looking to the future – national roll-	13. What role do you envisage for the network of Sports Partnership in the national roll-out of the Green Prescription programme?

out	14. What body or partnership of bodies do you think would be best fitted to take on the lead role for the roll-out and implementation of the Green Prescription programme nationally? WHY IS THIS?
	
	15. Hypothetically, in your opinion how well equipped do you think the collective network of Sports Partnerships would be to take the lead control of the Green Prescription programme and its roll-out nationally?
	
	    a. Would the Sports Partnerships have the capacity to do this?
	    b. Do all Local Sports Partnerships have equal capacity or do they differ?
	    c. Available resources
	    d. Time
	    e. Linking with primary care / Health professionals
	    f. Linking with community organisations
	    g. Experience

Topic Guide for Interview with HSE Lead on Obesity and Head of Health Promotion North East (Nazih Eldin)	

Motivations and Opinions	1. What motivated you to get involved with the Green Prescription Programme?
	
	   a. Opinion on the programme, its aims & its need in Ireland
	   b. Its fit with current polices and strategies (e.g. Healthy Ireland – A Framework for Improved Health and Wellbeing 2013-2025; National Cardiovascular Health policy 2010-2019; Framework for Health Promotion 2010; Smarter Travel A sustainable transport future 2009-2020; Chronic Illness Framework 2008)
	
	2. In your opinion what are the strengths (or potential strengths) of the programme model? [Show programme model if required]
	
	3. What are the weaknesses (or potential weaknesses) of the programme model?

Benefits and Challenges	4. What potential benefits can you envisage from the roll-out of the Green Prescription programme nationally? 5. What potential challenges can you envisage? a. Have you any opinion on ways to overcome these challenges? 6. Where you see the programme fitting in relation to the National GP Exercise referral scheme?

Looking to the future	7. What body or partnership of bodies do you think would be best fitted to take on the lead role for the roll-out and implementation of the Green Prescription programme nationally?
	
	   a. Who do you think should be the leading body/bodies per area/county?
	   b. Opinions on the current joint partnership between HSE and Donegal Sports partnership?
	   c. Does strength of working relationship between the HSE and Local Sports Partnership vary across counties/areas?
	
	8. If Sports Partnership considered the best fit to take on lead role - Hypothetically, in your opinion how well equipped do you think the collective network of Sports Partnerships would be to take the lead control of the Green Prescription programme and its roll-out nationally?
	
	   a. Do all Local Sports Partnerships have equal capacity or do they differ across counties?
	   b. Available resources / time
	   c. Linking with primary care / Health professionals
	   d. Experience

Funding	9. Have you any ideas on potential funding options for the Green Prescription programme for future roll-out?

Consent form A: Referred and Self-Referred Green Steps Participants (Took part in both the Green Steps and the Community Walks)

Information Sheet and Consent form – Green Prescription Interviews and Focus Groups

Dear Sir / Madam,

You are invited to participate in a focus group discussion being held on **today** which will be facilitated by Siofra Stirrat, a researcher from IT Sligo. The purpose of the discussion is to hear your opinions and feedback about *The Green Prescription Programme* you have been involved in. As the concept of a green prescription is new to Ireland, this programme is part of an evaluation study. The study aims to let us know how successful the Green Prescription is for increasing physical activity and improving health – so we're keen to hear your views.

All information you give during the focus group will be treated in the strictest confidence and used exclusively for research purposes. Once the information is given to the researchers you will be assigned an ID number and the researchers will securely hold the coding information so your name is never revealed as part of the study. Only other people referred by their GP with a Green Prescription will be present at the focus group.

You reserve the right to decline this invitation as taking part in the Green Prescription study is entirely voluntary. However, your participation in this group discussion will play a major role in the success of the study. It is only by carrying out the study on new initiatives like this that we can better develop programmes to help make and keep people healthier.

