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**The Long-Term Effectiveness of the New Zealand Green Prescription
Primary Health Care Intervention on Christchurch Residents.**

A Dissertation
submitted in partial fulfilment
of the requirements for the Degree of
Masters of Applied Science

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E.G.Yule

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**Abstract of a Dissertation submitted in partial fulfilment of the
requirements for the Degree of M.Appl.Sci (Sport and Recreation
Management)**

The Long-Term Effectiveness of the New Zealand Green Prescription Primary
Care Health Intervention on Christchurch Residents.

by

Elise Yule

The aim of this research was to evaluate the long term effectiveness of the 'Green Prescription' programme, (GRx) in encouraging an increase in physical activity levels in previously inactive individuals, between January 1st 2012 – May 1st 2014. Participants were a non-randomised subset of a larger GRx population. Prescribed Christchurch residents were separated into two groups, the intervention group (discharged-independently active from the programme) and the control group (discharged-not registered-declined programme and discharged-registered-declined programme). These groups were then randomly selected using Microsoft Excel. A retrospective survey was administered and conducted via telephone. Completed surveys were attained from 147 of 498 participants, a total response rate of 29.9% between the two groups. Forty-one percent of participants in the intervention group reported increases in physical activity levels since being prescribed the GRx programme, 23.1% meet the national physical activity guidelines, and 73.6% were classified as non-sedentary. A higher proportion of the control group (46.4%) were classified as sedentary and only 16.1% met the national physical activity guidelines. Participants who had completed a GRx averaged 146.9 ± 173.5 (mean \pm SD) physical activity minutes per week in comparison to the control group 83.1 ± 100.3 . A decrease in meeting physical activity guidelines was observed the longer participants were off the Green Prescription Programme. Participants in the intervention group also reported higher levels of energy, increased mobility, a decrease in medication, body weight and aches and pains, had fewer breathing difficulties, felt stronger and more mentally relaxed compared to those in the control group.

Keywords: Physical activity, health, green prescription, effectiveness, health interventions, primary care health, sedentary, exercise advice, prescription, counselling, chronic disease, physical inactivity, diet, lifestyle, health professionals.

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Chapter 1

Introduction

There are three main factors that influence our health; namely our genetics, the environment and our behaviour. With little control over our genetics we can focus on controlling our environment and behaviour to improve our health. Changing environmental factors have resulted in better health by reducing the influence of infectious diseases through improved hygiene and medical vaccinations. However, recently our behaviour has changed (alone or in combination with environmental change), which has resulted in less physical activity and subsequently poorer health outcomes. Physical inactivity is influencing chronic health conditions which are a major challenge within the health care sector in New Zealand and many other developed countries. Many of the risk factors associated with long term health conditions are lifestyle focused such as tobacco use, obesity, poor nutrition and physical inactivity. The health benefits of physical activity are well documented, although the percentage of adults who lead sedentary lifestyles has continued to increase along with obesity since the 1980's (Ministry of Health, 2008).

Overall, contemporary lifestyles are completely different from our ancestors, especially in Western societies as we are influenced by technological development, innovations, urbanisation and physical inactivity. These types of changes have influenced many of the lifestyle risk factors including sedentary behaviour. Sedentary behaviour is classified as undertaking activities that use very little energy for example, lying down, watching television or using a computer (Ministry of Health, 2014). Although there are other influences, physical activity is exceptionally beneficial to our health and we are all capable of physical movement. It is realising the importance and gaining the motivation to incorporate it into our lifestyles that can be difficult. Unless there is a reversal of this sedentary lifestyle or lifestyle habits are changed, chronic diseases and disabilities will continue to increase, life expectancy will continue to decrease and medical costs will continue to rise (Knight, 2012).

In many cases, medications being prescribed by physicians are managing and masking diseases without healing the problem. Therefore, it is generally accepted that when general practitioners prescribe physical activity as part of the patient's health management, health issues may be improved long term, which would help prevent other health problems from occurring. The evidence which is discussed throughout this dissertation indicates that active living and maintaining physical activity levels at an optimum are closely associated with beneficial health outcomes. Physical activity can reduce the risk of many long term health conditions and help manage the chronic conditions

some individuals develop. National recommendations state that New Zealand adults should partake in at least 30 minutes of moderate physical activity at least 5 or more days of the week (Ministry of Health, 2015). Currently 54% of New Zealand adults meet these guidelines (Ministry of Health, 2014). Even worse, 12% of New Zealand adults are considered sedentary, completing less than 30 minutes of physical activity a week (Ministry of Health, 2012). In this dissertation I will outline the major reasons behind the increasing chronic diseases, the consequences of sedentariness, the interventions and initiatives in place worldwide to promote healthy active lifestyles with a large focus in particular on the New Zealand health intervention known as Green Prescription (GRx). The Green Prescription programme was launched in 1998, and is a prescription for exercise which is predominately administered by a general practitioner or practise nurse as part of a patient's health management to help prevent and manage health issues such as hypertension, high cholesterol and type two diabetes (Patel, Kolt, Keogh & Schofield, 2012). In 2014/2015 Green Prescriptions were issued to more than 47,000 patients, (Ministry of Health, 2015). When the GRx was first established there was little focus on inequalities. Health inequalities within New Zealand exist between different geographic areas, ethnic groups, socio economics groups and male and females. However, expansion of the programme has included strengthening and enhancing the penetration of the GRx programme within high-needs communities for example, Pacific, Maori and lower socio economic communities have been highlighted, (Signal, Egan & Cook, 2009).

Previous research has investigated barriers, self-reported health benefits, support, effectiveness and the influence of different ethnicities on GRx success. Although, the programme has been analysed previously little is known about the long term effectiveness of the GRx. To investigate the long-term effectiveness of the GRx, we questioned, via telephone survey, 494 randomly selected patients who were referred to Sport Canterbury at least 1 year ago, from 1st May 2014. Approximately half of the sample (271 participants) were offered and completed the GRx programme (discharged as independently active; intervention group) while the other half (223 participants) were offered the programme but declined it or started the programme but did not complete it (discharged registered but declined the GRx; control group).

The dissertation will be organised in chapters as outlined below.

Chapter 1: Introduction

Introduces and briefly defines the topic and background, providing an overview of the research.

Chapter 2: Literature Review

A review of literature relating to the benefits of physical activity and the different primary care health interventions worldwide with a strong focus on The Green Prescription Programme. This helps to draw conclusions about existing research and the possible areas for future research.

Chapter 3: Research Methods

Outlines the overall research methods used to select participants, develop a reliable survey and collect and analyse data.

Chapter 4: Results

The results from the surveys are presented.

Chapter 5: Discussions and Conclusions

The changes in physical activity levels between the intervention group (discharged-independently active from the programme) and the control group (discharged-not registered-decline programme and discharged-registered-decline programme) are compared, followed by a discussion on the significance and implications of the study. This chapter summarises key findings and provides concluding statements for the dissertation.

Chapter 2

Literature Review

2.1 Introduction

The purpose of this literature review is to evaluate the New Zealand Primary Health Care Intervention known as The Green Prescription Programme, particularly in regard to its long term effectiveness. Other health interventions worldwide and their effectiveness will also be discussed. The literature review will identify gaps in the knowledge and subsequent areas of potential research.

The majority of the literature in this chapter came from peer-reviewed journals or statistical research from the Ministry of Health (MOH), making the findings accurate and reliable. Previous research involving the Green Prescription Programme from areas other than Canterbury are discussed, making this research timely and needed.

2.2 Lifestyle

Our modern lifestyle lacks physical activity which strongly correlates with chronic diseases such as high blood pressure and cholesterol. Our bodies are designed to be active, as physical movement is a basic condition of life required on a daily basis in order to achieve vitality and sustain health (Amusa, Toriola & Goon, 2012; Bowers, Carter, Gorton, Heta, Lanumata, Maddison, McKerchar, Nimhurch, O'Dea, Pearce, Signal & Walton, 2009). It has been well established that maintaining a healthy lifestyle is directly linked with health benefits. A physically inactive lifestyle poses a threat to human health, causing a major deterioration in our normal bodily functions. Large amounts of literature have previously investigated benefits of physical activity for people of all ages and ethnicities and recognises the fact that regular exercise has the potential to reverse the effects of these diseases (Blair, 2009). Physical activity increases our cardiorespiratory endurance and our blood circulation which helps prevent cardiovascular disease and risk of stroke. Furthermore, exercise reduces the risk of cardiovascular disease as oxygen supply to the heart is increased, it delays the progression of atherosclerosis, and decreases the stress on the heart. Regular physical activity also increases insulin sensitivity, thereby reducing the risk of type II diabetes, (Balkau, Mhamdi, Oppert, Nolan, Golay, Porcellati, Laakso & Ferrannini, 2008) but also has a beneficial effect on blood pressure in individuals with hypertension. Physical activity also increases our high density lipid proteins, improves our glucose tolerance and helps control our body weight (Bouchard, Blair & Haskell, 2012). Furthermore, regular physical activity can also increase confidence, self-efficacy, overall quality of life and lower levels of anxiety and depression (Sinclair & Hamlin 2007; Stephens 1988). Overall, you might suggest

that physical activity is a preventive medicine, and indeed the American College of Sports Medicine now promote 'Exercise is Medicine' to highlight the close links between the two concepts.

The intensity of exercise does not need to be vigorous to gain health benefits. Even moderate activity in daily life can have health benefits. However, the duration and frequency of exercise has more influence on health benefits than the intensity (Physical Activity and Health, 1996). This enables people to easily incorporate duration and frequency of exercise into their daily lives for example, choosing to take the stairs over the lift, or parking further away from the doors to increase walking duration.

Our lifestyles have negatively impacted on the amount of physical activity we do. Physical activity levels have changed dramatically over the last century (Clarke, 2003), for instance, farmers rode horses or walked instead of using motorbikes and had to collect firewood for the family fire instead of using a heat pump remote. Overall, our amount of physical activity and daily energy expenditure has rapidly declined in the 20th (Blair, Kohl, Gordon & Paffenbarger, 1992) and 21st century due to motorised transport, labour-saving devices, entertainment technologies, power tools and gadgets. This increase in labour-saving devices has reduced the need to depend on muscular work. Urban design has made it arguably challenging to be physically active and those who want to adopt a physically active lifestyle generally need to use their leisure time. These global changes have consequently resulted in a variety of health problems referred to as hypokinetic diseases (Bouchard et al, 2012). Hypokinetic diseases are triggered due to a lack of physical activity. When the word hypokinetic is broken down, hypo means "less" and kinetic means movement. Sedentary people who do not meet the recommended physical activity guidelines do not generally realise that they are inactive. For those that do, many of them struggle to motivate themselves to change. Therefore, we need to acknowledge these changes in today's society and become aware of how they affect our different dimensions of wellbeing and ability to live a balanced healthy lifestyle.

Chronic health conditions associated with physical activity are becoming increasingly common in the primary health care setting. For example, hypertension, type two diabetes, osteoporosis, chronic heart disease and elevated cholesterol (Kesaniemi, Danforth, Jensen, Kopelman, Lefebvre & Reeder, 2001; Elley, Kerse, Arroll & Robinson, 2003). The World Health Organisation (2009) has estimated that approximately 60% of the 59 million reported deaths globally in 2004 were associated with chronic diseases. Sedentary individuals are more likely to die prematurely than active individuals (Hallal, Victoria, Azevedo & Wells, 2006). Moreover, it has been suggested that the rise in non-communicable diseases over the last 40 years has led to predictions that for the first time, the current generation of young adults may not live as long as their parents (Olshansky, Passaro, Hershov, Layden, Carnes, Brody, Hayflick, Butler, Allsion & Ludwig, 2005). With evidence stating that

exercise has the capacity to improve many aspects of health it is concerning that people in developed countries such as the United Kingdom do not exercise sufficiently for health benefits to accumulate (Hammond, Brodie & Brundred, 1997).

Without intervention this issue will continue to develop and worsen. In the United States alone, approximately 250,000 premature deaths occur each year as a result of physical inactivity (Booth, Gordon, Carlson & Hamilton, 2000). In New Zealand, almost half of the adult population would be classified as insufficiently active or sedentary (Sport and Recreation New Zealand, 2003). Meanwhile in Australia 50% do not meet the public health guidelines (Plotnikoff, Morgan, Lubans, Rhodes & Costigan, 2014), despite the overwhelming evidence that physical activity has many health benefits. Increasing New Zealander's physical activity levels has been listed as a public health priority, in New Zealand's health strategy (Ministry of Health 2000). In 2000 there were 61 objectives of these 13 population health objectives were chosen for implementation. Increasing physical activity levels was considered fourth priority, (King, 2010).

