

# **Action and Coping Plans as Strategies to Improve Exercise Adherence in People with Osteoarthritis of the Hip and or Knee Joint**

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**Certificate of Authorship**

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief. It contains no material that has been previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other diploma or degree of a university or other institution of higher learning, except where due acknowledgment has been made in the acknowledgements.

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## **Abstract**

Osteoarthritis is a common, long-term, degenerative joint disease often affecting the hips and knees. Aerobic, strength and stretching exercise programmes have been shown to improve function in people with osteoarthritis, but their full benefits are limited by poor adherence. Action and coping plans, a central component of the Health Action Process Approach (HAPA) model of behaviour change, have been shown to improve exercise adherence behaviour in people with long term disorders. Therefore the purpose of this study was to investigate the effect of action and coping plans on exercise adherence behaviour in people with osteoarthritis of the hip and or knee.

Twenty seven people with moderate osteoarthritis of the knee and or hip were randomly allocated to the exercise group plus action and coping planning (intervention) or the exercise group only (control). Fifteen of these people completed the programme. Both groups attended a lower limb exercise class three times per week for a period of 12 weeks and completed a home-based walking and stretching programme. The outcome measures were adherence measured throughout the exercise programme and self-efficacy and functional outcomes measured at the beginning and the end of the programme. Adherence was assessed class attendance and adherence to the class- and home-based exercise programmes. Self-efficacy was measured by phase specific self-efficacy (task, maintenance and recovery) and the Arthritis Self-Efficacy Questionnaire. Functional outcomes were actual functional performance (TUG, 6MWT, step test and 10MWT), perceived functional performance (LLTQ-ADL), and pain. The group comparisons were analysed using analysis of variance, and correlations were analysed using Pearson correlation coefficients and regression analyses where appropriate.

There were no significant differences between the two groups' rates of class attendance ( $p=.811$ ), class-based exercise adherence ( $p=.522$ ), home-based exercise ( $p=.209$ ) and walking adherence ( $p=.927$ ). There were no significant differences in the self-efficacy scores of the control group over the time of the study. In comparison to the control group, the intervention group's Arthritis Self-Efficacy Questionnaire function subscale scores were significantly higher post-study ( $p=.015$ ), but their maintenance self-efficacy scores were significantly lower post-study ( $p=.025$ ). Significant differences in the actual functional performance measures occurred between the two groups from pre- to post-study, with the intervention group improving significantly on the TUG ( $p=.005$ ), step test ( $p<.0005$ ) and the 10MWT ( $p=.007$ ), but the control group improved significantly only on the 10MWT ( $p=.029$ ). There was significant difference in the action and coping plans group's perceived functional performance measures from pre- to post-study ( $p=.007$ ), but not for the control group ( $p=.460$ ). Notable significant correlations occurred between; pre-study Arthritis Self-Efficacy Questionnaire other activities subscale and home walking adherence ( $r=.43$ ); post-study LLTQ-ADL, and the pre-study task self-efficacy and Arthritis Self-Efficacy Questionnaire function and other activities subscales; pre-study Arthritis Self-Efficacy Questionnaire function subscale and TUG; SIRAS and the post-study LLTQ-ADL.

Action and coping plans in combination with an exercise programme improved actual and perceived functional performance and self-efficacy to some extent, but did not improve adherence behaviour. A limitation of this study was the small sample size, and a larger study is needed to test the full value of action and coping plans on people with osteoarthritis of the hip and/or knee.

## **1. STATEMENT OF THE PROBLEM**

### **1.1 Introduction**

Osteoarthritis is a joint disease characterized by a loss of articular cartilage and structural changes to the ligaments, muscle and bones ends that can lead to pain and a loss of function, and primarily affects the knee and hip joints (Goldring & Goldring, 2003). It is a result of mechanical breakdown of the structures within the joints, in particular the hyaline cartilage (Brooks, 2003). Osteoarthritis is also known as "wear and tear" or "degenerative" arthritis, but there is growing evidence that an inflammatory component may also be present (Brooks, 2003). The disease often causes a decrease in people's activity that can lead to a loss of muscle strength, balance and bone density. The consequence of these deficits can be a reduction in independence, mental health and quality of life for people with osteoarthritis (Cook, Pietrobon, & Hegedus, 2007; Wise et al., 2010). In New Zealand, it is reported that 60% of people over the age of 65 years suffer from osteoarthritis and almost all over the age of 80 years will suffer from the disease (Boreman et al., 2010). As New Zealand has a population that is steadily aging and an average life expectancy that is increasing (Boreman et al., 2010), it can be expected there will be a corresponding increase in the numbers of New Zealanders suffering from osteoarthritis.

Management of osteoarthritis has traditionally been pharmaceutical and/or surgical (Hunter & Lo, 2008; McHugh, Luker, Campbell, Kay, & Silman, 2007), but it has been shown that people who have osteoarthritis of the hip and knee joints benefit from specific exercise programmes that improve their strength, flexibility and cardiovascular fitness (Fransen, Nairn, Winstanly, Lam, & Edmonds, 2007; Fransen & McConnell, 2009; Mikesky et al., 2006; O'Reilly, Muir, & Doherty, 1999; Roddy et al., 2005; Suomi & Collier, 2003; Thomas et al., 2002; Topp, Woolley, Hornyak, Khuder, & Kahaleh, 2002). It has also been found that the functional improvements gained following completion of some exercises programmes are

comparable with those gained with non-steroidal anti-inflammatory drugs, and that following such programmes people with osteoarthritis are less reliant on health services (Fransen & McConnell, 2009). However adherence to prescribed exercise programmes and advice given by health professionals is known to be poor and better outcomes could be achieved if adherence behaviour was improved (Cook et al., 2007; Hootman, Macera, Ham, Helmick, & Sniezek, 2003; Pisters et al., 2010; Roddy et al., 2005; van Gool et al., 2005). Research has identified a significant relationship between high levels of exercise adherence and better treatment outcomes of pain levels, self-reported physical function and physical performance (Pisters et al., 2010).

Exercise adherence is a complex multi-faceted behaviour, with many contributing factors (Bassett, 2003). One factor believed to have a considerable effect on adherence behaviour is self-efficacy (Bandura, 1977; Bandura, 1997; Schwarzer, Luszczynska, Zeigelmann, Scholz, & Lippke, 2006). Self-efficacy has been defined as a person's beliefs of their capabilities to organise and manage prospective situations (Bandura, 1986). It has been proposed that if self-efficacy is enhanced it could lead to improved rates of adherence (Schwarzer et al., 2006), which in turn could improve perceived and actual functional performance (Pister et al., 2010). Self-efficacy beliefs have been shown to be improved with the use of implementation intentions (Gollwitzer & Schall, 1998) such as action and coping planning strategies (Schwarzer et al., 2006; Sniehotta, Scholz, & Schwarzer, 2005).

Implementation intentions are a planning process designed to bridge the gaps between intentions, goals and behaviour (Gollwitzer, 1993). Action plans are implementation strategies which require the participant to state how, when, where and with whom they are going to undertake the exercise (Sniehotta et al., 2005). Coping plans are strategies that assist the participants to positively cope with the barriers that may impede the completion of the exercise (Sniehotta et al., 2005). In combination, these two strategies have been shown to

improve exercise completion in people attending cardiac rehabilitation classes (Sniehotta et al., 2005).

Despite the possible benefit of increased exercise adherence to people living with osteoarthritis. Research (Murphy et al., 2008; Pisters et al., 2010) shows, there are a limited number of studies in the current literature that have included adherence strategies such as action and coping planning to improve exercise adherence behaviour. If the use of action and coping planning strategies are shown to improve exercise adherence amongst people with osteoarthritis, these could be integrated into other similar exercise based programmes to improve their adherence rates. Furthermore, higher levels of exercise adherence could improve the management and lifestyle of people living with osteoarthritis in New Zealand.

## **1.2 Purpose Statement**

This study will investigate whether using action and coping plans as an adjunct to an exercise programme will improve adherence to both a class-based and a home-based exercise programme, improve self-efficacy, improve perceived and actual functional performance and decrease pain in people with osteoarthritis for the hip and/or knee joint. The relationships between the variables of interest (adherence, self-efficacy, function and pain) will also be investigated.

## **1.3 Hypotheses**

1). In comparison to the exercise only group, the exercise plus action and coping plans group will have significantly higher levels of clinic attendance and adherence to the class- and home-based exercise and walking programmes.

- 2). In comparison to the exercise only group, the exercise plus action and coping plans group will have significantly higher levels of self-efficacy with regard to the management of their osteoarthritis symptoms and their ability to exercise post-study.
- 3) In comparison to the exercise only group, the exercise plus action and coping plans group will have significantly higher levels of actual functional performance post-study.
- 4). In comparison to the exercise only group, the exercise plus action and coping plans group will have a significantly higher level of perceived functional performance post-study.
- 5). In comparison to the exercise only group, the exercise plus action and coping plans group will have a significantly lower pain scores post-study.
- 6). There will be significant relationships between the following variables: (1) pre-study phase specific self-efficacy and arthritis self-efficacy, and the adherence scores, (2) pre-study phase specific self-efficacy and arthritis self-efficacy, and the post-study treatment outcomes, (3) and adherence and post-study treatment outcomes.

#### **1.4 Significance of the Study**

This study should be regarded as a feasibility project for guiding the development of a larger study. While it has many of the characteristics of a randomised control trial, the resources available within the frame work of a Master's thesis would not allow it to provide definitive findings and conclusions. Irrespective of the outcome, the findings will add to what is currently a very small body of literature in the area of adherence enhancing strategies for exercise programmes for osteoarthritis.

## **2. LITERATURE REVIEW**

### **2.1 Introduction**

This chapter is divided into eight sections. The first section outlines the search strategies undertaken to locate the papers used in the literature review. The second section discusses the current literature regarding the effects of exercise-therapy on people with osteoarthritis. The third section describes the problem of adherence to physiotherapy exercise programmes. The fourth section describes the measurement of adherence to physiotherapy exercise programmes. Following this is a description of the determinants of adherence to exercise in physiotherapy. The sixth section addresses the effect of self-efficacy on exercise adherence in physiotherapy. The seventh section reviews the theoretical models grounded in self-efficacy used in adherence research. The chapter concludes with a summary.

### **2.2 Literature Search Strategy**

Literature relating to the clinical management of osteoarthritis, in particular therapeutic exercises, and adherence to physiotherapy and exercise-based rehabilitation were considered for this review.

#### **Inclusion Criteria**

The criteria used to determine which studies relating to the clinical management of osteoarthritis would be examined were: (1) those investigating the conservative management of osteoarthritis, (2) those investigating exercise-therapy in the management of osteoarthritis or studies investigating physiotherapy treatment of osteoarthritis, and (3) those investigating the outcome measures used in the treatment of osteoarthritis of the lower limb. The criteria used to determine which studies relating to adherence to physiotherapy and exercise-based



rehabilitation would be examined were: (1) those pertaining to adherence to exercise-based rehabilitation or adherence to physiotherapy treatment, and (2) those investigating the measurement of rehabilitation adherence. There were no limits placed on the types of research methodology used to investigate exercise therapy for osteoarthritis and/or adherence to physiotherapy/rehabilitation programme, or the types of literature reviews of these two bodies of knowledge.

### Exclusion Criteria

Studies relating to the clinical management of osteoarthritis were excluded if they did not investigate exercise-therapy, evaluated only manual therapy or if they investigated the clinical management of other forms of arthritis. Studies relating to adherence behaviour were excluded if they did not relate to exercise adherence (i.e. drug addiction, or smoking cessation), and if they related to adherence to other forms of health care, such as recreational exercise. In addition studies were excluded if they were published in popular press such as magazines, newspapers or websites. Research and review articles were also excluded if they were not published in English.

### Databases and Resources Searched

The studies were found electronically using the following listed databases: Cochrane Database of Systematic Reviews, Cumulative Index to Nursing and Allied Health Literature (CINAHL, 1982+), EBSCO Database, E-Journals (AUT Library), Medline (1950+), Proquest, Pubmed, Sports Discus, Socpus. The references lists of the included studies were manually reviewed for relevant studies that may have been overlooked using the electronic searches.

### Search Terms Used

Literature searches were undertaken using the key words listed in Table 2.1. Index key words and varying combinations of the key words were used.

### Search Returns

Forty-two articles met the inclusion criteria for the adherence based literature and 257 articles met the inclusion criteria for the osteoarthritis based literature.

Table 2.1

#### *Key Search Words Used*

Key Words		
physiotherapy	osteoarthritis	adherence
exercise	rehabilitation	compliance
strength	endurance	hydrotherapy
knee	perceived function	implementation intentions
hip	quality of life	action plans
arthritis	goal setting	coping plans
exercise completion	conservative management	self-efficacy
behavior	physical therapy	

## **2.3 The Effect of Exercise-Therapy on People with Osteoarthritis**

There are a number of treatment approaches that have been shown to improve the function of people living with osteoarthritis (Jordan, Arden, & Doherty, 2003; Roddy et al., 2005). One approach that has received much attention has been exercise therapy, which is widely

accepted to be beneficial for people with osteoarthritis in either their hip or knee joints (Roddy et al., 2005; Vignon et al., 2006). A number of meta-analyses have been completed on the effects of exercise therapy in people with osteoarthritis, and subsequently some have then been used to develop management guidelines internationally (Mazieres et al., 2008; Roddy et al., 2005; Vignon et al., 2006; Zhang et al., 2007). The most noteworthy clinical trials that investigate exercise therapy for people with osteoarthritis will be reviewed in this section.

Studies have shown that after completing exercise-therapy based programmes, people with lower limb osteoarthritis have gained improvements in both their perception and performance of activities of daily living when compared with non exercising control groups (Allegrante & Marks, 2003; Deyle et al., 2005; Foley, Halbert, Hewitt, & Crotty, 2003; Hoeksma et al., 2004; Jan, Lin, Lin, Lin, & Lin, 2009; Mikesky et al., 2006; Roddy et al., 2005; Suomi & Collier, 2003; Thomas et al., 2002; Topp et al., 2002; Zhang et al., 2005). Furthermore, it has been shown that there are limited side effects to well designed exercise-therapy programmes (Allegrante & Marks, 2003; Roddy et al., 2005), providing further support for its use as a treatment option.

The manner in which exercise-therapy is delivered can differ. Exercise-therapy programmes can be water- or land-based (Foley et al., 2003; Fransen et al., 2007; Suomi & Collier, 2003), the exercises can be performed in classes or individually, and undertaken in either a clinic or gymnasium setting or as a home-based programme (Thomas et al., 2002). Exercise-therapy can be focused on improving muscle strength, joint range of motion or cardiovascular fitness (Jan et al., 2009; Mikesky et al., 2006; Topp et al., 2002). Two recent meta-analyses have indicated that exercise-therapy is a more effective treatment for people with osteoarthritis of the knee joint (Fransen & McConnell, 2009) than of the hip joint (Fransen, McConnell, Hernandez-Molina, & Reichenbach, 2010). In addition some studies have included manual-

therapy sessions in the exercise-therapy programme (Deyle et al., 2000; Deyle et al., 2005; Hoeksma et al., 2004). There is weak evidence to support manual-therapy in combination with exercise-therapy being better than exercise-therapy alone for the management of osteoarthritis of the hip joint (Deyle et al., 2000; Deyle et al., 2005). However further discussion of the effect of manual-therapy on osteoarthritis is outside of the scope of this thesis.

The findings of studies do not provide support for any particular type of exercise over another. For instance, no significant difference has been identified in the gains made in perceived functional performance and actual function performance between people completing hydrotherapy or land-based exercise programmes (Foley et al., 2003; Suomi & Collier, 2003). The differences noticed between the two groups were that the adherence rate was slightly greater with the hydrotherapy programme, but this difference was not significant (Foley et al., 2003; Suomi & Collier, 2003). The only other difference was that there was a trend toward greater quadriceps strength with the land-based programmes (Foley et al., 2003; Suomi & Collier, 2003). Tai Chi based exercise programmes have been shown to be less effective at improving perceived functional performance and actual function performance when compared to hydrotherapy programmes, however this difference could have been accounted for by the significantly greater rate of adherence to the hydrotherapy programme than the Tai Chi programme (Fransen et al., 2007).

Home-based exercise programmes have been shown to be an effective way of providing exercise-therapy for people with hip and knee joint osteoarthritis, as they have been found to be cost effective due to the limited number of resources required to implement them (Thomas et al., 2002). Thomas et al. (2002) and Pisters et al. (2010) both found a positive correlation between higher levels of home-based exercise programme adherence and decreases in knee pain. Deyle et al. (2005) compared a home-based exercise programme only, to a home-based

exercise programme combined with a short course of supervised clinic exercise and manual-therapy for the management of osteoarthritis of the knee joint. It was found that the addition of manual-therapy and supervised exercise improved the perceived effectiveness of the programme, but it did not affect the measures of function at the end of the eight-week programme and at the 12 month follow-up.

Specific muscle strengthening, joint range of motion and cardiovascular exercises have all been used with a range of outcomes (Jan et al., 2009; Mikesky et al., 2006; Topp et al., 2002; Roddy et al., 2005; Zhang et al., 2005). Topp et al. (2002) found a trend toward isometric strength exercises being more effective than isotonic strength exercises for improving completion of functional tasks in people with lower limb arthritis. Furthermore, both forms of strength training were shown to be significantly better than the control group. Strength training exercise programmes have been found to be moderately more effective ( $p = .05$ ) than range of motion exercise programmes for maintaining muscle strength and joint space in people with osteoarthritis (Mikesky et al., 2006). Weight bearing exercises have proven to be no more effective than non-weight bearing exercises for improving strength and perceived functional performance for people with osteoarthritis of the knee joint (Jan et al., 2009). However weight bearing exercises have been shown to be significantly more effective ( $p = .008$ ) than non-weight bearing exercises for improving position sense (Jan et al., 2009). It is of interest that Mikesky et al. (2006) found that there was no correlation between the progression of joint space narrowing and quadriceps muscle strength, pain or exercise adherence.

In summary, the findings of the research point to exercise-therapy being useful for improving the perceived functional performance and actual functional performance of people with osteoarthritis of the hip and/or knee joints. Currently, there is limited evidence to suggest that any specific type of exercise is better than another. Meta-analyses of the available literature

imply that a comprehensive programme including strength training, range of motion exercises and cardiovascular exercises is the best current management (Roddy et al., 2005; Zhang et al., 2005). However exercise-therapy can only be effective if the programmes are adhered to, at present there limited evidence about the extent of participants' adherence to these exercise programmes.

## **2.4 The Problem of Adherence to Physiotherapy Exercise Programmes**

Adherence can be defined as following the prescribed treatment programme and advice given by the health care professional (Bassett, 2003; Meichenbaum & Turk, 1987). The degree to which people adhere to prescribed exercises in rehabilitation has been measured in a number of studies and can be classified as full, partial and poor. The percentage of people described as fully adhering to prescribed exercises has been found to vary, with full adherence being reported as being as few as 10% of patients in one study (Forkan et al., 2006) and 35% in another (Sluij et al., 1993). Similarly the percentage of people described as partially adhering to their prescribed physiotherapy has also been found to vary widely with rates of partial adherence reported from between 39% to 100% (Barbour & Miller, 2008; Brassington, Atienza, Perczek, Di Lorenzo, & King, 2002; Fokran et al., 2006; Kovar et al., 1992; Krischak, Krasteva, Schnider, Gebhard, & Kramer, 2009; Lyngcoln, Taylor, Pizzari, & Baskus, 2005; O'Reilly et al., 1999; Rogind et al., 1998; Sluijs et al., 1993; van Gool et al., 2005). Poor adherence to physiotherapy has also been found to be variable with Sluijs et al. (1993) reporting 22% and Forkan et al. (2006) 49% of the participants in their studies being categorised as poor adherers to prescribed physiotherapy.

The differences in findings of adherence studies described above could be due to five methodological factors. Firstly, differences can be seen in the method of reporting adherence

rates. While some studies have rated participant attendance as high, medium or low (Brassington et al., 2002; Forkan et al., 2006; Sluijs et al., 1993; van Gool et al., 2005), others have calculated a percentage average for the sample (Krischak et al., 2009). Secondly, a variation has occurred in the types of adherence behaviour measured, such as appointment keeping, clinic or class behaviour and home behaviour. Thirdly, the tools used for the measurement of adherence have differed between studies. For example, adherence to home-based exercises has been measured by patient self-report scales (Sluijs et al., 1993; Taylor & May, 1996) and exercise diaries (Krischak et al., 2009; Lyngcoln et al., 2005).