We hope that you can support us in our work and we would like to thank you in anticipation for your help. Please sign below to indicate your consent to participate in this discussion alongside other individuals in receipt of a *Green Prescription* and bring it along with you to the focus group. Please do not hesitate to contact us if you have further questions.

Yours Sincerely,

_____

Siofra Stirrat & Maire McCallion & Azura Youell
(071 915274 / 071 9155242)
mccallion.maire@itsligo.ie

_____
___

I, _____(Print Name), consent to participating in a recorded group discussion about The *Green Prescription* Programme. I understand that this discussion involves other individuals who were also referred with a Green Prescription and that only my first name will be used to reserve my anonymity. I understand that no names will be included in the final report and that any information I give will be used only for the purposes of the research and kept confidential.

Signed: _____ Date: _____

Consent Form B: Community Walks Participants (Took part only in the Community Walks)

Information Sheet and Consent form The Community Walks Interviews and Focus Groups

The purpose of the discussion is to hear your opinions and feedback about The Community Walking Group linked to *The Green Prescription Programme* in which you have recently been involved. As the concept of a green prescription is new to Ireland, this programme is part of an evaluation study. The study aims to let us know how successful the Green Prescription is for increasing physical activity and improving health – so we're keen to hear your views.

All information you give during the focus group will be treated in the strictest confidence and used exclusively for research purposes. Once the information is given to the researchers you will be assigned an ID number and the researchers will securely hold the coding information so your name is never revealed as part of the study.

You reserve the right to decline this invitation as taking part in this research study is entirely voluntary. However, your participation in this group discussion will play a major role in the success of the study. It is only by carrying out the study on new initiatives like this that we can better develop programmes to help make and keep people healthier.

We hope that you can support us in our work and we would like to thank you in anticipation for your help. Please sign the attached sheet to indicate your consent to participate in this discussion.

Please do not hesitate to contact us if you have further questions.

Yours Sincerely,

Siofra Stirrat, Maire McCallion & Azura Youell
Department of Applied Science
Institute of Technology, Sligo
Ash   Lane
Sligo
 (071 915274 / 071 9155242)

Consent Form

I, _____(Print Name), consent to participating in a recorded group discussion about The *Green Prescription* Programme.

1. I know that I only have to answer questions that I want to answer and that if I want to I can stop participating in the focus group at any time.

2. I understand that no names will be included in the final report and that any information I give will be used only for the purposes of the research and kept confidential.

3. I understand and agree that the recording maybe transcribed by an appointed transcription agent who are bound by confidentiality.

Signed: _____ Date: _____

An Evaluation of the Green Prescription Programme: Visual Representation of how Initial Codes were Generated into Candidate Themes and Subthemes

Programme Challenges Encountered
- Stakeholder Concerns
- Environmental Challenges
- Individual Participant Challenges
- Overcoming Challenges
- Structural and Organisational Challenges

Programme Effects
- Effects on Participants
  - Negative Effects
  - Positive Effects
- Effects on Community Groups and the Community
- Effects on Health Promotion Department/HSE
- Effects on Health Professionals/Primary Care
- Effects on the Local Sports Partnership
- Effects on Walking Leader Volunteers

Influences on Participants' Participation and Physical Activity Behaviour
- Programme Branding and Community Perceptions of the Programme
- Environmental Influences
- Potential of Charging a fee for the Programme
- Incentives and Prompts
- Personal Influences
- Support Roles (SR)
  - Family and Friends SR
  - Green Steps Facilitators SR
  - Health Professionals SR
  - The Self SR
  - Support Worker SR
  - Other Participants SR
  - Walking Leader SR