2.3 Primary Care Setting

The primary care setting has been recognised as an ideal setting to promote physical activity. This is because 80% of New Zealand adults visit their general practitioner (GP) at least annually (Croteau, Schofield & McLean, 2006; Elley et al, 2003). Therefore, providing the opportunity for counselling on physical activity and lifestyle habits due to regular contact patients have with their GP's. Additionally, doctors are respected in society and patients tend to follow their advice as they are often concerned about their health and feel vulnerable when visiting their GP thus are receptive to the information and advice they receive, (Swinburn, Walter, Arroll, Tilyard & Russell, 1998). Overwhelmingly, two in every three adult New Zealanders suffer from at least one long term chronic disease (Ministry of Health, 2009). For instance, cardiovascular conditions affect many New Zealand adults with the Ministry of Health, (2014) reporting 16% taking medication for high blood pressure, (estimated 558,000 adults) and 10% for high cholesterol, (estimated 367,000). Furthermore, 5% of adults have been diagnosed with ischaemic heart disease (estimated 193,000) and the number of adults with diabetes is increasing slowly over time, currently 5% (almost 200,000).

With chronic diseases on the rise and currently 66% of New Zealand adults over the age of 65 not meeting the national physical activity guidelines, an increasing number of people will need medication for possible preventable chronic diseases in the near future. The necessity for prevention strategies to be focused on all age groups as seen in the Green Prescription Programme is vital to reduce the overall morbidity and mortality associated with chronic health conditions and diseases. If adult patients can be encouraged to participate in at least 30 minutes of moderate-intensity exercise on most days of the week they would obtain at least a 30% reduction in risk of stroke, colon cancer,

type two diabetes and coronary heart disease, which in America are the 4 biggest killers (Chakravarthy, Joyner, Booth, 2002).

This graph below from the Ministry of Health supports the evidence and necessity to increase physical activity levels across all age groups and genders (Ministry of Health, 2008). This graph indicates that nearly half of New Zealand's population across all age groups and genders do not partake in regular physical activity. The Ministry define regular physical activity as at least 2.5 hours of physical activity in a week, comprising at least 30 minutes of physical activity per day on five or more days of the week.

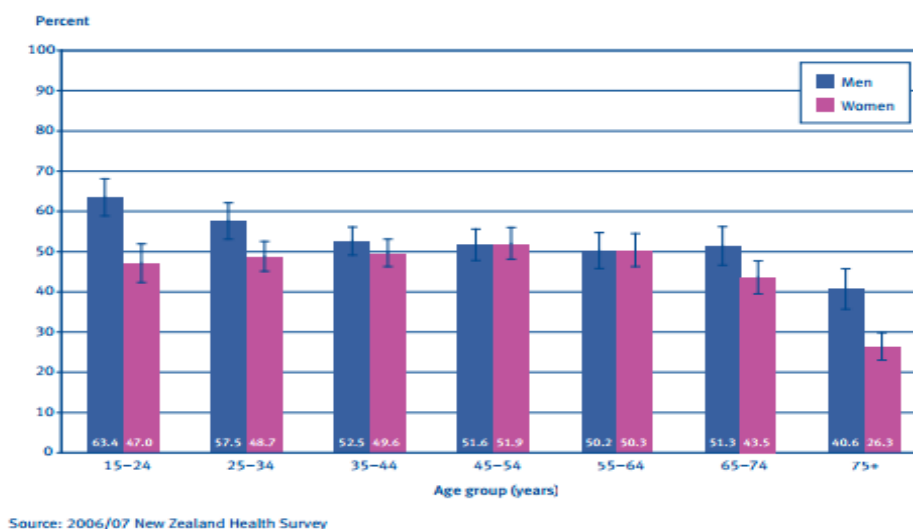


Figure 1: Regular physical activity for adults, by age group and gender (unadjusted prevalence).

Understanding these statistics allows the development of strategies to increase the population's physical activity levels and decrease risk of chronic disease through physical activity. GP's are in the ideal setting to implement an intervention such as Green Prescription as they have access to sedentary individuals and the at-risk population within their practices, (Handcock, Jenkins, 2003). Ultimately, sensible exercise offers more benefit than risk to our health.

2.3.1 Physical Activity Interventions in the Primary Care Setting:

An obvious answer to our growing chronic disease problem would be to get individuals more active. The general practice was identified as a suitable setting to motivate patients to increase physical activity as GP's acknowledge that physical activity is crucial to good health. General practitioners and practice nurses in the primary care health setting need to have positive attitudes and perceptions towards prescribing exercise to ensure the Green Prescription programme and their patients benefit.

There are personal trainers and health clubs within our communities which serve an important purpose to individuals, especially those who want high-intensity workouts or who are already regularly active. However, completely sedentary individuals will benefit from simple physical activity

within the structure of their daily living. Incorporating functional physical activity provides the opportunity to contribute to personal health. Rather than exercise being a barrier as a time-constraining ordeal, sedentary patients can learn from physical activity interventions and change their physical activity behaviour to incorporate physical activity into their daily lives. For example, restricting time watching television or parking on the far side of the mall instead of looking for the closest park.

Types of Primary Care Health Interventions and Models

It appears from analysing physical activity schemes based from a medical practitioner that primary care models are structured in one of three ways, Petrella & Lattanzio (2002)

- By simply providing physical activity advice,
- Linking to commercial exercise organisations or centres, or
- By providing physical activity advice which incorporates counselling with a main focus on behavioural changes.

Petrella & Lattanzio (2002) specifically studied whether counselling helped patients become more active. They found that interventions which improved physical activity levels included written materials, considered behavioural change strategies, and provided training materials for physicians to improve confidence and management of time (Handcock & Jenkins, 2003; Patrick, Sallis, Long, Calfas, Wooten, Heath & Pratt, 1994; Swinburn et al, 1998). However, they did not indicate how long the patients had increased their physical activity for as the long term effect of the interventions was not established.

Chronic diseases cannot be cured by medicine, prevented by vaccinations nor do they disappear. They generally become more common with age especially with health damaging behaviours such as a lack of physical activity, dietary choices and tobacco use. Therefore, primary care interventions are becoming common in many nations in attempt to prevent or delay these diseases from occurring. Interventions in countries such as the United States, the United Kingdom, Australia and Canada vary however the same principles and objectives apply. All patients that are referred, have similar health issues and work towards changing lifestyle habits like exercise and diet in sedentary individuals. For instance the United Kingdom have 200 physical activity schemes operating as leisure function schemes (Handcock & Jenkins, 2003). This is known as the Oasis Programme which is similar to the Green Prescription programme in that health professionals refer suitable patients to a leisure fitness centre for fitness evaluation and are offered discounted sessions over 10 or 20 weeks. Patient's risk classification is identified as either low, moderate or high risk. The majority of patients referred are of low risk, for example suffers from stress or osteoarthritis'. The number of moderate and high risk

patients is limited as they require greater supervision. Individuals in these particular groups may have suffered from asthma and angina, however it must have been stable and not suffered from any pain at rest (Wealden District Council, 1993). After the course, it is expected the patient will become a regular exerciser with all related health and lifestyle benefits at their own cost (Wealden District Council, 1993). Researchers found that 13% of the patients referred never made a visit to the leisure fitness centre and 28% were unable to complete 75% of the sessions offered. Those who did complete the programme revealed improvements in participant's mental and physical health (Handcock & Jenkins, 2003).

The United States uses an intervention known as 'Pace' (Physician-based Assessment and Counselling for Exercise). This intervention was designed on a model known as the Trans-Theoretical Model of behaviour to change unhealthy behaviours long term (Appendix 2). Previously the effectiveness of this model had been proven in assisting people to stop smoking, (Prochaska & Marcus, 1994). Fundamentals identified to improve implementation were resource materials, appropriate training for staff, patient follow up mechanisms (Swinburn et al, 1998) and time management. GP's are continuously challenged with time when counselling physical activity. Therefore, in the 'Pace' intervention the time barrier is avoided as patient's readiness to change is recognised when they complete a two minute questionnaire prior to seeing the healthcare professional. Based on survey answers, the physician uses one of three counselling protocols and makes brief personalised activity recommendations. Patients discuss protocols with their GP and are provided with a manual, progress notes for medical charts and review poster to monitor their progress. The intervention, like the Green Prescription programme, complete telephone follow up calls to prompt and encourage patients to continue physical activity, (Patrick et al, 1994). This scheme has been found to increase physical activity in 52% of initially sedentary patients after six weeks compared to a control group which only 12% were regularly active, (Calfas, Long, Sallis, Wooten, Pratt & Patrick, 1996). However, the effects of to the 'Pace' Project over a long time frame are unknown.

A current health initiative established in 2007 known as 'Exercise is Medicine' is utilised around the world in 43 westernised countries and aims to institutionalise physical activity assessment and prescription into Global Healthcare Systems (Exercise is Medicine, 2015). Physical activity is promoted to patients through 3 steps:

1. Physical Activity Assessment, GP's assess physical activity levels during every patients visit.
2. Physical Activity Prescription, GP's provide their patients with a prescription for physical activity based on identified health risks and the American College of Sports Medicine (ACSM) evidence based guidelines. This helps the prevention, treatment and management of chronic medical conditions.

3. Referral to a Physical Activity Network, GP's refer and provide options for their patients to select from existing resources such as programmes, places and professionals that meet their individual's needs to fill their physical activity prescription.

This intervention was established 8 years ago. Since then research states that advice and counselling of patients in a clinical practice has increased physical activity by 12-50 per cent for at least six months after the counselling session (Joy, 2012).

Altering an individual's ingrained behaviour is perceived to be challenging. This is understood as roughly 50% of individuals who join an exercise programme/intervention relapse 3-6 months after withdrawing (Carmody, Senner, Manilow & Mattarazzo, 1980). Evidence suggests that intensive and repetitive counselling by health care professionals can cause patients to become more physically active (Chakravarthy et al, 2002) and less likely to relapse. Therefore, counselling patients to undertake physical activity to prevent chronic diseases becomes a prime model to help increase prevention with the potential to decrease mortality and cost of care.

In New Zealand, interventions such as Active Families and Green Prescription have been designed to promote a healthy living lifestyle approach (Wormald, Waters, Sleaf & Ingle, 2006). Their aim is to capture the at-risk population in an attempt to change lifestyle behaviours and to manage long term health conditions. A patient can be seeing a doctor for any particular reason and a GP could issue them with a GRx if they believed their patient could benefit from physical activity due to their lifestyle choices or health problems.

The Green Prescription Programme

A Green Prescription is a written prescription for exercise which is predominately administered by a general practitioner or practice nurse (therefore is based in primary care) to help improve a patient's physical activity and health management. The main reasons an individual is prescribed a GRx is to help prevent and manage health issues such as hypertension, high cholesterol, obesity, back pain, osteoporosis, arthritis and type two diabetes, (Patel et al, 2012). All of which can be influenced by changes in lifestyle choices like exercise and diet. The patient is only prescribed a prescription if they want support and are willing to have their prescription forwarded through to the local support group. For example, in Christchurch the local support group is Sport Canterbury. Sport Canterbury is a regional sports trust which shares Sport New Zealand's focus on sport and recreation. Regional Sports Trusts are independent not-for-profit organisations governed by a Board of Trustees drawn from the local community. The GRx programme runs for a three month period where trained support personnel working in the regional sport trusts around New Zealand follow up patients prescriptions by telephone or face to face consultation, individually or in groups. Patients are also offered involvement in the "Be Active Program" which provides individuals the opportunity to meet with

others in a similar situation and try new physical activities such as yoga, zumba, badminton and aqua jogging.

The patient's progress is reported back to their health professional after the initial three months. If the patient feels they may benefit from another GRx they are encouraged to ask for another one. Otherwise they can be discharged as independently active. All patients have the option to call the free telephone line for further support in the future. Patients also have access to particular discounted exercise facilities and physical activity programmes (See Appendix 1 for a complex understanding of the GRx process).

For any intervention to be successful over the long term it must be cost effective. Elley et al. (2004) completed a study on the cost effectiveness of the GRx compared to similar programmes. Overall to convert one 'sedentary' individual into an 'active' individual over a twelve month period cost \$1,756 compared to the 'Prescription for Exercise' programme in the United Kingdom which totalled \$8,663 per person. The total costs for GRx were based on delivery costs of the programme which are identified as the general practitioner and practise nurse's time, the Green Prescription resources and the exercise specialists, for example Sport Canterbury. The individual's cost associated with exercise was also recognised as exercise equipment, subscriptions to clubs and exercise groups, travel expenses and other costs associated with exercise. Essentially verbal and written advice such as telephone follow-up calls is an inexpensive way to get sedentary people more active. Focusing on health prevention early will help save the Ministry of Health money in the long term. In 2013, \$7.2 million was allocated to the GRx budget to help increase referrals and assist those with exercise and support who show early signs of health issues. Currently Sport Canterbury receives 2040 referrals per year, (J. Wood, personal communication, March 25, 2014) and nationwide adult referrals are estimated to double in 2016/2017 to 68,000 (Ministry of Health, 2014). The predicted number of clients indicates the need for services that motivate and educate clients about exercise and healthy eating.

