School of Public Health

Development and evaluation of a physical activity intervention for older adults

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Declaration

This thesis does not contain any material that has been accepted for any other degree or diploma.

To the best of my knowledge this thesis contains no material previously published by any other person except where there is due acknowledgement.

The work described in this thesis was undertaken by the author and is original. The work of study design, ethics approval, writing up of the thesis and manuscripts for publication were conducted under the supervision of Professor Peter Howat and Professor Andy Lee, and associate supervisor, Associate Professor Bruce Maycock.

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Abstract

The present knowledge of factors associated with older adults' physical activity behaviour is limited. Therefore, this study trialled an innovative physical activity program for older adults, investigating effective recruitment and retention strategies, and exploring the adults' perceptions of physical activity.

A total of 573 subjects were recruited into the quasi-randomised controlled trial, located in 30 intervention and 30 control neighbourhoods in the Perth metropolitan area. The initial response rate was 74% (260/352) in the intervention group and 82% (313/382) in the control group. Self-reported questionnaires administered at three time points (baseline, 3-months, 6-months) measured physical activity levels, personal and demographic information, including perception of financial struggle, proximity to friends, and other psychosocial data. Descriptive statistics, repeated measure analysis of variance, logistic regression and generalised estimating equations were used in the analysis.

Qualitative data on the participants' perceptions of physical activity were collected through one-on-one interviews (n=16).

The results showed that:

1. This cost-effective recruitment procedure facilitated the selection of a reasonably representative sample of 65 to 74 year olds from the Perth metropolitan area. Names of 7378 older adults were obtained from the Federal Electoral Roll, then 6401 potential subjects were matched to telephone numbers and phoned with subjects meeting the screening criteria invited to join the program (n = 4209). From this sample, 573 subjects were recruited. More females (63%) than males (37%) were recruited. The study attracted a greater proportion of 'obese' older adults (27%) relative to state averages.

2. Over the intervention period there was a significant increase in participants' total physical activity of 2.25 hours per week ($p > .001$). The General Estimating Equation analysis confirmed significant increase in physical activity from baseline to midpoint ($p = .002$) and to post intervention ($p = .0031$). Perceptions of financial struggle ($p = .020$) were positively correlated with physical activity time spent by participants, whereas having friends or acquaintances living nearby ($p = .037$) had a significant negative correlation with physical activity time.

3. At the end of the intervention, 32% of the intervention group and 25% of the control group had dropped out, resulting in an overall drop out rate of 28%. Most of the attrition occurred in the first 3 months (77%). Characteristics of individuals lost to attrition (n=86, 35%) were compared with program completers (n=162, 65%). Logistic regression analysis showed that those lost to attrition came from areas of lower socio-economic status, were overweight, were less physically active, and had a lower walking self-efficacy score and a higher loneliness score. The results suggest that to improve retention and to avoid potential bias, early assessment of these characteristics should be undertaken to identify individuals at risk of attrition.

4. Based on the finding of this research, future intervention studies should consider: the role of tertiary students as a skilled resource; the use of volunteers to contain costs; the importance of a tailored program; the appropriateness of walking as a form of physical activity for this age group; the enjoyment associated with a walking group; and the usefulness of social support. This practical program is potentially effective and sustainable for mobilizing physically inactive older people.

5. Qualitative research highlighted the need for older adults to receive more specific information on: the benefits of physical activity; the role of pain management in physical activity; and the concept that involvement in physical activity in younger years leads to involvement when older. The older adults also expressed a desire to engage in less age appropriate activities.

These results suggest that the intervention was successful in recruiting older adults into and retaining them in the intervention, documenting a need for early identification of individuals at risk of attrition. The program significantly increased the participants' weekly mean time for physical activity and identified factors that affect their commitment to physical activity programs. This program was practical and could be used as a model for physical activity programs aimed at older adults.

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Abbreviations

ABS Australian Bureau of Statistics

BMI Body mass index

FER Federal Electoral Roll

GEE General estimating equation

RR Relative risk

OR Odds ratio

MET Metabolic equivalent task

SEIFA socioeconomic information for areas

SCT social cognitive theory

SES socioeconomic status

UK United Kingdom

US United States

UWA University of Western Australia

WHO World Health Organisation

Glossary

Ageing: In the strictest sense, this means growing old. It can also indicate life-long growth and development in physical, economic, psychological, cultural, spiritual and other ways (Sims et al 2006).

Body mass index (BMI): Is a measure of a person's weight in relation to their height, calculated as weight in kilograms, divided by height in metres squared. The self-reported BMI of each subject was classified as normal (18.5-24.9 kg/m2), overweight (25.0-29.9 kg/m2) and obese (≥ 30.0 kg/m2), based on WHO recommended guidelines (WHO 2000).

Drop out: A subject who did not complete the posttest.

Duration: Is the length of time (hours/minutes) spent participating in physical activity (McCormack et al. 2003).

Exercise: Is considered a subset of physical activity and is described as structured and repetitive body movements to maintain function (McCormack et al. 2003).

Fitness: Usually refers to the cardio-respiratory capacity of the individual to perform physical activity (McCormack et al. 2003).

Health: The WHO defines health as "a state of complete physical and mental and social well-being and not merely the absences of disease".

Incidental activity: Is unstructured physical activity taken during the day, such as walking for transport, doing work around the home, and activities of daily living (McCormack et al. 2003).

Incidence: The number of instances of illness commencing during a given period in a specific time (Gordis 2004).

Insufficient physical activity: Some activity but not enough to reach the levels required for health benefits (McCormack et al. 2003).

Intensity: Is the perceived intensity at which an activity is carried out, such as light, moderate and vigorous (McCormack et al. 2003).

METs (metabolic equivalent): Is the energy expenditure for conducting an activity.

Moderate levels of physical activity: Physical activity that causes the heart to beat faster and results in some shortness of breath, but a person is still able to speak; it is equivalent to 3 to 6 METs (McCormack et al. 2003).

Odds ratio: Is a measure of effect size**.** It indicates the odds of an event occurring in one group compared to the odds of it occurring in another group. The number of people exposed (Ie) over those with the condition who were not exposed (Io), divided by those with the condition who were exposed (Ne) over those without who were not exposed (No) (Gordis 2004).

Older adults: It is difficult to define the chronological age of an 'older person', as there is great variability in health status at any age. For this research 'older people' are defined as aged over 65 years.

Physical activity: Physical activity is defined as any bodily movement produced by skeletal muscles that results in energy expenditure, which may include walking, gardening, playing sport and any work-related activity (Bauman et al. 2002).

Prevalence: The total number of all individuals who have a disease at a particular time, divided by the population at risk of having the disease at this point in time (Gordis 2004).

Regular physical activity: Physical activity is regular if an accumulated 30 minutes of moderate physical activity is performed on most days of the week and preferably daily (McCormack et al 2003).

Sufficient physical activity: Undertaking 150 minutes of moderate intensity physical activity over five or more sessions in a week, or undertaking 60 minutes of vigorous intensity physical activity per week (McCormack et al. 2003).

Vigorous physical activity: Physical activity that causes huffing and puffing. In technical terms this is exercise at a heart rate of 70-85% of maximum heart rate (where maximum heart rate is 220 minus your age) (Department of Health and Aged Care 1999).

CHAPTER 1

Introduction

1.1 Statement of the problem

Physical inactivity among the Australian population is widespread. There has been a significant recent decline in the proportion of Australians participating in physical activity, with low levels reported by older population groups especially after age 60 (Bull et al. 2000; Premier's Physical Activity Taskforce 2001). It seems that as age increases physical activity declines. About 20% of adults over the age of 30 years are physically inactive (Armstrong, Bauman & Davies 2000), increasing to 46% in adults aged 60 to 75 years, with about one-third being completely sedentary (Bauman et al. 2002). Physical inactivity is the fourth leading contributor to overall burden of disease in Australia, and the leading contributor to burden of disease in women (Australian Bureau of Statistics 2005).

The attraction to a sedentary lifestyle and the ageing and increasing size of Australia's population raise social and public health concerns. Currently 14% of Australians are 60 years and older, with this estimated to increase to 22% by 2025 (Bauman et al. 2002). Ageing of the population will influence chronic disease morbidity and mortality, level of functioning, loss of independence, and the need for long-term care of elderly citizens (Australian Institute of Health and Welfare, 2004). Efforts to maintain or improve the functional independence of the elderly have thus become an important health promotion goal.

Current low rates of regular physical activity may be partially due to the misperception of many that vigorous, continuous exercise is necessary to reap health benefits. Many people, for example, fail to appreciate walking as "exercise" and fail to recognise the substantial benefits of short bouts (at least 10 minutes) of moderate level activity (Haskell et al. 2007). The National Activity Guidelines for Australians recommend that the "accumulation of 30 minutes of moderate physical activity on five or most days of the week" is beneficial for health (Department of Health and Aged Care 1999). The intent of the Guidelines is to offer guidance for moderate-

intensity physical activity and refer to the minimum levels of physical activity required for good health.

Physical activity by older adults results in several physiological (Bijnen, Feskers & Caspersen 1999; Kushi, Fe & Folsom 1997; United States Department of Health and Human Services 1996) and psychological health benefits (Morgan & Bath 1998; Victor & Howse 2000). For ageing individuals, exercise reduces chronic disease and injury risk factors as well as improves other health-related factors, including cardiovascular endurance, muscular strength, balance, flexibility, and body composition (Bauman & Owen, 1999; Wolf et al. 1997).

Recommending physical activity to people over 65 years is a recognised cost-effective public health strategy (Munro et al. 1997), as there is now irrefutable evidence that it reduces risk of all cause mortality for those who undertake at least moderate intensity physical activity on most days of the week (WHO 2000; Anderson et al. 2000; Crespo et al. 2002; Wannamethee, Shaper & Walker 2000). An estimated half of all physical decline associated with age is preventable if adequate levels of physical activity are maintained (O'Brien Cousins 2003).

1.2 Study location

This intervention research was based in the Perth metropolitan area, the capital of Western Australia. Perth is the largest city in Western Australia with a population of 1.5 million. It is the fastest growing city in Australia, and enjoys a relatively high standard of living.