Programme Structure and Organisation
- Role and Responsibility (R&R)
  - Participants R&R
  - Community Coordinators' R&R
  - Development Officers R&R
  - Green Steps Facilitators' R&R
  - Health Professionals R&R
    - Health Professionals Experiences of Referral
      - Paperwork
      - Reasons for Referral
  - Local Sports Partnership R&R
  - Green Prescription Coordinators R&R
    - Programme Origin and Initial Vision
  - Support Workers R&R
  - Walking Leaders R&R
- Green Steps
- Community Walks
- Programme Promotion and Advertisement
- Recruitment of Programme Partners
- Required Resources
- Signs of Progress
  - Markers of Programme Success
- Steering Group
- Sustainability
  - Programme Attendance
- Use of a Community Development Approach
- Referral

Looking to the Future
- Recommendations for Programme Development and Improvement
- Considerations for Programme Roll Out
  - Advice for Newly Appointed Programme Partners

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Code	Theme name	Definition What it includes	Exclusions What it doesn't cover	Example
P.V	**Programme Vision**	Data from interviews with Programme Coordinator and Community walks Development Officer – Why programme was developed; Initial Vision for programme; What programme aimed to achieve	Interview data from any stakeholders other than Programme Coordinator/Development Officer; Experience of implementation	"I wanted to develop a programme that used the outdoors, used nature as a source and resource for health and wellbeing" (Programme Coordinator) "what would be different in Ireland like in that we were going to develop a more community based approach and that my own experience is in community development so…[I] wanted to use the community development approach" (Programme Coordinator)
F&A	**Feasibility and Acceptability**			
	Subtheme 1: Recruitment			
	1.1 Recruitment of Community Groups (CGs):	Criteria for CG recruitment; How CGs were recruited; Ease of recruiting CGs; Challenges and Facilitators to recruiting CGs; CGs experiences of recruitment; CGs motivations for involvement		From the community aspect, to be honest I suppose in the very beginning it was an open door policy for me really with all the communities, so I didn't have an issue with the communities, them initially buying in and getting involved in the programme. (Programme Coordinator) when the Gardens Programme came along, and earlier on there was a Youth Participation Programme came along, we were quite happy to say Green Prescription it's an extension of that. Our bit is the garden, the new element was the walk. We thought, okay, it fits with what we do (Community Leader)

	1.2 Recruitment of Walking Leaders	Criteria for WL recruitment; How WLs were identified and recruited; WLs motivations for involvement; Challenges/Facilitators to WL recruitment		the walking leaders…were people we identified through various programmes that would be happening here in the centre…and also then we had open advertising then, just put out leaflets from the centre to say that this training opportunity was coming up (Community Coordinator) it wasn't a difficulty finding people to train [as walking leaders] (Community Coordinator) I worked out at Cloghan as a public health nurse where it all started so I knew about stuff so then, and I retired in February and I thought I wanted to do something…So I saw the Sunday Newsletter…and I thought, God, I'll get on to it. (WL volunteer)
	1.3 Recruitment of health Professionals (HPs)	Criteria for HP recruitment; How HPs were recruited; Ease of recruiting HPs; Challenges and Facilitators to recruiting HPs; HPs experiences of recruitment; HPs motivations for involvement		[the next challenge was] just kind of even exploring the area or working with GPs, trying to find where GPs were. There was no proper data bases, there was no kind of contact forms even though I contacted the GP unit, they didn't even have a list of the emails. (Programme Coordinator) [The Programme Coordinator]…came in and explained what the programme was about and it sounded really interesting and…it just sounded a very easy programme to take part in and would be quite effective (Nurse)
	1.4 Recruitment of participants	Range of methods used to recruit participants (referred/self-referred/community walkers); How participants heard about programme/became involved with the programme; Perceived effectiveness of recruitment methods; Perceived barriers or facilitators to participant recruitment		"I was recommended through my GP" (Participant) I think it is absolutely not publicised enough, I think a lot of pEOPle don't know about it because when I talk to people in my everyday life and I tell them what I'm doing and they say "what's that?", [they've] never heard of it (GSF)