GP's have recognised a number of barriers when attempting to help and advise patients on physical activity. These include a lack of time, lack of confidence in counselling patients on exercise, inadequate knowledge regarding the benefits of physical activity, lack of reimbursement and a perceived lack of patient motivation (Swinburn et al, 1998). Lack of time was considered the main barrier to prescribing Green Prescriptions as it generally puts GP's behind schedule. Therefore one third of patients who would benefit from being given a Green Prescription are not. Croteau et al. (2006) state that 84% of GP's do not issue Green Prescriptions to potentially appropriate patients due to time constraints. If patients are prescribed, it is generally during less busy times or those returning for a routine follow up session. It was also estimated that only 50% of general practitioners

use Green Prescription, (Handcock & Jenkins, 2003) therefore GP's could improve referral numbers to benefit more individuals. The doctors who stated they prescribe Green Prescriptions agreed that patients most at risk with heart disease, type two diabetes or suffering from multiple chronic diseases receive advice and a Green Prescription. This research found that further practical methods could be identified and explored to reduce barriers to giving advice to patients and increase uptake of physical activity advice and Green Prescription in the primary care setting to those at risk of chronic disease. Swinburn et al. (1998) also believed that GP's efforts to prescribing sedentary individuals would be more effective if they had further support from national media campaigns promoting physical activity.

2.4 Green Prescription Effectiveness:

With the Ministry of Health investing large sums into the GRx Programme it is essential to gain feedback for continual development to improve and increase patient's health management. There are many different aspects of the Green Prescription Programme which have been studied to determine it's effectiveness such as understanding support, types of advice, health benefits and the short term effectiveness on physical activity and preserved health benefits. For example Johnston & Wood, (2013) found that 6-8 months after participants had completed their GRx, 63% felt they were more active, 29% did the same amount of physical activity and 9% indicated they had become less physically active. For further results from the Green Prescription 2015 Patient Surveys refer to Appendix 3, 4 & 5.

Social support is a major factor when endeavouring to break unhealthy behaviours and habits. Without support and a positive influence it is difficult to break ingrained behaviours like sedentariness. Elley et al. (2003) compared and measured the effectiveness of oral and written advice on physical activity in the general practice. Patients who received oral and written advice from their GP and continued support from an exercise specialist (via telephone and post) increased both physical activity and improved quality of life over 12 months compared to patients who received usual care. This study strongly emphasised the importance of support and communication.

Communication and support within primary care health interventions correlates strongly with an increase in physical activity (Elley et al, 2003). Defining how advice should be given and what advice determines more success is essential to improving patients health management. Confronting patients on sensitive and vulnerable topics such as the need to lose weight or become more physically active can be challenging. Swinburn et al. (1998) explored whether written or verbal advice was more effective in increasing physical activity levels. It has been shown that written advice for a Green Prescription was superior to verbal advice alone. In the Swinburn et al. (1998) study, 252 sedentary patients received verbal advice alone from their GP on increasing their exercise levels. A

further 239 patients received verbal advice and a written GRx. They found that those who received written advice increased their physical activity levels compared to those who received verbal exercise advice (see Table 1).

Table 1: Change in physical activity levels in response to written or verbal exercise advice. Source: Swinburn et al, 1998).

All Participants	Increased, %	No Change %	Decreased, %
Green Prescription	73	13	14
Verbal Advice	63	17	20

Swinburn et al. (1998) investigated beyond the 6 week period and conducted an 11-month follow up survey on 100 random selected patients to investigate the medium to long term benefit of the GRx strategy. Of those from the GRx (written advice) 59% had maintained and increased their activity levels. Overall, this study provides evidence that written advice is more superior to verbal advice over the short to medium term.

Sinclair & Hamlin (2007) explored changes in physical activity levels of patients who had completed a GRx 6 months prior. In this study, self-reported indices of health such as weight loss, breathing difficulties and medication decreased in those patients that increased their physical activity in the GRx programme compared to those who did not. Whether these beneficial changes remained over the longer term is unknown.

2.5 Literature Review Conclusion:

The Green Prescription Programme has been helping people at risk for 16 years and although data on the effectiveness of this programme over the short to medium term has been investigated, research on the effectiveness of the GRx over the longer term (1-3 years) has yet to be completed.

Because little research on the long term effectiveness of the Green Prescription Programme exists, particularly on physical activity levels, we decided to investigate the long term changes in physical activity levels in Green Prescription patients. Not only will this research shed light on the effectiveness of this primary care health intervention it will also help to shape future interventions by identifying areas of improvement.

To explore the objectives discussed in the literature review, a research design using quantitative methods will be utilised. Concerns relating to study design, sample selection, interviews, ethics and data analysis will be addressed.

Chapter 3

Research Methods

3.1 Introduction

This study required Christchurch participants who were prescribed a GRx at least 12 months ago to complete a telephone survey. This quantitative study completed in association with Sport Canterbury utilised Sport Canterbury's client database to extract the participants details.

3.2 Research Objectives/Questions

Existing research on GRx has investigated areas such as health changes in GRx patients, cost effectiveness, comparison of written and verbal advice from GP's and referrals from health professionals. However there is little known about the long term effectiveness of the GRx, particularly after 12 months. After the 2011 earthquake Sport Canterbury only had client database information dating from the 1st January 2012, (3 years ago). Therefore, patients who were prescribed a GRx 1-3 years ago were questioned to gain understanding on their current physical activity levels compared to those who did not take up the GRx offer or did not complete the GRx programme once offered. The major research questions that we attempted to answer included;

- Are those who completed the Green Prescription Programme, (intervention group) more physically activity than those who did not complete the programme, (control group)?
- Are both the intervention and control group meeting the New Zealand physical activity guidelines and what is the difference between the two groups?
- What is the difference between the individual's duration, intensity and frequency of physical activity levels prior to Green Prescription?
- Has the programme helped engage individuals in community activities, events and clubs.?
- What are the self-reported health changes that individuals and their GP's noticed in the last 1-3 years?

3.3 Research Approach

Quantitative research is the most appropriate method to answer the questions posed in this study. Quantitative research falls into the classification of empirical or statistical studies and essentially reduces data to numbers (Newnham, 1998). The benefit of quantitative research is the numbers can be ranked, compared and graphed more accurately with other studies, (McLeod, 2008). The numbers

associated with this study will compare participants who completed the GRx versus those who did not. This will be conducted in Microsoft Excel.

3.4 Study Design and Sample Size

To qualify as an interviewee for this study, the participants must have been prescribed a Green Prescription from their general practitioner or practice nurse between the 1st January 2012 - 1st May 2014. Therefore, all participants will have been first prescribed their intervention at least 1-3 years ago. For GP's to prescribe patients to the GRx programme the patients generally have suffered a chronic health condition such as diabetes or hypertension therefore the patient might benefit from physical activity. These individuals did not keep sufficiently active to meet the national physical activity guidelines for physical activity or health. The subjects were both male and female and ranged from 18 years of age to 92 years of age. The participants were Christchurch based and after the health professional prescribed them the Green Prescription they verbally accepted or declined the offer. If accepted they were referred to Sport Canterbury who co-ordinated the Green Prescription Programme within Canterbury.

Two different groups of participants were investigated from the Sport Canterbury database. The intervention/experimental group were those registered (had a one-on-one consultation with a physical health advisor) and discharged (anyone classed as independently active 'doing more physical activity than when they were initially referred' and physical health advisors felt comfortable that they would continue their activity). The control group included participants who had been discharged, not registered and declined the programme (participants were referred but declined the programme when they were phoned about a consultation) and discharged, registered and declined the programme (participants who had had a consultation but declined the programme after the consultation). Sport Canterbury had recorded in their data base, 537 clients in the intervention group and 230 patients eligible for the control group. Using magnitude-based inferences to estimate the sample size required to detect the smallest beneficial effect (i.e. 60 minutes of leisure time physical activity per week) between an intervention and control groups with a typical error of 171 minutes found in previous research on the health effectiveness of the Green Prescription, (Elley et al, 2003). with the maximum chances of a Type 1 and 2 error set at 5% (i.e. very unlikely), approximately 435 participants (217 per group) were required. To allow for an approximate 30% non-completion rate across all study measures, 530 participants were recruited for the study. From these figures at least 217 subjects were expected to be selected at random from each group. However, due to various problems contacting participants the final numbers altered with a total of 494 participants (271 in the intervention group and 223 in the control group).

3.5 Interviews and Ethics

A letter on behalf of Sport Canterbury was sent to all 498 randomly selected participants with information about the research and prior warning of a telephone call regarding verbal permission to pass their contact details on to the authors at Lincoln University. The participants were informed of further contact by the authors of this study at a later date. With a list of accepted participants sent to the authors at Lincoln University the participants were subsequently contacted, given information on the study and asked to complete the 5 minute telephone survey. Two attempts at contacting the participants on different days and times were made. The research project, letters and questionnaires were approved by the Lincoln University Human Ethics Committee.

The questionnaires varied with 22 questions in the control group survey and 27 in the intervention group survey (Appendix 6 & 7). Participants were asked about their current physical activity frequency, intensity and duration as per the 2002/2003 New Zealand Health Survey (Ministry of Health, 2004). Exercise was separated by brisk walking, moderate exercise (uses your muscles and makes you breathe harder than normal) and vigorous exercise (make you breathe much louder and heavier than normal). The total days and minutes of physical activity per week were recorded. Additional questions from the GRx Patient Satisfaction Survey 2013, (Johnston & Wood, 2013) were used with further questions based on the un-validated survey used by Sinclair & Hamlin, (2007) to determine perceived health gains in GRx patients. The surveys were piloted on 10 subjects, prior to the official phone survey to check timing and understanding of questions. The questionnaire used in this study also asked participants about the type of physical activity they were involved in, their thoughts and satisfaction of the GRx and whether they perceived changes to their health (including energy levels, body weight and aches and pains) since first prescribed a GRx.

3.6 Data Analysis

Data was analysed using Microsoft Excel. Descriptive statistics were used to characterise the different participants in the surveys, analyse physical activity levels and changes and adherence rates after the GRx prescription. We used student's t-tests to examine the difference between the intervention and control groups. The variables of the t-test focused on total physical activity, sedentary activity, physical activity and walking activity minutes per week. The alpha level was set to $p < 0.05$. There was no post entry data screening conducted.

To calculate total physical activity (minutes per week) we used the following equation from the Ministry of Health publications, (Ministry of Health 2008):

Total Physical Activity = minutes of brisk walking per week + minutes of moderate activity per week + (minutes of vigorous activity per week x two).

The following definitions were used in the MOH publications and in this study:

- Sedentary - Individuals who complete less than 30 minutes of physical activity in a week.
- Physically active - Participants who partake in at least 2.5 hours of physical activity in a week, with exercise accumulated on one or more days of the week.
- Regularly physically active – At least 2.5 hours of physical activity in a week, comprising at least 30 minutes of physical activity per day on five or more days of the week (national physical activity guidelines).

Chapter 4

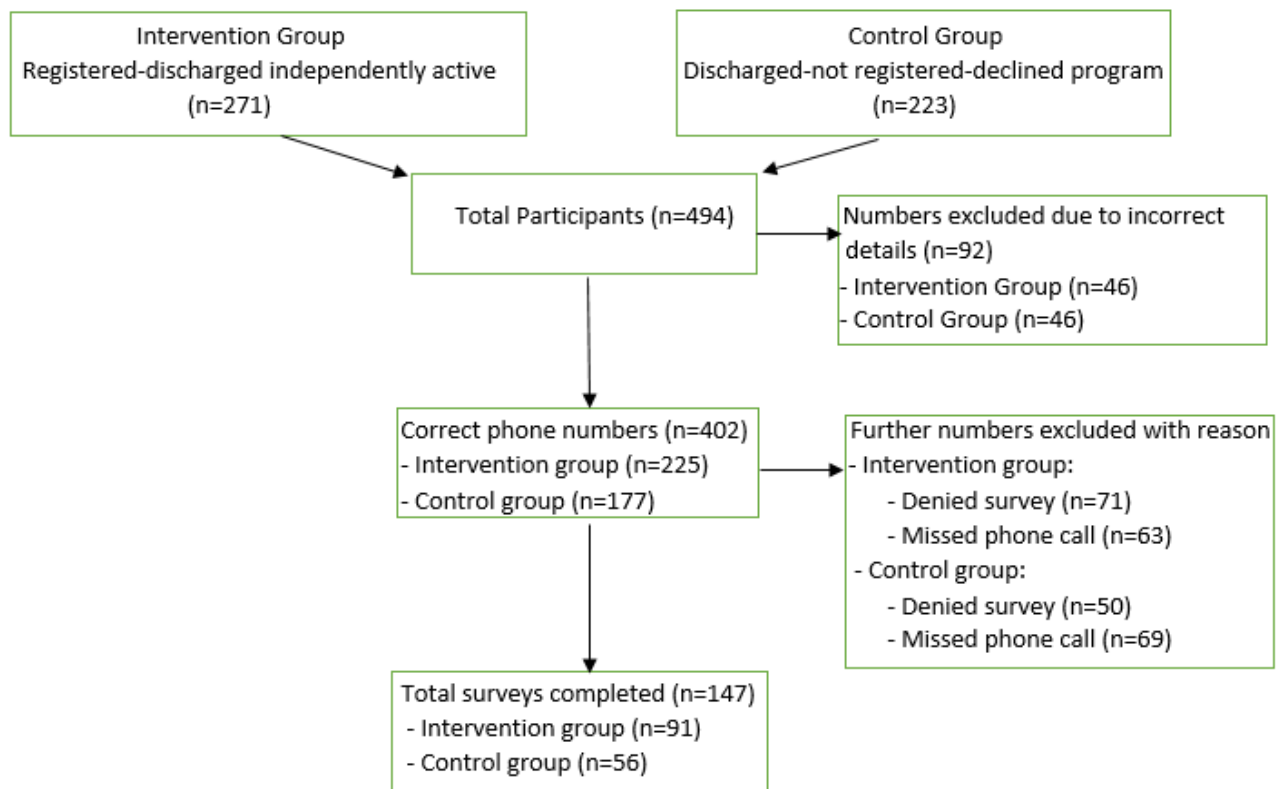
Results

4.1 Introduction

The purpose of this chapter was to display the findings in order to help answer the research objectives and questions as indicated in chapter 3. The results were displayed through a variety of graphs, tables and text to ensure they can be understood with ease. Characteristics of the respondents, physical activity levels, adherence of the GRx, community involvement, health changes and satisfaction of the GRx are presented in this chapter.