Perth's terrain is generally flat and rolling. It is bounded by the Indian Ocean to the west and divided into north and south by the snaking Swan River. Perth has a Mediterranean climate and receives moderate rainfall. Summers are generally hot and dry (December to March), whereas winters are cool and moist (July to August).

1.3 Series of published papers

This thesis will be presented as a series of published papers. Chapters 4, 5, 6, 7 and 8 contain an original copy of the text from each of the papers. These papers have all been accepted for publication and are either published or 'in press'. An original reprint of each published paper is provided in Appendix A. The list of papers and the objective of the study that the papers address follow.

1.3.1 Perceptions of physical activity by older adults: An exploratory qualitative study

Jancey, J, Clarke, A, Howat, P, Maycock, B & Lee, A 2007 *Health Education Journal*, Accepted with publication date to be advised.

- To identify perceptions of, and motivators and barriers to, physical activity.

1.3.2 Effective recruitment of older adults in physical activity research: PALS study

Jancey, J, Howat, P, Lee, A, Clarke, A, Shilton, T & Iredell, H 2006, *American Journal of Health Behaviour,* vol. 30, no. 2, pp. 626-635.

- To establish effective approaches to recruit seniors into, and retain them in, a physical activity research intervention.

1.3.3 Reducing attrition in physical activity programs for older adults

Jancey, J, Lee, A, Howat, P, Clarke, A, Wang, K & Shilton, T 2007, *Journal of Aging and Physical Activity,* vol. 15, no. 2, pp. 152-154.

- To determine variables important in predicting participant maintenance (social support, self-efficacy and loneliness, depression, satisfaction with life, physical environment) in a physical activity program.

1.3.4 A physical activity program to mobilise older people: A practical and sustainable approach

Jancey, J, Clarke, A, Howat, P, Lee, A & Shilton, T 2007, *The Gerontologist,* vol. 48, no. 5, pp. 251-257.

- To assess the feasibility and processes of establishing suburb-based walking groups.

1.3.5 The effectiveness of a physical activity program for seniors

Jancey, J, Lee, A, Howat, P, Clarke, A, Wang, K & Shilton, T 2007, *American Journal of Health Promotion,* vol. 22, no. 5, pp. 318-321.

- To assess changes in self-reported incidental and recreational physical activity levels of seniors, due to their participation in a physical activity program.

1.4 Significance of the study

Despite having increased knowledge about the benefits of exercise for health, health professionals are challenged to find ways to encourage older adults to become physically active (Kahn et al. 2002). If health benefits of exercise are to be realised, health professionals need to focus on feasible and effective physical activity and exercise intervention strategies that can be widely disseminated to the older population, preferably at low cost to the participating individuals and to the community (Dishman 1994).

The framework that guides this research is social cognitive theory (SCT), specifically the construct of self-efficacy (Bandura 1986; Bandura 1997). The research examines self-referent and contextual processes that influence and are influenced by exercise participation, so as to increase knowledge of the impact of physical activity on 65-74 year olds. According to SCT, successful participation in regular exercise activity should serve to enhance perceptions of physical capabilities, and thus enhance psychological and emotional well-being (Mihalko & McAuley 1996; Treasure & Newberry 1998).

This research makes a contribution to the existing elderly physical activity and health related research in Australia by providing an examination of the physical, social-psychological and environmental variables. The study provides important information on the dynamic interplay between a range of psychosocial variables in the context of exercise participation among the elderly in Western Australia. It also provides information for future intervention research in ageing populations.

1.5 Limitations of the study

The study design selected for this intervention research - the randomised controlled trial - is considered the ideal design for evaluating both the effectiveness and the side effects of new interventions (Gordis 2004). However, in a study such as this it was not possible to blind subjects to the intervention. All subjects were voluntary participants, but selection bias was minimised through the quasi-randomised study design and the procedure adopted to recruit participants. This multi-level recruitment procedure aimed to access a more representative sample, but in turn may have led to the recruitment of a less-motivated and a less self-selecting population.

The selection of neighbourhoods with populations of at least 11% of people aged over 65 years resulted in the selection of older suburbs with more established infrastructure supportive of physical activity, which might compromise the generalisability of the findings. Also the program was less successful in recruiting and retaining males than females.

Reporting bias is an inherent risk in self-reported physical activity due to overestimation (Gidlow et al. 2006). However, the literature suggests that self-report is sufficiently reliable for monitoring changes in activity levels (Booth et al. 1996; Shepard 2003), which formed the basis of the evaluation. The program was restricted to six months; nevertheless, this length of study period was deemed sufficient to reflect behaviour change (Stigglebout et al. 2006). This project was successfully accomplished within the available budget, but replication of the study on a large scale would require substantially more resources, funding and volunteers. It would also require the careful selection of walk leaders and admission to the educational networks to access these walk leaders.

1.6 Scope of the project

This PhD is part of a larger intervention study that was funded for three years. The candidate was the Project Co-ordinator of the project and was responsible for the development of the measuring instruments, the design and the implementation of the intervention, data collection and data analysis. However, the scope of this PhD has been narrowed so that the focus is related to five specific objectives, which are listed below.

1.6.1 Project objectives

1. To identify perceptions of, and motivators and barriers to physical activity.
2. To establish effective approaches to recruit seniors into, and retain them in, a physical activity research intervention.
3. To determine variables important in predicting participant maintenance (social support, self-efficacy and loneliness, depression, satisfaction with life, physical environment) in a physical activity program.
4. To assess the feasibility and processes of establishing suburb-based walking groups.
5. To assess changes in self-reported incidental and recreational physical activity levels of seniors, due to their participation in a physical activity program.

CHAPTER 2

Review of literature

2.1 Introduction

It is estimated that half of all physical decline associated with ageing is preventable if adequate levels of physical activity are maintained (O'Brien Cousins 2003). However, industrialised societies have not heeded this compelling evidence and continue to be attracted to an inactive lifestyle, especially in the older age groups (Bauman, Bellew, Vita, Brown, & Owen 2002; Resnick 2001). This increase in inactivity among older people is associated with potentially adverse health effects (Anderson, Schnohr, Schroll, & Hein 2000; Crespo et al. 2002; Lee & Skerrett 2000; Wannamethee, Shaper, & Walker 2000) and has resulted in an increased focus on encouraging and maintaining physical activity in the burgeoning older population.

2.2 Ageing populations

Worldwide there is a trend towards population ageing. Population ageing refers to a decline in the proportion of younger adults and an increase in the proportion of adults aged over 60 years. This 'greying' of the world's population is expected to continue as a result of increasing longevity and decreasing fertility rates. Worldwide in 2000 there were 600 million people aged over 60 years. It has been predicted that this number will rise to 2 billion by 2050, as the post-war baby boomers, who reach 65 years in 2011, contribute to this figure (WHO 2002).

The age structure of the Australian population follows a similar pattern to that found in Canada, New Zealand and the United States, with Australia having lower levels of ageing than many European countries (Australian Bureau of Statistics 2005). However, Australia has experienced a steady increase in the proportion of people aged over 65 years during the 20th Century, with this growth expected to continue in the 21st Century. Currently 14% of Australians are aged 60 years. By the year 2016 this is expected to reach 16% (3.6 million), then rise to 22% by 2025 (Bauman et al. 2002), with projections of the older population reaching 26% by 2051(Australian Bureau of Statistics 2005). These trends are shown in Figure 2.2 below.

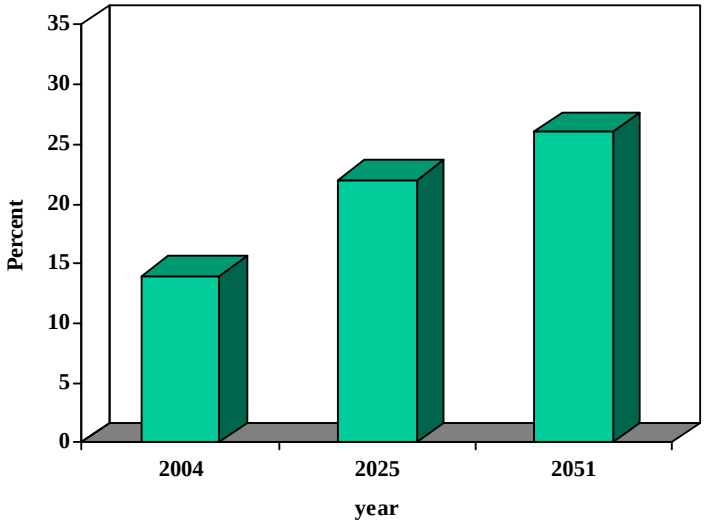

Figure 2.1 Australia's projected population 2004-2051 (for over 65 years)

(Australian Bureau of Statistics 2005)

Ageing is accompanied by many physiologic changes. These include changes in cardiac function, such as a reduction in maximal work capacity (aerobic fitness), maximal heart rate, tissue elasticity, muscle strength, and a decrease in bone mass leading to increased bone fragility (Singh 2002). Ageing is also associated with an increase in fat mass and a reduction in lean body mass, primarily related to loss of skeletal muscle mass, referred to as sarcopenia. This loss of muscle mass can result in a decrease in metabolic rate and muscle strength leading to possible functional limitation, which in turn may lead to lower physical activity levels. This reduced metabolic rate and physical activity level, if accompanied by a non-reduction in energy intake, can lead to weight gain (Schuit 2006). Alternatively, if this reduced activity is accompanied by reduced energy intake then nutrition may be inadequate. Sedentary individuals lose large amounts of muscle mass over the life course of adulthood (20-40%), and this loss plays a large part in loss of muscle strength seen in cross-sectional and longitudinal studies (Taylor et al. 2004).

With ageing of the population, levels of chronic disease morbidity and mortality, loss of independence, and the need for long-term care of elderly citizens will potentially increase. Efforts to maintain or improve the functional independence and decrease the adverse physiological changes in the elderly have thus become an important public health goal, especially considering that the majority of people over the age of 65 years live at home, with 35% of these living alone (Australian Institute of Health and Welfare 2004a).

2.3 Recommended levels of physical activity

In the early 70s, the recommended levels of physical activity were based on fitness and were usually expressed as 20 to 60 minutes of moderate to high-intensity endurance exercise performed three or more times per week (Pate et al. 1995). Then in the mid-90s the American College of Sports Medicine (1998) and the Centre for Disease Control (Pate et al. 1995) developed physical activity guidelines for health.