				well they advertised this walking group here but we didn't get very new, very many new members (Participant) they're not better attended and I think they're not better attended because people don't know enough about them and they're not being referred (GSF)
	Subtheme 2: Referral Component			
	2.1 HP perspective of referral component	Perceived need for programme; Experiences of referral role; Challenges and facilitators within referral role; Suggestions for improvement;	Not impact; Not perspective of any other stakeholder	"I think a shocking number [of my patients] would fit the criteria for referral…and we're not doing it maybe because we/I am still not good at it and maybe because…we feel that people won't or aren't ready to engage." (GP) "I do I understand the concept of a prescription but I mean me having to weigh them and get their height and their BMI and you know go through all that, blood pressure and all the rest of it I think em its just you know takes time and effort" (GP) "….remember the role of other practice staff and I don't just mean the health staff, I think we always forget the power of reception front desk staff and on a thing like this there is no real reason why they cant be involved – in encouraging, in providing the information, in offering it…" (GP)
	2.2 Reasons for Referral	Reasons why participants were referred to programme reported by HPs / Referred participants themselves / Support Worker	Not evidence of inappropriate referrals	"we've aimed it at the groups we've been particularly aware of…COPD, weight reduction / BMI reduction…diabetes…we have some awareness of psychological issues, post-depression … Now because the world is a multimorbidity world most people who fall into any of those categories would fall into a few of them…." (GP)
	2.3 Inappropriate referrals	Evidence of inappropriate referrals reported by GSFs / WLs / Support worker / Participants themselves		"one person that dropped out was, he just, it just wasn't the right program. The doctor forwarded him to the program but it didn't suit him, he was very, very, very old, very, very frail, you know. So it

			didn't suit him and he had ligament damage in his legs, you know this is a walking program, you know". (GSF)
	2.4 Referred Participants experience of referral	Info from referred participants only: Level of information received; Was prescription slip issued; Suggestions for improvement; Evidence of how HPs positively or negatively influenced programme uptake /adherence for referred participants	Other stakeholders beliefs about HP influence	"I mean I don't know if advertisements in a newspaper or anything at all is going to do it…I needed the push from the doctor especially to go and do it…" I didn't feel I knew enough about it [at the time I was referred] but when she decided on it I thought "well you know best", sort of thing that's the only information we got on it [at the time of referral] really word of mouth from eh Elsie the nurse ya know
	Subtheme 3: Green steps Component	How Green Steps was developed; Participants perceptions of the structure and organization of Green Steps; Participants satisfaction with Green Steps component; Suitability of exercises; Suitability of facilities	How GSFs influenced participant attendance; GSFs self-reports of how they structured programme & reasons why they structured programme the way they did; GSFs experience of programme	Well I was very pleased with that first 4 weeks, doing the exercise and all the rest, it was the sort of thing I wanted and I thought it was well delivered. I suppose another thing would have been the em, initially the location wouldn't have been, some of the places wouldn't have been the best. Initially in Letterkenny we had a very small room and it wasn't good, its not good and there are no windows in it, the location is very important.
	3.1 Role of Green Steps Facilitators (GSFs)	How GSFs lead sessions; facilitators and challenges experienced in roles; relationship with other members of GRx team; Suggestions for improvement; Skills needed to fulfil GSF role according to GSFs themselves and participants		I would describe my role as being, well I felt that em it wasn't just a walking instructor but I had to be eh somebody who kind of was somebody they could come in to that they would enjoy the class, that would know their names…somebody who was really going to motivate them and encourage them to come back The other challenge would have been I suppose I didn't know enough about them [referred participants]…And that would have made things

				easier [if i had known more about them].
				there's no way that a class can be conducted by what's written down on the page, you have to be able to em, what's the word I'm looking for, you have to be able to em, first of all em, vary it for different people and so you have to be able to just on the spot change things according to the needs of the people
	Subtheme 4: Transition Period from Green Steps to Walks	How transition period between Green Steps and Walks worked; Challenges encountered; Participants experiences of handover / transition		The Change of leaders [between the Greensteps and Walking group], no that didn't bother me at all, because Finola came to one of the first walking groups so she was there and no it didn't bother me at all.(Participant)