4.2 Characteristics of Respondents

Of the 498 GRx contact details, 147 participants completed the telephone survey. The response rate for the intervention group was 33.6% and 25.8% for the control group. Therefore a total response rate of 29.9%.



*Incorrect details: Contact number was either deactivated or incorrect phone number.

*Denied survey: When rung twice either wrong time for the participant to answer or they decided to not complete the survey.

Figure 2: Flow chart of responses to telephone surveys

The participants for this study had all been prescribed a GRx 12-36 months ago during the years 2012, 2013 and 2014. Due to random selection the majority of the participants were referred at least 24 months ago (see Table 2).

Table 2: Number of randomly selected participants for study over 1-3 years.

	Intervention, n=91	Control, n=56
2012	12	2
2013	79	49
2014	0	5

The majority of participants were female (68%) and all aged between 20-92 years. European New Zealanders made up 84% of the sample, while 5% were Maori, 3% British European, 2% Indian, 1% Samoan, 1% Cook Island, and 3% were of other ethnic origins. The majority from both groups (37.5%) had a combined annual income less than \$20,000.

4.3 Physical Activity Levels

Participants who were discharge-registered-independently active (intervention group, n=91) from the Green Prescription programme were less likely to demonstrate sedentary behaviour, were more likely to participate in at least 2.5 hours of exercise a week and meet the national recommended guidelines compared to those discharged-not registered declined or discharged-registered-declined programme (n=56, control group, see Table 3). Although a larger proportion of the intervention group were physically active it was found that only a quarter were meeting the national recommended guidelines (see Table 3).

Table 3: Physical Activity Levels Defined.

	Intervention %	Control %
Sedentary ^a	25.30*	46.40
Not Sedentary	73.60	51.80
Physically Active ^b	31.90	23.20
Not Physically Active	68.10	75
Regularly Active ^c	23.10	16.10
Not Regularly Active	75.80	82.10

* Significantly Different, ($p < 0.01$)

^a Less than 30 minutes of physical activity in the last 7 days.

^b At least 2.5 hours of physical activity in a week, with exercise accumulated on one or more days of the week

^c (National Guidelines) At least 2.5 hours of physical activity a week, comprising at least 30 minutes of physical activity per day on five or more days of the week.

Note: Total physical activity (minutes per week) was calculated as: minutes of brisk walking per week + minutes of moderate activity per week + (minutes of vigorous activity per week x two)

We found that 40.6% of the intervention group and 26.7% of the control group completed a total of 30-180 minutes of physical activity a week. Therefore, they do not fall into any of the categories in Table 3. The duration of physical activity was significantly different between groups when comparing total minutes and walking (Table 4).

Table 4: Total Minutes of Physical Activity in the Last 7 Days.

	Intervention n=91 Mean +/- SD	Control n=56 Mean +/- SD	Difference	P Value
Total Walking Minutes	24.7 +/- 26.3*	12.0 +/- 19.4	12.7	0.00
Total Moderate Intensity Minutes	19.9 +/- 27.9	14.6 +/- 23.3	5.3	0.21
Total Vigorous Intensity Minutes	4.4 +/- 14.0	1.7 +/- 8.4	2.7	0.14
Total Physical Activity Minutes ^a	137.7 +/- 156.5*	78.6 +/- 96.1	59.1	0.01
Total Calculated Physical Activity ^b	146.9 +/- 173.5*	83.1 +/- 100.3	63.8	0.006

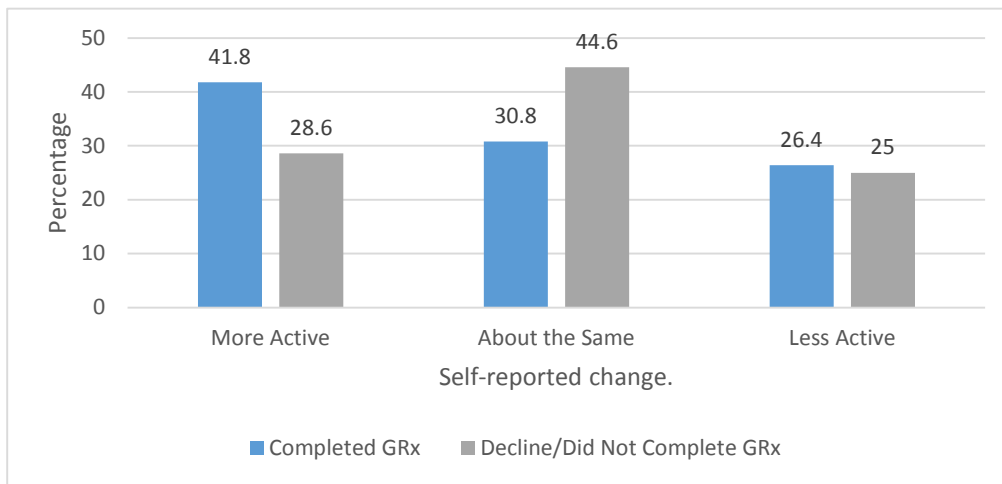
* Significantly different

^aTotal minutes of physical activity in last 7 days

^bTotal physical activity (minutes per week) was calculated as: minutes of brisk walking per week + minutes of moderate activity per week + (minutes of vigorous activity per week x two)

Over half of the control group (60%) undertook no walking during the week compared to 36.3% of the intervention group. Of those who walked 6-7 days of the week 22% had completed a GRx compared to 7.2% in the control group. We found no significant difference between the two groups regarding the number of days per weeks and intensity of exercise (moderate and vigorous activity).

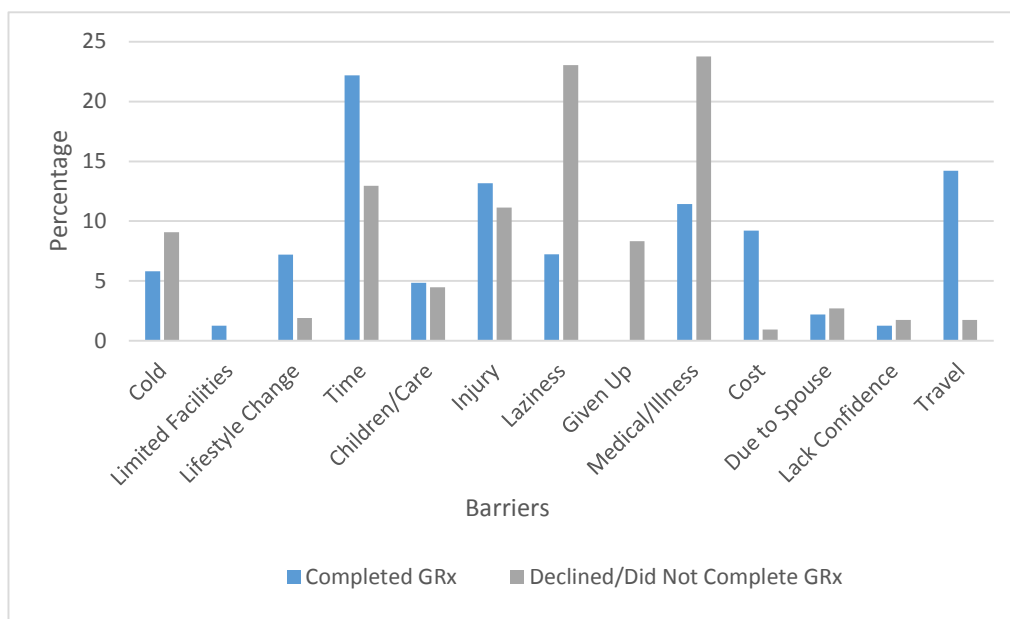
Figure 3: Self-Reported Change in Physical Activity since Being Prescribed a GRx.



Our study

identified that the intervention group were 13.2% more likely to feel more active after completing the programme compared to those who declined the intervention. Over half (57.2%) of the intervention group indicated that their physical activity levels had remained the same or become less compared to 69.6% of the control group. Various barriers prevented participants from increasing their activity included medical reasons (23.8%) and laziness (23%) followed by time (12.9%) and injury (11.1%). These differed slightly for the intervention group, time (22.2%), travel (14.2%), medical (11.4%) and injury (13.2%), (see figure 4). Overall, laziness was 15.8% more likely to affect those who did not partake in the GRx intervention.

Figure 4: Barriers to Physical Activity Since: (Those who stated they did the same amount of less physical activity since being prescribed).

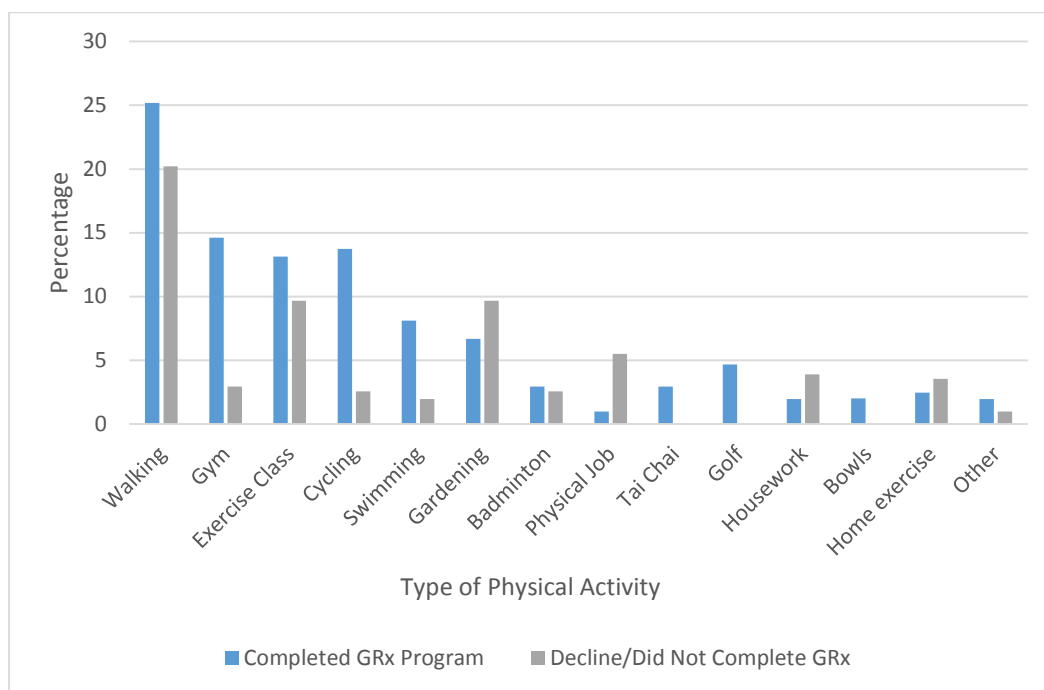


Approximately one-third (30.4%) of the control group could not recall being prescribed to the GRx intervention. The participants who did recollect (n=39) specified they did not engage in the

programme due to medical or injury reasons (35.8%), time (12.8%) , other reasons (10.3%), moved location (7.7%), due to spouse (5%), or were not interested (5%).

Positively, 20.6% of the control group have since become involved in the intervention or have gone out on their own to get active. Of those who declined the programme and went out on their own after being prescribed the GRx 75% felt more active whilst 50% of the individuals who have since become involved in the intervention felt more active. The majority (75%) of those in the control group who went out on their own are now meeting the Ministry of Health’s physical activity guidelines with an average total of 211 minutes of physical activity per week. Those who have since participated in the GRx, 50% are meeting the National physical activity guidelines through various activities (Figure 5) and show an average total of 52.2 minutes of physical activity a week.

Figure 5: Different Types of Physical Activity between Groups.



Walking was the most popular activity in both groups with 25.5% walking in the intervention group and 20.2% walking in the control group (figure 5).