These United States guidelines recommended exercising for 30 minutes on at least five (and preferably all) days of the week at a moderate intensity. Moderate intensity was interpreted as any activity with an effort equivalent to brisk walking for that person or an energy cost of three to six METS (metabolic equivalent task) (Taylor 2004). It was recommended that vigorous physical activity be undertaken for 30 minutes three or four times per week. Vigorous activity was described as 'huff and puff' or as exercising at a heart rate of 70% to 85% of maximal heart rate, or an energy cost of 6 METS. It included activities such as football, basketball, netball and running (Department of Health and Aged Care 1999; WHO 2006).

In Australia in 1996 the Federal Ministry for Sport and the Federal Ministry for Health and Family Services launched 'Active Australia' and made physical activity a priority area, providing a framework for action. In 1998 they published 'Developing an Active Australia: A Framework for Action for Physical Activity and Health',

which provided targets and strategies (Bull et al. 2004). In 1999 the Australian National Physical Activity Guidelines were released (Department of Health and Aged Care 1999), prompted by the United States Surgeon General's Report (United States Department of Health and Human Services 1996). The Australian guidelines followed those of the United States, stating the need to 'put together at least 30 minutes of moderate intensity physical activity on at least five days per week'

Both the US and Australian physical activity guidelines result from laboratory-based research and data from large prospective studies aimed at establishing the threshold for the protective effects of physical activity and the corresponding health benefits (Bull 2003). The intent of the physical activity guidelines was to offer guidance for moderate-intensity physical activity and refer to the minimum levels of physical activity required for good health.

2.3.1 Recommendations for Older Adults

Recommending specific volumes of physical activity for older adults remains contentious, due to the variation in the ageing process (Taylor et al. 2004). Most calculations about the appropriate amount of physical activity are based on data from young adults. Activities are often classed as light, moderate and vigorous, although it is not always recognised that the amount of perceived energy expenditure depends on the age, fitness level and environment in which the exercise occurs (Shepard 2003).

A recent document from the WHO (2006b, p. 2) provides some general and somewhat vague guidelines for the retired person to reach the recommended levels of physical activity for health. It states:

> Daily walking, cycling, home repairs or gardening. Taking all small opportunities to be active: using stairs. Doing manual tasks. Weekend: longer walks, cycling and swimming.

Recommendations recently compiled by the Australian National Ageing Research Institute (Sims et al. 2006, p. 11) reflect the heterogeneity of this older age group. These recommendations are as follows and are also quite non-specific.

1. Older people should do physical activity no matter what their weight, health problems or abilities.

2. Older people should be active every day in as many ways as possible, doing a range of physical activities that incorporate fitness, strength and balance.

3. Older people should accumulate at least 30 minutes of moderate intensity physical activity on most or preferably all days.

4. Older people who have stopped involvement in physical activity for more than several weeks or who are starting a new physical activity, should start at a level that is easily manageable and gradually build up the amount type and frequency of activity.

5. Older people who have enjoyed a lifetime of vigorous physical activity should be able to maintain vigorous physical activity into late life, especially when adhering to recommended safety procedures and guidelines.

2.3.2 New United States guidelines for older adults

In August 2007 the American Heart Association and the American College of Sports Medicine released revised physical activity recommendations for health (Nelson et al. 2007). These new guidelines update and clarify the earlier recommendations on the type and amount of activity required for health, using new evidence that has evolved over the last 10 years. With this update they have issued separate recommendations for adults aged 65 years and over. The guidelines are more prescriptive and provide clearer guidance, recommending that older adults include aerobic/endurance and muscle strengthening activities to ensure healthy ageing, and to reduce the risk of chronic disease, functional limitations and disability. Under

these guidelines endurance activity should be performed for a minimum of 30 minutes on five days of the week; alternatively, vigorous physical activity can be performed for 20 minutes on three occasions during the week. There is also a clearer definition of the terms moderate and vigorous physical activity, defined on a likert type scale. Moderate physical activity is defined as 5 or 6 on a scale of 1 to 10, with 0 being equal to sitting, whereas vigorous activity is 7 to 8 on the scale. This recommended amount of endurance activity is in addition to light or moderate intensity physical activity lasting less than 10 minutes.

The guidelines all emphasise the importance of muscular strength activities. These should be performed on two or more days of the week, using the major muscle groups and with 8 to 10 repetitions. Flexibility exercises should be conducted on two or more days per week, as well as balance activities. There is also a recommendation for an activity plan that addresses each of the activity types and considers chronic disease and its management and prevention. For those who are physically inactive, plans should include a gradual approach to physical activity over time using bouts of physical activity greater than 10 minutes, as opposed to continuous bouts. Table 2.1 below summarises the recommendations.

Table 2.1 Summary of new physical activity recommendations

(Nelson et al. 2007, p. 1442)

1	To promote and maintain good health, older adults should maintain a physically active lifestyle.
2	They should perform moderate intensity endurance physical activity for a minimum of 30 minutes five times a week or vigorous activity for a minimum of 20 minutes on three days each week. Moderate intensity endurance activity involves a moderate level of effort relative to the individual's fitness level. On a 10 point scale where sitting is 0 and all effort is 10, moderate intensity would be 5 to 6, producing noticeable increases in heart rate and breathing. Vigorous physical activity is a 7 to 8 on the scale producing large increases in heart rate and breathing. (Because of the heterogeneity of this group in some older adults a moderate intensity walk would be slow while for others it would be brisk).
3	A combination of moderate and vigorous physical activity can be performed to meet the physical activity recommendation levels. These moderate and vigorous activities are in addition to daily life activities, such as self care, washing dishes, or moderate activities lasting less than 10 minutes, such as walking to shops, bus and car.
4	At least twice per week muscle strengthening exercises, using large muscle groups should be done to maintain strength and endurance. It is recommended that 8-10 exercises be performed on at least two non-consecutives days. The level of effort should be moderate to high.
5	Older persons who wish to further improve their fitness and reduce the risk of chronic disease will likely gain benefit from doing more than the recommended guidelines.
6	To maintain flexibility older adults should perform activities to increase flexibility on at least two non-consecutives days for at least 10 minutes.
7	To reduce the risk of falls older adults should perform exercises to maintain and improve balance.
8	Older adults with medical conditions for which physical activity is therapeutic should maintain a level of physical activity that is safe.
9	Those who have a specific medical condition should have a plan for obtaining sufficient physical activity. Those with a chronic disease for which physical activity is considered therapeutic should have a single plan that integrates prevention with treatment. For those that are not active, plans should recommend a step-by-step guide to increasing physical activity over time. Older adults should be encouraged to self-monitor and evaluate their plans as their ability improves.

The recent guidelines are clearer and more prescriptive. They suggest that previously some people failed to appreciate walking as 'exercise' or to recognise the substantial benefits of short bouts (at least 10 minutes) of moderate level activity (Department of Health and Aged Care 1999). This current advice of 10 minute bouts of physical activity, adding up to 30 minutes, aims to make physical activity adoption more attractive to even very sedentary people. However, the evidence for this approach is less strong and is motivated by a desire to get sedentary populations to do anything rather than nothing (Bassey 2006).

2.4 Modes of Physical Activity

The new American physical activity guidelines describe a number of exercise modes recommended for maintaining health. The following description of exercise modes is adapted from Cress et al. (2004). Table 2.2 below outlines the recommended exercise modes to address the physiological change related to ageing.

Exercise modes

Aerobic Endurance Activities: refers to continuous movement that involves large muscle groups for a minimum of 10 minutes. Examples are cycling, swimming, walking, as well as work around the home and in the garden. Endurance activities provide the greatest protection against the effects of chronic diseases that are associated with ageing.

Resistance Training: refers to increasing muscle strength by moving or lifting some type of resistance, such as a weight, at a level that requires physical effort. The amount of resistance and number of repetitions will vary between individuals. Strength development is safe for older adults and injuries are rarely reported.

Flexibility Activities: refers to exercise that facilitates a greater range of motion around the joint. Flexibility increases the length of the muscle beyond that which is used for normal activities. These activities can be included in the cool-down period of an endurance program. An example is stretching, which could include both static and dynamic techniques.

Balance Activities: refers to the ability to maintain control of the body over the base of support so as to avoid falling. Increases in muscular strength and endurance can lead to improvements in balance via a greater range of movement around the joint. These activities can also conveniently be incorporated as a cool-down component of an endurance program.

Table 2.2 Body composition changes with ageing and recommended exercise

Body compartment	Age-related change	Recommended physical activity modality
Adipose Tissue	Increased adipose mass	Aerobic or resistance training
Skeletal Muscle	Decreased skeletal muscle mass Loss of fast twitch fibres Decreased muscle quality	Resistance training Flexibility/balance training
Bone	Decreased bone mass density Increased bone fragility	Weight bearing exercise Progressive resistance training High impact high velocity loading

(Singh 2002, p. 265)

2.5 Measurement of physical activity

Accurate measurement of physical activity is important to establish epidemiological patterns of research and to assess changes in smaller population groups. The amount of physical activity conducted is traditionally measured across three domains: frequency (sessions per week), duration (minutes per week) and intensity (amount of energy expended), with research tending to focus on intensity, and the context in which it is undertaken (leisure, transport, work in and around the home) (Shepard 2003). There are several measurements for assessing physical activity levels, which include pedometers, physical activity diaries, oxygen consumption meters and heart rate recorders. However, these options are expensive, making the self-reported questionnaire assessment a more feasible and attractive option for measuring physical activity levels for many intervention studies (Shepard 2003).

Self-reported questionnaires have been criticised as they can be influenced by social desirability and the over reporting of physical activity levels by respondents (Klesges et al. 1990). Physical activity questionnaires often rely on recalling activities over a period of time and are subject to the limitations of human memory, with the reliability of the data generally decreasing with the length of the period surveyed (Shepard 2003). This may be of particular relevance to older adults whose short-term memory may be weaker than their long-term memory.