Obviously getting the flow from the Greensteps to the walking group, is essential, keeping that flow and keeping that, em unified em consistency with em, with not just time eh but also with exercise. So you've got to get your time slot right, you've got to get your venue right, you've got to get your exercise and you got to get the right walk leaders and that's very difficult (GSF) |
| | **Subtheme 5: Community Walks Component** | | | |
| | 5.1 Community Leaders' (CLs) Role | Descriptions of CLs role: CLs Perceived need for programme; Experiences of community leader role; Challenges and facilitators within role; Ownership of programme; Suggestions for improvement | | I think when you're in the community capacity you're used to recruitment, you're used to…the development side of things

I think it would be great if there were more check-ins [from]…the HSE

Well I think it [improvements/developments within the programme] should be initiated by the HSE definitely because they are technically |

			governing the programme. With the support of definitely the people on the ground.
	5.2 Community Walks	Descriptions of what walks entailed – how they were structured and organised; Participants perceptions of the structure and organization of walks; Participants satisfaction with walks; Suitability of walks; Challenges experienced by participants on walks	the outdoor walking it was a bit hit and miss because of weather (Participant)
			I find in the outside were not walking far enough or even fast enough I suppose (Participant)
			the way it is, it's a strollers group, it's a very easy walk because you don't want to overwhelm anybody. (Development Officer)
			I think it was well organised… you got three quarters of an hour of a walk and the progress was monitored and basically it motivated you…it started on time and it finished on time, very well structured. (Referred participant)
			The footpaths are diabolical around here – they're broken….you could slip and fall and break your leg (Community Walker)
	5.3 Walking Leader (WL) Role	How WLs experienced role; facilitators and challenges to WL role; WLs satisfaction with role; Suggestions to improve WL role; Others perceptions about role played by WL (e.g. importance; how well others felt WL fulfilled role; Level of satisfaction with role played by WLs); Key skills needed within WL role	"The role of the leader is not to be bossy it is to encourage" (Walking leader)
			I don't like the way the fast and slow, I can't seem to manage that…As your man [walking leader trainer] said the hares and the turtles, so I know he done a lot of work on that for us but in practical terms it's very difficult to get round it. (WL)
			I'd say the walking leaders [have the biggest role to play] because they ultimately have the responsibility when they go out on the walk

			(Community Leader)
			The walking leader needs to be motivated, which they were, encouraging and experienced, so that's it. (Referred participant)
	Subtheme 6: Influences on participant uptake, participation and adherence to the programme	All factors that acted as motivators or disincentives for participants to uptake the programme and/or attend the programme each week.		
	6.1 Environmental influences	Influence of environmental factors – e.g. weather; lighting		One of the challenges was people didn't continue to come along because the weather and things like that (WL)
	6.2 Individual participant challenges	Personal barriers faced by participants – e.g. illness, disability; psychological factors; other commitments		I lack motivation (Referred participant) I have…an 11 year old that needs a lot of attention so some mornings she's hard to get out to school and she has special needs so I've other commitments that I just can't just commit (Community Walker)
	6.3 Individual facilitators	Personal motivators for participants e.g. internal motivators	Not external prompts	I'm a very determined person like I can get things to work out that way for me. I've got big motivation.
	6.4 Timing issues	Influence of the times of Green Steps / Walks		I would have like to have joined [the walking group]you know what I mean but times didn't suit (Referred participant, dropped out)
	6.5 Incentives and Prompts	influence of tangible incentives and prompts provided during Green Steps and Walks (e.g. Stepcounters, Diaries)		I was walking all around the house or walking from the house, you know, to somebody else's house, where you'd normally drive, you'd do it deliberately to get the mileage up [on the pedometer] (Referred