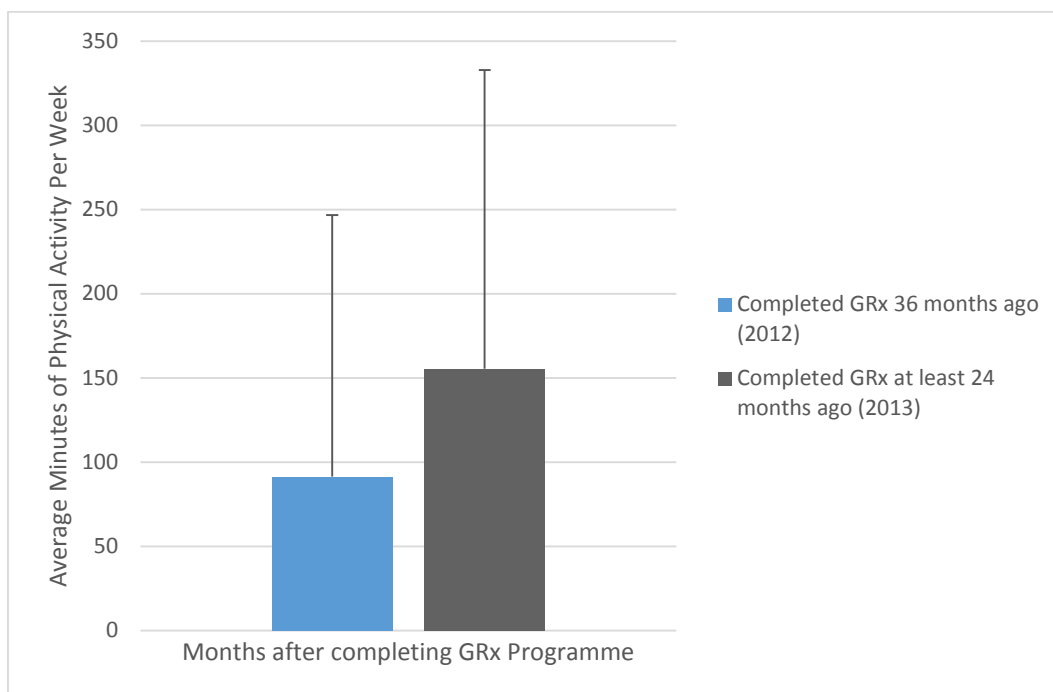
4.4 Adherence to the Green Prescription

The average physical activity levels per week for participants who completed the GRx at least 24 months ago was 155.4 minutes +/- 177.4 compared to 36 months ago 91.3 minutes +/- 138.9 which indicates a reduction over time but this was not statistically significant (Figure 6). However, there was a significant difference between moderate minutes ($p < 0.000$) and vigorous minutes ($P = 0.003$). Average moderate minutes were greater when the GRx was completed 24 months ago (22.9

minutes) compared to at least 36 months (0.4 minutes). Oddly, no one completed vigorous activity post GRx after 36 months.

After 24 months of completing a GRx 24.4% were meeting the national physical activity guidelines with a drop off after 36 months to 16.6%.

Figure 6: Average Total Minutes of Physical Activity per Week after GRx Completion



4.5 Long Term Effect of 'Be Active Programme

The 'Be Active' Programme is an 8 week course co-ordinated by a physical health advisor and can be taken up as part of the GRx. GRx participants may elect to exercise with others in groups as the programme emphasises fun and 'having a go'. The sessions are mixed between physical activity, motivation, well-being and nutrition with an aim to improve physical activity levels, provide support and increase community cohesion.

The majority of participants (48.2%) who completed the 'Be Active Programme' reported that they felt more active, 26.8% felt they did the same amount of physical activity and 25% felt they did less.

Of those who did not do the programme only 25% felt more active, 40.6% did the same and 34.4% did less.

Table 5: Long Term Effect of the 'Be Active Programme' on Physical Activity, n (%).

	Did 'Be Active' ,n = 56	Did Not Do 'Be Active' ,n = 32
Sedentary	13 (23.2)	9 (28.1)
Not Sedentary	43 (76.8)	23 (71.9)
Physically Active	21 (37.5)	8 (21.9)
Not Physically Active	35 (62.5)	23 (75)
Regularly Active	15 (26.8)	6 (18.8)
Not Regularly Active	41 (73.2)	26 (81.3)

Note: physically active and regularly active are based on total physical activity (minutes per week) was calculated as: minutes of brisk walking per week + minutes of moderate activity per week + (minutes of vigorous activity per week x two).

4.6 Community Involvement

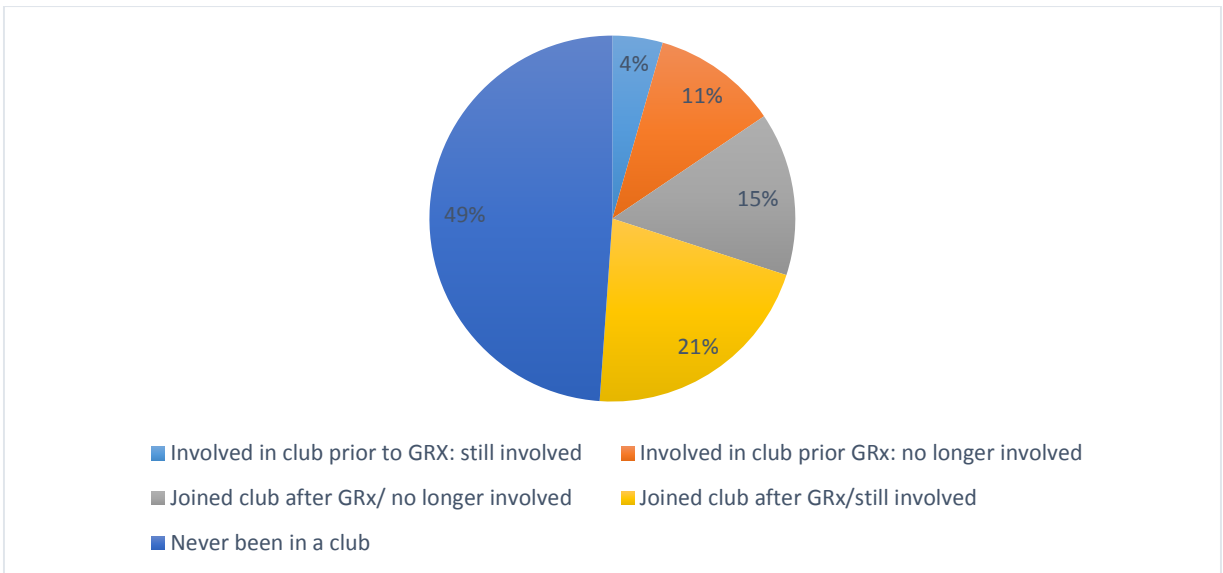
Table 6: Community Club Participation Rates between Prescribed GRx Participants.

	Intervention %	Control %
Involved in Club	50.5	28.6
Not Involved in Club	49.5	69.6

Significant difference of 0.01 between the two groups and their involvements in clubs.

The barriers preventing involvement in clubs were similar for both groups, travel, moving location, children, illness and cost were the main reasons. The majority of participants had never been involved in a club. Those who had been involved in a club indicated in figure 7 when they joined and withdrew. Most individuals (89%) from both groups have not participated or competed in any events in the past 3 years therefore no significant difference was identified.

Figure 7: Intervention Groups Involvement/Participation in Community Clubs.



Majority of GRx members in clubs (64%) were involved socially with 0% involved for competitive reasons.

4.7 Self-reported Health Changes

A large number of the intervention group (48.4%) indicated that their health felt better with 31.9% indicating it had remained the same. The control group reported only 28.5% felt their health had improved and 50% thought it remained the same. When comparing self-reported body mass index (BMI) there was also no substantial difference as the average BMI in each group was very similar.

Table 7 : Changes in self-reported health outcome in participants who were prescribed a GRx at least 12- 24 months ago, n (%).

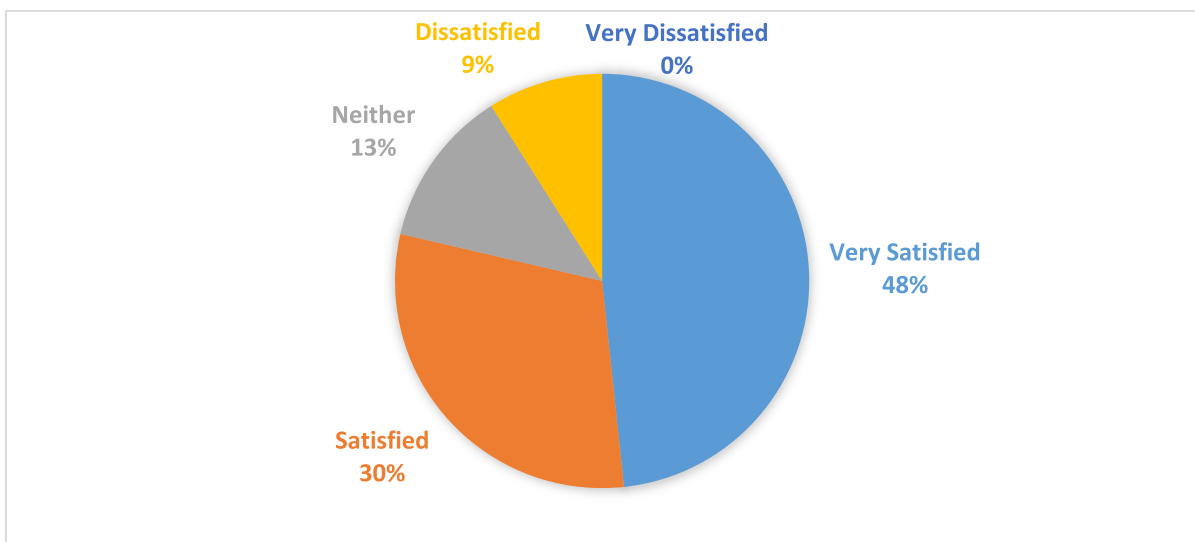
	Intervention			Control		
	Increased	Decreased	Unchanged	Increased	Decreased	Unchanged
Medications	21 (23.1)	13 (15.4)	54 (58.2)	13 (25.0)	3 (7.1)	25 (64.3)
Body Mass	24 (26.4)	32 (37.4)	31 (35.2)	14 (30.4)	8 (21.4)	20 (46.4)
Energy Levels	34 (41.7)	24 (26.4)	30 (31.9)	9 (28.6)	14 (26.8)	18 (41.0)
Mobility	32 (38.5)	26 (27.5)	31 (33)	6 (17.9)	12 (26.8)	23 (51.8)
Aches/Pains	28 (29.7)	16 (17.6)	44 (50.5)	16 (35.7)	5 (14.3)	21 (48.2)
Breathing	Easier	More Difficult	Unchanged	Easier	More Difficult	Unchanged
	13 (20.9)	12 (14.3)	59 (61.5)	2 (7.1)	7 (12.5)	29 (67.9)
Strength/fitness improvement	Yes	No	Unchanged	Yes	No	Unchanged
	29 (38.5)	13 (15.4)	45 (44)	8 (21.4)	4 (8.9)	29 (62.5)
Feel relaxed	43 (50.5)	3 (2.2)	40 (45.1)	13 (35.7)	1 (3.6)	27 (55.4)
Feel better	33 (45.1)	11 (12.1)	43 (40.7)	8 (19.6)	6 (12.5)	27 (64.3)

Other changes to benefit one’s health were identified from participants. Food changes was the biggest change for the intervention group with 47.9% followed by 25% changing their overall goals, 12.5% changing their job to be less sedentary and 10.4% quit smoking. Without intervention 42.3% reported that they had made changes to their food and 16.7% changed their goals, job and decreased their alcohol intake in the past two years. For, instance some individuals changed their sedentary occupations, such as truck driving to a more active occupation in order to improve their health outcomes.

4.8 Satisfaction and Improvements of GRx

Based on responses (figure 8) most participants were satisfied or very satisfied with the GRx. However a number of improvements were suggested (discussed in Chapter 5) along with positive ideas). Other improvements included more help connecting to activities (15%), more phone support (13.2%), doctors should be more aware and more willing to prescribe (12.9%) and 12.4% stated that the ‘Be Active programme’ should go longer. The remaining improvements included having the ‘Be Active Programme’ in more areas, ensure that the information provided is up to date and valid and a ‘Be Active’ time for working mums .

Figure 8: Satisfaction of the Intervention group.



Chapter 5

Discussion and Conclusion

5.1 Introduction

The purpose of this project was to examine the long term effectiveness of the Green Prescription Programme and understanding the main influences which have helped change participants health management. The literature review in chapter 2 identified a gap in the knowledge of the intervention which led to the research question:

- What is the Long-Term Effectiveness of the New Zealand Green Prescription Primary Health Care Intervention on Christchurch Residents?

In order to answer this question background information was gathered, surveys were conducted and discussed individually with participants. Responses were statistically compared and analysed.