Fourthly, adherence to a variety of treatment programmes for different disorders have been studied. These programmes included cardiac rehabilitation (Barbour & Miller, 2008), home-base knee joint osteoarthritis rehabilitation (Pisters et al., 2010), post-operative wrist rehabilitation (Krischak et al., 2009), falls prevention programme (Fokran et al., 2006), sports injury rehabilitation (Taylor & May, 1996) and a general physiotherapy out-patient treatments (Sluijs et al., 1993). The latter three studies (Fokran et al., 2006; Sluijs et al., 1993; Taylor & May, 1996) consisted of participants with a large variety of injuries and disorders, which are known to have different adherence rates. Brewer (1999) reports that these different rates of adherence are due to the different demands of the disorder or injury on the individual and the different treatment behaviours required for the different rehabilitation programmes.

Fifthly, the duration of the treatment has a bearing on the level of adherence. It is usual for short-term physiotherapy programmes to have higher levels of adherence (Deyle et al., 2000; Kovar et al., 1992; Sluij et al., 1993) in comparison to long-term physiotherapy programmes (Barbour & Miller, 2008; Forkan et al., 2006; O'Reilly et al., 1999; Pisters et al., 2010). This decrease in adherence over time has been exemplified in the study by Rejeski et al. (1997), with adherence to the exercise programme being 85% three months after commencement of the programme and dropping to 50% at 18 months. In contrast, Forkan et al. (2006) found

that the adherence rates did not decrease over time, with partial adherence rates being 69% at 12 months after commencement of the programme and 73% at 48 months after commencement. Forkan et al. (2006) found that a decrease of their general health status usually led to a decrease in participants' adherence to exercises. Similarly the study by Brassington et al. (2002) found no significant decrease in exercise adherence rates over a 12 month period.

## **2.5 The Measurement of Adherence to Physiotherapy Exercise Programmes**

Treatment adherence is a multifaceted phenomenon requiring different behaviours for different aspects of treatment in a variety of settings. Hence, different tools have been advocated for the measurement of adherence to exercise rehabilitation programmes (Bassett & Prapavessis, 2007; Levy, Polman, & Clough, 2008; Spetch & Kolt, 2001). Some studies have investigated the use of mechanical measures of adherence such as pedometers or exercise counters, these studies are beyond the scope of this review. This section will evaluate the three commonly used methods of assessing adherence to physiotherapy rehabilitation; attendance at classes or clinic-based rehabilitation sessions (Bassett & Prapavessis, 2007; Brassington et al., 2002; Levy et al., 2008; Lyngcoln et al., 2005; Krischak et al., 2009; van Gool et al., 2005), class- or clinic-based observations of treatment behaviour (Bassett & Prapavessis, 2007; Brewer et al., 2000; Brewer, van Raalte, Petitpas, Sklar, & Ditmar, 1995; Levy et al., 2008; Lyngcoln et al., 2005) and self-reporting of the home-based rehabilitation (Bassett & Prapavessis, 2007; Forkan et al., 2006; Levy et al., 2008; Lyngcoln et al., 2005; Lysack, Dama, Neufield, & Andreassi, 2005; O'Reilly et al., 1999; Scholz, Sniehotta, & Schwarzer, 2005; Sluijs et al., 1993, van Gool et al., 2005).



The first common method of measuring adherence is attendance at class- or clinic-based rehabilitation sessions (Bassett & Prapavessis, 2007; Brassington et al., 2002; Levy et al., 2008; Lyngcoln et al., 2005; Krichak et al., 2009; van Gool et al., 2005). A percentage measure is calculated by dividing the number of sessions attended by the number of sessions scheduled (Bassett, 2003). The strength of this measure of adherence is its simplicity to calculate. The weakness is that clinic attendance does not correlate strongly ( $r = .21$ ) with adherence to the prescribed clinic rehabilitation and does not necessarily represent the behaviour during the session (Brewer et al., 2000).

The second common method of measuring adherence is class- or clinic-based clinician observations (Brewer et al., 2000; Campbell, Evans, Tucker, & Quilty, 2001; Levy et al., 2008; Lyngcoln et al., 2005). A reliable and valid tool for this measurement is the Sports Injury Rehabilitation Adherence Scale (SIRAS; Brewer et al., 2000; Levy et al., 2008; Lyngcoln et al., 2005). The SIRAS is a three item, five point incremental scale that requires the clinician to measure the intensity that the participant exercises at, the ability of the participant to follow instructions during the session and how receptive the participant was to changes of the programme during the session. A Cronbach's alpha coefficient of .82 and a test-retest intraclass correlation coefficient of .77 were obtained for the SIRAS, pointing to it being a valid and reliable tool (Brewer et al., 2000). The strengths of the tool are that it is easily completed and it is not subject to participant bias. The weakness of this method is that it is prone to inter-tester variability.

The third common method of measuring adherence is participant self-reporting of the home-based rehabilitation (Bassett & Prapavessis, 2007; Brassington et al., 2002; Fokran et al., 2006; Levy et al., 2008; Lyngcoln et al., 2005; Lysack et al., 2005; Scholz et al., 2005; Sluijs et al., 1993; van Gool et al., 2005). This can be done either in the form of the completion of an exercise diary or as a patient self-report scale. The exercise diary is a participant

completed record of the exercises undertaken. A percentage measure is created by dividing the number of completed exercises by the number prescribed (Levy et al., 2008). The patient self-report scale is a multiple item, five increment scale that requires the participant to rate the extent to which they followed the components of the home management programme (Bassett & Prapavessis, 2007; Taylor & May, 1996). The strengths of both these measures are that they give a measurement of the participants' adherence behaviour outside of the clinical environment and they are quick and easy to complete. As with other self-reported measures, exercise diaries and self-reporting scales have been criticised for being vulnerable to both participant recall error and over reporting (Campbell et al., 2001; Pisters et al., 2010; Spetch & Kolt, 2001).

In summary, the three commonly used methods of assessing adherence to physiotherapy rehabilitation all have strengths and weaknesses. Given that treatment adherence is a multifaceted and complex issue and that no one measure is without its problems, a number of measures should be used when assessing adherence so that a comprehensive representation of rehabilitation adherence behaviour is obtained (Lyngcoln et al., 2005; Spetch & Kolt, 2001).

## **2.6 Determinants of Adherence to Exercises in Physiotherapy**

There are a number of determinants which have been shown to influence exercise adherence in physiotherapy (Campbell et al., 2001; Darmish, Perkins, Mikesky, Roberts, & O'Dea, 2005; Meichenbaum & Turk, 1987; Rejeski et al., 1997; Rovniak, Anderson, Winett, & Stephens, 2002; Roddy et al., 2005; Scholz et al., 2005; Sluijs et al., 1993; Veenhof et al., 2006). Determinants can have either an inhibitory or enhancing effect on adherence behaviour. For ease of discussion and comprehension the determinants have been divided

into four categories (Meichenbaum & Turk, 1987) which are; patient-clinician interactions, disease or injury, treatment, and personal determinants.

### Patient-Clinician Interactions

Patient-clinician interactions have been shown to affect adherence to exercise rehabilitation programmes, with adherence being enhanced by good therapist promotion of the prescribed exercises (Sluijs, et al., 1993) and previous positive interaction with a physiotherapist (Scholz et al., 2005; Veenhof et al., 2006). Sluijs et al. (1993) found that higher levels of adherence were seen when therapists asked patients to indicate their demands and regularly monitor their progress. Campbell et al. (2001) and Levy et al. (2008) found that if patients with osteoarthritis of the knee joint described they felt a sense of obligation to the physiotherapist, they were seen to have enhanced short term adherence behaviour.

### Disease or Injury

Disease or injury related determinants that have been shown to inhibit adherence to rehabilitation exercise programmes are pain (Sluijs et al., 1993), poor general health (Damush et al., 2005) and poor disease prognosis (Campbell et al., 2001). Disease or injury related determinants that have been shown to enhance adherence to exercise programmes are higher levels of disability (Sluijs et al., 1993) and a definitive clinical diagnosis (Damush et al., 2005). With regard to osteoarthritis, disease or injury related determinants that have been suggested as inhibiting exercise adherence are the presence of associated joint and muscle pain, limited cardiovascular fitness, joint stiffness as well as other age related co morbidities such as cardiac disease (Allegante & Marks, 2003). Damush et al. (2005) found people were more adherent to a home-based exercise programme if they had been diagnosed with

osteoarthritis of the knee joint when compared to those diagnosed with non-specific knee pain.

### Treatment

Treatment related determinants that have been shown to inhibit adherence to rehabilitation exercise programmes are treatment regimes that extend over a long period of time (Rejeski et al., 1997), treatment regimes that are too complex (Roddy et al., 2005) and poor availability of the equipment and rehabilitation services (Roddy et al., 2005). In contrast, the use of exercise diaries and follow-up physiotherapy after discharge, have been shown to improve long-term adherence (Roddy et al., 2005). Nonetheless, Holden, Nichols, Hay, and Foster (2008) surveyed physiotherapists in the United Kingdom about their management of knee joint osteoarthritis, finding only 12% of them would use an exercise diary and only 34% would offer follow up physiotherapy after discharge. Other treatment factors that have been identified as enhancing adherence behaviour are high levels of supervision (Roddy et al., 2005), a well structured organised exercise programme (Damush et al., 2005) and previous patient experience with the required activities (Damush et al., 2005). Attendance incentives have been shown to increase exercise adherence rates in studies with participants from lower socioeconomic groups (Damush et al., 2005).

### Personal

Personal factors that have been identified as predictors of poor adherence to rehabilitation exercise programmes are not perceiving treatment benefit and having low outcome expectancies (Fokran et al., 2006), clinical depression (Barbour & Miller., 2008), decreases in health status (Fokran et al., 2006), decreased levels of social support (Veenhof et al., 2006),

poor coping strategies (Scholz et al., 2005), perceived barriers to exercise (Fokran et al., 2006), poor knowledge of their illness (Campbell et al., 2001), not having enough time to complete the programme (Sluijs et al., 1993; Veenhof et al., 2006) and insufficient skills to complete the task (Marks & Allegrante, 2005). Personal factors that have been shown to enhance adherence to rehabilitation exercise programmes are increased levels of social support, particularly if the social support is that of a partner or spouse (Brassington et al., 2002; Damush et al., 2005; Rovnaik et al., 2002; Veenhof et al., 2006), positive outcome expectancy and perceived benefit of the intervention (Brassington et al., 2002; Campbell et al., 2001; Damush et al., 2005; Rovnaik et al., 2002; Scholz et al., 2005), increasing age (Sluijs et al., 1993; Damush et al., 2005), a greater degree of perceived severity (Campbell et al., 2001), a high level of coping skills (Levy et al., 2008; Scholz et al., 2005), a high level of self-motivation (Rovniak et al., 2002) and a high level of self-efficacy (Brassington et al., 2002; Damush et al., 2005; Rovnaik et al., 2002; Scholz et al., 2005; Veenhof et al., 2006). Brassington et al. (2002) concluded that the most significant factors affecting exercise adherence in the elderly were cognitive factors, in particular self-efficacy and exercise expectations. Mazieres et al. (2008) described the most significant predictors of exercise adherence in people with osteoarthritis as being prior exercise behaviour, level of education regarding the disease and perceived benefit of the exercises. The findings of Mazieres et al. (2008) indicate that people with osteoarthritis may have different barriers to exercise adherence than seen in the general elderly population.

### Summary

An understanding of the determinants of exercise adherence permits prescribers of exercise to facilitate better adherence. Programmes and guidelines have been designed using these determinants to reduce the impact of barriers to adherence to physiotherapy programmes (Fransen et al., 2010a; Jamtvedt et al., 2008; Roddy et al., 2005; Zhang et al., 2005). Patient's

beliefs with regard to an exercise programme need to be developed so that they have a high level of self-efficacy and a positive expectation with regard to their ability to undertake and adhere to the programme (Mazieres et al., 2008). This increase in self-efficacy can be facilitated through effective education and instruction with regard to the exercise programme, a comprehensive introduction process as well as close initial supervision and support (Brassington et al., 2006; Marks & Allegrante, 2003; Roddy et al., 2005; Zhang et al., 2005).

## **2.7 The Effect of Self-Efficacy on Exercise Adherence in Physiotherapy.**

Self-efficacy was first described by Bandura (1977) as a key construct of the social cognition theory. Bandura (1986) defined self-efficacy as a person's beliefs of their capabilities to organise and manage prospective situations. Self-efficacy has proven to be such a significant construct in the study of health behaviour research it is now seen as an essential component of most major models that describe behaviour change (Conner & Norman, 2005). Behaviour change is heavily influenced by a person's sense of control, if people believe they can control an action or behaviour, they will be more inclined to make the change and then continue with the behaviour (Conner & Norman, 1995).

Self-efficacy is described as being context specific (Bandura, 1995; Lorig, Chastain, Ung, Shoor, & Holman, 1989; Marlatt, Baer, & Quigley, 1995; Orbell et al., 2001; Scholz et al., 2005; Schwarzer et al., 2006), and hence tools and questionnaires need to be designed to measure self-efficacy in the context of the behaviour being studied. It has also been found that the type of self-efficacy required for behaviour change can itself change during task acquisition and maintenance (Marlatt et al., 1995). Because of this, self-efficacy has been divided into five different phases or sub categories; resistance self-efficacy, harm reduction self-efficacy, task self-efficacy (pre action / action), maintenance self-efficacy (coping) and recovery self-efficacy (Marlatt et al., 1995; Scholz et al., 2005; Schwarzer et al., 2006). It is

the latter three that have been linked to exercise adherence (Scholz et al., 2005; Schwarzer et al., 2006). As it relates to exercise-therapy, task self-efficacy is the belief that people have of their ability to adopt new exercise behaviours. Maintenance self-efficacy, also known as coping self-efficacy, describes peoples' beliefs about their capability to overcome barriers that may prevent them from continuing to complete their exercises. Recovery-self efficacy is the belief that people have about their ability return to their exercise programme after a break or a return to old behaviours (Scholz et al., 2005).

Phase specific self-efficacy has been used to predict physical exercise behaviour in number of studies (Levy et al., 2008; Scholz et al., 2005; Schwarzer et al., 2006). Scholz et al. (2005) found a significant ( $p < .05$ ) correlation between high levels of task, maintenance and recovery self-efficacy and higher rates of exercise adherence during the completion of a cardiac rehabilitation programme. Self-efficacy has also been shown to predict exercise adherence behaviour by Levy et al. (2008), who found that clinic-based rehabilitation adherence ( $p < .05$ ) and clinic attendance ( $p < .01$ ) correlated positively with high self-efficacy levels. However, Levy et al. (2008) found that adherence to home-based exercises did not correlate with self-efficacy levels which is in contrast with the results of other research (Taylor & May, 1996). Levy et al. (2008) stated that one possible reason for there being no correlation was the measure of adherence used in the study was a self-report scale about the completion of the home-based exercise programme. As previously discussed this measure is prone to response bias and Levy et al. (2008) believed that the participants may have over reported the completion of their home-based exercise programme. Levy et al. (2008) found that high levels of home-based adherence related significantly to effective coping skills ( $p < .05$ ), habit ( $p < .05$ ) and high levels of social support ( $p < .01$ ).

While people's knowledge of their ability may not directly be affected by osteoarthritis, the level of self-efficacy of people with osteoarthritis may be decreased due to a reduction in

their confidence in their ability to attempt the task as well as beliefs with regard to a reduced ability to complete a task or functional activity (Allegrante & Marks, 2003; Harrison, 2004). Lorig et al. (1989) designed a tool to measure self-efficacy in relation to exercise and treatment behaviour in people with arthritis. This test is a self-report measure which consists of three subscales; pain, function and coping. Lorig et al. (1989) tested the construct, concurrent validity and reliability of the scale finding it was a reliable and reproducible measure of perceived function for people with arthritis.

Barriers not motivators are seen as the most significant indicators of adherence to exercise in the elderly (Fokran et al., 2006). Lower levels of self-efficacy or perceived ability to cope could therefore result in greater perceived barriers and lower functional levels (Rejeski et al, 2001; Sohl & Mayer, 2010). Enhancing self-efficacy beliefs has been associated with increased ability to cope with the barriers to exercise and subsequently greater levels of adherence (Barbour & Miller., 2008; Levy et al., 2008; Rejeski et al., 1998). High levels of self-efficacy facilitate behaviour change as people who anticipate a more positive outcome are more likely to set goals and make the changes (Conner & Norman, 2005).

## **2.8 Theoretical Models Grounded in Self-Efficacy Used in Adherence Research**

As previously outlined, self-efficacy has proven to be a significant contributor to behaviour change and as a consequence has become a component of most behaviour change models (Conner & Norman, 2005).



### The Social Cognitive Theory

The starting point for the social cognitive theory model is self-efficacy (Figure 2.1), with it influencing outcome expectancies, goals and socio-structural factors which in turn affect behaviour. Self-efficacy is also believed to directly affect behaviour (Bandura, 1997). The theory implies that human motivation and action are controlled by forward thought and planning (Conner & Norman, 2005). Outcome expectancy, the other key construct, is defined as consequences which are anticipated as a result of the behaviour change or actions.

Outcome expectancies are understood to be influenced by physical, social and personal factors and are believed to act on goals and behaviour (Conner & Norman, 2005). The other two constructs of the social cognitive theory are goals and socio-structural factors, both of which are believed to be affected by self-efficacy. Goals impact directly on behaviour, whereas socio-structural factors do not directly affect behaviour but affect goals. It is considered that socio-structural factors and outcome expectancies impact on goals, which in turn affect behaviour.

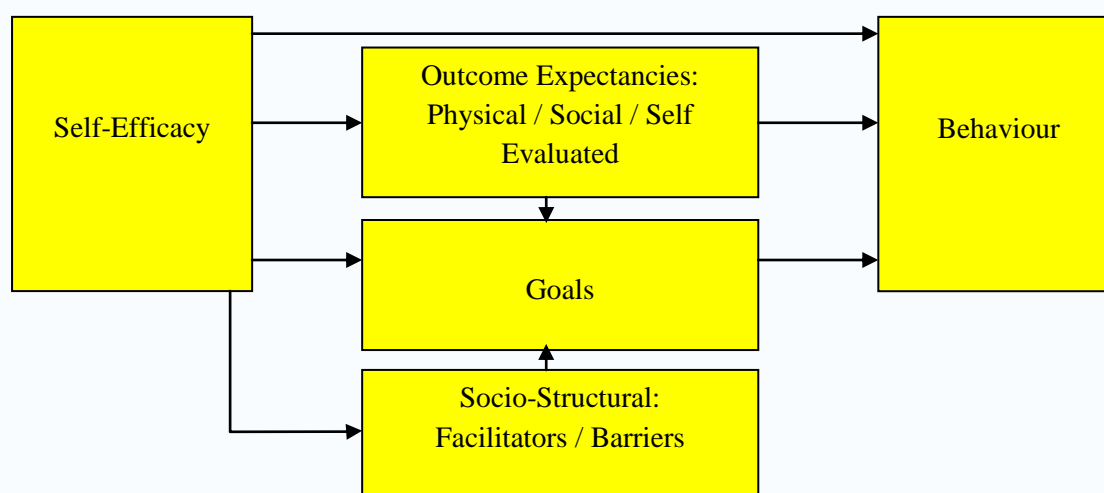


Figure 2.1 The Social Cognitive Theory. Adapted from Bandura (1997).

There are three limitations with the use of social cognitive models to facilitate behaviour change and each will be discussed in turn. First, intentions and goals alone do not facilitate

behaviour change, nor have they the ability to maintain behaviour change. Implementation processes have been designed to bridge the gaps between intentions and goals, and behaviour change (Gollwitzer, 1993; Schwarzer et al., 2006; Weinstein, 2007). It has been found that behaviour change is more likely to be achieved if the desired behaviour is framed as being specific and measurable (Gollwitzer & Schall, 1998).

One strategy designed to facilitate behaviour change is post intentional planning which has been called 'Implementation Intentions' (Gollwitzer & Schall, 1998). Implementation intentions are a planning process, which describe how, when and where the desired behaviour will occur (Gollwitzer, 1993). Sniehotta et al., (2005) divided implementation intentions into action plans and coping plans to facilitate these different skills. The action plan is a description of the manner in which the behaviour change would occur, it describes the how, when, where and with whom the behaviour will occur (Sniehotta et al., 2005). For example, 'I will cycle for 30 minutes each morning at the local gymnasium with my friend'. The coping plan is a plan that prepares the person to successfully overcome barriers to their planned activity. For example, 'on the days that the gymnasium is closed I will go for a 30 minute walk'. Action and coping planning have been shown to be effective tools for increasing exercise adherence and programme completion in cardiac rehabilitation patients (Sniehotta et al., 2005). Sniehotta et al. (2005) divided participants into three groups, one group received action planning only, another received action and coping planning, and a control group received usual care. The group that completed the action and coping planning were shown to have completed significantly ( $p < .01$ ) more exercises than the other two groups. In addition there was a trend towards the action planning only group completing more exercises than the control group. Sniehotta et al. (2005) concluded that the application of a combination of both action and coping planning was effective at significantly increasing completion of exercise following discharge from cardiac rehabilitation.