			participant)
			"that bloody pedometer didn't work".(Participant)
	6.6 Influence of significant others	Influence of WLs, GSFs, Support worker and other group members		just the way she [Greensteps facilitator] would instruct us you know, and didn't put pressure on anybody. Finola kind of made you want to come to it (Referred participant)
				The phone calls just prompting you to make sure you turn up for the class and that I found were definitely good (Referred participant)
				"I would find it boring to go out walking on my own but to know that there were going to be others starting off, yes that would be a lot of what would entice [me to go]" (Community walker)
	Subtheme 7: Support System	Description of support system: how it was structured; how structure changed over time; role of support worker; challenges and facilitators within the support worker role; perceived effectiveness of support worker role (according to support worker); suggestions for improvement; perceptions of other members of GRx team re support system	Participants reports of how support worker influenced attendance	Support worker role is to take in referrals coming from GP's…introduce them to the program…answer any questions they might have…and get them motivated and get rid of any kind of anxiety or worries they might have. (Support Worker)
				I think there's more to it [my role] than what I thought at the beginning…my thinking was that it was just kind of supporting participants through…the program…I see it now there's more because…you're linking with community groups, linking with GP surgeries… (Support Worker)
				the vision I had for the support worker – [XXXX] is doing that, doing

				it really, really well. I think the difference [in the Support Worker role from last year to now] is also he's got two days work…it's more structured…accountable…effective and efficient (Programme Coordinator)
	Subtheme 7.1 Dealing with Drop-outs	How programme dealt with the issue of drop-outs (system for dealing with drop-outs)	Reasons why participants dropped out	Well [if a participant dropped out] we have contact numbers for everybody so like just to give like a wee phone call to say, do you know, we're just checking up to see if you're coming back or not (WL)
PI	**Programme Impacts**	References to any positive or negative impacts of the programme for participants and other stakeholders	Anything other than positive or negative **outcomes**	
	Subtheme 1: Impacts on Participants			"…it was a very good thing to get me going really, a great motivation to get me started again. I used to walk a way back years ago but then with this old ostEOPorosis [I thought] "oh sure I'm useless now I'm not going to be able to do anything - ya know walking anyway…but nah it gave me the encouragement to know that I could do it.." (Referred walker)
	Subtheme 2: Impacts on Primary care			"..we have been spouting the evidence for increased exercise for years and we're not delivering it so that's the big thing it [the Green Prescription Programme] actually gives us a mechanism whereby we can deliver something that we believe to be an important intervention." (GP)
	Subtheme 3: Impacts on Communities / Community groups			"people who wouldn't come in and maybe access training or whatever with us, are involved, you know they don't maybe get involved in any of the other activities but they're specifically very keen in getting involved in the green prescription. And the green prescription as well has been a great nucleus of people that we have

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				been able to kind of identify, that may need support and help in other ways as well. So we've found that people that have actually got themselves involved in other activities within the centre as well" (Community Leader) I suppose there were a few people that I didn't know and I got to know them on the group walk that were living in the area and I had never seen them before! Like their social life and my social life wouldn't have interconnected but I was able to chat to them and get to know them. (Referred Participant)
	Subtheme 4: Impacts on Walking Leader Volunteers			"…well I'm getting to know people I never worked with before…..and especially for me now I'm retired and I want to get involved in things, its great, for me" (Walking leader)
PID	**Programme Improvement and Development**	Recommendations / Suggestions on how to improve the programme and how its structured and organised from all the different players – things that would make involvement in the programme easier, more appealing etc	Some overlap with other subthemes e.g. a WL might have mentioned a challenge and suggestion for improvement within same sentence	"…I think there'd be no harm if we did know or at least made aware "be careful of them [referred walker] and they have certain capabilities" and I think it wouldn't be as worrying then for us… (Walking leader) "we were hoping to do it last year and just with the funding and that we didn't get around to it, but what we're hoping this year too is now to do volunteer awards recognition evening and I think that's very important for them to get a sense of something out of it. A sense of recognition and thank you (Development Officer) "maybe we could think about putting an add up on Facebook too for it, advertising these walks" (Participant)
CKSE	**Consultation with Key Stakeholders and Experts (CKSE)**			