However, this criticism is counteracted by studies that show self-report questionnaires to be both reliable and valid. Shepard (2003) reviewed the reliability and validity of physical activity questionnaires and found these instruments to be appropriate for monitoring changes in levels of physical activity. Some studies have showed a reasonable correlation between pedometers and self-completed questionnaire, with coefficients of around 0.70 (Shepard 2003). Whereas studies reviewing seven and fourteen day recall of physical activity measures have found

questionnaires to have acceptable repeatability (Booth et al. 1996). It should be recognised that the underlying assumption for repeatability is that a measure remains constant over time, but this may not be the case with physical activity levels. The time spent engaged in physical activity is greatly influenced by illness and other commitments, especially in the older age groups.

The International Physical Activity Questionnaire (IPAQ), long and short form, has been found to have reasonable measurement properties, with repeatability at an acceptable level, with 75% of the correlation coefficients above 0.65. Concurrent validity has also been found to be reasonable and just as good as other self-reported measures (Craig et al. 2003). The IPAQ enables the measurement of various physical activity domains that include leisure time physical activity, incidental physical activity and work in and around the home.

When measuring the physical activity levels within domains, Egger et al. (1999) have argued that the dose response relationship is best developed between leisure time physical activity, as opposed to non-leisure time physical activity, such as occupational activity or work in and around the home. This is due to some reports of poor validity when measuring occupational work; whereas leisure time physical activity has shown adequate validity (Ainsworth et al. 2000). Corti and colleagues (1995) have also documented problems with determining the activity level required for work in and around the home. They conducted qualitative research with adults aged 31 to 72 years to determine their perceptions of physical activity. The authors found that activity in and around the home could be extremely passive. Participants reflected on activities, such as bending down and picking up tools when doing repairs or pottering around the garden propagating seeds, that would not be considered strenuous enough to provide health benefits.

The recently revised physical activity guidelines (Nelson et al. 2007) have highlighted the lesser importance of short bursts of work in and around the home in providing health benefits.

2.5.1 Within program measurement

Activities are often classed as light, moderate or vigorous, with the perception of the energy expenditure dependent on the age and fitness level of the participant, along with the duration of the activity. For example, a young adult may perceive a bout of exercise that demands an increase in oxygen uptake of 50% to be light activity, whereas an older person may perceive this to be vigorous (Shepard 2003).

Measures of moderate exercise intensity have traditionally been described in terms such as results in sweating or results in shortness of breath that limits conversation. It has been suggested by Shepard (2003) that perception of intensity can be unreliable because the perception of the experience depends on the stoicism of the individual, with some people being more prone to reporting symptoms. Examples of specific measurements used in interventions research programs are the Borg Scale and the six-minute walk test (6MWT). These are described as being simple and appropriate measurement tools for older adults, because they can provide information on the impact of the physical activity intervention and feedback to the participants on their progress.

The Borg Rating of Perceived Exertion (RPE) scale (Borg 1998) provides an inexpensive and convenient method for measuring physical activity intensity (see Table 2.6). It is a self-monitoring measurement that is based on sensations during physical activity, such as heart rate, respiratory rate and muscle fatigue. It is a subjective measure that provides a good estimate of how hard one is working (Borg 1998). The intention of this scale is that each unit of measurement corresponds to 10 beats per minute increase in heart rate. It is expected that a Borg rating of 12 to 14 would correspond in a middle-aged adult to a heart rate of 120 to 140 beats per

minute and would indicate moderate intensity physical activity. Through experience, individuals can monitor how their body feels and adjust the intensity. Table 2.3 below depicts the levels of intensity.

Table 2.3 The Borg Rating of Perceived Exertion (RPE)

(Borg 1998)

Perceived score	Description of behaviour
6	No exertion at all
7	Very, very light exertion
7.5	Extremely light
8	
9	Very light
10	
11	Fairly light
12	
13	Somewhat light
14	
15	Hard
16	
17	Very hard
18	
19	Extremely hard
20	Maximal exertion

Timed walking tests are often used in research to assess physical function. The 6MWT measures the distance walked within the 6-minute timeframe. The distance that can be walked by healthy subjects ranges from 400 to 700 meters, with mean improvements of 70 to 170 metres published for various interventions (Enright

2003). Most studies have found it to be a valuable measure of exercise capacity in older people as it is tolerated well by the older person, and it has been found to be a reliable and valid measure (Harada, Chiu & sterwart 1999). Variation in the distance walked has been found to be related to age, gender, height and weight. Bautman, Lamber and Mets (2004) assessed the usefulness of the 6MWT in determining the exercise capacity of elderly community dwelling persons. They found it to be a valuable instrument and proposed that it could be useful for physical trainers and could provide valuable feedback to older people on their physical activity progress.

2.6 Physical activity patterns

Western societies are increasingly engaging in an inactive lifestyle, especially in the older age groups (DiPietro 2001). The World Health Organisation (WHO) (Matsudo et al. 2004) estimates that the prevalence of insufficient physical activity (less than 2.5 hours per week of moderate activity) ranges from 31% to 51%, with some reports of up to 80%. In the United States the Healthy People 2010 project (US Dept Health and Human Services 2000) indicates that 51% of adults aged over 65 years are inactive. In the United Kingdom (UK) only 15% of adults aged between 65 and 74 years reported walking briskly for 15 minutes in the past four weeks, while in Canada around 50% of those aged more than 65 years were found to be sedentary (Sims et al. 2006). Table 2.4 below depicts the physical activity levels of these three developed countries. The different methods of collecting data and, in turn, presenting data on levels of activity makes between-country comparisons difficult.

Table 2.4 Physical activity patterns of three developed countries

Country	65 –74 years	75 year+	Prevalence of reported measure
United States	51%	65%	No leisure time physical activity
	25%	46%	Physical inactivity
United kingdom	15%	8%	15 minutes brisk walking in last 4 weeks
Canada	50%	63%	Sedentary

(Sims et al. 2006)

Likewise in Australia, as age increases physical activity declines with about 20% of adults over the age of 30 years being physically inactive (Armstrong, Bauman & Davies 2000), increasing to 46% in adults aged 60 to 75 (Bauman et al. 2002). The most recent Australian Bureau of Statistics (ABS) Health Survey (2004-2005) states that in the 65 to 74 year age group 31.9% are sedentary and 32.9% are low active (low active is defined as 100 mins to less than 1600 mins physical activity). These figures have not changed significantly over the last 10 years. Table 2.5 depicts the prevalence of sedentary behaviour in older Australians over the last 10 years.

Table 2.5 The prevalence of sedentary behaviour in older Australians (1995-2005)

	Men %		Women %	
	65-74 years	75+ years	65-74 years	75+ years
2004-2005	31.9	51.5	40.5	58.6
2001	30.9	44.0	38.8	55.9
1995	35.6	44.9	43.7	54.0

(Australian Bureau of Statistics 2006)

Along with the decrease in level of physical activity that accompanies ageing, as adults move through the life-course, their leisure lifestyle tends to centre on a decreasing number of familiar activities. They gradually disengage from many aspects of their social life and focus more on home-centred leisure, with choices of physical activity being quite narrow (Thurston & Green 2004). It has been found that general participation in outdoor sport tapers off after middle age, whereas participation in some activities, such as walking and bowls do not suffer the same disengagement (Australian Sports Commission 2003). The preferred activities for this age group include swimming, golf, aerobics and walking (see Table 2.6) (Australian Sports Commission 2003). It has been suggested that this narrowing of activities is because older people are seeking the most enjoyable age-appropriate activity and perhaps do not feel skilled and able to participate in other types of activities (O'Brien Cousins 2000).

Table 2.6 Top 10 physical activity and sports for Australians 65 years and over

	Activity type	**Participation rate 65 years + (%)**
1	Walking	48.2
2	Aerobic/fitness	16.0
3	Lawn bowls	9.3
4	Golf	8.4
5	Swimming	7.3
6	Tennis	4.0
7	Fishing	2.6
8	Cycling	2.5
9	Dancing	2.1
10	Carpet bowls	1.7

(Australian Sports Commission 2003)

2.7 Correlates of physical activity

The identification of factors associated with physical activity aims to explain and predict behaviour. The literature is replete with associations of personal, social and environmental factors with physical activity. In the literature the term determinant has been used to demonstrate reproducible associations (correlates) rather than the more appropriate use of the term for a 'cause and effect' relationship (Bauman, Sallis & Dzewaltowoski 2002). A 'cause and effect' relationship is more difficult to establish in behavioural research. Considering this, the term correlate will be used to describe factors that have been shown to have a repeated association with physical activity.

It has been suggested by Bauman, Sallis and Dzewaltowski (2002) that the vast number of correlates of physical activity strongly indicates the complex situation whereby individual, social and environmental factors interplay. Bandura's (1986, 1997) Social cognitive theory (SCT) gives a central role to the individuals' cognitive processes to help predict and understand behaviour and beliefs. SCT claims that human behaviour is guided by motivation (incentive to act), beliefs that behaviour will be beneficial (outcome expectation), one's ability to perform (self-efficacy), and reward (social and environmental impact). Individuals learn what actions contribute to positive outcomes, what are risky, which are beneficial, how competent they are, and how much the social and physical environment endorses and supports their physical activity behaviour.

A review by Bauman, Sallis and Dzewaltowski (2002) reported that documented correlates of overall physical activity include higher levels of education, being of male gender, exercise enjoyment, perceived health or fitness benefits, income/socio-economic status, self-efficacy, self-motivation, history of activity in childhood, along with social support from family and friends. However, many demographic correlates have been found to be unstable predictors of physical activity (Martin & Sinden 2001). Factors that show weaker evidence of association are control over exercise,

psychological health, involvement in past exercise programs, and actual access to facilities.

Orsini and colleagues' (2007) Swedish Mammary Study recruited 38,933 women aged 48 to 83 years and assessed correlates of higher levels of their physical activity. They found that there was decreased linear association with age, higher body mass index, higher education levels and residence in rural areas. Previous studies have often highlighted leisure time physical activity, finding that higher education was associated with higher physical activity levels (Orsini et al. 2007), with individuals from lower socio-economic status (SES) reporting more time walking for transportation (Ross 2000; Giles-Corti & Donovan 2002; Miles & Panton 2006). Ford et al. (1991) found that women from low SES levels are generally less active than women of higher SES.

Bopp et al. (2006) interviewed 572 subjects to determine correlates of physical activity. They found that the men meeting walking recommendations had a higher income, were employed, had a more positive health rating and greater physical activity enjoyment. Among the women, being younger, being employed, having fewer chronic illnesses, a higher health rating and a higher physical activity self-efficacy score were associated with achieving the recommended walking levels.