5.2 Surveys and Limitations

Telephone surveys are relatively inexpensive and easy to administer. They are more adaptable than mail surveys as you can guide the participants through the questions. The response rate of those contacted is generally higher than mail surveys as they are quicker to complete and mail surveys are often not returned. Liao, Tucker, Okoro, Giles, Mokdad & Harris (2004) state that telephone surveys have been used effectively to gather information on most dimensions of health however may suffer from poor validity and reliability. Considering these aspects this study utilised telephone surveys to measure the change in participant's lifestyles, health and physical activity levels. Comparisons were made between the intervention group and control group to distinguish the long term effectiveness of the GRx intervention.

Confirming the validity and reliability of the measures used in this survey was difficult. The surveys utilised questions from various validated surveys such as the MOH Physical Activity Survey, the Annual GRx Patient Satisfaction Survey and the un-validated survey used by Sinclair & Hamlin, (2007) (as stated in chapter 3). The remaining questions were designed to specifically answer Sport Canterbury's questions. Despite this weakness, the research provides a valuable insight into the changes of physical activity levels and health associated with participating in the GRx programme. Furthermore, the questions and results from the Annual GRx Patient Survey 2013 and 2015 report shows similar findings to our study with improved self-reported health benefits, participants more active, feeling much better and majority satisfied with the intervention (Johnston & Wood, 2013; 2015).

Unfortunately there was an uneven distribution of subjects interviewed between the two groups (intervention group, 271 resulting in 91 completed surveys and control group, 223 resulting in 56 completed surveys) which may have a slight effect on the overall results. The limited number of subjects available in the control group of this study must be considered because it may not be demonstrative of the entire GRx patient population. Two attempts were given to contact each participant if they were unable to be contacted the first time. The second phone call was conducted at a different time and day to the previous. However, this may have affected the number and types of people who responded as the majority of phone calls were made between 9:30am – 6pm Monday to Friday. For example, the participants results may indicate an older age group as they are less likely to be working during these hours and lower income participants who may be on a benefit. If time had allowed a third phone call could have improved the response rate and the total number (n=132) un-contactable may have been improved.

Nonetheless, because this study was based on participants who were prescribed a GRx 12-36 months ago participants may have had difficulty recalling relevant information and recognising changes within themselves to when they were first prescribed, (e.g. comparing health and physical activity level changes). With interviews examining participant's physical activity in the last seven days this may not capture true results of an individual for example, the interviews were conducted in the winter months and wet weather may have interrupted ones usual routine.

There may have also been ethnic-specific barriers to GP visits for example, only 7% of participants were identified as Maori or Pacific which seems considerably low since Maori and Pacific people constitute 15% and 7% of New Zealand's population, respectively (Statistic New Zealand, 2015). Given that these ethnic groups in New Zealand and elsewhere present higher health risks and are less likely to visit their GP (Ministry of Health, 2014), perhaps a primary care physical activity scheme is less useful for addressing inactivity in these populations. This is supported by the 25% Maori and 25% Pacifica who reported they were no longer following the Green Prescription programme compared to 14% of European New Zealanders. Additional research should investigate other approaches which better address groups of people with high health risk and low frequency of GP visits.

This research was conducted 4 years after the 2011 Christchurch earthquake. This disaster had a large physical impact on the city and participants environments for example, change in work places, living arrangements, physical activity facilities and their green spaces. Psychological impacts also had a large impact. Four years post the earthquake it seems natural that 50.5% of participants feel more relaxed. Although feeling more relaxed is a benefit of physical activity due to the release of stress, the earthquake may have impacted this result. Therefore, it is important to remember that it would

be premature to accept these results as definite and final without further supportive evidence. However, the results were real perceptions of participants after the GRx intervention, which may be of use for future improvements of the programme.

5.3 Demographics

The majority of participants involved in this study were female (68%) and of European New Zealand background. According to the MOH (2014) both Maori and Non Maori females were significantly more likely to see their GP over 12 months compared to males. Only 3% of participants in this study were Maori which is alarming considering Maori and Pacific ethnicities are in the greatest need of lifestyle behaviour changes. Results from the 2013/14 New Zealand Health Survey, (Ministry of Health, 2014) indicate that Maori and Pacific adults have high rates of most health conditions, particularly diabetes, asthma and suffer from psychological distress. Overall, Non Maori are more likely to see a GP over 12 months than Maori due to cost and transport reasons (Ministry of Health, 2014). Therefore, the GRx intervention may be missing a large portion of the population who could benefit from physical activity advice to help manage and improve their health.

5.4 Physical Activity Levels

It's never too early or late to start increasing physical activity levels. Small improvements can produce measureable health benefits. The U.S Department of Health and Human Services, (1996) state that the frequency and duration of physical activity is more important than the intensity as every increase can add further health benefits. This is important to recognise as the findings from the surveys in this study indicated that both the intervention and control group partake in minimal amounts of moderate and vigorous physical activity. Positively, there is a significant difference between the intervention and control group when specifically focusing on total walking minutes and total physical activity minutes per week (duration), (see Table 4). Therefore, the intervention group was likely to have increased health benefits compared to the control group which was supported by intervention participants self-reporting positive health changes post GRx.

When participants were first prescribed a GRx from their healthcare professional they had the ability to gain many health benefits from physical activity as they were among the 46% of adult New Zealander's not meeting the current national physical activity guidelines (Ministry of Health, 2014). This study indicated that after at least 24 months of being prescribed and completing a GRx 23.1% were meeting or exceeding physical activity guidelines. This was a substantial change from prior the intervention when no participants were meeting the physical activity guidelines. A significant number of the intervention group (73.6%) were completing more than 30 minutes of physical activity a week (therefore not classified as sedentary) which supports the positive response that 41.8% felt more

active. This was encouraging to find as Sport Canterbury discharge participants from the GRx when they feel that they are doing more physical activity than when they were initially referred, not when they are meeting the national physical activity guidelines.

This study has found that counselling patients for exercise increases the total amount of physical activity minutes per week and total walking minutes per week. The finding was significant between the two groups therefore indicating that after completing a GRx programme, individuals are more likely to increase their physical activity minutes. A randomised controlled trial on the effectiveness of the GRx intervention in promoting physical activity adherence over 12 months supports this finding that counselling patients increases physical activity minutes. Elley et al. (2003) reported a 34 minute per week increase in leisure exercise (63 minutes per week increase in this study) compared to those who received no exercise counselling. Further research from Sinclair & Hamlin (2007) investigated adherence of physical activity 12 months after receiving a GRx, 34% met the current physical activity guidelines. This suggests a decrease in adherence to participants meeting physical activity guidelines as our study found only 24.4% of participants (prescribed 24 months ago) and 16.6% (prescribed 36 months ago) are meeting national physical activity guidelines.

Maintaining consistent physical activity levels since being prescribed a GRx was difficult for 57.2% of the intervention group who confirmed they were partaking in the same or less amount of exercise. Barriers which participants revealed in the surveys that hindered their physical activity levels were similar to the Green Prescription Patient Survey 2013 and 2015 Report, (Johnston & Wood, 2013; 2015) such as time, travel, injury and illness. Individuals who did a lot of travelling with work found it difficult to get into a routine with little support and motivation around them while they were away. They suggested the programme should include ideas for when routine is broken down and how to cope. The control group identified medical and illness issues as their main barriers to participation. This is contradicting considering the countless health benefits physical activity has and the assistance GRx offers to help adjust physical activity to their needs and create positive lifestyle change.

This research is for the benefit of Sport Canterbury therefore they can make improvements from these findings. Fifteen per cent of individuals felt they needed more help connecting with activities this was due to motivation issues. Many stated that they physically wanted Sport Canterbury to sign them up to their selected activity after the Be Active classes and GRx had finished. This was because the 15% found they had the intention to sign or join a club after the completion of the programme and never did. If Sport Canterbury had officially signed them up they would have felt pressure to attend.

The most popular physical activity for majority of the participants was walking. Sport New Zealand also identified walking as the most popular for all ages and ethnicities with 60% of adults

participating in walking (Sport New Zealand 2015). The other popular activities for the intervention group were activities which they were exposed to during the 'Be Active' Programme such as the gym, cycling, exercise classes and swimming. The control group was more likely to consider their physical activity in their everyday life such as gardening, having a physical job, housework and doing home exercise. Findings revealed that participants involved in the 'Be Active' programme were more likely to join a club and have a greater increase in physical activity levels.

5.5 Self-Reported Health Changes

Many participants observed positive health changes since they were first administered a GRx, with 50.5% of these individuals reporting that they felt more relaxed (this could be due to the Christchurch earthquakes), 45.1% generally felt better and 41.7% noticed an increase in their energy levels. Health benefits were more obvious in the intervention group as they scored considerably higher in all health outcomes compared to the control group. These positive changes correspond with Kesaniemi et al. (2001) research that compares long-term physical activity adherence with health benefits against chronic disease. A similar research also indicated increased health benefits in participants who reported an increase in physical activity since being given a GRx compared to the group who specified they were doing the same or less amount of exercise (Sinclair & Hamlin, 2007). Further investigation from Elley et al. (2003) also supports this finding that health benefits were improved significantly in those who were counselled on exercise in the general practice particularly in general health and bodily pain.

5.6 Community Involvement

There are many positive benefits from participating in physical activity in a community environment. Social networks and enjoyment are offered in clubs which are important motivators (Allender, 2006). With a significant difference between the two groups and their involvement in clubs it appears the GRx had a positive influence on participants joining clubs as 36% joined a club after completing a GRx. A number of participants indicated that the GRx made them feel more sociable and confident to join clubs. Recent research regarding participation in sport and physical activity exposed two main reasons for participation in sports clubs. These were that members were either motivated by competition and winning or health benefits, and the social environment which improved their status by non-exercisers who saw them as being fit and healthy (Allender, 2006). From this study it was clear that intervention members were more likely to be involved for non-competitive reasons (64.%). This explains why only 9.9% of the intervention group have participated in an event such as 'City to Surf'. With few partaking in community events there could be improvement in the advertising and cost of community events to emphasis participation and 'give it a go'.

Community involvement was defined within the survey by questioning participants on their past and current involvement in organised groups and clubs. If they were involved it was important to understand how they were involved for example, as a coach, umpire, on the committee or a social player. It was also vital to gather an understanding of when the participant either joined the club or discontinued with the club. Understanding participants barriers and the difference between the intervention group and control group was important to see how the GRx programme effected their involvement with clubs as seen in table 6 and figure 7.

5.7 Satisfaction and Improvements of the GRx

Maintaining a high level of satisfaction for patients using the Green Prescription Programme is vital as unsatisfied or disgruntled participants will not be encouraged to make the healthy lifestyle choices they need to (Spanier & Allison, 2001). Understanding personal experiences allows improvement in areas and reassurance that the programme is kept to a high expectation for participants. The majority of participants (78%) were either satisfied or very satisfied with their involvement in the GRx initiative, similar to 2013 Green Prescription patient survey results. Positive explanations demonstrated the significance of a team approach to assisting inactive participants to become physically active as seen below:

- It gave confidence
- There was no pressure
- Fabulous encouragement
- Great variety
- Learnt about living it the present
- Motivational
- Provided emotional support
- Provided great educational values which could be passed onto friends and family
- Disciplined with follow ups, telephone calls and newsletter
- Very positive and understanding patient support personnel
- Provided the opportunity for self-improvement. Prolong their life not lessen it.

While the majority of participants were impressed with the overall intervention, ideas for improvement were acknowledged and discussed. Many perceived the intervention differently for example, participating in the programme ensured them a free gym membership, or the intervention was more personalised and individually focused, not so general. Some found the physical activity information invalid (this may be due to the Christchurch earthquakes and the closing/movement of areas and facilities). Participants identified that not all doctors will prescribe a GRx; many had to prompt their health care professional to be prescribed. Many participants said if they had known

about the GRx programme sooner they would have prompted their GP about referring them. Considering the GRx initiative has been running for 16 years, participants felt it needed advertisement or more promotion. Numerous participants felt a cooking class or healthy recipes would be beneficial for not only themselves but their families. Suggestions for the recipes included seasonal recipes utilising cheap seasonal vegetables eliminating processed and packaged foods and recipes for different quantities.

When focusing primarily on the 'Be Active' Programme many found the large number of elderly in the programme uncomfortable. They felt there needed to be a larger focus on all demographics prescribed, although the majority of participants prescribed were elderly. Many who completed the 'Be Active' Programme thoroughly enjoyed it and wished the programme went for longer. A few suggested that a similar class like the GRx continued as an option for those who had completed the GRx programme and been discharged as independently active. The price could be increased and covered by the participants after the completion of their GRx. This was suggested as participants felt comfortable exercising with other discharged participants and enjoyed the variety of exercises. Therefore, they felt comfortable and confident having been through a similar process with others in their situation.