	Subtheme 1: Acceptability CKSE	Perceived and realized acceptability of model; perceived need; Perceived fit with governmental priorities; Perceived fit with priorities of Local Sports Partnerships		it fits incredibly well with every policy that you can think of in Ireland. And basically the policies are that we have to increase the level of physical activity among the people, so really it fits there. (National Lead on Obesity, HSE) So it [the Green Prescription Programme model] has been accepted and recognized and acknowledged as a way of working and that it has involved the community. (Programme Coordinator)
	Subtheme 2: Feasibility (Realised and Perceived feasibility for roll-out) CKSE	Feasibility of the programme – challenges to implementation and roll-out; Facilitators to implementation and roll-out; Key requirements for the programme to work; Perceived suitability of programme for roll-out; Potential funding; Partnership of bodies perceived as best placed to lead		the collaborative work, partnership work and whether its community, statutory and ourselves working together, it's a good, model to have…I think we can get a lot done on very little resources with that model. (Sports Partnership Officer) the other thing is that can impact on it is that if there are no community facilities – you know if there are no access to community facilities and things like that it can be an obstacle so that is something that we have to be aware of (National Lead on Obesity, HSE) there were a lot of issues around…the present climate of community infrastructure and the changing political and social arena. So that's…a big challenge for us really. (Programme Coordinator) well [the best partnership of bodies to lead the programme is] as per current practice – we have the health services, the GP's, the community, as well as Health Promotion OK. I would add to that wherever possible the local Sports Partnership Ok, I would add them definitely. I would add also the Department of Environment – that's more general, County Councils or local Councils and so on

	Subtheme 3: Opportunities to enhance the model (CKSE)	Perceived ways in which the programme could be improved / increase the impact of the programme		Innovation is huge as well, I think you know sometimes we have to realize that maybe you know this program is not working here, we might have to tweak it a little, we might have to change it a little, not be afraid to do that. I think reviewing it, evaluating the programs and so on is key (Sports Partnership Officer) the newest link we are developing now I suppose is referring routes from the hospital (Programme Coordinator) it needs to be linked into the Chronic Disease Model so that it's seen as a core part of the wider programme which is being driven nationally and is also happening at the regional and county level (Programme Coordinator)
	Miscellaneous Themes	Themes / Nodes that do not fit into the above nodes / extra information		

Note: Coding   queries   were   used   within   Nvivo   to   further   explore   themes   and   subthemes

icgp

The Irish College of General Practitioners

Coláiste Dhochtúirí
Teaghlaigh Éireann

5th April 2012
Ms Azura Youell
Dept of Applied Science
Institute of Technology
Ash Lane
Sligo

Green prescription physical activity study

Dear Ms Youell,

I wish to confirm that I have reviewed the additional documentation from the Green Prescription Physical Activity Study including the additional questionnaires. I am happy to approve the study as now agreed including the addition of the wellbeing scales (i.e. two new questionnaires).

Yours sincerely,

Prof Colin Bradley
Chair Research Ethics Committee

Kieran Ryan
Chief Executive Officer

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30th May 2012

Ms. Azura Youell
Dept. Allied Science
Institute of Technology Sligo
Ash Lane
Sligo

Re: **Application for Ethical Approval – Green Prescription Physical Activity Study**
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Dear Azura,

I have considered your request for Ethics approval in relation to above study and am happy on behalf of Letterkenny General Hospital Ethics Committee to grant Chairman's approval.

Yours sincerely

Mr. Seán Murphy
General Manager &
Chairperson of Ethics Committee