Self-efficacy

Self-efficacy is a major construct in SCT, being concerned with the individual's belief in their capability to perform a task. For older adults whose functional abilities are declining, physical activity may provide a mastery experience that leads to increased self-efficacy. Self-efficacy is related to well-being and psychological health (Netz et al. 2005). It is consistently shown to influence physical activity behaviour as well as social and health-related behaviours, and it is suggested that self-efficacy can act as both a correlate and outcome of physical activity behaviour (McAuley et al. 2000a). Self-efficacy is one the most frequently cited correlates of

physical activity and has been found to decrease as age increases (Resnick et al. 2000). An individual's self-efficacy expectation can be increased to promote positive changes in health behaviour (Nies & Partridge 2006). However, increasing self-efficacy alone may not increase physical activity.

A review of 91 studies by Eyler et al. (2002) found that self-efficacy, social support and perceived benefits of physical activity were correlates of being physically active. A study by Turner, Rejeski and Brawley (1997) examined the influence of leadership behaviour on exercise-induced self-efficacy and positive engagement. Those in the socially enriched instructional environment reported more self-efficacy and positive effects than those in the bland social environment, suggesting that the efficacy was enhanced as a function of the group. McAuley et al. (2000) believe that exercise environments play an important role in influencing efficacy cognition. It seems that efficacy does not predict exercise patterns all the time and not all kinds of physical activity environments have the same effect on self-efficacy.

A more recent study by McAuley et al. (2003) looked at self-efficacy over a program and found that exercise efficacy decreased over the course of the program. The author suggests that this is reflective of the change in level of challenge; that is, the participants were required to remain physically active on their own due to the program finishing. Exercise efficacy at program end has been demonstrated to be useful for predicting long-term exercise maintenance. It has been found that those who were more frequently active enjoyed greater social support within the exercise program, more positive experiences, and a greater sense of efficacy at program end. Those who reported greater social support also expressed greater efficacy. McAuley (2003) concluded that self-efficacy patterns are influenced by the behavioural and social factors of a physical activity experience.

2.7.1 Motivators and barriers (individual)

The literature contains a range of motivators for physical activity. For example, understanding the health benefits of being physically active should and can act as a

motivator for being physically active. However, there is mixed information in the literature about health literacy and older people, with some authors believing this older demographic has good awareness and understanding of the benefits of physical activity (O'Brien Cousins 2000; Cohen-Mansfield, Marx & Guralnik 2003), whereas others indicate there is an information and understanding deficit with general health information, as well as specific information (Schutzer & Graves 2004; O'Brien Cousins 2000). Allender, Cowburn and Foster (2006), in a review of qualitative studies on physical activity, found that older adults were unsure about the amount of physical activity required for health benefits and there was a lack of realistic role models in the community. Allender and colleagues (2003) also found that exercise prescription usually targeted young people and that it was not made relevant to older age groups. This indicates the importance of the social environment as a means of supporting positive physical activity behaviour, and the need for its consideration when developing physical activity interventions.

Anticipatory outcomes of certain behaviours (expectancies) can act as a strong motivator for behaviour, as shown by the participants in the Walking the Way to Health Initiative (2005). This walking program in the United Kingdom was comprised of 202 grant aided schemes operating throughout the country. The program attracted 300,000 older people, with 90% being aged between 56 to 85 years. They were predominantly female (73%), young olds (65 to 74 years) and retired. The Walking the Way to Health Initiative (2005) reported that the main motivation for joining the walking groups was health improvements. These older adults perceived that by being physically active they would prevent illness, have an ideal opportunity to be outdoors, along with the social element, such as meeting people, companionship and making new friends.

A qualitative study by Kamphuis et al. (2007) with subjects from low and high socio-economic backgrounds found that the motivators for physical activity were much the same. At an individual level the motivators for being active were improvements in health, enjoyment, relaxation and weight control. Social environmental factors were

also similar, with social support from relevant others and meeting new people during physical activity nominated as being important motivators.

Aiming to better understand participation in physical activity, Allender, Cowburn and Foster (2006) reviewed 1200 qualitative papers. In the final review 24 studies were accepted; of these, only four reported on subjects aged over 50 years. The stated reasons for older adults' participation were social support, health benefits and enjoyment. In one study the sense of enjoyment was exemplified by the discussion around ballroom dancing, describing it as helping them to challenge the traditional expectations that older people are infirmed. The different forms of dance enabled involvement in both vigorous and less vigorous forms of activity to suit the skills and capability of the participants. Equally important were the social interactions. Once again the dynamic interaction of the individual, the social environment and expectancies were demonstrated.

Physical activity levels are strongly influenced by degree of enjoyment (Salmon et al. 2003), and it has been suggested this is particularly the case with older people (Thurston & Green 2004). Regular participation can lead to habitualised physical activity that is reinforced by social networks in which physical activity is customary. For physical activity to be appealing, it must be 'presented appropriately'. Getting people active is a challenge and adults must be able to sample a large number of activities. These activities should have the potential to bind individuals into group settings that generate social commitment; and programs should be of sufficient length to establish routine (Thurston & Green 2004).

Regardless of their beliefs about the benefits of physical activity, older people have many perceived and real barriers, over 80% of them acknowledge at least one barrier to physical activity (Schutzer & Graves 2004). On a personal level, older adults consistently cite lack of time as a barrier to physical activity (Schutzer & Graves 2004). This lack of time is associated with time reaching the exercise site and time to

participate, as older people may need to rely on public transport. Other documented barriers are the characteristics of being older, such as physiological changes, cognitive impairment and poor health (Jacomb et al. 2002; Van Beijsterveldt et al. 2002; Chatfield, Brayne & Matthews 2005), fear of injury and illness (King, Rejeski & Buchner 1998), as well as symptoms associated with physical activity, such as perspiring, heavy breathing and muscle soreness (Schutzer 2004), perceived financial cost (Salmon et al. 2003), and lack of previous physical activity experience (O'Brien Cousins 2000).

Sport socialisation research suggests that later life participation in physical activity is influenced by early life experiences, such as childhood encouragement and organized sport participation (O'Brien Cousins 1997). It is suggested that activities learned in youth increase the likelihood that these activities will be maintained in older age groups (O'Brien Cousins 2000). This indicates the consideration that should be given to an individual's experiences and capabilities and the importance of teaching people new skills, irrespective of age.

2.7.2 Social environment

The social environment, such as friends and family, has been consistently found to influence participation in physical activity (Sallis, Bauman & Pratt 1998; Ainsworth et al. 2000; Stahl et al. 2001). Booth et al. (1997) found that older adults' preferred sources of support for physical activity were through doctors and health professionals. This was especially so in the sixty plus age group (more than 50%), possibly indicating their growing health concern, followed by an opportunity to exercise in a group (19%). Other researchers have found that motivators for physical activity were also doctors' advice and peer support, class instruction and type of exercise (Cohen-Mansfield, Marx & Guralnik 2003; Corti et al. 1995). It has been suggested that brief counselling by general practitioners can lead to a 10% to 20% increase in their patients' physical activity for up to 6 months (Briffa et al. 2006).

Exercise often takes place in a social context, and as acknowledged by Social cognitive theory (SCT), the social environment has an important influence on physical activity participation. Social support is related to exercise adherence, intentions to be physically active, and perceived behavioural control in physical activity settings (Carron, Hausenblas & Mack 1996; Chogahara, OB'rien Cousin & Wankel 1998). There is some evidence that this support is particularly important to the exercise involvement of older people (Wankel et al. 1994; O'Brien Cousins 1995). However, older people generally receive less encouragement from others for their exercise habits (Hayslip et al. 1996). This is of particular concern, because support may be of greater importance to older adults (Chogahara, Ob'rien Cousins & Wankel 1998). In fact, social support and inculcated values have been shown to be significant predictors of late life exercise (O'Brien Cousins 2003).

2.7.3 Physical environment

The neighbourhood has been operationalised as the area within a radius of 0.9 kilometre or less from one's residence (Duncan, Spence & Mummery 2005). As supported by SCT, neighbourhood environments that have the best access for physical activity, such as walking paths and parks, are the ones that are likely to be associated with physical activity (Ball et al. 2001; Booth et al. 2000). Furthermore, more aesthetic environments (Ball et al. 2001) and safe environments, have a positive association. Booth et al. (2000) found that footpaths perceived as safe for walking were associated with increased walking. From a more practical point, Brawley, Rejeski and King (2003) found a place to sit down during walking was important.

Factors that inhibit physical activity may include lack of access (Godin et al. 1994), inconvenient locations, transportation problems, bad weather (Cohen-Mansfield, Marx & Guralnik 2003) and poor perception of safety. The 1996 Behaviour Risk Factor Surveillance System in the United States found that people over 65 years were less likely to walk if they perceived their local area to be unsafe (Centres for Disease

Control and Prevention 1999). In a cross-sectional study by Salmon et al. (2003) it was reported that, apart from the weather, 70% to 80% reported few environmental barriers for being physically active.

In Australia Bauman et al. (1999) reported that, after adjusting for demographic factors, respondents living in coastal suburbs were 23% less likely to be sedentary and more likely to reach sufficient levels of physical activity. They were also 38% more likely to report more vigorous levels of physical activity. This suggests that features of the coastal area impact on residents' level of physical activity, and offer more evidence of the relevance of the physical environment to overall physical activity levels.

International research has also found that place of residence impacts on life expectancy. A study conducted in Tokyo analysed the five year survival of 3,144 adults born between 1903 and 1918. The baseline was in 1992; with the follow-up in 1997. At follow-up they found that survival of older adults had increased in relation to the walkable green streets and spaces near their residence, along with a positive attitude to their community (Takano, Nakamura & Watanabe 2002).

2.8 Physical health benefits of activity

The benefits of physical activity have long been expounded. In the late 1940s Morris and colleagues demonstrated the benefits of being physical active using quantitative analysis. They showed that the active role of a London bus conductor provided a protective effect against Coronary Heart Disease (CHD), when compared to the inactive London bus driver (Morris & Crawford 1958). More recently, the Harvard Alumni Study (Paffenbarger, Wing & Hyde 1995) reported that the risk of heart attack in 16,936 males aged 35 to 74 years was inversely related to the amount of reported energy expended.