Many mothers and fathers during this survey mentioned the difficulty of incorporating physical activity into their daily life due to time constraints, guilt and a lack of support. According to Mailey, Huberty, Dinkel & McAuley (2014) the transition to parenthood is regularly associated with declines in physical activity. Parents who manage to fit in physical activity have developed strategies to allow balance between their household and occupational responsibilities (Mailey et al, 2014). Many mums mentioned ideas to help break this barrier for example, having a play pen at the 'Be Active' programme or getting programmes incorporated into Plunket with a pay as you go system due to continuous routines changing.

A few participants were disappointed with the lack of follow up support beyond the involvement of the programme and communication from all areas of the health sector. Following this the trans theoretical model, as discussed in the literature review, emphasises the need for continual support throughout the maintenance stage (Appendix 2) in order to maintain motivation levels and prevent behavioural relapses (Prochaska & Marcus, 1994). A recent global initiative known as 'Exercise is Medicine' strongly focuses on providing support and communication between the departments in the primary care health industry, (Exercise is Medicine, 2015). However, the GRx involves more follow-ups per patient. Patients are referred to the correct professionals, programmes and places depending on their illness and needs. Based on feedback certain participants felt the GRx was too

generalised for all health issues. Ideas and processes from 'Exercise is Medicine' initiative could be utilised to improve particular areas of the GRx.

Feedback from participants indicating the breakdown of communication between health departments and the GRx programme being too 'broad' provides room for improvement. Some ideas to consider regarding this feedback is:

- GP consultations struggle with time barriers therefore patients could complete a form in the waiting room regarding their physical activity levels prior to their appointment. This could then be assessed by the GP. If physical activity levels are low and a patient is suffering from long term health problems or indicating early signs they could be referred to a liaison person. Depending on a patients illness, injury and severity the liaison person could then refer them to specific groups. This would help ensure the groups were more personalised and specific to the individual's health needs. For example, individuals recovering from knee replacements participate in a programme together and all the people with arthritis, diabetes and so forth. The liaison people would therefore be the communication link to all the health departments, specialists and health care professionals.

Furthermore, the Exercise is Medicine intervention acknowledges that all health professionals should have an opportunity to affect physical activity change in patients which would overcome the fact that only GP's and nurses associated with GP's can refer patients under the Green Prescription. Current restrictions do not allow medically qualified personnel for example, sport physicians, surgeons and specialists to be involved in getting patients more physically active without approval from their patient's GP. Therefore, incorporating Exercise is Medicine's standard physical activity monitoring system within the overarching medical records system would assist those GP's that currently do not have access to the software used for the Green Prescription. Lastly, having a multi-sectoral approach to physical activity promotion in these inactive patients could help diminish the factors that lead to intervention drop-out including injury and illness.

5.8 Conclusion

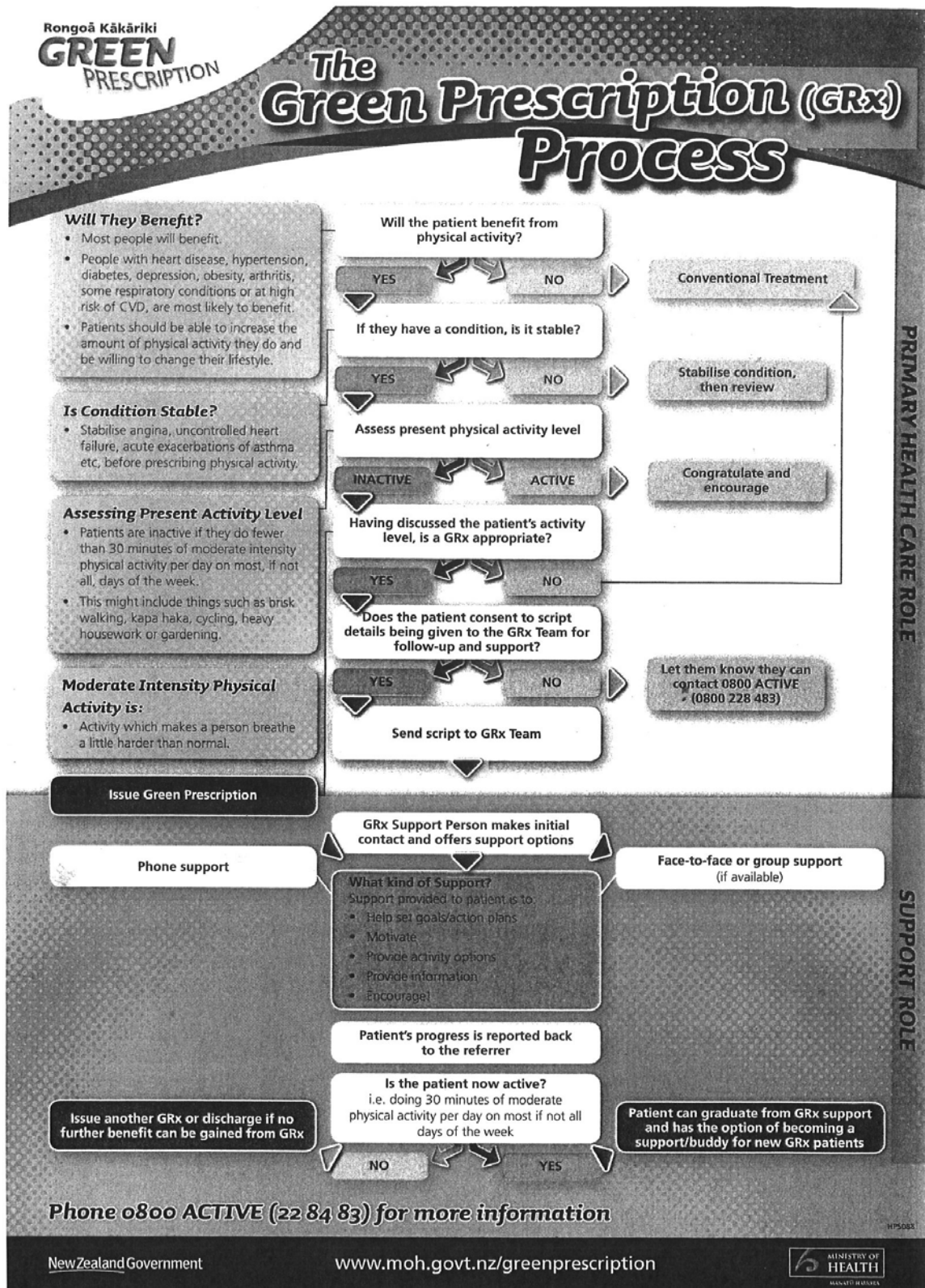
It appears from this study that the Green Prescription Programme has many positive benefits for participants if they engage. Although not many participants reached or exceeded the national physical activity guidelines in this study, it showed an increase in health benefit awareness, self-reported health benefits and an overall increase in physical activity minutes compared to those in the control group. It was also found that participating in the Green Prescription programme was cost effective and effective over the long term (2-3 years). With positive outcomes identified there were improvements suggested which could help enhance the programme by focusing on feedback and increasing support over a longer period. Developing stronger communication links between GP's and gyms, personal trainers, exercise professionals and encouraging fitness opportunities outside of

organised sport and gyms such as, active transportation, outdoor recreation, clubs and volunteer groups. All of which could further improve the quality of individuals health, quality of life and increase physical activity levels.

Therefore this research shed light on the effectiveness of the Green Prescription primary care health intervention and will help shape future interventions. The literature discussed in this dissertation and the findings from this research supports past evidence that physical activity interventions are effective and making a positive difference to those involved compared to those in need but not involved in physical activity interventions. Discussions throughout this document supported countless studies that numerous health benefits are received from physical activity. For that reason, we should consider exercise as a form of preventive medicine in order to extend life and prevent chronic diseases. Therefore, are we at a point now, that if health professionals are not prescribing physical activity, they could be considered as being neglectful towards their patients?

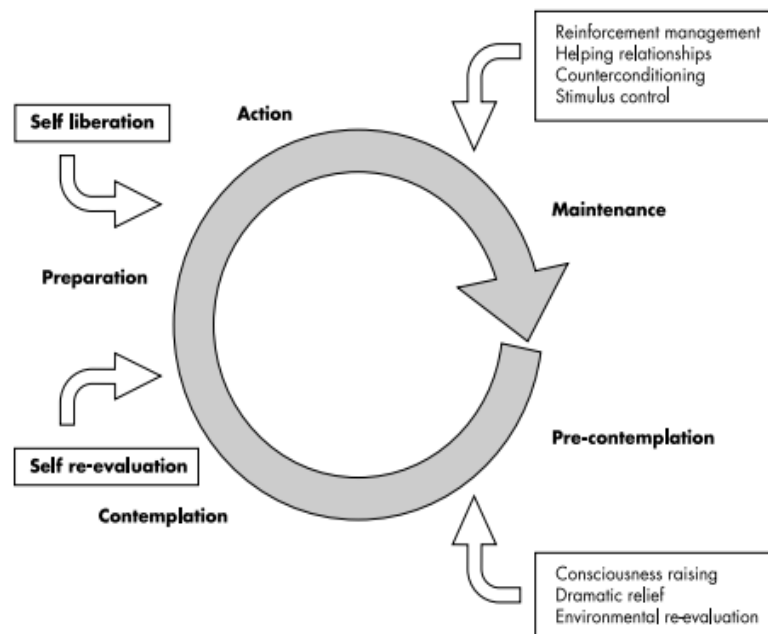
APPENDICES

A.1 The Green Prescription Process



A.2 The trans-theoretical model of behaviour change

- Stages are shown in bold and processes in boxes.



Stages:

- Pre-contemplation: Individuals are not participating in any physical activity and have no intention to do so in the future.
- Contemplation: Individuals are not participating in any physical activity but intend to start doing so in the next six months.
- Preparation: Individuals intend to start participating in regular physical activity in the next six months and are starting to make small changes in their activity behaviour.
- Action: Individuals meet defined criteria for physical activity but have done so for the last six months.
- Maintenance: Individuals have met defined criteria for physical activity for more than six months.

A.3 Participants feel more confident about doing physical activity after completing their GRx.

Strongly Agree	40%
Agree	42%
Neither agree nor disagree	13%
Disagree	4%
Strongly Disagree	2%

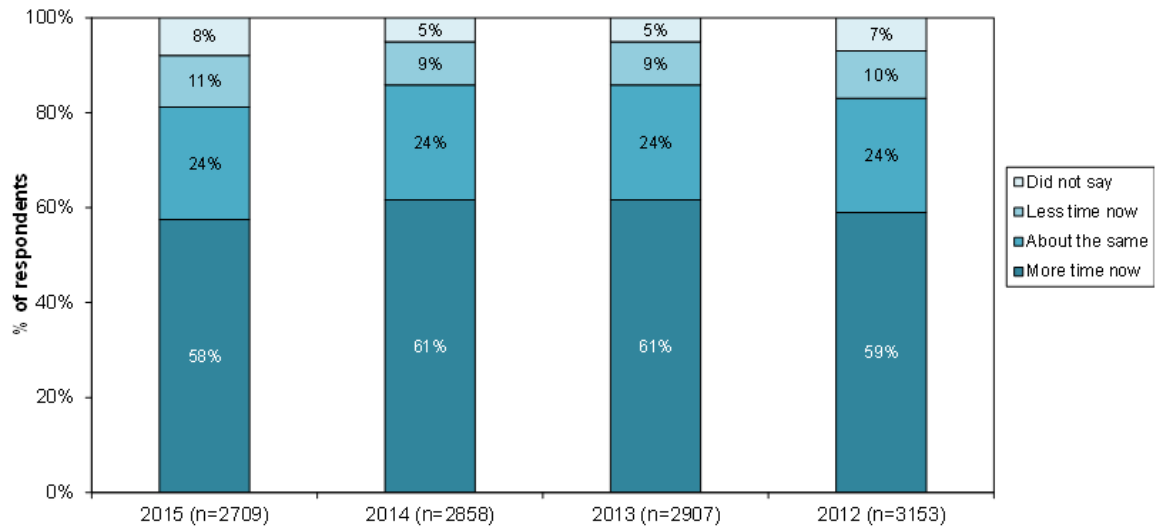
Therefore, 82% of patients feel more confident about doing physical activity due to the support they received from the GRx.

A.4 Patients are aware of and understand the benefits of physical activity since completing a GRx.

Strongly Agree:	42%
Agree:	43%
Neither Agree nor Disagree	10%
Disagree	3%
Strongly Disagree	2%

This result indicates that 85% of patients reported that they now understand the benefits of physical activity.

A5. Changes in activity levels since GRx was issued.



Total may not sum to 100% due to rounding.

A6. Control group survey.

Lincoln University/ Sport Canterbury – Green Prescription Survey (The Control Group)

Title: The long term effectiveness and quality of the Green Prescription Programme on physical activity.

Hi there, my name is Elise Yule and I am a student from the Environment, Society and Design Faculty at Lincoln University undertaking a Masters in Applied Science Degree. How are you today?

A few weeks ago Sport Canterbury sent a letter out to you inviting you to participate in a project that aims to examine physical activity levels. Your telephone number was randomly selected from Sport Canterbury's data base and pasted on to myself to conduct this research project.