A second limitation with the use of the social cognitive model is its ability to facilitate behaviour change. Behaviour change is described as a two stage process, namely planning and action (initiation and maintenance) stages (Schwarzer et al., 2006). As people go from planning the new behaviour, to changing their behaviour and maintaining this new behaviour, the type of skills required also change (Marlett et al., 1995). The social cognitive model does not describe this change in skills sets (Conner & Norman, 2005). It has also been shown the type of self-efficacy required to initiate behaviour change is different from that required to maintain behaviour change (Marlatt et al., 1995). Schwarzer et al. (2006) found that high levels of task self-efficacy correlated with effective action planning skills and high levels of maintenance or coping self-efficacy correlated with good coping planning skills.

Third, the social cognitive theory was not designed to be used as an interventional model, it was originally designed to predict behaviour not facilitate it. Stage models, such as the Health Action Process Approach (HAPA: Schwarzer et al., 2006), are better suited to the implementation of interventions (Conner & Norman, 2005).

### *The HAPA Model*

In an attempt to overcome the limitations of the social cognitive theory Schwarzer (2004) developed the HAPA (see Figure 2.2), a two stage intervention model (a planning stage and an action stage) based on the social cognitive theory but designed to include implementation intentions (action and coping planning) to bridge the gap between goals and behaviour. The model shows risk perception influencing outcome expectancy and in turn task self-efficacy. Task self-efficacy influences goals (behaviour change), implementation intentions (action and coping planning), initiates task or action (behaviour change), maintenance of the behaviour (coping) and recovery of the behaviour after a relapse. The HAPA model also splits self-efficacy into the three types required to complete a task, acknowledging that the type of self-

efficacy required can change at different stages of the adoption of the new behaviour. For example, task self-efficacy is required for the initial behaviour change and then maintenance and recovery self-efficacy become important for coping with barriers to continuation of the behaviour.

The HAPA model has been found to predict exercise behaviour in cardiac rehabilitation (Luszczynska, 2006, Scholz et al., 2005) and orthopaedic rehabilitation (Lippke, Ziegelmann, & Schwarzer 2004). Schwarzer et al. (2006) applied the HAPA model to the data sets of the three studies described above and found that outcome expectancies, task self-efficacy, intention, action planning and recovery self-efficacy were effective predictors of exercise behaviour. However, two of the three studies (Lippke et al., 2004; Luszczynska, 2006) found

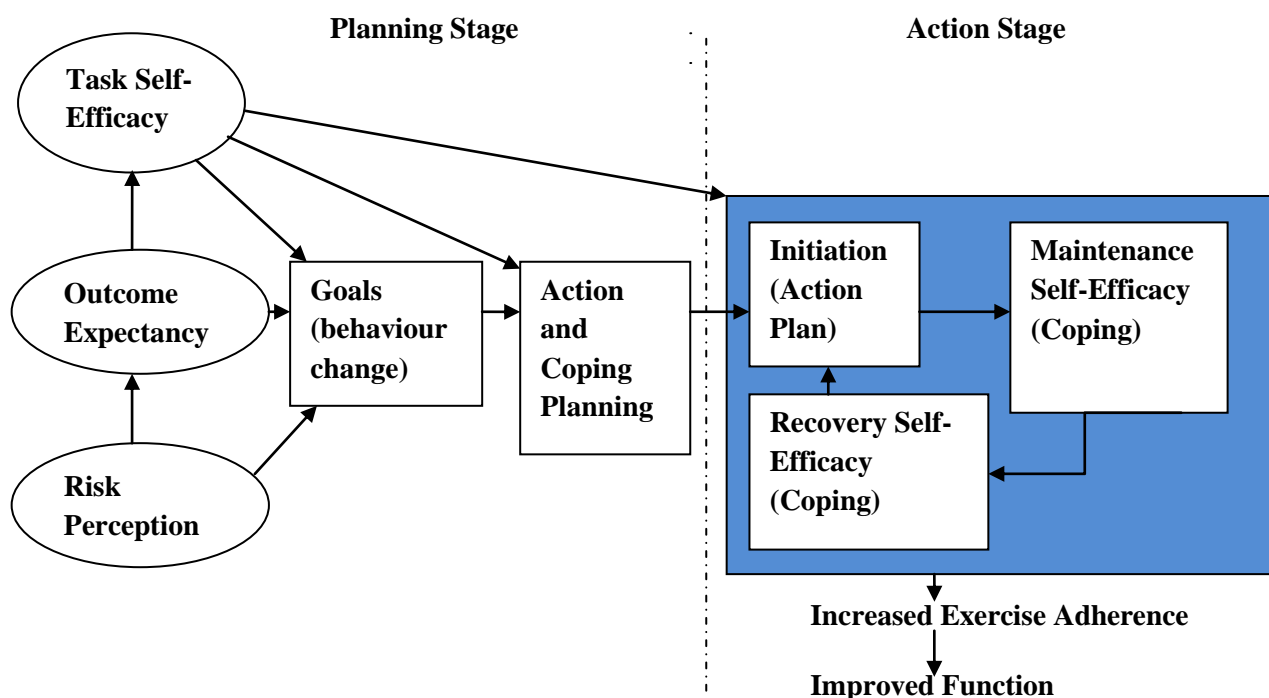


Figure 2.2. The HAPA, adapted from Conner and Norman (2005).

risk perception was not significantly related to either outcome expectancies or intention. Luszczynska and Schwarzer (2005) found similar results regarding a non-significant link between risk perception and outcome expectancies or intention. This led Schwarzer et al. (2006) to suggest that programmes designed to improve health behaviour should direct their

resources to improving outcome expectancies and task self-efficacy and not attempting to raise risk awareness. Sniehotta et al. (2005) used the HAPA model to implement action and coping planning as an intervention to improve exercise completion in people attending cardiac rehabilitation and found that the group that completed the action and coping planning completed significantly more physical activity ( $p < .01$ ) than participants who received action planning only or no planning skill.

## 2.9 Summary

Osteoarthritis is a significant health problem in New Zealand. Exercise therapy has been shown to be an effective management strategy, but its full potential is limited due to poor adherence. It is believed that adherence is limited by perceived barriers to the exercise programmes. If these barriers were overcome it is probable that adherence rates would improve. Action and coping planning have been shown to be an effective strategy to improve adherence to long term exercise programmes for cardiac disorders but thus far not osteoarthritis. These planning strategies could be implemented through the HAPA model into an exercise therapy programme for people with osteoarthritis of the hip or knee. This increase in adherence and subsequent exercises may in turn improve both perceived functional performance of functional performance. Therefore this feasibility study will compare the use of action and coping plans, as derived from the HAPA model, with not using plans on adherence to an exercise programme for osteoarthritis of the hip and/or knee joints.

### 3.0 METHODOLOGY

#### 3.1 Study Design

This was a two group, randomised, controlled, clinical trial to test the feasibility of the procedures and intervention for a larger study. See Figure 3.1 for the study design. The intervention group received an exercise programme plus action and coping plans and the control group received only the exercise programme. The dependent variables were adherence (measured by class attendance, class-based adherence and by home-based adherence), self-efficacy (measured by task self-efficacy, maintenance self-efficacy, recovery self-efficacy subscales (Scholz et al., 2005) and using the Arthritis Self-Efficacy Questionnaire [Lorig et al., 1989]), perceived functional performance (measured by the Lower Limb Task Questionnaire – Activities of Daily Living subscale [LLTQ-ADL: McNair et al., 2007]), actual functional performance (measured by the time up and go test (TUG), the 10 meter walk test (10MWT), the step test and the 6 minute walk test[6MWT]) and pain (measured by a pain box plot ).With the exception of adherence, which was measured throughout the trial, the other measures were undertaken pre- and post-study. It is acknowledged that the measurement of maintenance and recovery self-efficacy prior to the implementation of the exercise programme and the planning strategies is contrary to the sequence of intentional and volitional phases of the HAPA model. However, the initial measurement of these self-efficacy variables provided an insight into the participants' preconceived notions of overcoming barriers to exercises. Dropouts were counted in the statistical analysis.

## Study Design: Showing the Flow of Participants through the Study

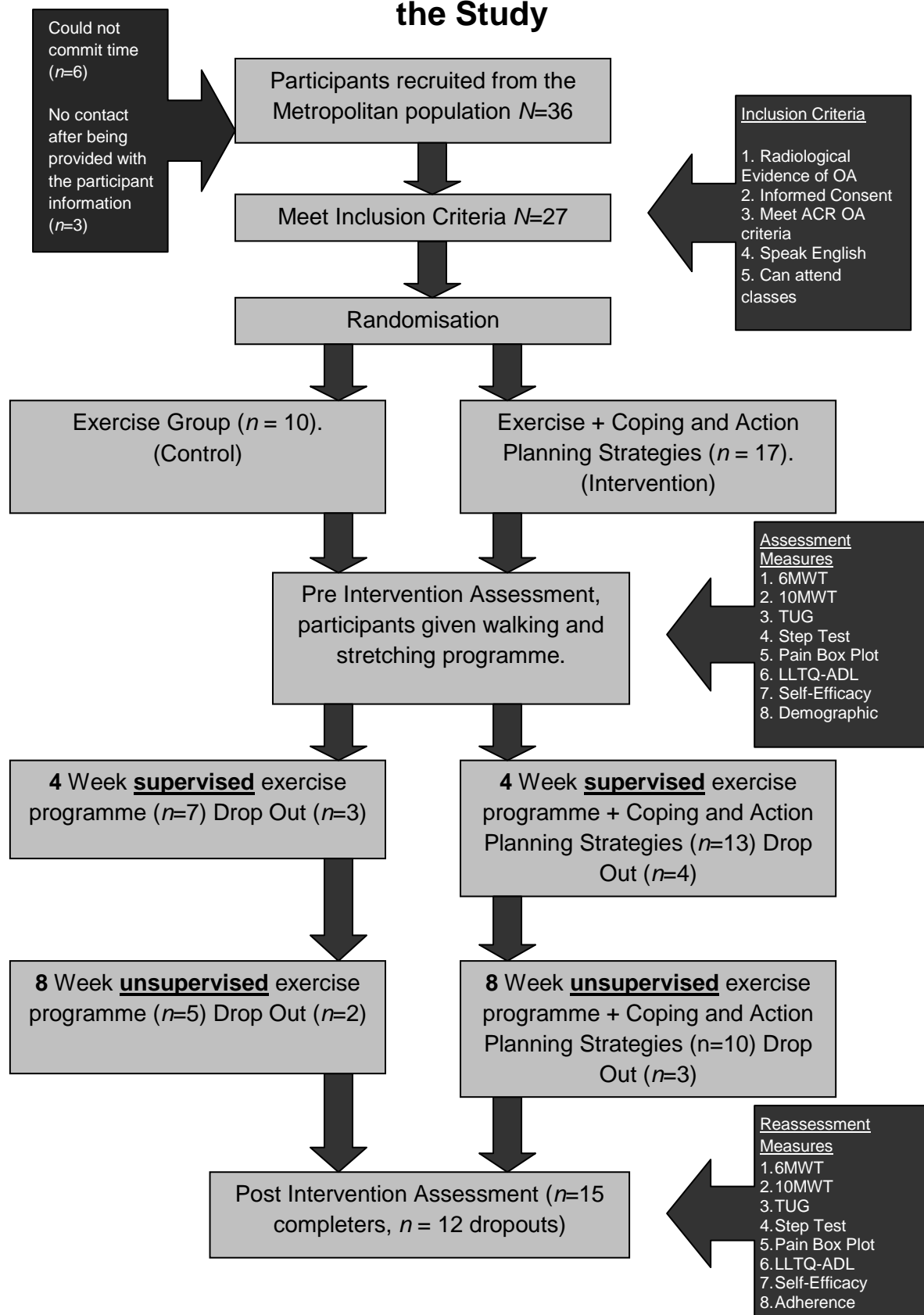


Figure 3.1 Study design. ACR = American College of Rheumatology. OA = Osteoarthritis.

### 3.2 Participant Selection

Twenty seven people with moderate osteoarthritis of the hip and/or knee joints were recruited from the Akoranga Integrated Health (AIH) physiotherapy clinic and local population, either by self-referral from the advertisement in the local paper, or by orthopaedic specialist, general practitioner or physiotherapist referral. The group included 11 men and 16 women who were aged between 38 and 86 years, with a mean age of 63.4 ( $\pm 10.6$ ). There were 20 people with osteoarthritis of the knee joint, six with osteoarthritis of the hip joint and one with osteoarthritis of both joints. The time since diagnosis of osteoarthritis varied between one and 180 months with a mean duration being 52 ( $\pm 50$ ) months. Thirty six people initially expressed an interest in the study, however only 27 enrolled. Of the 27 people who enrolled in the study 15 completed the programme. Five dropped out due to an increase in symptoms, three dropped out due to other illness, one stated they were over committed, one dropped out due to lack of transport, one dropped out due to work commitments and one for unknown reasons.

Participants met inclusion criteria if they had a clinical diagnosis of hip and/or knee joint osteoarthritis that meet the American College of Rheumatology guidelines (Altman et al., 1986) and were able to attend the clinic for the period of the trial. The American College of Rheumatology guidelines require the person to have radiographic evidence of osteoarthritic changes, joint pain on most days of the last month as well as three of the following; aged 50 years or older, morning joint stiffness for longer than 30 minutes, crepitus, bony tenderness, bony enlargement and no palpable warmth. Participants also had to have a good command of the English language to undertake the action and coping plans and answer the questionnaires. People were excluded from the trial if they were attending physiotherapy elsewhere during the period of the trial or if they had a systemic illness that prevents them from exercising safely such as unstable cardiac disease.



### **3.3 Measures**

The measures utilized included the PAR-Q (Chen, Lin, & Yu, 2009), phase specific self-efficacy scales (task, maintenance and recovery self-efficacy scales [Sniehotta et al., 2006]), Arthritis Self-Efficacy Questionnaire (Lorig et al., 1989), TUG test (Podsiadlo & Richardson, 1991), 10MWT (Freter & Fruchter, 2000), step test (Kennedy, Stratford, Wessel, Gollish, & Penney, 2005), 6MWT (Kennedy et al., 2005; Stratford Kennedy, & Woodhouse, 2006), LLTQ-ADL (McNair et al., 2007), pain box plot (Boonstra, Schiphorst-Preuper, Reneman, Posthumus, & Stewart, 2008), class attendance, class-based adherence (Brewer et al., 2000) and home-based adherence.

#### **3.3.1 Demographic and Osteoarthritis Characteristics**

The PAR-Q (Chen et al., 2009) is a commonly used tool designed to identify people who could be medically unfit to participate in an exercise programme (see Appendix 1). The PAR-Q includes questions regarding history of current and previous exercise levels, cardiac disease, surgery, asthma, diabetes, epilepsy and other systemic illness, current medications and current employment status. The questionnaire was modified for this study to include questions about age, gender, length of time since first developing symptoms of osteoarthritis and current analgesic usage. The PAR-Q has been found to be a useful for identifying people who are not appropriate for gym-based exercise in an elderly population (Chen et al., 2009).

### 3.3.2 Adherence

The measures of adherence were total number of exercise classes attended, programme completion, participation in the class-based programme and completion of the home-based walking and exercise programmes.

#### Attendance

Attendance at the exercise classes was recorded by the research assistant at the end of each class (see Appendix 2). At the end of the 12 week programme the total number of classes attended was recorded. There were 36 scheduled classes unless the programme was affected by a public holiday.

#### Programme Completion

Programme completion was stated as attending a minimum of one class per week for the 12 weeks. An exception to this was made if a participant had planned leave (holiday) or illness and returned to the programme following the break. Programme completion was measured and in the cases of non-completion the reasons for non-completion were noted. Attendance and programme completion are simple, commonly used measures of exercise adherence (Bassett & Prapavessis, 2007; Brassington et al., 2002; Levy et al., 2008; Lyngcoln et al., 2005; Krischak et al., 2009; van Gool et al., 2005).

#### Clinic-Based Adherence

Participation during the class-based sessions was measured with the SIRAS (Brewer et al., 2000). The SIRAS is a three item, 5 point increment scale that requires the supervisor to measure the intensity with which the participant exercised, the ability of the participant to follow instructions during the session and how receptive the participant was to changes to the programme during the session (see Appendix 3). A Cronbach's alpha coefficient of .82 (Shaw et al., 2005) and a test-retest intraclass correlation coefficient of .77 were obtained for the

SIRAS (Brewer et al., 2000). The Cronbach's alpha coefficient of the SIRAS in this study's was .72.

### Home-Based Adherence

Home-based adherence was measured by a participant self-report scale (see Appendix 4). The scale was a two question, five increment scale, 1 = *not at all* to 5 = *as advised*, that required the participant to rate the extent to which they followed the instructions of the home management programme (Bassett, 2003; Bassett & Prapavessis, 2007; Levy et al., 2008). The two components were the home-based walking programme and the stretching programme. The internal consistency of the self reported measure of adherence has been found to be .78 (Bassett & Prapavessis, 2007).

### **3.3.3 Self-Efficacy**

There were two measures of self-efficacy used in this study, the Arthritis Self -Efficacy Questionnaire and phase specific self-efficacy (task, maintenance and recovery self-efficacy). Task self-efficacy, maintenance self-efficacy and recovery self-efficacy were each measured using a separate four-point Likert response scale (1 = *strongly disagree* to 4 = *strongly agree*). The measures have been adapted from those used by Scholz et al. (2005).

### Arthritis Self-Efficacy Questionnaire

Participants completed the Arthritis Self-Efficacy Questionnaire (Lorig et al., 1989), which requires the participants to rate their perceived certainty that they can cope with different tasks or problems that commonly affect people living with arthritis. For the purpose of this study the items which related to upper limb symptoms were omitted from the questionnaire to make it more applicable to lower limb osteoarthritis (see Appendix 5). The scale has three subscales, pain, function and other activities. The pain subscale had five items which related

the perceived impact of pain on the participants, for example '*how certain are you that you can decrease your pain quite a bit?*' The function subscale had four items which related to the participants perceived lower limb function, for example '*how certain are you that you could walk 100 feet on flat ground in 20 seconds?*' The other activities subscale had six items about how the participants to cope with other symptoms of arthritis, for example '*how certain are you that you can control your fatigue?*' Reporting of the scale was measured using a 10 cm line with an incremental scale from 10% to 100% with participants being asked to circle the percentage which best represented the perceived certainty that they could complete the stated task. Lorig et al. (1989) tested the scale and found it to have high construct validity (.90 - .93) and medium concurrent validity (.61). Lorig et al. (1989) concluded that the measure was a reliable (.85 - .90) tool for the measurement of self efficacy in people with arthritis. The pre-study Cronbach's alpha coefficients of this study were; pain .75, function .79 and other activities .85. In this study the post-study Cronbach's alpha coefficients were; pain .94, function .84 and other activities .90.

#### Phase Specific Self-Efficacy

Task self-efficacy was measured by a four item report scale, each item commencing with the stem '*I am confident that I can...*' and related to the participants' perceived ability to undertake the prescribed exercise programme, maintain their general fitness and follow the advice given about exercising (see Appendix 6). For example, '*I am confident that I can complete the home based walking programme as prescribed*'. Scholz et al. (2005) reported that the internal consistency of this scale was acceptable ( $\alpha = .75$ ). In this study the task self-efficacy Cronbach's alpha coefficients for this study were pre-study .86, and post-study .67.

Maintenance self-efficacy was measured by a four item, self report scale with each of the items starting with the stem '*I am confident that I am able to...*' and related to the

participants' perceived ability to maintain the prescribed exercises (see Appendix 7). For example, '*I am confident that I am able to continue with the home based walking programme as prescribed*'. Scholz et al. (2005) reported that the internal consistency of this scale was acceptable ( $\alpha = .75$ ). The maintenance self-efficacy Cronbach's alpha coefficients for this study were pre-study .88, and post-study .91.

Recovery self-efficacy measured the possibility that the participants have had lapses in their exercise programme (see Appendix 8). It was measured by a three item report scale with each of the items commencing with '*I am confident that I am able to resume the regular performance of exercises...*'. For example '*I am confident that I am able to resume the regular performance of exercises even if I have not done the exercises for a couple of days*'. Scholz et al. (2005) reported that the Cronbach's alpha was .85 at the first measurement time point and .93 at the last measurement time point. In this study the maintenance self-efficacy Cronbach's alpha coefficients for were pre-study .92, and post-study .90.