The first Surgeon General's Report on Physical Activity and Health released in July 1996 (A Report of the Surgeon General Executive Summary 1996) concluded that: a) people of all ages benefit from being physically active; b) significant health benefits can be achieved; c) additional health benefits can be gained by greater levels of physical activity (regular vigorous activity); d) and regular physical activity reduced the risk of developing and dying from heart disease, diabetes, colon cancer and hypertension

A recent consensus paper reviewing the dose response relationship between physical activity and health concluded that the relationship is curvilinear, with most of the health improvements happening when an individual goes from sedentary behaviour (< 100 minutes per week of leisure time physical activity), or moves from light activity (1-2.9 METS) to moderate activity (> 3 METS). It is suggested that even more health benefits can be achieved from additional levels of physical activity (CATI Technical Reference Group: National Public Health Partnership 2003). Figure 2.2 depicts the relationship between physical activity level (minutes per week) over the amount of energy expended (Kcal per week), with the recommended threshold for health benefits based on the Australian Physical Activity Guidelines for Health. Although this physical activity threshold for health-enhancing behaviour is now established, the precise dose-response relationship between physical activity and health, for specific diseases, is less well understood (CATI Technical Reference Group: National Public Health Partnership 2003).

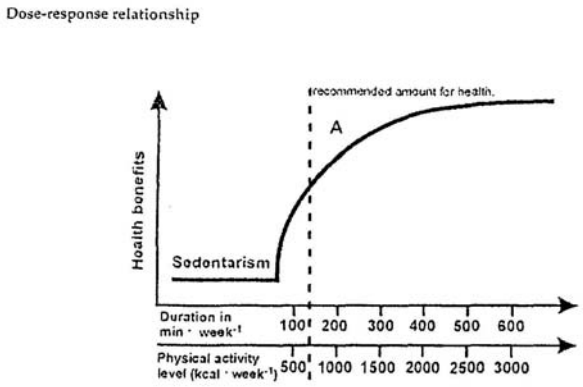

Figure 2.2 Dose response relationship: relationship between physical activity levels (minutes) and health benefits

(CATI Technical Reference Group: National Public Health Partnership, 2003)

2.8.1 All cause mortality

There is an inverse relationship between all cause mortality and physical activity. Crespos et al. (2003) analysed a sample of 9,136 Puerto Rican males who were free from coronary disease. The crude death rate was highest in those males aged between 65 to 79 years who were hypertensive, underweight and had no formal education. They found that physical inactivity was independently related to all cause mortality, with the greatest all cause mortality seen in inactive men, after controlling for age. These results demonstrated that greater levels of physical activity were associated with lower deaths.

Anderson et al. (2000) evaluated the physical activity level of 31,896 randomly selected males and females aged 20 to 90 years of age. The activity level during

leisure, at work and incidental physical activity and participation in sport were measured. The data suggested that a body mass index of 25 to 30 was not a significant risk factor for mortality. The researchers classified leisure time physical activity as high, moderate and low. They found there was a significant graded risk reduction in all age groups (1, 0.65, and 0.59 for females and 1, 0.72 and 0.71 for males). The relative risk (RR) for those who cycled to work for longer than three hours per week showed a 30% lower risk of all cause mortality, RR 0.70 (0.55-0.89).

Gregg et al. 2003 investigated all cause mortality in older women, with a cohort of 7,533 women aged 65 years and over, recruited from four United States research centres. The physical activity results were divided into five equal groups and demonstrated a dose response with all cause mortality. The relative risk of death for the quintiles was 1.0, 0.73, 0.77, 0.62, 0.66, with those who became sedentary over the course of the program having the same relative risk as those who were originally sedentary.

2.8.2 Cardiovascular disease

Cardiovascular disease (CVD) is the main contributor to the burden of disease, with Australian figures showing that rates increase markedly with age (Australian Institute of Health and Welfare 2004b).

The debate about the benefits of physical activity and heart disease commenced in the 1950s, with Morris's landmark study of London bus drivers and conductors (Parfenbarger, Blair, Min Lee 2001). More recently, a critical review by Blair, Cheng and Holder (2001) found that there was consistency across studies showing that there was an inverse dose response across both activity and fitness for stroke and CVD.

The strongest evidence for the benefits of physical activity is found in studies of reduction in the risk of mortality and morbidity associated with CVD (Bauman et al.

2002); for example, a study showed that moderate physical activity reduced the risk of CVD by about 50% (Singh 2002). More recent evidence supports the role of moderate physical activity in the form of walking, with a study by Lee, Arthur and Avis (2007) demonstrating that at least one hour of walking per week was associated with decreased risk of coronary heart disease. This study was conducted with 202 subjects aged 60 years and over, with participants randomised into a 6-month walking program while the control group received the usual primary health care.

A study by Hu and colleagues (2007) investigated five independent cross-sectional populations in four geographic areas in Finland over a 10 year period, with a population age ranging from 25 to 64 years (n=19,707 men; 21,346 women). They found that moderate or high levels of work or leisure time physical activity, along with active transport, were significantly associated with a reduced 10 year risk of CVD among women. These favourable outcomes were observed regardless of CVD risk level at baseline.

2.8.3 Type 2 diabetes

The prevalence of type 2 diabetes rises with age, with the rate being highest among men over 65 years and women over 75 years (Australian Institute of Health and Welfare 2002). The benefits of physical activity in the management and prevention of diabetes have been demonstrated in a range of studies. Tuomilehato, Lindstrom and Ericksson (2001) investigated impaired glucose tolerance with a sample of 523 adults. Individuals were randomised into 'usual care' or 'exercise and dietary advice'. Over the 3 year follow-up the intervention group had a 58% reduction in incidence of type 2 diabetes. Among those who exercised but did not achieve weight loss there was an 80% reduction in incidence, suggesting the effectiveness of exercise alone in the prevention of the development of diabetes.

The Framingham Heart Study, a cohort of United States adults aged 28 to 62 years from Massachusetts, were initially recruited between 1948 and 1951 and followed

for over 50 years. Higher rates of physical activity were found to be associated with lower rates of diabetes. Moderately and highly active people lived longer and spent more years without diabetes than low active individuals. The effect of physical activity on life expectancy without diabetes reflects both the lower incidence of diabetes and the lower mortality of non-diabetic individuals associated with increased physical activity levels. The study suggested that getting sedentary people to be at least moderately active could extend their lives and increase lifetime spent without diabetes (Jonker et al. 2006).

The Diabetes Prevention Trial (DPP) (2002) represents the largest prevention trial undertaken. Conducted in the United States, it recruited 3,234 subjects with impaired glucose tolerance. The research was comprised of three intervention arms: first, an intensive lifestyle intervention; second, a pharmacological intervention in which subjects received metformin; and third, a usual care arm (control group). The intensive lifestyle intervention showed a 58% reduction in the incidence of diabetes compared to the controls, whereas the metformin intervention showed a 31% reduction. These results indicate that diabetes can be prevented in those at high risk.

2.8.4 Cancer

Cancer is predominantly a disease of the elderly, with 60% of cancers occurring between 65 and 79 years (Penedo et al. 2004). Systematic reviews support an inverse dose relationship between physical activity and colon cancer, with physically active people experiencing about half the risk compared to those who are less active (Colditz, Cannuscio & Frazier 1997). Vigorous physical activity has also been significantly associated with a dose response reduction in risk of prostate cancer and stomach cancer. On reviewing 12 recent studies, Penedo et al. (2004) found that many physical activity interventions are started after cancer treatment, with a range of positive results being reported. These included improved functional capacity, increased muscle strength, and reduced fatigue.

2.8.5 Daily activities/function

Functional decline results in a decreased ability to perform activities of daily living, with function being essential for independent living. Studies with follow-up periods of up to 14 years have shown that sedentary older adults have greater risk of functional decline than those who are physically active (Christensen et al. 2006; Lim & Taylor 2005). Moreover, there appears to be an association between physical inactivity at age 70 and disability at age 75 (Christensen et al. 2006), confirming the importance of physical activity as a method of postponing disability and improving survival.

A prospective study by Van Den Brink et al. (2005) found that, after adjusting for lifestyle factors, high levels of physical activity reduced risk of disability 10 years later by about 50%. Miller, Rejeski and Reboussin's (2000) study of 5,151 participants in the Longitudinal Study of Ageing showed that physical activity results in a slower progression of functional limitations and, in turn, a slower progression in decline of activities of daily living. A prospective study by Hirvensalo, Rantanen and Heikinen (2000) in Finland found that physical activity lowered disability and mortality among 1,109 community dwelling older adults.

Several studies have demonstrated that participation in vigorous and/or high intensity physical activity exercise programs, as well as low to moderate activity program's, are associated with reduced functional decline. Landi et al. (2007) recently conducted a study with adults aged 65 years and older living at home (n=2005). The population was randomly drawn from 11 European Home Health Agencies over the period 2001 to 2003. The researchers found that moderate to vigorous leisure time physical activity decreased the risk of poor physical function and increased the possibility of postponing the onset of disability.

Leino-Arjas et al. (2006) conducted a study over 28 years in Finland with workers at an engineering company. The study population (pre n=2,653; final analysis n=546) was comprised of two-thirds males, white and blue-collar workers. The researchers found that vigorous leisure time physical activity was associated with reduced poor physical functioning in both blue and white-collar workers. Thus the blue-collar workers' leisure time physical activity, of any intensity, showed an inverse relationship to poor functioning. The results led the researchers to recommend that physical activity be encouraged.

2.8.6 Musculoskeletal

Joint pain and musculoskeletal conditions are a significant problem for older people, with almost 50% of those aged 65 complaining of differing forms of arthritis (Australian Bureau of Statistics 2006), and two out of three persons over the age of 50 reporting recent muscular-skeletal pain (Keenan 2006). Figures from the ABS 2004 to 2005 Health Survey (2005)(Australian Bureau of Statistics 2005) showed that 66% of older adults described themselves as having musculoskeletal conditions and 28% as having osteoarthritis. Physical activity has been shown to produce improvements in function and strength and reduce pain in those with musculoskeletal conditions (Roddy 2005).