Your participation in this survey will involve a moment of your time to answer a few questions about your physical activity it should only take a maximum of 10 minutes.

Participation in this research is voluntary and you may decline to answer questions at any time prior to data analysis. If you do withdraw at any stage, information you have already provided will be destroyed. All information will remain confidential to me as researcher and my supervisor.

Would you like to participate in this research project?

- If **yes** go to question 1

o **Yes** but not now: Phone Back Date: _____ Time: _____

o Not Interested

1) Our records show that you did not take up the offer to participate in the Green Prescription Programme. Can I ask you why you decided not to engage in the programme?

I'm now going to ask you to think about your physical activity in the last 7 days. I will ask different questions regarding brisk walking, moderate and vigorous exercise so consider different types of activity at work, home, getting from place to place, any sport, recreation or leisure activities.

- Avoiding any activity undertaken today.

- Think only about activity which has been done for at least 10 minutes at a time

2) I want you to think about walking at a 'brisk' pace. This is where you would be breathing harder than normal. In the last 7 days can you think how many days you did this for more than 10 minutes at a time?

o _____ days per week (range 0-7)

o I don't know **go to Q3**

o Refuse to answer **go to Q3**

2a) How much time did you typically spend 'briskly walking' on each of these days?

_____ Hours (0-24) _____ Minutes (0-60) **Note: Must be >= 10 minutes**

3) Now I would like you to think about 'moderate activity' this is anything that uses your muscles and makes you breathe a little bit harder than normal. For example, jogging or cycling from place to place, aerobics, farm work or anything that you did for sport or leisure. In the last 7 days on how many days did you do this?

- _____ days per week (range 0-7)
- I don't know **go to Q4**
- Refuse to answer **go to Q4**

3a) How much time did you typically spend doing 'moderate activity' on each of these days?
_____ Hours (0-24) _____ Minutes (0-60) **Note: Must be >= 10 minutes**

4) During the last 7 days on how many days did you do vigorous physical activity for more than 10 minutes at a time?
- Vigorous activity makes you 'huff and puff' breathing much louder and heavier than normal, for example heavy lifting, fast cycling and digging.

- _____ days per week (range 0-7)
- I don't know **Go to Q5**
- Refuse to answer **Go to Q5**

4a) How much time did you typically spend doing 'vigorous activity' on each of these days?
_____ Hours (0-24) _____ Minutes (0-60) **Note: Must be >= 10 minutes**

5) Comparing to one or more years ago do you consider yourself.....

- More active?
- About the same? **If ticked go to Q5a**
- Less physically active? **If ticked go to Q5a**
- I don't recall

5a) If the same or less time being physically active why is this?

6) What physical activities are you doing currently? Eg, swimming, yoga, bowls, cycling, tennis

7) Are you involved in any clubs or organised groups?

- Yes **Go to Q7a**
- No **Go to Q7b**

7a) How are you involved in the club or organised group?

- An Umpire
- A competitive player
- A social player
- Club Support/Committee
- A coach

7b) Please state when and why you are no longer involved in the club:

When:

Why:

8) In the last two years can you recall being involved in any form of events or tournaments, focusing on physical activity?

(For example: city to surf, the colour run, a social team, relay for life, swimming events, triathlons, walking festivals, cycle events, adventure races, family event)

- Yes , please state: _____
- No

9) How do you rate your health compared to two years ago?

- Much better
- Somewhat better
- About the same
- Somewhat worse
- Much worse

10) I am now going to read out a list and I would like you to tell me whether you have noticed any health changes in the last two years. Or has your doctor told you of any changes? (Please tick **all** that apply)

- | | | | |
|--|---|--------------------------------------|---|
| 10a) Medication | <input type="radio"/> More | <input type="radio"/> Less | <input type="radio"/> Unchanged |
| 10b) Body Weight | <input type="radio"/> Increased | <input type="radio"/> Decreased | <input type="radio"/> Unchanged |
| 10c) Energy Levels | <input type="radio"/> Increased | <input type="radio"/> Decreased | <input type="radio"/> Unchanged |
| 10d) Mobility | <input type="radio"/> Increased | <input type="radio"/> Decreased | <input type="radio"/> Unchanged |
| 10e) Breathing | <input type="radio"/> Easier | <input type="radio"/> More Difficult | <input type="radio"/> Unchanged |
| 10f) Aches/Pains | <input type="radio"/> More | <input type="radio"/> Less | <input type="radio"/> Unchanged |
| 10g) <input type="radio"/> Feel Stronger/Fitter | <input type="radio"/> Don't feel stronger or fitter | | <input type="radio"/> Feel about the same |
| 10h) <input type="radio"/> More relaxed and calm | <input type="radio"/> Less relaxed and calm | | <input type="radio"/> Feel about the same |
| 10i) <input type="radio"/> Generally feel better | <input type="radio"/> Generally feel worse | | <input type="radio"/> Feel about the same |
| 10j) Other (Please write in) | _____ | | |

I now need to get some personal details.... (This information will not be used to identify you individually).

11) How old are you? _____ years old

12) Are you Male or Female?

- Male
- Female

13) Which ethnic group do you belong to?

- NZ European
- Maori
- Samoan
- Cook Island Maori
- Tongan
- Niuean
- Chinese
- Indian
- British/European
- Other _____

14) Which suburb in Christchurch do you currently live in?

15) If you feel comfortable telling me, What is your average annual family income?

- \$20,000 or Less \$20,001-\$30,000 \$30,001-\$50,000 \$50,001-\$70,001
 \$70,001-\$100,000 \$100,001-\$150,000 \$150,001 or more

16) If you feel comfortable do you mind telling me your height and weight?

Height: _____ m

16a) Weight: _____ Kgs

Thank you very much for your time and I wish you all the best for your future well-being!

If you have any further questions regarding this research please contact:

The Researcher: Elise Yule, 0273662240 or (03) 423 0507

My Supervisor: Mike Hamlin, (03) 423 0489

A7. Intervention group survey.

Lincoln University/ Sport Canterbury – Green Prescription Survey **(The Intervention Group)**

Title: The long term effectiveness and quality of the Green Prescription Programme on physical activity.

Hi there, my name is Elise Yule and I am a student from the Environment, Society and Design Faculty at Lincoln University undertaking a Masters in Applied Science Degree. How are you today?

A few weeks ago Sport Canterbury sent a letter out to you inviting you to participate in a project that aims to examine physical activity levels. Your telephone number was randomly selected from Sport Canterbury's data base and pasted on to myself to conduct this research project.

Your participation in this survey will involve a moment of your time to answer a few questions about your physical activity it should only take about 10 minutes.

Participation in this research is voluntary and you may decline to answer questions at any time prior to data analysis. If you do withdraw at any stage, information you have already provided will be destroyed. All information will remain confidential to me as researcher and my supervisor.

Would you be interested in participating in this research project?

- If **yes** go to question 1

Yes but not now: Phone Back Date: _____ Time: _____

Not Interested

1) Did you receive support through face to face consultations or phone support?

Face to Face Support Phone Support

2) Did you take part in the Be Active Programme?

Yes No I don't recall

I'm now going to ask you to think about your physical activity in the last 7 days. I will ask different questions regarding brisk walking, moderate and vigorous exercise so consider different types of activity at work, home, getting from place to place, any sport, recreation or leisure activities.

- Avoiding any activity undertaken today.

- Think only about activity which has been done for at least 10 minutes at a time

3) I want you to think about walking at a 'brisk' pace. This is where you would be breathing harder than normal. In the last 7 days can you think how many days you did this for more than 10 minutes at a time?

_____ days per week (range 0-7)

I don't know **go to Q4**

Refuse to answer **go to Q4**

4) How much time did you typically spend 'briskly walking' on each of these days?
_____ Hours (0-24) _____ Minutes (0-60) **Note: Must be >= 10 minutes**

5) Now I would like you to think about 'moderate activity' this is anything that uses your muscles and makes you breathe a little bit harder than normal. For example, jogging or cycling from place to place, aerobics or anything that you did for sport or leisure. In the last 7 days on how many days did you do this?

- _____ days per week (range 0-7)
- I don't know **go to Q6**
- Refuse to answer **go to Q6**

5a) How much time did you typically spend doing 'moderate activity' on each of these days?
_____ Hours (0-24) _____ Minutes (0-60) **Note: Must be >= 10 minutes**

6) During the last 7 days on how many days did you do vigorous physical activity for more than 10 minutes at a time?

- Vigorous activity makes you 'huff and puff' breathing much louder and heavier than normal, for example heavy lifting, fast cycling and digging.

- _____ days per week (range 0-7)
- I don't know **go to Q7**
- Refuse to answer **go to Q7**

6a) How much time did you typically spend doing 'vigorous activity' on each of these days?
_____ Hours (0-24) _____ Minutes (0-60) **Note: Must be >= 10 minutes**

7) I want you to compare your current physical activity levels to before you were prescribed a Green Prescription. Are you now spending...

- More time being active?
- About the same amount of time being active? **If ticked go to Q7a**
- Less time being active? **If ticked go to Q7a**
- I do not recall **go to Q8**
- Prefer not to answer **go to Q8**

7a) If the same or less time being physically active why is this?

8) What physical activities are you doing currently? Eg, swimming, yoga, bowls, cycling, tennis.

9) I am now going to ask you whether you have ever been a part of any clubs or organised groups?

Are or have you ever been involved in any clubs or organised groups?

- Yes, **Go to Q9a**
- No **Go to Q9c**

9a) When did you join the club or organised group?

- I was in club/s prior to GRx and still am **Go to Q9b**
- I was in club/s prior to GRx and no longer am **Go to Q9c**
- I joined a club after GRx but no longer belong to it **Go to Q9c**
- I joined a club after GRx and still belong to it **Go to Q9b**

9b) How were you involved in the club? **Go to Q10**

- An Umpire
- A competitive player
- A social player
- Club Support/Committee
- A coach
- Other

9c) Please state when and why you are no longer involved in the club:

When: _____
Why: _____

10) In the last two years can you recall being involved in any form of events or tournaments, focusing on physical activity?

(For example: city to surf, the colour run, a social team, relay for life, swimming events, triathlons, walking festivals, cycle events, adventure races, family event)

- Yes , please state: _____
- No

11) How satisfied were you with the service and support provided to you through the GRx programme?

- Very satisfied
- Satisfied
- Neither/or
- Dissatisfied
- Very dissatisfied

12) Are there any ways in which you think this service could be improved? (Please explain)

13) Compared to prior the GRx how would you rate your health in general now?

- Much better
- Somewhat better
- About the same
- Somewhat worse
- Much worse

14) I am now going to read out a list and I would like you to tell me whether you have noticed any change since you were first issued a Green Prescription? Or has your doctor told you of any changes?

- | | | | |
|--|---|---|---------------------------------|
| 14a) Medication | <input type="radio"/> More | <input type="radio"/> Less | <input type="radio"/> Unchanged |
| 14b) Body Weight | <input type="radio"/> Increased | <input type="radio"/> Decreased | <input type="radio"/> Unchanged |
| 14c) Energy Levels | <input type="radio"/> Increased | <input type="radio"/> Decreased | <input type="radio"/> Unchanged |
| 14d) Mobility | <input type="radio"/> Increased | <input type="radio"/> Decreased | <input type="radio"/> Unchanged |
| 14e) Breathing | <input type="radio"/> Easier | <input type="radio"/> More Difficult | <input type="radio"/> Unchanged |
| 14f) Aches/Pains | <input type="radio"/> More | <input type="radio"/> Less | <input type="radio"/> Unchanged |
| 14g) <input type="radio"/> Feel Stronger/Fitter | <input type="radio"/> Don't feel stronger or fitter | <input type="radio"/> Feel about the same | |
| 14h) <input type="radio"/> More relaxed and calm | <input type="radio"/> Less relaxed and calm | <input type="radio"/> Feel about the same | |
| 14i) <input type="radio"/> Generally feel better | <input type="radio"/> Generally feel worse | <input type="radio"/> Feel about the same | |
| 14j) Other (Please write in) _____ | | | |

I now need to get some personal details.... (This information will not be used to identify you individually).

15) How old are you? _____ years old

16) Are you Male or Female?

- Male Female

17) Which ethnic group do you belong to?

- NZ European Maori Samoan Cook Island Maori Tongan
 Niuean Chinese Indian British/European
 Other _____

18) Which suburb in Christchurch do you currently live in?

19) If you feel comfortable telling me, What is your average annual family income?

- \$20,000 or Less \$20,001-\$30,000 \$30,001-\$50,000 \$50,001-\$70,001
 \$70,001-\$100,000 \$100,001-\$150,000 \$150,001 or more

20) If you feel comfortable do you mind telling me your height and weight?

Height: _____ m

20a) Weight: _____ Kgs

Thank you very much for your time and I wish you all the best for your future well-being!

If you have any further questions regarding this research please contact:

The Researcher: Elise Yule, 0273662240 or (03) 4230507

My Supervisor: Mike Hamlin, (03) 4230489

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