### **3.3.4 Actual Functional Performance**

The four measures of actual functional performance used in the study (see Appendix 9) were the TUG test (Podsiadlo & Richardson, 1991), 10MWT (Freter & Fruchter, 2000), step test (Kennedy et al., 2005) and the 6 MWT (Kennedy et al., 2005; Stratford et al., 2006).

#### **TUG Test**

The TUG test is a measure of peoples' functional mobility (Podsiadlo & Richardson, 1991). Participants sit in a chair with their back against the back of the chair and their arms placed on the arm rests. When instructed participants get up from the chair with the use of their arms, walk around a mark three meters in front of the seat and return to the seat and sit down. The test-retest reliability of the TUG test was found to be .75 (95% CI: .51,- .89) (Kennedy et

al., 2005) and .80 (Yeung, Wessel, Stratford, & MacDermid, 2008). Yeung et al. (2008) found that the TUG test measures correlated with functional ability ( $r = -.23, p < .01$ ). Kennedy et al. (2005) found that the TUG test was responsive to detecting change (minimal detectable change at 90% confidence level: 2.49 seconds) in patients with osteoarthritis of the hip or knee joint, a finding that has been supported by similar studies (Freter & Fruchter, 2000; Piva et al., 2004; Yeung et al., 2008).

### 10MWT

The 10MWT can be used to measure either maximal walking speed or normal walking speed (Freter & Fruchter, 2000; Kennedy et al., 2005; Steffen, Hacker, & Mollinger, 2002). For this study maximal walking speed was tested with participants being required to walk as quickly as possible for a length of 10 meters with the time taken to cover the distance is measured. Kennedy et al. (2005) found that the 10MWT was responsive (minimal detectable change at 90% confidence level: 1.01 seconds) to detecting deterioration and improvement in patients with osteoarthritis of the hip or knee joint, the finding has been supported by similar studies (Freter & Fruchter, 2000). The test-retest reliability of the 10MWT for people with osteoarthritis of the hip and knee joint was .91 (95% CI: .81, - .97) (Kennedy et al., 2005). Curb et al. (2006) however stated that gait velocity tests such as the 10MWT were only a moderately reliable ( $r = .59$ ) measure of functional performance and should always be used in combination with a battery of assessment tools. Average velocities for the 10MWT have been found to vary from 1.59 meters per second for 60 to 64 year olds through to 1.15 meters per second for 80-89 year olds (Steffen et al., 2002).

### Step Test

A modified version of the Hill's step test known as the step test was used for this study (Hill, Bernhardt, McGann, Maltese, & Berkovits, 1996). The participant stepped up and down a

single 20 cm step as many times as was possible in 15 seconds. A higher number of completed steps is indicative of greater lower limb strength and dynamic balance. The test has been shown to be useful for measuring function in people with osteoarthritis (Kennedy et al., 2005). The test-retest reliability of the step test (15 seconds) was 0.90 (95% CI: 0.79 - 0.96) (Kennedy et al., 2005). Kennedy et al. (2005) found that the step test was responsive to detecting deterioration and improvement in patients with osteoarthritis of the hip or knee joint. No normative data was found for people with osteoarthritis of the hip or knee joint.

### 6MWT

The 6MWT, a commonly used measure of functional physical capacity and exercise tolerance (Nogueira, Leal, Pulz, Nogueira, & Filho, 2006), has been used with people who have osteoarthritis (Kennedy et al., 2005; Stratford et al., 2006). The participants walk as quickly as possible along a flat 20 meter track turning around a marker placed at each end for six minutes. Encouragement is offered by the measurer during the walking. If participants need to stop to rest, the timer is not stopped, the distance participants covers in the six minutes is then measured. The distance covered is described as a measure of the participants fitness (Nogueira et al., 2006; Steffen et al., 2002). Kennedy et al. (2005) found that the 6MWT was able (minimal detectable change at 90% confidence level: 61.34 meters) to detect deterioration and improvement in patients with osteoarthritis of the hip or knee joints. The test-retest reliability of the 6MWT for people with hip and knee joint osteoarthritis was .94 (95% CI: .88 - .98) (Kennedy et al., 2005). Stratford et al. (2006) found the 6 Minute Walk Test to have a high correlation with perceived functional measures ( $r = .83$ ). This finding was supported by Curb et al. (2006) who also found the 6MWT to be a reliable measure of function ( $r = .90$ ) and was a sensitive test for discriminating between different levels of functional abilities. Average distances for the 6MWT have been found to vary from 572

meters for 60 to 64 year olds through to 392 meters for 80 to 89 year olds (Steffen et al., 2002).

### 3.3.5 Perceived Functional Performance

#### LLTQ-ADL Subscale

The measure of perceived ability was the ADL subscale of the LLTQ (McNair et al., 2007[see Appendix 10]). For the purpose of this study only the ADL subscale was used as it was more appropriate for the sample in this study. The LLTQ-ADL subscale has ten activities each of which the participant rated on a five increment scale with 0 = *unable to complete* and 4 = *no difficulty to complete*. The LLTQ possesses good factor structure and composition, shows high levels of reliability (Cronbach alpha = .91) and responsiveness, and shows evidence of good minimal important difference scores (McNair et al., 2007). The ADL subscale was found to have a good correlation ( $r = .72$ ) with actual performance of task. McNair et al. (2007) concluded that the LLTQ is a useful measure of function for both clinic-based and research use. For this study, the pre-study Cronbach's alpha coefficient of the LLTQ-ADL section was .92 and post-study was .90.

### 3.3.6 Pain

Pain was measured with a box plot (see Appendix 11). The scale was 10 small boxes numbered from '1' on the left end through to '10' at the right. Participants were asked to rate their current pain level on a scale of 1 = *no pain* and 10 = *worst pain imaginable*, and then place a mark in a box as a representation of their rating. The pain scale has been found to be a reliable ( $r = .60 - .77$ ) and reproducible measure of pain for people with chronic



musculoskeletal pain (Boonstra et al., 2008) and rheumatic conditions (Joos, Petretz, Beguin, & Famaey, 1991).

### **3.4 Intervention**

All participants invited to attend the exercise sessions and were also given the home-based walking and stretching programme. They were also provided with the Arthritis New Zealand Osteoarthritis leaflet (see Appendix 12). The intervention group also received the action and coping planning skills session.

#### **3.4.1 Exercise Sessions**

The exercise sessions were based on the work by Mazieres et al. (2008), Roddy et al. (2005), Vignon et al. (2006) and Zhang et al. (2007). The programme was circuit based and had eight stations; exercycle, cross trainer, leg press, calf press, quadriceps knee extension, sit to stand, a 20centimeter step up, and resisted hip abduction. Participants had 60 seconds at each station to complete as many repetitions of the exercise as possible. They were given 30 seconds in which to move between stations. Where resistance was required in the exercise, participants were asked to pick a load that they could manage for the full 60 seconds. The participants undertook three complete circuits at each session, which in total took approximately 36 minutes to complete.

#### **3.4.2 Home-Based Exercise Programme (Walking and Stretching)**

The home-based exercise programme was based on the work of Roddy et al. (2005), and Zhang et al. (2007). Participants were asked to complete a 20 minute walk and a stretching

programme two times per week. The stretching programme consisted of one 30 second stretch bilaterally for each muscle group and included the quadriceps, the gastrocnemius and the hamstring muscles.

### **3.4.3 Action and Coping Planning Strategies (Intervention Group)**

The development and implementation of the action and coping plans was based on the work of Sniehotta et al. (2005). Following the completion of the baseline measures, the participants in the intervention group were given action and coping plans to complete with the assistance of the researcher. The researcher was blinded to the results of the baseline measures. The participants in the intervention group were asked to write down a realistic functional goal that they would like to achieve by the end of the 12 week exercise programme, for example, to be able to walk for 30 minutes without stopping. Then the participants and researcher discussed how completion of the exercise programme would aid the achievement of this goal. Next the participants, under the guidance of the researcher, completed an action plan that stated specifically when, where, how and with whom they were going to complete to the home-based walking, the home-based stretching, and class-based exercise programmes (see Appendix 13). For example, *'I will walk around the park with my sister for 20 minutes on Tuesday and Thursday at three in the afternoon'*.

For development of the coping plans, the participants were asked to think about obstacles that were likely to prevent them from continuing their newly developed exercise behaviours. They listed obstacles that could prevent them from attending the classes, completing the stretching programme or completing the walking programme, for example *'I don't like walking in the rain'*. The participants then listed specifically what they would do to overcome these anticipates obstacles by completing the sentence, *'I will overcome these obstacles by....'*. For

example *‘I will overcome these obstacles by riding my exercycle for 30 minutes on the days that it is raining’*. The coping plan was created with the guidance of the researcher (see Appendix 14). Finally the participant signed and dated the bottom of the form.

### **3.5 Procedure**

The research proposal for this study was approved by the AUT Faculty of Health and Environmental Sciences Postgraduate Research Committee on the 8<sup>th</sup> of August 2008 (see Appendix 15). Ethical approval for the study was gained from the Northern Region ‘Y’ Ethics Committee, Ministry of Health, on the 6<sup>th</sup> of April 2009 (NTY/09/01/001 [see Appendix 16]). The study was registered with the Australia New Zealand Clinical Trial Registry (308160). Participants were recruited for the study via advertising in the local paper (see Appendix 17), at local GP’ and physiotherapy clinics and through the AIH Physiotherapy Clinic. Those who met the inclusion criteria were asked for confirmation of their diagnosis from their general practitioner.

Research assistants were employed to carry out all data collection and to supervise the exercise classes. The research assistants were blinded from participants’ group allocation. In contrast, the primary researcher was blinded from the results of the data collection until analysis of the data was undertaken and did not supervise the exercise classes. Participants who met the inclusion criteria were provided with a written participant information form (see Appendix 18). Those who wished to undertake the study were then asked to complete and sign a consent form (see Appendix 19). A participant number was generated for each participant by the order in which the participants joined the programme. The participants were then randomly assigned, by way of a computer based random number generator, to either the exercise and coping and action planning group (intervention) or to the exercise only

group (control). The procedures of the class-based exercise programme, the walking programme and the stretching programme were explained to all the participants. They then completed the questionnaires (Physical Activity Readiness Questionnaire [PAR-Q], LLTQ-ADL, pain box plot, Arthritis Self-Efficacy Questionnaire, task, maintenance and recovery self-efficacy subscales) and the functional measures (TUG, 6MWT, 10MWT and the step test). Following the assessment process the intervention group were instructed in the use of action and coping plans. The intervention group completed an action plan and a coping plan form with the assistance of the researcher and a copy of both forms was given to the patient. Irrespective of their study grouping, all participants were asked to attend three exercise classes per week for a period of 12 weeks and were provided with an osteoarthritis educational leaflet (see Appendix 6).

During the first four weeks of the class-based exercise programme all participants were closely supervised by a research assistant. The research assistant provided high levels of advice and encouragement to the participants during this time. During the supervision period they were taught how to use the equipment and how to perform the exercises safely and accurately. They were also encouraged by the research assistant to apply maximal effort to each exercise. Following this four week induction period, participants were asked to continue attending the class three times per week for a further eight weeks, during these eight weeks they had minimal supervision. The research assistants documented participant attendance at the exercise classes, completed a SIRAS at the end of each class session for each participant and asked the participant to complete the self-report scale for adherence to the home-based walking and exercise programmes.

At the end of the 12 weeks participants again completed the questionnaires (LLTQ-ADL section, pain box plot, Arthritis Self-Efficacy Questionnaire, task, maintenance and recovery self-efficacy subscales) and the functional performance measures (TUG, 6MWT, step test

and the 10MWT). Fifteen participants completed the entire programme, and 12 dropped out. However the 12 drop-outs were contacted and they completed the final set of measurements.

### **3.6 Statistical Analysis**

All data analysis was conducted using Statistical Package for Social Sciences Version 16 (SPSS Inc., Chicago, IL, USA), with an alpha level set at  $p=.05$ . Prior to hypothesis testing the data was screened for normal distribution, and mean scores, standard deviation and confidence intervals were calculated. An intention-to treat analyses was not undertaken because all 27 participants who commenced the study undertook the final set of measurements irrespective of whether they completed the intervention or not. The process used for the analysis of the data is described below. Group equivalence was checked by the use of t-tests to demographic and pre-study data scores. Categorical data were compared for group equivalence using Chi-square tests.

#### *Adherence Data*

Attendance was calculated counting the total number exercise classes attended, the number of scheduled classes was 35 for all participants (due to a public holiday). Programme completion was defined as attendance at one or more class each week for the 12 weeks of the programme (unless absent for pre-arranged reasons or illness) and was categorised as yes or no. For participants categorised as not completing the programme, the reason for drop out was tabled. Group attendance and completion measures were compared using Chi-square tests.

Class-based adherence was measured with the SIRAS. A mean score was created for each of the items on the scale. Home-based adherence was measured with the home-based self-report

scales. A mean score was created for each of the items on the scale. All of the adherence data was tested for normal distribution and screened for extreme values and outliers. The means and standard deviations were then calculated for these results and the two groups were compared by the use of t-tests. A Cronbach's alpha score was calculated for all of the self-efficacy subscales and they were then tested for normality.

### *Self-Efficacy Data*

The Arthritis Self-Efficacy Questionnaire (Lorig et al., 1989) was divided into its three subscales; pain, function and other activities. The subscales scores were analysed individually, with each scale being totalled and a mean score calculated for each participant. The phase specific (task, maintenance and recovery) self-efficacy subscales were analysed individually, with each scale being totalled and a mean score calculated for each participant both pre- and post-study. The means and standard deviations were then calculated for the scales for both the intervention and control groups. These results were then tested for normality and screened for extreme values and outliers. A Cronbach's alpha score was calculated for all of the self-efficacy subscales and they were then tested for normality.

### *Actual Functional Performance*

The measures of actual functional performance were the pre- and post-study TUG, 6MWT, step test and the 10MWT. Group means and standard deviations were calculated for each of the measures and the results were tested for normality and screened for extreme values and outliers.

### *Perceived Functional Performance*

Perceived functional performance was calculated with the use of the LLTQ-ADL section (McNair et al., 2007) and initial and follow up measures were completed. For each

participant, the scores were added and presented as a total. Group means and standard deviations were then calculated for the scale for both the intervention and control groups. These results were then tested for normality and screened for extreme values and outliers. A Cronbach's alpha score was calculated for the scale and tested for normality.

### Pain

Pain was measured using a visual analogue scale both at pre- and post-study. Group means and standard deviations were calculated for each of the measures and the results were tested for normality and screened for extreme values and outliers.

### Hypothesis Testing

Hypothesis one (in comparison to the exercise only group, the exercise plus action and coping plans group will have significantly higher levels of clinic attendance and adherence to the class- and home-based exercise and walking programmes) was tested by comparing the two study groups using independent *t*-tests for the attendance scores, SIRAS and home-based self report scale. Chi-square tests were used to compare the programme completion rates of the two groups.

Hypothesis two (in comparison to the exercise only group, the exercise plus action and coping plans group will have significantly higher levels of self-efficacy with regard to the management of their osteoarthritis symptoms and their ability to exercise post-study) was tested using a repeated measures mixed between- and within-group ANOVA to measure changes over the time of the study for the measures of the Arthritis Self-Efficacy Questionnaire subscales, task self-efficacy, maintenance self-efficacy and recovery self-efficacy subscales. Post-hoc paired sample *t*-test analyses were used to compare between- and within-group changes over time.

Hypothesis three (in comparison to the exercise only group, the exercise plus action and coping plans group will have significantly higher levels of actual functional performance post-study [TUG, 6MWT, step test and the 10MWT]) was tested using a repeated measures mixed between- and within-group ANOVA to measure changes over the time of the study for the measures the TUG, 6MWT, step test and the 10MWT. Post-hoc paired sample t-test analyses were used to compare between- and within-group changes over time.

Hypothesis four (in comparison to the exercise only group, the exercise plus action and coping plans group will have a significantly higher level of perceived functional performance post-study) was tested using a repeated measures mixed between- and within-group ANOVA to measure changes over the time of the study for the measures of the LLTQ-ADL subscale scores of the two groups. Post-hoc paired sample t-test analyses were used to compare between- and within-group changes over time.

Hypothesis five (in comparison to the exercise only group, the exercise plus action and coping plans group will have a significantly lower pain scores post-study) was tested using a repeated measures mixed between- and within-group ANOVA to measure changes over the time of the study for the measures the pain scores of the two groups.

Hypothesis six (there will be significant relationships between the following variables: (1) pre-study phase specific self-efficacy and arthritis self-efficacy and the adherence scores, (2) pre-study phase specific self-efficacy and arthritis self-efficacy and the post-study treatment outcomes, (3) and adherence and post-study treatment outcomes) was tested using Pearson's correlations. Where a significant relationship occurred between variables that were related conceptually and temporally, a hierarchical regression analysis was undertaken to determine the amount of variance each predicting factor contributed to the dependent variable.



### Power Analyses

As this was an investigative study to test the procedures and protocols for a larger study power analyses were undertaken on the main outcome variables. These power analyses were undertaken using G\*Power 3 (Faul, Erdfelder, Lang, & Buchner, 2007), to calculate the sample sizes that should produce a significant difference if there is one to be found. A *t*-test power calculator was used for the analyses, with the alpha level set to .05 and the power level of .8. The calculations were undertaken using the means and standard deviations of the main outcome variables; attendance, class-based adherence, home-based walking adherence, perceived functional performance, and post-study task and maintenance self-efficacy.

## 4.0 RESULTS

This chapter initially presents the findings of the two groups' equivalence of demographic and osteoarthritis characteristics. This is followed by the tests of the hypotheses. Lastly, as this is a feasibility study, power calculations have been undertaken using the main outcome variables to ascertain the sample size needed for statistically significant results.

### 4.1 Demographic and Osteoarthritis Characteristics

#### Demographic Characteristics

Of the 27 participants who took part in the study, 11 were male and 16 were female. The mean age of the sample was 63 ( $\pm 10$ ) years and the mean duration since diagnosis of osteoarthritis was 54 ( $\pm 50$ ) months. The descriptive statistics for the pre-study demographic characteristics of the action and coping plans group and the control group are presented in Table 4.1. This Table shows that at baseline there were no significant differences between the mean age, current employment status, previous exercise participation and current exercise level of the two groups. There was a trend towards the action and coping plans group having more males than females in comparison to the control group.

Table 4.1

*Descriptive and Statistical Comparison of the Two Groups' Demographic Characteristics*

Variable	Int. group (n=17)	Cont. group (n=10)	Statistic	Significance (p value)	C.I. 95%
Gender					
male	9	2	$\chi^2(1)=2.83$	.093	
female	8	8			
Age (years)	63.29 ( $\pm 10.36$ )	63.70 ( $\pm 11.31$ )	$t(25)=-.95$	.925	-9.20-8.39
Currently employed	9	4	$\chi^2(3)=1.27$	.530	
Undertaken previous regular exercise	15	8	$\chi^2(1)=.34$	.561	
Current exercise level	3.47 ( $\pm 1.46$ )	3.00 ( $\pm 1.76$ )	$t(24)=.87$	.394	0.82-1.77

*Note.* Int. = Intervention (action and coping plans), Cont. = Control.

*Osteoarthritis Characteristics*

The descriptive statistics of the pre-study osteoarthritis characteristics of the action and coping plans group and the control group are shown in Table 4.2. As can be seen in the Table, there was no significant difference between the two groups with regard to which joint was affected. A trend toward a significant difference between the duration since diagnosis of osteoarthritis occurred, with the duration of the control group being longer than that of the action and coping plans group. There was a significant difference between the two groups with regard to the number of participants taking analgesic medication at pre-study, with more people in the control group taking medication than in the action and coping plans group.

Table 4.2

*Descriptive and Statistical Comparison of the Two Groups' Osteoarthritis Characteristics*

Variable	Int. Group (n=17)	Cont. Group (n=10)	Statistic	Significance (p value)	C.I. 95%
Joint					
hip	5	1	$\chi^2(2) = 2.84$	.241	
knee	12	8			
both	0	1			
Duration since diagnosis of OA (months)	41.00 ( $\pm 48.49$ )	76.70 ( $\pm 47.71$ )	$t(25) = -1.98$	.059	-75.21-3.81
Currently using analgesics	1	5	$\chi^2(1) = 7.09$	.008	

*Note.* Int. = Intervention (action and coping plans), Cont. = Control, OA = Osteoarthritis.