2.8.7 Injury

Fear of falling is an important psychological barrier to physical activity and has been reported to occur in 12% to 65% of older adults who live independently, and is shown to be consistently higher in women (Legters 2002). In the long-term the avoidance of physical activity reduces mobility and quality of life by increasing the negative effects of social isolation and physical inactivity (Delbaere et al. 2004). A third of all community dwelling older adults will experience a fall over a 12 month period and a low level of physical activity has been identified as a risk factor for falls (Hill et al. 2004). Death from falls increases with age (see Figure 2.3).

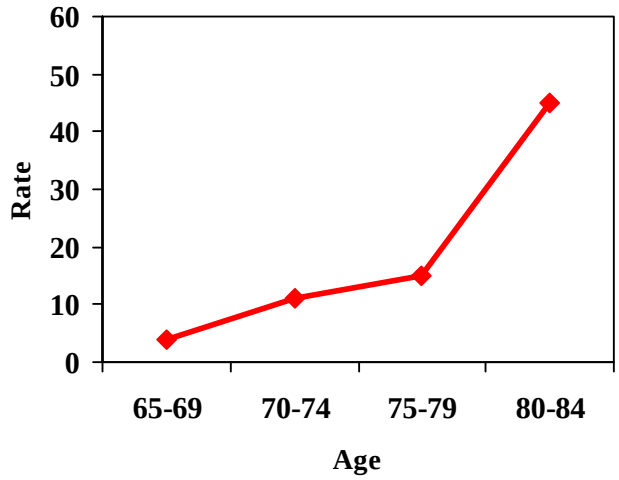

Figure 2.3 Death from accidental falls in Australia 2004 (rate per 100,000) (Australian Bureau of Statistics 2005)

It has been shown that an appropriate exercise program can improve balance and mobility and hence reduce falls (Bruce, Devine & Prince 2002). Incorporating prevention of falls injuries into a physical activity program for seniors is a potentially economically beneficial and an effective approach (Campbell et al. 1999). For example Melzer, Benjuya and Kaplanski (2003) found that older adults who have been walking on a regular basis could reduce degeneration of postural stability and reduce unexplained falls.

2.8.8 Obesity

Older Australians are now heavier than they were a generation ago, with the average weight gain in men and women being 6 to 7 kilograms over the last 20 years. There has been a substantial increase in the number of older Australians who are obese, from 11% in 1980 to 23% in 2000 (Australian Institute of Health and Welfare 2004). Currently, 30% of older men and 44% of older women are at increased risk of disease due to their abdominal fatness (Australian Institute of Health and Welfare 2004).

The important information is that physical activity has many health benefits for the overweight and obese. In the landmark Aerobics Centre Longitudinal study by Blair et al. (1996), with a population of over 25,000 men and 7,080 women, it was found that fitness resulting from physical activity has many benefits regardless of body mass index. They found no increased mortality risk with obesity as long as subjects had a moderate or high fitness level, suggesting that once a fitness level is reached, then obesity has much less impact on mortality. The recommendation from this study was that all physicians should advise their patients of the benefits of physical activity and accompanying fitness.

2.9 Psychological health benefits of activity

Healthy mental ageing may be defined as the absence of mental health problems, especially cognitive decline and depression, along with a positive perception of quality of life (Flicker, Lautenschlager & Almeida 2006). Compared to the evidence associated with physical health, there is limited evidence in the area of the effects of physical activity on mental health. However, physical activity has been shown to enhance perception of physical capabilities, and therefore enhance psychological and emotional well-being (Bozoian, Rejesk & McAuley 1994; Mihalko & McAuley 1996; Bezner, Adams & Whistler 1999), as well as increasing satisfaction with life (Rejeski & Mihalko 2001) and improving self-rated sleep quality (King et al. 1997). It has even been suggested as a treatment of individuals suffering depression (Singh 2000) and has been shown to improve quality of life by lowering levels of psychological distress and negative moods (Dishman 1988; Spangler & Konen 1993; Kritz-Silverstein, Barrett-Connor & Corbeau 2001). However, many of the studies on mental health measure a number of variables simultaneously and these variables often interconnect and influence each other.

The review by Netz et al. (2005) examined the effect of physical activity interventions on the psychological health of older adults. They considered emotional well-being (depression, confusion, anxiety), self perceptions (self-efficacy; self-

esteem, perceived physical fitness), bodily well being (pain and perceptions of bodily symptoms), and global perceptions (life satisfaction, well being). Self-perception, especially self-efficacy and global well-being, revealed the larger treatment control differences. Physical activity had the strongest effect on self-efficacy, and improvements in functional capacity were linked to well-being improvement overall.

A large population survey was conducted with 8881 community-dwelling older adults residing in Australia aged 65 years and over. Of the total sample, 49% reported adequate physical activity levels in the previous week. These adequate physical activity levels were associated with lower psychological distress (Lim et al. 2005).

2.9.1 Depression

Estimates on the prevalence of depression in community-dwelling individuals lie between 10% and 35% (Sims et al. 2006). Research indicates that those individuals who participate in more physical activity are less likely to be depressed, although the exact mechanism underlying the link between physical activity and depression is not known. It has been suggested that it is the result of increased serotonin and endorphins and an increase in control and self-efficacy (Harris, Cronkite & Moss 2006).

Harris, Cronkite and Moss (2006) looked at the therapeutic effects of physical activity with depressed patients, along with the effect of physical activity on coping with negative life events or health status, to determine if it was a feasible strategy for the treatment of mild to moderate depression. Over a 10-year period, higher levels of physical activity were associated with less depression at four time points. They also found that increased physical activity counteracted the effect of medical conditions and negative life events on global depression. High levels of physical activity have been found to have a protective effect for both prevalent and incident depression in large-scale longitudinal studies (n= 1947) with community-dwelling older adults

(Strawbridge et al. 2002). A prospective cross-sectional study by Kritz-Silverstein, Barrett-Connor and Corbeau (2001) with community-based older men aged 50-89 years in California found that exercisers had less depressed mood, but exercise was not found to protect against the onset of future depressed mood. Conversely, a critical review of 36 studies with older adults experiencing clinical disorders by Netz et al. (2005) did not find any treatment effect for depression. It was suggested that this may be the result of non-clinical disorders in the study population and the fact that most instruments assessing depression are designed for clinical populations.

2.9.2 Loneliness and well-being

Loneliness is a subjectively perceived experience that may develop when the quality of one's relationship does not meet expectation. Both social isolation and loneliness are considered health risk factors, with loneliness being linked to excess morbidity and mortality, as well as heart disease and depression (Lauder et al. 2006). A cross-sectional study by Lauder et al. (2006) was conducted with 1289 subjects, of whom 65% were classified as lonely by the UCLA loneliness scale. Lonely and non-lonely individuals equally agreed that walking 30 minutes per day would improve their health, but lonely subjects were less confident about their ability to walk for recreation or transport. Lonely individuals had a significantly higher body mass index than non-lonely individuals. Loneliness was more common in males and those that were not employed.

Both aerobic and non-aerobic activity has been found to have a positive affect on subjective well-being (SWB). A randomised control trial by McAuley et al. (2000) with 174 older adults looked at the affect of two modes of physical activity (walking and stretching/toning) on SWB. The researchers found that both aerobic and non-aerobic modes of exercise had positive effects on SWB. Satisfaction with life increased while loneliness decreased significantly over the 6-month program. It has also been suggested that exercise may be of moderate benefit in improving feelings

of well-being by improving quality of sleep, especially in older people whose sleeping may be compromised (Taylor et al. 2004).

2.9.3 Social support

Social support, much like physical activity, has been shown to have a beneficial affect on physical health outcomes, including improvement in endocrine, immune and cardiovascular function, and has been shown to be associated with subjective well-being in the elderly (McAuley et al. 2000b). Conversely, lack of social support and feeling of being isolated has found to be associated with ill health such as coronary heart disease (Bunker et al. 2003). A number of studies have indicated that individuals with low levels of social support have increased risk of premature death and physical and psychological morbidity (Goodger, Byles & Higganbotham 1999).

A summary of the physiological changes of ageing that are modifiable by physical activity are presented in Table 2.7 below.

Table 2.7 Modifiable physiological changes of ageing by physical activity

Cardiovascular health	Improves myocardial performance
	Increases peak diastolic filling
	Increases heart muscle contractility
	Reduces premature ventricular-contractions
	Improves blood lipid profile
	Increases aerobic capacity
	Reduces systolic blood pressure
	Improves diastolic blood pressure
	Improves endurance
	Improves muscle capillary blood flow
Body composition	Decreases abdominal adipose tissue
	Increases muscle mass
Metabolism	Increases total energy expenditure
	Improves protein synthesis rate and amino acid uptake into the skeletal muscle
	Reduces low-density lipoproteins
	Reduces triglycerides
	Reduces cholesterol
	Increases high-density lipoproteins
	Increase glucose tolerance
Bone health	Slows decline in bone mineral density
	Increases total body calcium, nitrogen
Psychological well-being	Improves perceived well-being and happiness
	Decreases levels of stress-related hormones
	Improves attention span
	Improves cognitive processing speed
	Increases slow wave and rapid eye movement sleep
Muscle weakness and function	Reduces risk of musculoskeletal disability
	Improves strength and flexibility
	Reduces risk of falls
	Improves dynamic balance
	Improves functional performance

(Singh 2002)

2.10 Cost of physical inactivity

Currently, the WHO (2006a) estimates physical inactivity results in two million deaths annually worldwide. This inactivity is also associated with significant financial cost. In the United States the direct medical cost of an inactive lifestyle was around $76 billion in 2000 (Pratt et al. 2004), while in Canada it was estimated to be $2.1 billion (Duncan, Spence & Mummery 2005). In Australia physical inactivity is the fourth leading contributor to overall burden of disease and the leading contributor to burden of disease in women (Australian Bureau of Statistics 2005). The financial cost in Australia attributable to inactivity is estimated to be around A$377 million annually. The estimated cost for each individual disease is: coronary heart disease costs A$161 million; stroke A$101 million; mental health disorder A$56 million; and non-insulin dependent diabetes A$28 million. Physical inactivity is believed to be associated with about 8,000 preventable deaths each year. It is estimated that a gross saving of A$3.6 million per annum in health care costs could be achieved for every 1% gain in the proportion of the population who are sufficiently active (Stephenson et al. 2000).