#### 4.2 Test of Hypothesis One (Adherence)

The test of hypothesis one (in comparison to the exercise only group, the exercise plus action and coping plans group will have significantly higher levels of class attendance and adherence to the class- and home-based exercise and walking programmes) showed no significant differences between the two groups. This is seen in Table 4.3 which shows the comparison the two groups' mean scores for exercise class attendance, scores of adherence to the class-based component (SIRAS), their home-based exercise scores or their home-based walking scores. A Chi-square test showed there was no significant difference between the completion rates of the two groups. Twelve participants dropped out of the study, of the seven dropouts from the action and coping plans group, four dropped out due to an increase in symptoms, two dropped out due to other illnesses, one stated they were over committed. Of the five participants who dropped out from the control group, two were due to an increase in their symptoms, one was due to lack of transport, one was due to work commitments and one for unknown reasons. Of note, four of the six participants with hip osteoarthritis dropped out of the study due to an increase in pain as a consequence of the exercises. Three of these

drop outs were from the action and coping plans group and one was from the control group. In contrast, only two out of 21 participants with knee joint osteoarthritis, dropped out because of an increase in pain, and these participants were from the control group. One of the participants with osteoarthritis of the hip completed the study despite an increase in pain.

Table 4.3

*Descriptive and Statistical Comparisons of the Two Groups' Adherence Data*

Adherence variable	Int. Group (n=16)	Cont. Group (n=9)	Statistic	Significance (p value)	C.I. 95%
Classes attended	17 ( $\pm 11$ )	16 ( $\pm 10$ )	$t(24) = .24$	.811	-8.52-10.66
Class-based adherence (SIRAS)	4.5 ( $\pm 0.4$ )	4.6 ( $\pm 0.9$ )	$t(23) = -.65$	.522	-.35 -.18
Home-based exercise adherence	3.7 ( $\pm 1.3$ )	3.9 ( $\pm 0.2$ )	$t(23) = -1.29$	.209	-1.64-.38
Home-based walking adherence	3.6 ( $\pm 1.3$ )	3.5 ( $\pm 1.0$ )	$t(23) = .93$	.927	-0.96-1.05
	(n=17)	(n=10)			
Programme completion	10	5	$\chi^2(1) = .20$	.656	

*Note.* Int. = Intervention (action and coping plans), Cont. = Control.

**4.3 Test of Hypothesis Two (Self-Efficacy)**

The test of hypothesis two (in comparison to the exercise only group, the exercise plus action and coping plans group will have significantly higher levels of self-efficacy with regard to the management of their osteoarthritis symptoms and their ability to exercise post-study) showed three significant differences between the groups. Differences occurred in the Arthritis Self-Efficacy Questionnaire function subscale, the maintenance self-efficacy within-group analysis, and the recovery self-efficacy between-group analysis.

### Arthritis Self-Efficacy Questionnaire Subscales

The three Arthritis Self-Efficacy Questionnaire subscales' mean pre- and post-study scores were high and did not differ greatly for the two groups, as can be seen in Table 4.4. The mean scores for each of the scales increased from pre- to post-study.

Table 4.4

#### *Descriptive Statistics of the Group Comparison of the Mean Pre- and Post-Study Arthritis Self-Efficacy Questionnaire Scores*

Variable	Pre-study		Post-study	
	Int. group mean (n=17)	Cont. group mean (n=10)	Int. group mean (n=13)	Cont. group mean (n=8)
Arthritis SEQ:				
pain	66 ( $\pm 15$ )	61 ( $\pm 20$ )	76 ( $\pm 18$ )	68 ( $\pm 32$ )
function	67 ( $\pm 23$ )	56 ( $\pm 19$ )	83 ( $\pm 18$ )	68 ( $\pm 27$ )
other activities	66 ( $\pm 18$ )	64 ( $\pm 21$ )	78 ( $\pm 16$ )	71 ( $\pm 23$ )

*Note.* SEQ = Self-Efficacy Questionnaire, Int. = Intervention (action and coping plans), Cont. = Control.

The mixed between- and within-group ANOVA revealed that there were no significant interaction effects for the subscales of the Arthritis Self-Efficacy Questionnaire, pain subscale (Wilks-Lambda = .99,  $F(1,19) = .16$ ,  $p = .690$ ,  $\eta^2 = .01$ ), function subscale (Wilks-Lambda = .96,  $F(1,19) = .88$ ,  $p = .359$ ,  $\eta^2 = .04$ ) and other activities subscale (Wilks-Lambda = .95,  $F(1,19) = 1.05$ ,  $p = .318$ ,  $\eta^2 = .05$ ). The main between- and within-group effect for the pre- and post-study Arthritis Self-Efficacy Questionnaire subscales are presented in Table 4.5. There were no significant differences between the groups over the time of the study.

However, the within-groups analysis revealed a significant difference for the function subscale, but no significant difference for the other two subscales over time.

Table 4.5

*Statistical Comparison of the Main Mixed Between- and Within-Group Effect, Pre- and Post-Study Arthritis Self-Efficacy Questionnaire Subscale Scores*

Subscales		$F(df=1,19)$	Significance ( $p$ value)	Effect size $\eta^2$
Between-groups				
Pain		.61	.443	.03
Function		1.50	.236	.07
Other activities		.11	.744	.01
Within-groups				
	Wilks-Lambda			
Pain	.87	2.93	.103	.13
Function	.70	8.25	.010	.30
Other activities	.87	2.77	.113	.13

A post-hoc paired sample  $t$ -test analysis comparing each groups' pre- and post-study function subscale adjusted mean scores, showed that a significant difference occurred for the action and coping plans group from pre- to post-study (function subscale adjusted mean ( $n=13$ ) pre-study = 66 ( $\pm 27$ ), post-study = 83 ( $\pm 19$ ),  $t(12) = -2.83$ ,  $p < .015$ ,  $CI(95\%) = -31.66 - 4.11$ ), but not the control group (function subscale adjusted mean ( $n = 8$ ) pre-study = 58 ( $\pm 20$ ), post-study = 68 ( $\pm 27$ ),  $t(7) = 1.45$ ,  $p = .178$ ,  $CI(95\%) = -23.37 - 5.24$ ).

*Phase Specific Self-Efficacy (Task, Maintenance and Recovery)*

With regard to the task, maintenance and recovery self-efficacy scores the groups' mean pre- and post-study scores were between 2.88 and 3.81 (See Table 4.6).

Table 4.6

*Descriptive Statistics of the Group Comparison of the Pre- and Post-Study Phase Specific Self-Efficacy Subscale Scores*

SE subscale	Pre-study		Post-study	
	Int. group mean (n=17)	Cont. group mean (n=10)	Int. group mean (n=13)	Cont. group mean (n=8)
Task	3.39 ( $\pm.55$ )	3.16 ( $\pm.65$ )	3.60 ( $\pm.34$ )	3.27 ( $\pm.59$ )
Maintenance	3.44 ( $\pm.50$ )	3.00 ( $\pm.66$ )	2.96 ( $\pm.73$ )	3.81 ( $\pm 1.03$ )
Recovery	3.51 ( $\pm.59$ )	3.03 ( $\pm.48$ )	3.46 ( $\pm.59$ )	2.88 ( $\pm.92$ )

*Note.* SE = Self-Efficacy, Int. = Intervention (action and coping plans), Cont. = Control.

The mixed between- and within-group ANOVAs revealed that there were no significant interaction effects for any of the self-efficacy subscales, task (Wilks-Lambda = .99,  $F(1,19) = .28$ ,  $p = .602$ ,  $\eta^2 = .02$ ), maintenance (Wilks-Lambda = .98,  $F(1,19) = .46$ ,  $p = .505$ ,  $\eta^2 = .02$ ) and recovery (Wilks-Lambda = 1.00,  $F(1,19) = .02$ ,  $p = .902$ ,  $\eta^2 = .00$ ). The main between- and within-group effect, for the pre- and post-study task, maintenance and recovery self-efficacy scores are presented in Table 4.7.



Table 4.7

*Statistical Comparison of the Main Mixed Between- and Within-Group Effect, Pre- and Post-Study Phase Specific Self-Efficacy Subscale Scores*

SE scales		$F(df=1,19)$	Significance ( $p$ value)	Effect size $\eta^2$
Between-groups				
Task		1.70	.208	.08
Maintenance		1.04	.321	.05
Recovery		6.66	.018	.26
Within-groups				
Wilks-Lambda				
Task	1.00	.05	.827	.00
Maintenance	.77	5.82	.026	.23
Recovery	1.00	1.44	.244	.07

*Note.* SE = Self-efficacy.

The between-groups analysis revealed a significant difference for the recovery self-efficacy scale, but no significant difference for the other two subscales. To establish where the significant group difference occurred independent sample  $t$ -tests were conducted on the groups' pre- and post-study recovery self-efficacy adjusted means. There was a significant difference present between the two groups pre-study scores (recovery self-efficacy adjusted means ( $n=26$ ) action and coping plans = 3.51 ( $\pm .59$ ), control group = 3.03 ( $\pm .48$ ),  $t(25) = 2.28$ ,  $p < .033$ ,  $CI(95\%) = .42-.91$ ), but no significant difference between the post-study scores (recovery self-efficacy adjusted means ( $n=26$ ) action and coping plans = 3.46 ( $\pm .59$ ), control group = 2.88 ( $\pm .92$ ),  $t(25) = 1.79$ ,  $p = .089$ ,  $CI(95\%) = -.10-1.27$ ). As the significant difference occurred between the groups at pre-study, a one-way between-groups analysis of covariance (ANCOVA) was conducted to compare the two groups' pre-study recovery self-efficacy

means. Preliminary checks of the data showed that there were no violations of the assumptions for conducting an ANCOVA. The analysis showed no significant interaction effect ( $F(1,17) = .17, p = .689$ ) and no statistically significant main effect ( $F(1,18) = .31, p = .583, \eta^2 = .02$ ).

As shown in Table 4.7 the within-groups analysis revealed a significant difference for the maintenance self-efficacy scores, but no significant difference for the other two subscales. A post-hoc paired sample *t*-test analysis comparing each groups' pre- and post-study maintenance self-efficacy adjusted mean scores showed that a significant difference occurred for the action and coping plans group over time (maintenance self-efficacy adjusted means ( $n = 13$ ) pre-study = 3.52 ( $\pm .48$ ), post study = 2.96 ( $\pm .73$ ),  $t(12) = 2.56, p < .025$ , CI(95%) = .08 - 1.03), but not the control group (maintenance self-efficacy adjusted means ( $n = 8$ ) pre-study = 3.12 ( $\pm .63$ ), post study = 2.81 ( $\pm 1.03$ ),  $t(7) = 1.06, p < .323$ , CI(95%) = -.38 - 1.00).

#### **4.4 Test of Hypothesis Three (Actual Functional Performance)**

The test of hypothesis three (in comparison to the exercise only group, the exercise plus action and coping plans group will have significantly higher levels of actual functional performance post-study) showed three statistically significant differences, with these occurring in the 10MWT, the step test and the TUG test.

##### *Actual Functional Performance*

The means and standard deviations of the pre- and post-study actual functional performance measures, the 10MWT, step test, 6MWT and TUG for the two groups are presented in Table 4.8. As can be seen in the Table, the 10MWT scores for the two groups were similar and lower post-study; the step test scores were also similar and were higher post-study; the 6MWT scores were similar at both pre- and post-study; the TUG scores were slightly higher

for the intervention group, than for the control group, but both groups' mean scores were lower post-study.

Table 4.8

*Descriptive Statistics of the Group Comparison of the Pre- and Post-Study Actual Functional Performance Measures*

	Pre-study		Post-study	
Functional performance	Int. group mean ( <i>n</i> =17)	Cont. group mean ( <i>n</i> =10)	Int. group mean ( <i>n</i> =13)	Cont. group mean ( <i>n</i> =6)
10MWT	7.0 (±2.6)	6.8 (±2.2)	6.2 (±2.1)	5.5 (±1.4)
Step test	7.4 (±2.4)	7.5 (±2.1)	9.4 (±1.6)	9.5 (±2.1)
6MWT	475 (±130)	459 (±171)	465 (±171)	499 (±91)
TUG	9.0 (±3.6)	7.9 (±2.8)	7.4 (±2.8)	6.6 (±1.6)

*Note.* Int. = Intervention (action and coping plans), Cont. = Control, 10MWT = 10 meter walk test, 6MWT = 6 minute walk test, TUG = 3 meter timed up and go test.

The mixed between- and within-group ANOVA revealed that there were no significant interaction effects for any of the actual functional performance measures, 10MWT (Wilks-Lambda = .94,  $F(1,17) = 1.11$ ,  $p = .306$ ,  $\eta^2 = .06$ ), step test (Wilks-Lambda = .87,  $F(1,17) = 2.50$ ,  $p = .132$ ,  $\eta^2 = .13$ ) and the 6MWT (Wilks-Lambda = 1.00,  $F(1,17) = .09$ ,  $p = .767$ ,  $\eta^2 = .01$ ). However, the analysis of the TUG was approaching a significant interaction effect (Wilks-Lambda = .82,  $F(1,17) = 4.20$ ,  $p = .056$ ,  $\eta^2 = .20$ ). The main between- and within-group effects for the pre- and post-study actual functional performance measures are presented in Table 4.9. As can be seen there are no significant differences between the groups. In contrast, the within-groups analysis revealed significant differences in the 10MWT, step test and TUG, but not in the 6MWT scores.

Table 4.9

*Statistical Comparison of the Main Mixed Between- and Within-Group Effect, Pre- and Post-Study Actual Functional Performance Measures*

Functional measure		$F(df=1,17)$	Significance ( $p$ value)	Effect size $\eta^2$
Between-groups				
10MWT		.88	.362	.05
Step test		.67	.423	.04
6MWT		.53	.476	.03
TUG		1.37	.258	.08
Within-groups				
Wilks-Lambda				
10MWT	.63	10.21	.005	.38
Step test	.50	17.22	.001	.50
6MWT	1.00	.12	.734	.01
TUG	.73	6.33	.022	.27

*Note.* Int. = Intervention (action and coping plans), Cont. = Control, 10MWT = 10 meter walk test, 6MWT = 6 minute walk test, TUG = 3 meter timed up and go test.

Post-hoc paired sample  $t$ -test analyses comparing the pre- and post-study adjusted actual functional performance mean scores for the action and coping plans group, showed that significant differences occurred in the 10MWT scores (adjusted mean measures ( $n=13$ ), pre-study 7.3 ( $\pm 2.8$ ), post-study 6.2 ( $\pm 2.1$ ),  $t(12) = 3.27$ ,  $p < .007$ ,  $CI(95\%) = .36 - 1.83$ ); the step test scores (adjusted mean measures ( $n=13$ ), pre-study 7.2 ( $\pm 2.3$ ), post-study 9.4 ( $\pm 1.6$ ),  $t(12) = -4.76$ ,  $p < .0001$ ,  $CI(95\%) = -3.25 - -1.21$ ); the TUG scores (adjusted mean measures ( $n=13$ ), pre-study 9.4 ( $\pm 3.9$ ), post-study 7.4 ( $\pm 2.7$ ),  $t(12) = 3.48$ ,  $p < .005$ ,  $CI(95\%) = .73 -$

3.17); but not for the 6MWT scores (adjusted mean measures ( $n=13$ ), pre-study 466 ( $\pm 131$ ), post-study 465 ( $\pm 171$ ),  $t(12) = .03$ ,  $p = .973$ ,  $CI(95\%) = -86.50 - 89.27$ ).

Post-hoc paired sample  $t$ -test analyses comparing the control groups' pre- and post-study adjusted actual functional performance means showed that a significant difference occurred in the 10MWT scores (adjusted mean measures ( $n=6$ ), pre-study 6.0 ( $\pm 1.3$ ), post-study 5.5 ( $\pm 1.6$ ),  $t(5) = 3.02$ ,  $p < .029$ ,  $CI(95\%) = .08 - 1.02$ ), but not for the other three measures (step test adjusted mean ( $n=6$ ), pre-study 8.5 ( $\pm 1.9$ ), post-study 9.5 ( $\pm 2.1$ ),  $t(5) = -1.94$ ,  $p = .112$ ,  $CI(95\%) = -2.33 - 0.33$ ; TUG adjusted mean ( $n=6$ ), pre-study 6.4 ( $\pm 2.1$ ), post-study 6.6 ( $\pm 1.6$ ),  $t(5) = .77$ ,  $p = .477$ ,  $CI(95\%) = -.47 - 0.87$ , and the 6MWT adjusted ( $n=6$ ), pre-study 519 ( $\pm 89$ ), post-study 499 ( $\pm 91$ ),  $t(5) = .96$ ,  $p = .380$ ,  $CI(95\%) = -33.41 - 73.41$ ).

#### **4.5 Test of Hypothesis Four (Perceived Functional Performance)**

The test of hypothesis four (in comparison to the control group, the exercise plus action and coping plans group will have significantly higher levels of perceived functional performance) showed significant differences.

##### **Perceived Functional Performance**

The groups' mean scores for LLTQ-ADL were similar, the pre-study mean score for the action and coping plans group was 28.2 ( $\pm 8.4$ ) and for the control group was 29.0 ( $\pm 8.1$ ). The post-study mean score for the action and coping plans group was 32.2 ( $\pm 6.0$ ) and for the control group was 27.8 ( $\pm 8.4$ ).

The mixed between- and within-group ANOVA revealed that there was a significant interaction effect for the LLTQ-ADL section (Wilks-Lambda = .74,  $F(1,19) = 6.84$ ,  $p = .017$ ,  $\eta^2 = .27$ ). In contrast, the main mixed between- and within-group effect, pre- and post-study perceived function scores revealed no significant differences for either the between-groups

( $F(1,19) = .30, p = .589, \eta^2 = .02$ ) or the within-groups (Wilks-Lambda = .91,  $F(1,19) = 1.83, p = .937, \eta^2 = .09$ ) LLTQ-ADL scores.

As a significant interaction effect occurred between the two groups' pre- and post-study LLTQ-ADL scores, but no significant within- and between-group differences were found, post-hoc paired sample  $t$ -tests were conducted on each group's pre- and post-study LLTQ-ADL mean scores. The results showed that a significant difference occurred for the action and coping plans group over time (LLTQ-ADL means ( $n = 13$ ),  $t(12) = -3.27, p < .007$ ,  $CI(95\%) = -6.54 - -1.31$ ), but not the control group (LLTQ-ADL means ( $n = 8$ ),  $t(7) = .786, p = .460, CI(95\%) = -2.54 - 5.04$ ).

#### **4.6 Test of Hypothesis Five (Pain)**

The test of hypothesis five (in comparison to the exercise only group, the exercise plus action and coping plans group will have a significantly lower pain scores post-study) showed that there were no significant differences. The control group's mean pre- and post-study scores were higher than the action and coping plans group's. The action and coping plans group's pain box plot pre-study mean was 3.7 ( $\pm 2.1$ ) which decreased to 3.6 ( $\pm 2.0$ ) post-study. The control group's pain box plot pre-study mean was 4.6 ( $\pm 2.9$ ) which increased to 5.1 ( $\pm 2.8$ ) post-study.

The mixed between- and within-group ANOVA revealed that there was no significant interaction effect for the pain box plot scores (Wilks-Lambda = .94,  $F(1,19) = 1.20, p = .286, \eta^2 = .06$ ). The main mixed between- and within-group effect, pre- and post-study pain box plot scores were analyzed with the no significant difference seen either between-groups ( $F(1,19) = 1.00, p = .331, \eta^2 = .05$ ) or within-groups (Wilks-Lambda = .94,  $F(1,19) = 1.20, p = .286, \eta^2 = .06$ ).

#### **4.7 Test of Hypothesis Six (Correlation between Variables of Interest)**

The test of hypothesis six (there will be significant relationships between the following variables: (1) pre-study phase specific self-efficacy and arthritis self-efficacy and the adherence scores, (2) pre-study phase specific self-efficacy and arthritis self-efficacy and the post-study treatment outcomes, (3) and adherence and post-study treatment outcomes) revealed a number of significant correlations between the variables of interest.

First, the correlations that occurred between the pre-study phase specific self-efficacy and arthritis self-efficacy, and adherence scores are shown in Table 4.10. There was a significant, moderate strength positive relationship between pre-study Arthritis Self-Efficacy Questionnaire other activities subscale and the home walking adherence scores. In addition there was a non-significant positive correlation of moderate strength between task self efficacy and the home walking adherence scores.

Second, the correlations that occurred between the pre-study phase specific self-efficacy and Arthritis Self-Efficacy Questionnaire, and post-study treatment outcome scores are shown in Table 4.11. Pre-study Arthritis Self-Efficacy Questionnaire function subscale was shown to have a statistically significant strong positive relationship with post-study LLTQ-ADL and a significant moderate strength negative relationship with post-study TUG. Significant positive moderate strength relationships occurred between the post-study LLTQ-ADL scores and pre-study Arthritis Self-Efficacy Questionnaire other activities subscale and task self-efficacy scores. Pre-study Arthritis Self-Efficacy Questionnaire pain subscale was found to have a significant moderate strength, negative relationship with post-study pain. A number of moderate strength correlations occurred that did not reach significance. One was between pre-study Arthritis Self-Efficacy subscale pain and LLTQ-ADL post-study. Four were between Arthritis Self-Efficacy subscale function and post-study 6MWT, 10MWT, ST and

pain. The final one occurred between Arthritis Self-Efficacy Questionnaire subscale other activities and post-study pain, and one between task self-efficacy and post-study TUG.

Third, correlations between adherence measures and post-study perceived functional performance, actual functional performance and pain measures are shown in Table 4.12. The only significant correlation noted was a positive relationship of moderate strength between clinic based adherence (SIRAS) and post-study LLTQ-ADL. However, a number of non-significant moderate strength correlations occurred between attendance and post-study LLTQ-ADL, 6MWT and pain scores, and between the SIRAS scores and post-study 6MWT and TUG scores.

#### *Predictions of Perceived Functional Performance*

A hierarchical multiple regression analysis was used to explore the relationship between the variables, pre-study Arthritis Self-Efficacy Questionnaire function and other activities subscale scores, pre-study task self-efficacy scores and post-study LLTQ-ADL scores. These variables were chosen for further analysis as they were the only variables to show a significant bivariate association that made temporal and conceptual sense.

The assumptions of the hierarchical multiple regression analysis were met. The regression analysis predicting that the post study LLTQ-ADL score was statistically significant ( $F(2,18)=10.53, p < .0001$ ), adjusted  $R^2=.59$ , with pre-study Arthritis Self-Efficacy Questionnaire function subscale ( $\beta=.67, p < .001$ ) being the sole significant predictor and not pre-study task self-efficacy subscale ( $\beta=.12, p = .478$ ) or pre-study Arthritis Self-Efficacy Questionnaire other activities subscale ( $\beta=.13, p = .449$ ).



Table 4.10

*Correlations between Pre-Study Self-Efficacy with Adherence Scores*

	Arthritis SEQ pre-study			Phase specific SE pre-study		
	Pain	Function	Other activities	Task	Maintenance	Recovery
Attendance	.18	.05	.09	.22	.09	.14
Clinic adherence (SIRAS)	-.07	.14	.03	.28	.25	.18
Home walking adherence	.24	.08	.43*	.36	.13	-.04
Home exercise adherence	.11	-.17	.20	-.07	-.13	-.28

*Note.* \*= $p < .05$ , \*\*= $p < .01$ , SEQ Self-Efficacy Questionnaire, SE = Self-Efficacy.

Table 4.11

*Correlations between Pre-Study Self-Efficacy with Treatment Outcome Scores*

	Arthritis SEQ pre-study			Phase specific SE pre-study		
	Pain	Function	Other activities	Task	Maintenance	Recovery
LLTQ-ADL post-study	.43	.79**	.52*	.44*	.20	.23
TUG post-study	-.10	-.50*	-.14	-.33	.09	-.03
6MWT post-study	-.09	.42	-.04	.25	.02	-.04
10MWT post-study	.13	.45	-.12	-.26	.15	.08
ST post-study	-.12	.32	.02	.16	.08	-.01
Pain post-study	-.50*	-.36	-.41	-.06	.20	-.00

*Note.* \*= $p < .05$ , \*\*= $p < .01$ , LLTQ-ADL = Lower limb task questionnaire – activities of daily living, TUG = timed up and go test, 6MWT = 6 minute walk test,

10MWT = 10 meter walk test, ST = step test, Pain = Pain box plot, SEQ Self-Efficacy Questionnaire, SE = Self-Efficacy.

Table 4.12

*Correlations between Adherence Measures and Post-Study Treatment Outcome Scores*

Post-Study	Attendance	SIRAS	Home walking	Home exercise
LLTQ-ADL	.30	.51*	.08	.01
10MWT	-.20	-.28	-.18	-.08
Step test	.08	.27	.11	.27
6MWT	.44	.40	-.21	-.19
TUG	-.28	-.30	-.27	-.13
Pain	-.31	-.06	-.14	-.28

\*= $p < .05$ , LLTQ-ADL = Lower limb task questionnaire – activities of daily living, 10MWT = 10 meter walk test, ST = step test, 6MWT = 6 minute walk test, TUG = timed up and go test, Pain = Pain box plot.

#### 4.8 Power Calculation Results

Power analyses were undertaken, using G\*Power 3 (Faul et al., 2007), to calculate the sample sizes that should produce a significant difference if there is one to be found. The calculations were undertaken using the means and standard deviations of the main outcome variables and the power set at 80% and the alpha level at .05; attendance, class-based adherence, home-based walking adherence, perceived functional performance and post-study task and maintenance self-efficacy.

##### Adherence

The power calculation using the means and standard deviations of the attendance scores of the two groups' showed that a sample size of 1373 participants would be required to show significant findings. The power calculation using the means and standard deviations of the

class-based adherence (SIRAS) scores of the two groups' showed that a sample size of 813 participants would be required to show significant findings. The power calculation using the means and standard deviations of the home-based walking adherence scores of the two groups' showed that a sample size of 3454 participants would be required to show significant findings.

#### *Perceived Functional Performance*

The power calculation using the means and standard deviations of the action and coping plans group's pre-and post study LLTQ-ADL scores showed that a sample size of 25 participants would be required to show significant findings. The power calculation using the means and standard deviations of the control group's pre-and post study LLTQ-ADL scores showed that a sample size of 273 participants would be required to show significant findings

#### *Self-Efficacy*

The power calculation using the means and standard deviations of the task self-efficacy scores of the two groups' showed that a sample size of 109 would be required to show a significant finding. The power calculation using the means and standard deviations of the maintenance self-efficacy scores of the two groups' showed that a sample size of 30 would be required to show significant findings. A further 10% would need to be added to each of sample sizes to allow for an anticipated drop out.

## **5. DISCUSSION**

### **5.1 Introduction**

There was no support for the effect of action and coping plans on the adherence behaviours and pain scores. However, there was partial support for the plans effectiveness of self-efficacy and function. Also significant relationships between variables interest. The results will be discussed and interpreted in the context of research and in relation to relevant literature. The discussion will conclude with strengths and limitations of the study, recommendations for future research and a summary of the key findings.

### **5.2 Demographic and the Osteoarthritis Characteristics**

Overall, the results of the demographic and osteoarthritis characteristics are similar to those reported for people with osteoarthritis of the hip and knee joints (Boreman et al., 2010). The larger number of women within the study is in keeping with the higher prevalence of osteoarthritis in women than men (Boreman et al., 2010). The mean age of the participants in the study was 63.4 ( $\pm 10.5$ ) years and is similar to the findings of other osteoarthritis studies (Boreman et al., 2010, Brooks, 2003). The number of people in this study who had previously undertaken regular exercise was higher than expected and higher than the findings of Fokran et al. (2002). Their weekly exercise level was also higher at the time of starting the study, suggesting that the participants were already physically active. This may have reduced the effect of the exercise programme on the post-study performance scores, as greater gains in performance related to function are usually seen in people who have not previously undertaken exercise (Hakkinen, Sokka, Kautiainen, Kotaniemi, & Hannonen, 2004). The study had a greater number of participants with osteoarthritis of their knee joints compared to hip joints. This may have been due to a change in the inclusion criteria part way through the

study. Initial findings showed that participants with osteoarthritis of their hip joints were experiencing notable discomfort related to the exercise programme. Therefore, from an ethical perspective, after the first 16 participants had started in the study, no further people with osteoarthritis of the hip joint were included in the study. The response of these participants to the exercises is discussed further in section 5.3.

The mean duration since diagnosis of osteoarthritis, 54 ( $\pm 50$ ) months is in keeping with the chronic nature of the disease. Given that the most common method used to manage osteoarthritis is pharmaceutical (Hunter & Lo, 2008; McHugh et al., 2007), it was surprising that only six participants were taking analgesics for their arthritis at the time of the initial assessment. As five of the six participants taking analgesics for their osteoarthritis were in the control group, it had been anticipated that the control group may report higher levels of pain and disability. However the pre- and post-study mean pain scores did not differ significant across groups, which will be discussed further in section 5.6.

### **5.3 Hypothesis One (Adherence)**

There were no significant differences found between the two groups' adherence and attendance scores, therefore hypothesis one could not be supported. Characteristics of the participants and the exercise programme may have contributed to this outcome. The groups' mean scores for the adherence to the class-based (SIRAS) and home-based activities were moderate to high, ranging from 3.4 to 4.6 out of a possible 5. These scores are very similar to those found by Bassett and Prapavessis (2007), in which the class- and home-based adherence scores ranged from 3.5 to 4.7. Like the participants in the Bassett and Prapavessis (2007) study, the majority of participants (21 out of 27) had been previously treated by physiotherapy. Hence it is likely that these participants were prepared to undertake a programme of exercises both in the class and at home. Adherence to physiotherapy exercise

programmes rates have been shown to increase with age (Damush et al., 2005; Sluijs et al. 1993), which in light of the mean age of the participants could have been responsible for the moderate to high adherence scores. The high rates of both the class-based and home-based adherence could also be attributed to the close supervision of the class-based component of the programme during the participants' first four weeks on the programme. Previous research has shown close supervision to be associated with high levels of adherence amongst patients undertaking exercise programmes for osteoarthritis of the knee (Roddy et al., 2005).

The possibility of response bias cannot be excluded in this study. It is a known limitation of adherence research involving self-report questionnaires, with participants over-estimating their levels of adherence (Sluijs et al., 1998). Another limitation of adherence based research is the ethical requirement to fully inform participants about the study procedures prior to the commencement of any research (Paterson, 2009). As a consequence, six potential participants declined to take part in the study, because they did not think they could commit to the time the exercise programme would take in terms of the overall duration of the programme (12 weeks) and the number of sessions per week (three). Not having enough time to undertake physiotherapy programmes is a well known reason for poor levels of adherence (Rejeski et al., 1997; Sluijs et al., 1993). Hence on this basis it could be assumed that those who volunteered to take part in the study were more likely to adhere to the requirements of the study than those who declined.

In contrast to the high levels of adherence to the components of exercise programme, the attendance rates of both groups were less than desirable, at approximately 50%, which is similar to the findings of other exercise therapy research (Kerins, McKee & Bennett, 2010; Krischak et al., 2009; Lyngcoln et al., 2005; Pisters et al., 2010; Sluijs et al., 1993). However, the results of present study differ from those found by Luszczynska (2006), Scholz et al.

(2005) and Lippke et al. (2004) who all found increases in adherence associated with the implementation of action and coping plans. The reason for the difference across studies is unclear, but there are four factors that may have influenced the adherence rate. Firstly, the participants were required to participate in the programme for a period of 12 weeks. Adherence to exercise programmes has been shown to decrease over duration of the programme (Dishman, 1988; Lombard, Lombard, & Winnett, 1995), especially in programmes which are longer than eight weeks (Rejeski et al., 1997). Secondly, some participants attributed their poor attendance to the timing of the class-based sessions clashing with other daily commitments such as work, as well as problems with transport to and from the classes. Both of these factors have been found in other physiotherapy research to affect adherence (Roddy et al., 2005; Vasey, 1990). Thirdly, five participants dropped out of the study due to an increase in pain, four of whom had osteoarthritis of the hip. These participants indicated that the leg-press and step-up exercises were the most provocative of their symptoms. Increased pain and stiffness caused by exercising are known to reduce exercise adherence (Allegrante & Marks, 2003; Rejeski et al., 1997). Finally, Brewer (1999) revealed patients have different adherence behaviours for different injuries or illness, which may have occurred with the participants in the present study.

#### **5.4 Hypothesis Two (Self-Efficacy)**

There were two note worthy significant differences found between the self-efficacy scores of the two groups, the differences occurred in the Arthritis Self-Efficacy Questionnaire function subscale and the exercise maintenance self-efficacy subscale. One of these differences occurred in the anticipated direction giving partial support for hypothesis two. As expected, the action and coping plans group's perceptions about their ability to function, as measured



by the Arthritis Self-Efficacy Questionnaire function subscale significantly improved post-study, whereas no significant changes were seen for the control group. The link between action and coping plans and self-efficacy was predicted by the HAPA model (Schwarzer et al, 2006). The action and coping plans gave the participants' strategies to undertake their activities, which in turn may have led to an increase in confidence and self-belief about their functional ability (Chin, Neufeld, Feely, & Skinner, 1998), as well as an increase in their perceived ability to cope positively with the physical activities (Diehl, Semegon, & Schwarzer, 2006).

It was anticipated that the action and coping plans group would have also had significant increases in the other five post-study self-efficacy scores, as seen in other self-efficacy based studies (Lippke et al., 2004; Luszczynska, 2006; Scholz et al., 2005). However there were no other significant improvements in these self-efficacy measures. In contrast, this study revealed a significant decrease in the mean exercise maintenance self-efficacy score for the action and coping plans group post-study, but not for the control group. This finding is contradictory to the prediction of the HAPA model (Schwarzer et al, 2006) and the findings of other studies (Luszczynska, 2006; Scholz et al., 2005; Lippke et al., 2004). A possible cause for the finding is that the action and coping plans may have raised the participants' awareness of the barriers to regular exercise (Diehl et al., 2006). With barriers to regular exercise highlighted, the completion of the exercise programme may have caused participants to decrease the rating of their beliefs regarding their ability to exercise regularly (Ogden, 2003; Woodgate, Brawley, & Western, 2005). This decrease could therefore be regarded as an adjustment to the "accuracy" of the participants' beliefs regarding their ability to exercise regularly, with the pre-study maintenance self-efficacy subscale scores being an underestimation of the barriers to exercise. Other studies have also found this discrepancy between perceived ability and actual ability in the context of rehabilitation (Larmer, 2009;

Munn, Beard, Refshuge, & Lee, 2002). More specifically, Larmer (2009) found that the capacity of patients with ankle sprains to accurately perceive their functional ability significantly increased following the completion of the functional task in question.

### **5.5 Hypotheses Three, Four and Five (Actual Functional Performance, Perceived Functional Performance and Pain)**

Significant differences were found between the two groups' actual functional performance scores. A significant interaction effect was identified between the two groups' perceived functional performance scores. No significant differences were found between the two groups' pain scores. These results indicate partial support for hypothesis three and four, but no support for hypothesis five.

#### **Actual Functional Performance**

The action and coping plans group's mean scores for 10MWT, step test and the TUG test improved significantly from pre- to post-study, but in contrast only the control group's 10MWT mean scores improved significantly over the duration of the study. There were no significant differences observed in the 6MWT scores either across the groups at pre- or post-study or within groups' from pre- to post-study.

The improvements in actual functional performance may have been influenced by three factors. First, the increases in actual functional performance in participants who completed the study could be attributed to effect of the prescribed exercises of the class-based sessions and the home-based exercise and walking programmes. Similar improvements in actual functional performance have been found in other studies which have required participants with osteoarthritis of the hip and/or knee joint to complete strength-based exercise programmes (Deyle et al., 2005; Jan et al., 2009; Mikesky et al., 2006) and endurance-based exercise programmes (Hoeksma et al., 2004; Roddy et al., Zhang et al., 2005). Second, the

levels of adherence during the class-based sessions were high, indicating that when participants were attending the class based session they were working hard. Similar relationships have been found between high levels class-based adherence and gains in actual functional performance (Cook et al., 2007; Hootman et al., 2003; van Gool et al., 2005). Third, the action and coping plans may have affected the actual functional performance scores by causing the participants to focus their attention on the exercise programme (Diehl et al., 2006), to cope better with the exercise programme (Sohl & Moyer, 2009) and to have greater beneficial beliefs in the exercises they completed (Taylor & May, 1996).

The non-significant results of the 6MWT scores may have been due to two factors. One, the disease process of the osteoarthritis often limits peoples walking ability (van Dijk et al., 2010). Both groups' pre- and post-study 6MWT mean scores ranged from 459 to 499 meters, which is considerably lower than the normal (572m in people age 60-64: Steffen et al., 2002). Two, the adherence to the home-based walking programme was lower than to the class-based programme, indicating that participants undertook less of the home-based walking programme. Participants may not have undertaken enough of the home-based walking programme to effect a change in their means scores.

### *Perceived Functional Performance*

The mixed between- and within-subjects analysis of the two groups' LLTQ-ADL mean scores produced perplexing results in that there was a significant interaction effect but no significant differences occurred in the between- and within-groups analysis. However this result was clarified by the use of the paired samples t-tests on each group's LLTQ mean scores. This analysis revealed that the action and coping plans group's LLTQ-ADL mean scores improved significantly over the time of the study, whereas the control group's mean scores did not. The perplexing result of the mixed between- and within-subjects analysis may

have been due to the small sample size (Tabachnick & Fidell, 2007), in particular that of the control group ( $n = 8$ ).

The findings of the groups paired  $t$ -test indicate that the action and coping plans group's self-reported activities of daily living improved over the duration of the study, whereas the control group's activities did not change in that time. This finding points to the possible beneficial effects of using action and coping plans as an adjunct to exercise programmes for people with lower limb osteoarthritis. The formulation of the action and coping plans may have enhanced the participants' ability to cope with the exercise programme (Sohl & Moyer, 2009), and strengthened their beliefs about the beneficial nature of the exercises (Taylor & May, 1996). In turn this may have led them to believe they could also cope better with activities of daily living. The significant changes that occurred in the perceived functional performance scores in this study are in line with the other significant improvements in the actual functional performance scores found in the current study. Hence the reasons for those findings may well have had some bearing on the action and coping plans group's significant improvement in their LLTQ-ADL scores.

### Pain

As with the perceived functional performance findings, there were no significant differences in the pain scores either across or within the groups. Other studies have described non-significant changes in pain scores following the completion of exercises programmes (Allegrante & Marks, 2003; Focht, Ewing, Gauvin, & Rejeski, 2002; Mikesky et al., 2006). Like the present study, Mikesky et al. (2006) found significant gains in actual functional performance, but the pain scores in participants with osteoarthritis of the knee joint did not change at the completion of an exercise programme. A review by Allegrante and Marks (2003) reported that very few exercise-based studies have shown reduction in pain levels

amongst people with lower limb osteoarthritis. They suggested that a well designed exercise programme should aim to not increase participants' pain.

In contrast, some studies have shown improvements in pain levels following the completion of exercise programme completion (Blackham et al., 2008; Pisters et al., 2010). There are two possible reasons for the results of the present study's pain scores. Firstly, the attendance rates in this study were less than optimal, meaning the participants did not complete a sufficient number of the exercises to cause physiological changes that were large enough to reduce pain. Secondly, while the exercise programme may have altered the muscle performance at the hip and knee joints, it may not have slowed the pathological processes within the joints that cause pain (Mikesky et al., 2006; Wise et al., 2010).

## **5.6 Hypothesis Six (Correlations between Variables of Interest)**

A number of statistically significant relationships occurred amongst the variables of interest ([1] pre-study phase specific self-efficacy and arthritis self-efficacy, and the adherence scores, (2) pre-study phase specific self-efficacy and arthritis self-efficacy and the post-study treatment outcomes, (3) and adherence and post-study treatment outcomes), thereby providing some support for hypothesis six. The discussion focuses on the notable relationships that made temporal and conceptual sense.

### **Relationships between Pre-Study Self-Efficacy and Adherence Scores**

The positive, moderate strength relationship between pre-study Arthritis Self-Efficacy Questionnaire other activities subscale and home walking adherence points to those who anticipated coping better with activities of daily living pre-study adhered better to the walking programme. Other studies have found a similar link between positive coping beliefs

and higher levels of exercise completion in people following joint replacement surgery (Greenglass, Marques, de Ridder, & Behl, 2005). There were a number of anticipated correlations between self-efficacy and adherence behaviour that did not occur, which is contrary to the findings of other studies (Levy et al., 2008; Lippke et al., 2004; Scholz et al., 2005). The non-significant moderate correlations may have been due to the small sample in this study, which is evident with the moderate strength correlation between task self-efficacy and home-walking adherence ( $r = .36$ ).

#### *Relationships between Pre-Study Self-Efficacy and Post-Study Treatment Outcomes*

The pre-study Arthritis Self-Efficacy Questionnaire subscales function and other activities as well as task self-efficacy subscale scores were all positively correlated with the post-study LLTQ-ADL scores. The hierarchical regression analysis showed that the pre-study Arthritis Self-Efficacy Questionnaire function subscale was the sole significant predictor of post-study LLTQ-ADL. This indicated that those participants who perceived that they could cope functional at the beginning of the study also had greater beliefs regarding their ability overcome difficulties with activities of daily living post-study. A possible reason for this finding is that both questionnaires are designed to measure a similar construct, participants' perceived ability to cope with functional activities. Therefore this finding may be a measurement artefact due to the similarity of the content of the two measurement scales. For example: *as of now, how certain are you that you can get out of an armless chair quickly, without using your hands for support?* (Arthritis Self-Efficacy Scale function subscale: Lorig et al., 1989) and *rate your difficulty to get up from a lounge chair* (LLTQ-ADL: McNair et al., 2007).

The only statistically significant correlation that occurred between the pre-study self-efficacy measures and post-study functional performance measures occurred between pre-study Arthritis Self-Efficacy Questionnaire function subscale and post-study TUG. The relationship

is not surprising given that the TUG is very similar to a physical task in the Arthritis Self-Efficacy Questionnaire function subscale. The finding may indicate that participants were accurately scoring their perceived function. A number of non-significant moderate strength relationships also occurred between Arthritis Self-Efficacy Questionnaire function subscale and the post-study 6MWT ( $r = .42$ ), 10MWT ( $r = .45$ ), step test ( $r = .32$ ) and pain ( $r = -.36$ ). A non-significant moderate strength correlation was also seen between Arthritis Self-Efficacy subscale other activities and post study pain scores ( $r = -.41$ ), and between task self-efficacy and post-study TUG ( $r = -.33$ ). The strength of these correlations suggests that had the sample size been larger that these relationships would have been significant.

#### *Relationships between Adherences and Post-Study Treatment Outcomes*

Only one correlation was identified between any of the measures of adherence and the post study and the post-study treatment outcomes. High class-based adherence scores were associated with high levels of perceived functional ability (LLTQ-ADL scores) post-study. These findings are similar to those of Pister et al. (2010), who also found correlation between high adherence and high perceived functional performance. However, the limited number of correlations in this study between adherence and actual functional performance in people with osteoarthritis is contrary to the results of other research (Cook et al., 2007; Roddy et al., 2005; van Gool et al., 2005), which found stronger links between the two variables than seen in this study. While it is difficult to determine exactly why the present study results differ from other similar studies, a possible reason may be that the sample size was not large enough to identify statistically significant relationships. This possibility is particularly apparent in light of the moderate strength correlations between attendance and the 6MWT scores ( $r = .44$ ), and between the SIRAS scores and the 6MWT scores ( $r = .40$ ) and the TUG scores ( $r = -.30$ ).

## 5.7 Strengths and Limitation

There were four main strengths of this study. One, the demographic and osteoarthritis characteristics of participants were similar to that of the general population of people in New Zealand with osteoarthritis of their hip and/or knee joint, and hence the findings can be to some extent generalised to this group of people. Two, the twelve week duration of the exercise programme gave an insight into both short and medium term adherence behaviours. Three, as the implementation of action and coping plans were the only difference in the two groups' exercise programme, the results of the study provide a preliminary insight into the effect of including these plans in exercise programmes for people with osteoarthritis. Four, the outcome measures used in this study were known to be either reliability and or valid. The questionnaires used in this study were shown to have acceptable to excellent Cronbach alpha values, thereby indicating they were suitable measures for this group of participants.

Five limitations have been identified with this study. One, as this was a feasibility study designed to test the measures and procedures for a larger study, the sample size was small. As a consequence the study was under powered, which was demonstrated by the findings of the correlation analyses. Two, the problems of the small sample size was further compounded by the proportionally large number of dropouts from the study. Three, not enough appointment times were scheduled for participants to attend the class-based exercise programme, which in turn reduced the number of potential participants. Four, the use of self-report patient measures may have lead to response bias as participants may wish to be seen in a good light. Self-report scales have also been criticised for not being sensitive enough to detect difference in home-based adherence behaviour (Pisters et al., 2010). Five, volunteers were used as the participants for this study. By volunteering, participants have expressed a vested interest in the study and this may have resulted in a self-selected study sample with more adherent behaviours than those of the general population (Wilson & Musick, 1999).



## 5.8 Recommendations for Future Research

A larger study is required to investigate the true extent of the effect of action and coping plans on the adherence behaviour in people with osteoarthritis. The following recommendations should be considered before undertaking such a study. If the main independent variable is to be maintenance self-efficacy, then a minimum sample size of 42 participants will be required to detect statistically significant findings if they are there to be found. A further 30% needs to be added onto this sample size to overcome the potential threat to the power of the study by participants dropping out. The measures of the self-efficacy task, maintenance and recovery subscales should be undertaken after participants have been orientated to the exercise programme, such as at the end of the first week of the programme. Finally, a measure of home-based adherence that takes into account the quality, dose and intensity of exercises may be more appropriate for participants with osteoarthritis (Pisters et al., 2010).

## 5.9 Conclusions

Within the context of this study, the action and coping plans were shown to have beneficial effects for people with osteoarthritis of the hip and/or knee joint. These effects were most noticeable in the actual functional performance and perceived functional performance outcomes. The action and coping plans group showed significant improvement in their performance of the TUG test, the step test and 10MWT post-study, whereas the control group only improved in the 10MWT. Despite there being no significant differences between and within the two groups' perceived functional performance scores over the duration of the study, a further analysis of the significant interaction effect showed that the action and coping plans group scores significantly improved, whereas the control group did not.

There were only a few significant differences in the self-efficacy scores over the time of the study. The action and coping plans group showed a significant improvement in their Arthritis Self-Efficacy Questionnaire function subscale, whereas the control group did not. In contrast, the action and coping plans group's phase specific maintenance self-efficacy scores were seen to decrease post-study, but the control groups score did not change. This finding may have been due to the action and coping plans have raised the participants' awareness of the barriers to regular exercise, possibly indicating that their post-study scores were a more accurate belief of their ability to exercise regularly.

Contrary to expectations, clinic attendance was less than optimal and adherence was not improved by the use of action and coping plans. There were a limited number of significant correlations in the expected direction. These were predominantly between the pre-study Arthritis Self-Efficacy scores and the post-study treatment outcomes. The true value of incorporating action and coping plans into exercise programmes for people with osteoarthritis of the hip and/or knee joint will only be ascertained by a larger investigation that replicates this study's protocols and procedures, and includes the methodological recommendations.

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## **7. APPENDICES**

## Appendix 1: Physical Activity Readiness Questionnaire (PAR-Q)

Participant #:

Date:

### Par - Q Health Questionnaire

Please read the questions carefully and answer each one honestly, ticking the appropriate box or adding information if necessary. Your responses will of course be kept in the strictest confidence. **This form must be completed, returned to the assessor prior to beginning the programme.**

Participant #: \_\_\_\_\_ Date of Birth : \_\_\_\_\_

Gender: M / F

Contact phone number (mobile preferred):

email:

Has your doctor ever said that you have had a heart problem?

No ☐ Yes ☐

In the past month have you had any chest pain when...

You were doing any activity No ☐ Yes ☐ You were resting No ☐ Yes ☐

Are you currently taking medication for...

A heart condition No ☐ Yes ☐

Any other problems No ☐ Yes ☐

Do you take regular medication for pain and how long ago you were diagnosed with osteoarthritis?

No ☐ Yes ☐ Time since diagnosis: \_\_\_\_\_

In the past year have you had any major illness or major surgery?

No ☐ Yes ☐

Have you ever been diagnosed with...

Diabetes No ☐ Yes ☐

Asthma No ☐ Yes ☐

Epilepsy No ☐ Yes ☐

Other problems No ☐ Yes ☐

Have you undertake regular exercise before?

No ☐ Yes ☐

If yes, when and how often did you do this?

Are you current working?

No ☐ Yes ☐ What do you do?

Do you ever...

lose your balance because of dizziness or lose consciousness No ☐ Yes ☐

Are you feeling unwell at present due to cold, etc

No ☐ Yes ☐

## Appendix 2: Class Attendance Record

**Class Attendance Form**

**Participant Name:.....**

<b>Week / Day</b>	<b>Mon</b>	<b>Wed</b>	<b>Fri</b>
<b>1</b>			
<b>2</b>			
<b>3</b>			
<b>4</b>			
<b>5</b>			
<b>6</b>			
<b>7</b>			
<b>8</b>			
<b>9</b>			
<b>10</b>			
<b>11</b>			
<b>12</b>			

### Appendix 3: SIRAS Scale Form

#### SPORT INJURY REHABILITATION ADHERENCE SCALE (SIRAS)

To be completed by the physiotherapist at the end of each of the participant's treatment sessions.

---

For each of the following circle the number that best indicates the patient's behaviour:

1. The intensity with which the patient completed the rehabilitation exercises during today's appointment  

minimum effort	1	2	3	4	5	maximum effort
----------------	---	---	---	---	---	----------------
  2. During today's appointment, how frequently did the patient follow your instructions and advice?  

never	1	2	3	4	5	Always
-------	---	---	---	---	---	--------
  3. How receptive was this patient to changes in the rehabilitation programme during today's appointment?  

very unreceptive	1	2	3	4	5	very receptive
------------------	---	---	---	---	---	----------------
-

## Appendix 4: Home Exercise Self-Report Form

### Participant Self-Report Scales of their Home-Based Rehabilitation Adherence:

Participants are to complete at the beginning of each treatment session. Please use the scale below and write down the number that best indicates the extent to which you have followed the instructions for the treatments your physiotherapist has requested you do at home. Circle N/A for those treatments you have not been asked to do.

Not at all	A little	Rather Regular	Very Regular	As Advised	N/A
1	2	3	4	5	N/A

Completed Stretching Exercises.	
Completed Walking Programme.	

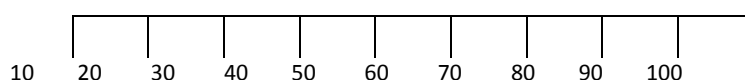


## Appendix 5: Arthritis Self-Efficacy Questionnaire

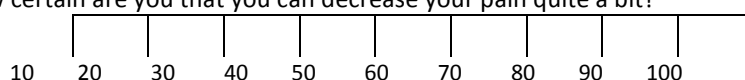
### Self efficacy Scale for Arthritis: Lorig et al., Arthritis and Rheumatism 32: 37-44,1989

#### Pain subscale

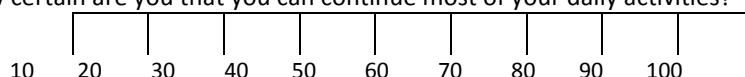
In the following questions, we'd like to know how your arthritis pain affects you. For each of the following questions, please circle the number which corresponds to your certainty that you can now perform the following tasks. 10 being very uncertain and 100 being very certain.



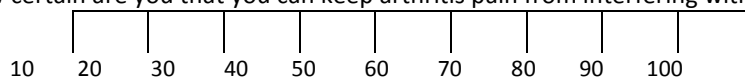
1. How certain are you that you can decrease your pain quite a bit?



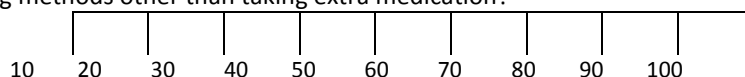
2. How certain are you that you can continue most of your daily activities?



3. How certain are you that you can keep arthritis pain from interfering with your sleep?



4. How certain are you that you can make a small-to-moderate reduction in your arthritis pain by using methods other than taking extra medication?



5. How certain are you that you can make a large reduction in your arthritis pain by using methods other than taking extra medication?

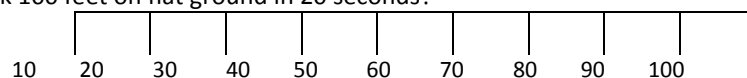


#### Function subscale

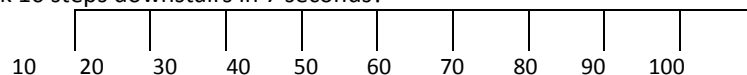
We would like to know how confident you are in performing certain daily activities. For each of the following questions, please make a circle around the number which corresponds to your certainty that you can perform the tasks as of now, without assistive devices or help from another person. Please consider what you routinely can do, not what would require a single extraordinary effort. 10 being very uncertain and 100 being very certain.

As of now, how certain are you that you can:

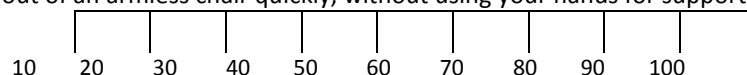
- 1) Walk 100 feet on flat ground in 20 seconds?



- 2) Walk 10 steps downstairs in 7 seconds?



- 3) Get out of an armless chair quickly, without using your hands for support?



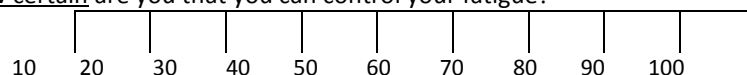
- 4) Get in and out of the passenger side of a car without assistance from another person and without physical aids?



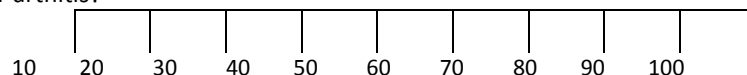
#### Other symptoms subscale

We would like to know how you feel about your ability to control your arthritis. For each of the following questions, please circle the number which corresponds to the certainty that you can now perform the following activities or tasks. 10 being very uncertain and 100 being very certain.

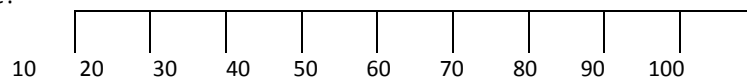
1. How certain are you that you can control your fatigue?



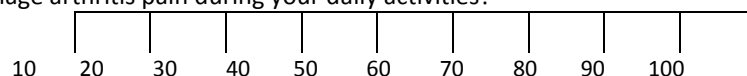
2. How certain are you that you can regulate your activity so as to be active without aggravating your arthritis?



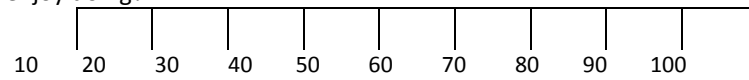
3. How certain are you that you can do something to help yourself feel better if you are feeling blue?



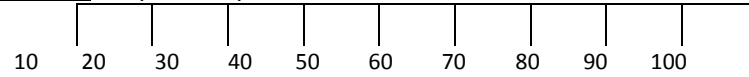
4. As compared with other people with arthritis like yours, how certain are you that you can manage arthritis pain during your daily activities?



5. How certain are you that you can manage your arthritis symptoms so that you can do the things you enjoy doing?



6. How certain are you that you can deal with the frustration of arthritis?



## Appendix 6: Task Self-Efficacy Assessment Form

### TASK SELF-EFFICACY

In terms of your prescribed exercise programme, use the rating scale to indicate how confident you are that you can complete all its requirements.

1	2	3	4
Strongly disagree	disagree	agree	Strongly agree

1. I am confident that I can undertake each of the prescribed exercises at each exercise session	
2. I am confident that I can undertake the prescribed number of exercise sessions at least once a day	
3. I am confident that I can do the prescribed repetitions for each exercise, or exercise for the prescribed duration	
4. I am confident that I can be physically active (such as walking) at least three times a week.	
5. I am confident that I can follow my physiotherapist's advice about the exercise programme including becoming physically active.	

## Appendix 7: Maintenance Self-Efficacy Assessment Form

### MAINTENANCE SELF-EFFICACY SCALE

After having started doing your prescribed exercise programme, it is important for you to continue with this programme on a long-term basis. How confident are you that you will succeed in doing so in the situations given below? Use this scale to respond to each of the situations:

1	2	3	4
Strongly disagree	disagree	agree	Strongly agree

1. I am confident that I am able to do rehabilitation exercises regularly even if I do not see any positive effects of the exercises.	
2. I am confident that I am able to do rehabilitation exercises regularly even if exercising takes me a lot of time.	
3. I am confident that I am able to do rehabilitation exercises regularly even if I have to force myself to them again everyday	
4. I am confident that I am able to do rehabilitation exercises regularly even if I am tempted to do something else.	

## Appendix 8: Recovery Self-Efficacy Assessment Form

### RECOVERY SELF-EFFICACY SCALE

Despite all good intentions it may happen that you have to give up the regular performance of the recommended exercise programme for a short period of time, such as a couple of days, because of health problems. If this happened to you how certain are you that you could resume them again? Use the following scale to respond to the statements that follow it:

1	2	3	4
Strongly disagree	disagree	agree	Strongly agree

1. I am confident that I am able to resume the regular performance of exercises (after giving them up) even if I fail to pull myself together to exercise.	
2. I am confident that I am able to resume the regular performance of exercises (after giving them up) even if I feel weak after a period of illness	
3. I am confident that I am able to resume the regular performance of exercises (after giving them up) even if I haven't done the exercises for a couple of days	

## **Appendix 9: Functional Performance Assessment Protocol**

### **Testing Protocol**

For safety reasons, during the administration of each of the performance measures, patients are permitted to use their regular walking aids, however any use of aids should be noted.

All timing will be done with a stopwatch and times will be measured to the nearest second. The case of the Hill's step test only the completed number of steps will be counted. The case of the 6 minute walk test only the completed number of meters will be counted.

#### **Timed Up and Go (TUG):**

On the assessors instruction the participants To complete the TUG, patients were required to rise from a standard arm chair, walk at a safe and comfortable pace to a tape mark 3-m away, then return to a sitting position in the chair. The time taken is counted and noted

#### **Hills Step test:**

The patient is standing in front of a 20 cm high step. On the assessors instruction the participants completes as many complete steps, (up and down with both feet) as they can manage in 15 seconds. The number completed is counted and noted.

#### **6 Minute Walk test (6MWT)**

During the performance of the 6MWT, patients will be instructed to cover as much distance as possible during the 6 minute time frame with opportunity to stop and rest if required. The test will be conducted on a

pre-measured, 20 meter unobstructed, carpeted, straight circuit. The course will be marked off in meters and the distance traveled by each subject was measured to the nearest meter. As encouragement has been shown to improve performance, standardized encouragement, "You are doing well, keep up the good work" will be provided at 60 second intervals.

#### 10 Meter Walk test (10MWT)

Participant will be timed while they walked one length of a 10-m indoor course in response to the instruction: "walk as quickly as you can without overexerting yourself." The test will be repeated two times and the quickest time to complete the distance will be noted.



## Appendix 10: LLTQ-ADL Subscale



Health and Rehabilitation Research  
Centre

### LOWER LIMB TASKS QUESTIONNAIRE ACTIVITIES OF DAILY LIVING SECTION

Patient: \_\_\_\_\_  
Date: \_\_\_\_\_

#### INSTRUCTIONS

Please rate your ability to do the following activities in the **past 24 hours** by circling the number below the appropriate response.

If you did not have the opportunity to perform an activity in the **past 24 hours**, please make your *best estimate* on which response would be the most accurate.

Please also rate how important each task is to you in your daily life according to the following scale:

- 1. = Not important
- 2. = Mildly important
- 3. = Moderately important
- 4. = Very important

Please answer all questions.

	NO DIFFICULTY OF TASK	MILD DIFFICULTY	MODERATE DIFFICULTY	SEVERE DIFFICULTY	UNABLE	IMPORTANCE
1. Walk for 10 minutes	4	3	2	1	0	1 2 3 4
2. Walk up or down 10 steps (1 flight)	4	3	2	1	0	1 2 3 4
3. Stand for 10 minutes	4	3	2	1	0	1 2 3 4
4. Stand for a typical work day	4	3	2	1	0	1 2 3 4
5. Get on and off a bus	4	3	2	1	0	1 2 3 4
6. Get up from a lounge chair	4	3	2	1	0	1 2 3 4
7. Push or pull a heavy trolley	4	3	2	1	0	1 2 3 4
8. Get in and out of a car	4	3	2	1	0	1 2 3 4
9. Get out of bed in the morning	4	3	2	1	0	1 2 3 4
10. Walk across a slope	4	3	2	1	0	1 2 3 4

TOTAL (/40):

**Appendix 11: Pain Box Plot****Box Plot Pain Scale**

Below we would like you to rate your pain on a scale of 1 (being no pain) to 10 (being the worst pain imaginable). Please make a circle around the number which best describes the worst your pain has been in the last seven days.

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

## Appendix 12: Osteoarthritis Education Leaflet

### LOOKING AFTER YOURSELF

Living and coping with a chronic condition can be difficult. At times you may feel angry, depressed and isolated. It is not easy to accept the loss of good health or accept constant pain and changes in your physical appearance.

Talking about how you feel with someone who is close to you is very important. But sometimes you may feel the need to confide in someone who really understands. Arthritis New Zealand employs skilled Educators, who are always on hand. They can give you information and advice, put you in touch with support and exercise groups throughout the country and help you obtain special equipment and aids for daily living.

### LIVING WITH ARTHRITIS

A variety of known techniques can help people control and reduce the effects of arthritis. Research has shown that people who exercise regularly, practise relaxation and/or use other self management techniques have less pain and are more active than those people who are not self managers.

Self management courses are available through Arthritis New Zealand. They are designed to give people the skills needed to take a more active part in their arthritis care, together with a healthcare team. Medication, physical activity, joint protection, stress management, acupuncture, heat/cold therapy and weight control to prevent extra stress on weight bearing joints, are just some of the components of self management.

### ARTHRITIS NEW ZEALAND

Arthritis New Zealand is a not-for-profit organisation whose main aim is to enable a better quality of life for people affected by arthritis. Arthritis New Zealand works in the areas of education, public awareness, direct support, lobbying and funding research.

There are local offices and 34 Arthritis Educators, who offer advice, information and guidance on services and special equipment. Arthritis Educators run self management courses.

For more information look in the telephone directory for local contacts or contact:

**ARTHRITIS NEW ZEALAND**  
PO BOX 10-020  
WELLINGTON  
TELEPHONE 04 472 1427  
[www.arthritis.org.nz](http://www.arthritis.org.nz)



*Discover You Can*

**ARTHRITIS NEW ZEALAND**  
ENABLING A BETTER QUALITY OF LIFE  
KAIPONAPONA AOTEAROA  
*Te whakapiki i te huainga ora*



## WHAT IS OSTEOARTHRITIS?

Osteoarthritis (OA) is the most common form of arthritis. It is often referred to as 'wear and tear' or 'degenerative' arthritis as it involves the breakdown of the protective cushion of the cartilage covering the ends of the bones, where two bones meet to form a joint.

## WHAT HAPPENS IN OSTEOARTHRITIS?

The current thinking is that osteoarthritis is due to changes within the cells of the cartilage that lead to a loss of elasticity.

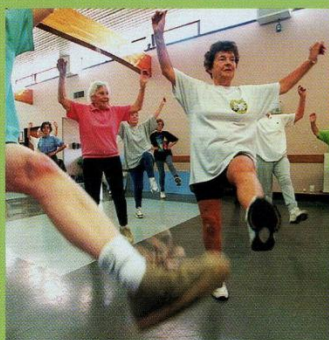
Over a period of time the cartilage thins and breaks down to leave the bones unprotected. As a result the joint loses its smooth movement. The bone loses shape and thickens at the end to produce bony spurs called osteophytes.

## WHAT CAUSES OSTEOARTHRITIS?

There are several reasons for the development of OA. These include age, being overweight, heredity factors and joint damage from a prior injury, for example a fall during a sporting activity.

## WHICH JOINTS ARE MOST COMMONLY AFFECTED?

Hands, spine, hips, knees and other joints such as the ankles, feet, toes and shoulders may also be affected.



## WHAT ARE THE SYMPTOMS?

For some people the changes within the joint may lead to quite severe pain, tenderness, swelling and stiffness. For others symptoms may be very mild and only brought on by periods of activity or some minor injury. Muscle weakness may lead to the joint feeling 'unsafe.'

## TREATMENT OPTIONS

Although there is no cure for osteoarthritis there is a variety of treatments and management techniques which can help control and reduce the effects of the condition.

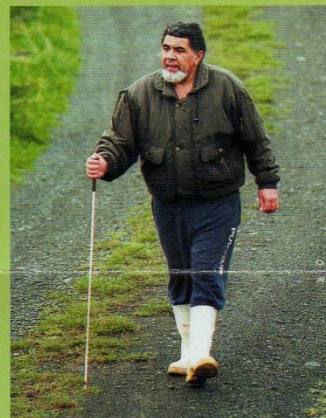
### Medication

Medication is often prescribed for osteoarthritis. Health professionals can provide a great deal of information about what is available and what is best in individual cases.

### Exercise

There is a very positive relationship between exercise and the management of osteoarthritis. Exercise helps to decrease pain, keep joints mobile, increase muscle strength, strengthen bones and ligaments, prevent joint deformities, provide nourishment to joints, increase general fitness and wellbeing, and maintain and increase the ability to perform daily tasks.

There are many appropriate programmes available within the community including swimming, walking, Tai Chi and gentle exercise classes.



### Joint protection

Once it has been established which positions, activities and stresses cause pain, it is wise to look at alternative ways to manage and do things. Planning ahead, reducing body weight, balancing rest and activity, simplifying work and using labour saving devices are some of the ways to look after joints.

### Surgery

The development of highly successful surgical techniques has led to many people benefiting from joint replacements, particularly of hips and knees.

Other treatments can include acupuncture, heat/cold therapy and weight control to prevent extra stress on weight-bearing joints.

*Although there is no cure for Osteoarthritis there is a variety of treatments and management techniques...*

*Discover You Can*

## Appendix 13: Action Plans Form

### Action Planning:

Action Planning is a form of goal setting and attainment. What we want you to do is set yourself one task that you would like to achieve over the next 12 weeks with the help of this fitness programme. The goals should be specific, measurable and achievable, (*i.e. in 12 weeks I would be able to walk at a steady pace, non-stop for 40 minutes*).

My goal is to be able to: .....

The next thing we would like you to do is to plan the steps needed to achieve this goal. Please think about the next 12 weeks. I want you to think about when where and how you plan to be physically active? Please write down your plan in the following tables. The more precise, concrete and personally you formulate the plans the more that can help you. Memorize your plans carefully. Visualise the situations and your planned actions and make a firm commitment to act as planned.

### AUT Classes

When do you plan to attend the class?	
Where do you attend the class?	AUT rehabilitation clinic
How are you going to get there?	

### Walking Programme

When do you plan to do the walking?	
Where to you plan to do the walking?	
How long do you plan to do the walking for?	
With whom will you do the walking?	

### Stretching Programme

When do you plan to do the stretching?	
Where to you plan to do the stretching?	
How long do you plan to do the stretching for?	
With whom will you do the stretching?	

## Appendix 14: Coping Plans Form

### Coping Planning:

Nothing ever goes completely according to plan. Things will always get in the way. Coping planning is identifying in advance, some of the obstacles that could get in the way of the achievement of your goal and planning how these obstacles could be overcome, (*i.e. on the days that it is raining I will go to the local pools do the walking in the pool or initially I may have to put an ice pack on the knee after exercise to help control any pain*).

Which obstacles or barriers might interfere with the implementation of your exercise plans? How could you successfully cope with such problems? The more precise, concrete and personally you formulate the plans the more that can help you. Memorize your plans carefully. Visualise the situations and your planned actions and make a firm commitment to act as planned.

<b>Obstacles to of the completion exercise classes</b>	<b>I will overcome these obstacles by:</b>

<b>Possible obstacles to completion of the walking programme</b>	<b>I will overcome these obstacles by:</b>

<b>Possible obstacles to attending the exercise classes</b>	<b>I will overcome these obstacles by:</b>

Participant Name.....

Signed.....

Date.....



## Appendix 15: AUT Post Graduated Board of Studies Approval Letter



8 August 2008

**Daniel O'Brien**  
**60A Katinui Avenue**  
**Mt Albert**  
**Auckland 1003**

Private Bag 92006  
 Auckland 1020, NZ  
 T: +64 9 921 9999  
 www.aut.ac.nz

Dear Daniel

### ST9700873 approval of MHSc thesis topic and supervisors

Thank you for submitting your new *Research Proposal PG1* application. The Faculty of Health and Environmental Sciences Postgraduate and Research Committee 1 August 2008 meeting have approved the topic and supervisors for your proposed thesis. Details are:

**Your topic:** Do adherence enhancing strategies increase self efficacy, adherence to exercise programmes and functional outcomes for people with hip and knee joint osteoarthritis

**Principal supervisor:** Dr Sandra Bassett  
**Additional supervisor:** Professor Peter McNair

**Start date:** 21 July 2008  
**Expected completion date:** 30 June 2010  
**Enrolment:** Part-time

The committee have asked that you consider the following points raised at the meeting regarding your research and discuss these with your supervisors:

1. Recruitment be widened beyond GPS to ensure the number of participants required is met and the project is completed on time.
2. The methodology and number of participants were considered large for a masters thesis.

You will see processes for your progress within the thesis paper are laid out in the *Postgraduate Handbook*. If you do not have a copy of this booklet please contact the Executive Administrator on (09) 921 9999 extension 7020.

Please contact your supervisors to complete your *Postgraduate Supervisors Agreement* and the development of your ethics proposal.

If you have any questions or require further clarification please contact me.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Marion Jones', written in a cursive style.

**Associate Professor Marion Jones**  
**Associate Dean Postgraduate**  
**Faculty of Health and Environmental Sciences**

**CC: Dr Sandra Bassett**  
**Professor Peter McNair**  
**Dr Wayne Hing**

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## Appendix 16: Northern Region 'Y' Ethics Committee Approval Letter



6 April 2009

Mr Daniel O'Brien  
60A Kitenui Ave  
Mt Albert  
Auckland

### Northern Y Regional Ethics Committee

Ministry of Health  
3<sup>rd</sup> Floor, BNZ Building  
354 Victoria Street  
PO Box 1031  
Hamilton  
Phone (07) 858 7021  
Fax (07) 858 7070

Email: [northern\\_y\\_ethicscommittee@moh.govt.nz](mailto:northern_y_ethicscommittee@moh.govt.nz)

Dear Daniel

**Action and Coping plans as strategies to improve adherence to exercise programmes for osteoarthritis of the hip and knee.**

**Investigators:** Daniel O'Brien, Sandra Bassett, Peter McNair.

**Ethics ref:** NTY/09/01/001

**Locations:** AUT University.

The above study has been given ethical approval by the **Northern Y Regional Ethics Committee**.

#### Approved Documents

- Information Sheet and Consent Form version 1 dated 24/11/2008.
- Action planning
- Class attendance Form
- Self-report scales
- Assessment Form
- Testing protocol
- Questionnaire
- Advert
- Flyer on osteoarthritis

#### Certification

The Committee is satisfied that this study is not being conducted principally for the benefit of the manufacturer or distributor of the medicine or item in respect of which the trial is being carried out.

#### Accreditation

The Committee involved in the approval of this study is accredited by the Health Research Council and is constituted and operates in accordance with the Operational Standard for Ethics Committees, April 2006.

#### Final Report

The study is approved until **6 April 2010**. A final report is required at the end of the study. The report form is available on <http://www.ethicscommittees.health.govt.nz> and should be forwarded along with a summary of the results. If the study will not be completed as advised, please forward a progress report and an application for extension of ethical approval one month before the above date.

#### Requirements for SAE Reporting

The Principal Investigator will inform the Committee as soon as possible of the following:

- Any related study in another country that has stopped due to serious or unexpected adverse events
- withdrawal from the market for any reason
- all serious adverse events occurring during the study in New Zealand which result in the investigator breaking the blinding code at the time of the SAE or which result in hospitalisation or death.
- all serious adverse events occurring during the study worldwide which are considered related to the study medicine. Where there is a data safety monitoring board in place, serious adverse events occurring outside New Zealand may be reported quarterly.

All SAE reports must be signed by the Principal Investigator and include a comment on whether he/she considers there are any ethical issues relating to this study continuing due to this adverse event. It is assumed by signing the report, the Principal Investigator has undertaken to ensure that all New Zealand investigators are made aware of the event.

**Amendments**

All amendments to the study must be advised to the Committee prior to their implementation, except in the case where immediate implementation is required for reasons of safety. In such cases the Committee must be notified as soon as possible of the change.

**Please quote the above ethics committee reference number in all correspondence.**

The Principal Investigator is responsible for advising any other study sites of approvals and all other correspondence with the Ethics Committee.

**It should be noted that Ethics Committee approval does not imply any resource commitment or administrative facilitation by any healthcare provider within whose facility the research is to be carried out. Where applicable, authority for this must be obtained separately from the appropriate manager within the organisation.**

Yours sincerely



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**Amrita Kuruvilla**  
**Northern Y Ethics Committee Administrator**

Email: amrita\_kuruvilla@moh.govt.nz

## **Appendix 17: Study Advertisement**

### **Do you have osteoarthritis of the hip or knee and would like to do more to manage it?**

AUT, Department of Physiotherapy, North Shore Campus, are currently looking for people, who have osteoarthritis of either their hips or knees or both to take part in an exercise study.

#### **What is the study and what is its main aim?**

Regular long-term exercise has been shown to improve strength, flexibility and general fitness in people with osteoarthritis of their hips and knees. The big problem is that most people who start these programmes do not continue with them. We are looking for people to take part in a study that test a simple everyday method to help people with osteoarthritis stick to their long-term exercise programmes.

#### **Who can participate?**

Any person who has been diagnosed with osteoarthritis of the hip or knee by their doctor and has had this diagnosis confirmed by X-ray.

#### **How long is the study and how many times will I need to visit the clinic if take part?**

Each person will have to attend supervised 45-minute exercise class three times per week for a period of 12 weeks as well as complete a series of stretches and exercises at home twice weekly. They will have to attend two one hour assessment sessions, one at the beginning and one at the end of the programme.

#### **What is the benefit to me?**

All exercise sessions are free of charge and you will also be provided with education about living with osteoarthritis.

#### **Where can I get more information if I am interested?**

If you are interested in taking part in the study or you know someone who would like to take part, please contact Daniel O'Brien (Lead Researcher) on (09)9219160 or at [dobrien@aut.ac.nz](mailto:dobrien@aut.ac.nz).

## Appendix 18: Participant Information Form



School of Physiotherapy,

Division of Rehabilitation and Occupation Studies,

Faculty of Health and Environmental Sciences.

**Participant information sheet for the research;** Strategies to improve adherence to exercise programmes for osteoarthritis of the hip and knee.

**Principal Investigator & Contact person:** Daniel O'Brien, Clinical Educator, School of Physiotherapy, Auckland University of Technology, telephone (09)9219999 ext 9160 e-mail [dobrien@aut.ac.nz](mailto:dobrien@aut.ac.nz).

### Invitation to take part in the study

You are invited to take part in this study, but before you accept this invitation would you please read the following outline of the study. You will need to make a decision about taking part in this study prior to starting the rehabilitation for your osteoarthritic (OA) joint(s). Your participation is entirely voluntary (your choice). If you do agree to participate you can withdraw from the study at any time without giving a reason, and this will in no way affect your future health care. You do not have to take part in this study, there is no cost to participate in the study.

### What are the aims of this study?

This study will investigate whether the provision of action and coping planning will improve adherence to an exercise programme once the supervision is removed. Action and coping planning is a simple way in which has been shown to increase people's adherence to exercise programmes.

### How many participants are involved in the study, how are they selected, and who selects them?

40 people with hip and/or knee osteoarthritis are required. People who are about to start a course of physiotherapy or have been diagnosed with OA and would like to increase their activity may participate in the study. To be accepted for the study people must have had an X-ray confirming the presence of OA, have pain in the joint for most days of the last month

as well as three of the following; older than 50 years of age, morning stiffness in the affected joint for longer than 30 minutes, clicking or grinding, bony tenderness, bony enlargement, no palpable warmth. Participants need to be able to read and understand English and must not have any health problems that limit their ability to exercise.

### **What is the time span for the study?**

Your contribution to the study will be attending a 40 minute exercise class up to three times per week for 12 weeks as well as attending an assessment session of 60 to 90 minutes at the start and end of the 12 weeks.

### **What will happen during the study?**

You will first be invited to AUT University for an assessment. On arrival you will find that you have been randomly allocated into one of two groups, either the intervention group or the control group. All participants will be assessed and will be instructed with regard to usage to the exercise equipment and shown the exercise circuit. This will take approximately 60 minutes. People in the intervention group will establish action and coping plans in conjunction with their exercise programme, this will take a further 30 minutes. Action planning and coping planning are simple planning skills which help you to set and achieve a desired goal. Action planning requires a person to think about the steps that are required to achieve a goal and coping planning requires the person to plan how to productively manage barriers that may affect the achievement of this goal.

Irrespective of your study grouping, all participants will be asked to attend three 40 minute exercise classes per week for a period of 12 weeks. During the first four weeks the research assistants will provide you with advice and encouragement as you complete the classes. Following this four week induction period, you will be asked to continue attending the class three times per week for a further eight weeks however during these eight weeks there will be minimal supervision. The exercise classes will be circuit based and will have eight exercise stations. The resistance of each exercise will be tailored to the ability of the individual. You will also be asked to attempt to complete a 20 minute walk and a stretching programme two times per week. You will be provided with an OA education leaflet, a walking programme, a stretching programme as well as attending the exercise classes. You will be reassessed at the end of the 12 weeks to note any improvements gained. Adherence to the programme will be measured during the 12 week programme.

### **What are the benefits of the study?**

Participants in the intervention group may find that the action and coping planning skills can be used in other aspects of their lives to help them to adopt healthy behaviour changes in the future. Gentle exercise has been shown to improve the fitness and function of people living

with OA and in some cases it has also been shown to reduce pain and medication dependency.

### **What are the discomforts, risks and inconveniences of the study?**

There are no risks associated with being taught the action and coping planning skills. There are small risks associated with any form of exercise. All efforts will be made to ensure the safety and well being of all participants in the study. It is usual when starting any new exercise programme to have a low level of discomfort as the muscle adapt to the new activities, but these will be closely monitor. A supervisor will be available at every scheduled class.

### **How is my privacy protected?**

No material which could personally identify you will be used in any reports on this study. For the analysis of the questionnaires, each participant will be given a confidential coding, so as their information can be linked. After the analysis, the questionnaires will be kept locked in a filing cabinet at the School of Physiotherapy, Auckland University of Technology for ten years. The consent forms for the study will be stored in a similar fashion but will be kept separate from the questionnaires.

### **Are there any costs for participating?**

There are no monetary costs involved in taking part in this study. The only cost to you is the time it will take to attend the exercise classes as well as completing the assessment process and answering the questionnaire.

### **What compensation is available for injury or negligence?**

In the unlikely event of a physical injury as a result of your participation in this study, you may be covered by ACC under the Injury Prevention, Rehabilitation and Compensation Act. ACC cover is not automatic and your case will need to be assessed by ACC according to the provisions of the 2002 Injury Prevention Rehabilitation and Compensation Act. If your claim is accepted by ACC, you still might not get any compensation. This depends on a number of factors such as whether you are an earner or non-earner. ACC usually provides only partial reimbursement of costs and expenses and there may be no lump sum compensation payable. There is no cover for mental injury unless it is a result of physical injury. If you have ACC cover, generally this will affect your right to sue the investigators.

If you have any questions about ACC, contact your nearest ACC office (freephone 0800 101 996; e-mail [claims@acc.co.nz](mailto:claims@acc.co.nz)), or visit the ACC website ([www.acc.co.nz](http://www.acc.co.nz)), pathway Claims and care > Getting help from ACC > Treatment injury, or contact Daniel O'Brien, the principal investigator.

**Do you have any questions regarding your rights as a participant?**

If you have any queries or concerns regarding your rights as a participant in this study, you may wish to contact an independent Health and Disability Advocate, telephone 0800 555 050 (Auckland region and north), or e-mail [advocacy@hdc.org.nz](mailto:advocacy@hdc.org.nz)

**Who can give me further information about the study?**

If you need more information you may contact **Daniel O'Brien**, who is the principal researcher and can be contacted at 09-9219999 ext 9160 or by email at [dobrien@aut.ac.nz](mailto:dobrien@aut.ac.nz).

Thanking you for taking the time to read this information sheet and for the interest you have shown in the study. Should you wish to take part please inform Daniel O'Brien, the principal investigator.

(This study has received approval from the Auckland Regional Ethics Committee Y).

Daniel O'Brien (Principal Investigator, MHSc. Student and Clinical Educator, School of Physiotherapy, Auckland University of Technology).

## Appendix 19: Participant Consent Form



### CONSENT FORM

Title of Project: Do adherence enhancing strategies increase self-efficacy, adherence to exercise programmes and functional outcomes for people with hip and knee joint osteoarthritis.

I have:

- Read and understood the participant information sheet dated December 2008, for volunteers taking part in the study designed to investigate the effect Action and coping plans on Adherence to exercise classes in participants with OA.
- Had the opportunity to discuss this study with the researcher and I am satisfied with the answers that I have been given.
- Had the opportunity to use whanau support or a friend to help me ask questions and understand the study.

I understand:

- That taking part in this study is voluntary (my choice), and that I may withdraw from the study at any time and this will in no way affect my future health care.
- That my participation in this study is confidential and that no material which could identify me will be used in any reports on this study.
- The compensation provisions for this study.

Also I:

- Have had time to consider whether to take part, and know to contact the researchers should I have any further questions.
- Know who to contact if I have any adverse effects from the study.
- Know that if I wish, I can receive a copy of the results of the study, but I do realise that there may be a delay between my participation in the study and publication of the results.
- I wish to receive a copy of a short report about the outcomes of this study YES/NO

I \_\_\_\_\_ (full name) hereby consent to take part in this study.

**Date:**

**Signature:**

**Researchers:** Dr Sandra Bassett, Professor Peter McNair and Daniel O'Brien

**Contact phone number for researchers:** Dr Sandra Bassett (09) 9219999 ext 7123, Daniel O'Brien 021 815 717.

**Project explained by:**

**Project role:**

**Signature:**

**Date:**