2.11 Intervention programs

It has been suggested that the design of an intervention is one of the most influential factors affecting participation in physical activity programs (Mills et al. 2001). Acknowledging this, the literature contains a mix of physical activity intervention programs that aim to determine the key components that will result in older adults becoming and remaining more active. The results of these studies are varied and inconclusive.

A review of eight general physical activity intervention programs by Cyarto, Moorhead and Brown (2004) found that program designs ranged from broad-based community promotion to one-on-one counselling with a health practitioner. These interventions were based in the United States, Australia and Europe, with varying

sample sizes (20 to 700). The majority used self-reporting measures, were conducted in a supervised setting, and incorporated specialised equipment. The researchers found that interventions that were more tailored and aimed to reduce barriers to physical activity were more likely to be successful. However, most of the positive results occurred with 'volunteer' participants, who were recruited through advertising. Baranoswski, Anderson and Carmack (1998) also found greater success with 'volunteers' after reviewing 25 physical activity interventions. It has also been reported that in many physical activity studies participants often consist of convenience samples (Rowland et al. 2004). Randomised sampling methods aim to reduce this and reach a broader sample of community-living older adults.

The tailoring of programs to suit the individual appears to be important, and this is perhaps why exercise on prescription (EOP) has emerged as a type of intervention for encouraging people to become more active. The general idea of EOP is that there are structured, supported exercise programs, to which general practitioners can refer their clients. Higher attendance at these schemes is believed to be associated with their flexibility, with the tailoring of the program to suit individuals' capabilities, and with accommodating the groups' preferences for type of exercise and time of sessions (Thurston & Green 2004).

The literature also emphasises the need for the content of the intervention program to be relevant. A study by Van Gool et al. (2006) looked at adherence to diet and exercise interventions in older people during an 18 month program (n=206). Over the program the attendance at the exercise sessions (n=133) decreased from 69% in the first 4 months to 50% in the last 14 months. The authors reported that higher attendance at sessions early in the intervention was a significant determinant of high attendance later in the program, suggesting that stimulating intervention sessions early in the program can assist in long-term attendance.

The style of leadership can be critical. A study by Turner, Rejeski and Brawley (1997) showed that socially enriched leadership styles for group physical activity, as opposed to bland leadership, enhanced positive feelings. By providing encouragement and positive feedback for healthy behaviours, the likelihood of a recurrence of that positive behaviour is increased (Glanz, Rimmer & Lewis 2002). There is a wealth of literature to suggest that close relationships are integral to quality of life and sense of well-being (McAuley et al. 2005). Therefore, exercise leaders who aim to enhance social support should enhance participants' sense of well-being and enjoyment.

Social support is consistently found to be an important component of an intervention program that retains individuals and has positive health outcomes. McAuley et al. (2000b) documented the importance of the social environment, advocating that exercise groups should have their own structure with friendships and alliances. The author concluded that physical activity interventions need to enhance social support within the group by way of social activities, such as meetings, incentives and group identifications (e.g. T shirts and hats).

Group-based programs provide this opportunity for social support. Van der Bij, Laurant and Wensing (2002) reviewed 38 randomised controlled trials and 57 physical activity interventions aimed at older adults. The authors found evidence that there was higher adherence for group-based programs. They also reported that long-term group-based program participation rates decline less over time, when compared to home-based programs. Group-based interventions appear to be more effective in the long term in achieving higher participation rates. Engaging in physical activity with others can also help to establish positive social norms for physical activity within social networks, while observing physical activity can help others to learn about it (McNeill, Kreuter & Subramanian 2006).

The intervention design also needs to consider self-efficacy for physical activity, or one's confidence to be active, a signficant SCT construct. Exercise programs that aim to increase self-efficacy through cognitive behavioural approaches have been successful in increasing levels of physical activity. Intervention programs that focus on increasing confidence in the elderly so as to overcome their barriers to exercise are beneficial (Taylor et al. 2004).

Hillsdon, Foster & Thorogood (2006) reviewed 150 studies of various intervention designs aimed at promoting physical activity in adults. Seventeen studies met the selection criteria that included: One-to-one or group advice; self-directed or prescribed physical activity; supervised or unsupervised physical activity; home-based or facility-based physical activity; ongoing face-to-face support; telephone support; written education/motivation support material; and self-monitoring. The interventions were delivered by health professionals, practitioners, exercise leaders and peers. The authors found that the interventions had a moderate effect on increasing self-reported physical activity levels. There was some indication that on-going professional guidance, along with self-direction, led to more effective outcomes. The majority of interventions did not go beyond 12 months, so long-term effectiveness was difficult to establish. The review was unable to determine if any type of physical activity was more likely to be adopted than others (walking, jogging, running). However, a number of weaknesses were acknowledged, such as the insensitivity of self-reported physical activity measures and whether the recruitment of volunteers via newspaper advertisements resulted in more motivated individuals participating. This led the authors to suggest that interventions with non-volunteer subjects may be less effective. Participants often had to agree to screening prior to randomisation and, as a consequence, those who finally entered the study may have been highly motivated.

Although the literature is inconclusive, the American College of Sport Medicine overview of best practice has resulted in a number of key recommendations for initiating and maintaining physical activity in older adults (Cress et al. 2005). The

College recommends that a physical activity program for older adults needs to incorporate a range of behaviour strategies relevant to SCT. There needs to be social support from health professionals, family and peers, and there needs to be reinforcement of older adults' confidence (self-efficacy) in their ability to perform physical activity, which may be achieved through a graduated program, as well as providing opportunity to practice and gain skills. There also needs to be a building of perceptions of safety by helping individuals to monitor the intensity of their exercise levels, as well as providing regular feedback and positive reinforcement to the older adults regarding their attendance and adherence to physical activity.

2.11.1 Walking interventions

Walking is the most reported leisure activity among adults across all socio-economic strata in the United States, Canada, Europe and Australia, as older adults prefer lower intensity activities (DiPietro 2001). It has been found to be acceptable and accessible to sub-groups with a low prevalence of physical activity. Walking is an ideal start-up for the inactive elderly person, as it requires no special skill, instruction or equipment; it is low impact with minimal adverse effects (Morris & Hardman 1997) and it is inexpensive (Siegel, Brackbill & Heath 1995).

The Australian 2003 Annual Sport Survey (Australian Sports Commission) indicates that walking is the most popular physical activity (48.2%). This finding coincided with the Western Australian 2002 Adult Physical Activity Survey (McCormack 2003), which found that walking for recreation was the most popular activity performed among adults aged 60 to 74 years (64.5% males and 66.7% females). This was followed by walking for transport (20.2% males and 24% of females), whereas only 12% of males and 3.8% of females participated in a team sport.

Walking is the safest, most complete form of exercise that can be done almost anywhere, at any time and it can be done alone or with a friend. Walking has been described as the near perfect exercise, with a moderate pace of 5 kilometres an hour

expending enough energy to meet the required moderate level of intensity (Ogilvie et al. 2007). Goodrich et al. (2007) conducted a multi-site randomised control trial in the United States over five years with chronically ill individuals. On average participants reported five health conditions that included hypertension, osteoporosis, Parkinson's disease, emphysema, and diabetes. The home-based walking intervention was evaluated via a walking log and pedometers. Only one serious study-related accident and emergency was reported, which was due to atrial fibrillation. The study demonstrated that older adults can safely start and maintain an unsupervised walking program.

Walking programs have become increasingly popular due to their safety and appropriateness for older adults. Kahn et al. (2002) found that programs that offered social support in community settings, such as setting up a 'buddy system' or walking groups, increased physical activity duration by 44% and frequency by 20%. Other researchers have found that successful walking interventions increase walking in general by 30 to 60 minutes a week on average, whereas walking for transport was rather less, with increases of up to 15 to 30 minutes on average per week. Studies that have reported a significant increase in walking also recorded effects on self-reported health, well-being or quality of life (Ogilvie et al. 2007).

The purpose of a study by Nies and Partridge (2006) was to increase walking in sedentary African and European American women (n=253) aged between 30 and 60 years. The program was a 12-month intervention with three arms: 1) a control group that received video education; 2) an intervention group that received telephone calls with no counselling; and 3) another intervention group that received telephone calls with counselling. The program aimed to promote the benefits of physical activity, offer assistance with goal setting, provide social support and increase exercise self-efficacy. All three arms of the program showed an increase in walking time and speed and showed an improvement in mood. This implies that minimally invasive, low-cost interventions can improve physical activity. Nies and Partridge (2006) found that study adherence was higher in participants who received a weekly phone

call as opposed to one phone call every three weeks. However, the study did contain higher educated women and they did not achieve the recommended levels of physical activity for health.

Brownson et al. (2005) aimed to increase walking in rural communities in mid-west United States communities using a quasi-experimental design. The sample was drawn from six rural intervention communities in Missouri and six comparison communities in Arkansas and Tennessee. The sample was comprised of mainly females (80%) aged 18 years and older. The lower level of walking in these communities is believed to be associated with fewer footpaths, less access to facilities and less social support. Using an ecological approach they addressed the issue at the individual, interpersonal and community levels. The intervention was comprised of a tailored newsletter containing motivational and feedback information, and feedback letters that also provided information on a) walking trails; b) a calendar of up-coming events; and c) a health message. At each trail head electronic counting devices were installed that allowed the monitoring of trail use. The program also stressed counselling from health professionals. The follow-up survey (n = 1531) found that the percentage of respondents who met the recommended levels of physical activity for health was the same in the comparison and intervention group. However, after adjusting for covariates the intervention participants were three times more likely to meet the recommended walking activity levels. The researchers concluded that change to the physical environment, (construction of walking trails) needs to be supported by behavioural and social interventions (creation of walking groups).

A systematic review by Ogilvie et al. (2007), that included randomised control trials, non randomised controls, experimental and observational studies along with environmental and policy interventions, found that no single method of walking emerged as the best (individual, household, group approach), nor were the researchers able to reach a conclusion about the effectiveness of different types of providers (doctors, nurses, exercise physiologists). However, they did find that the

tailoring of the program was beneficial, such as the counselling and written materials. The authors also concluded that 'one size does not fit all' when it comes to walking interventions. Some participants may respond best to information delivered by a trained expert, while others may prefer the anonymity provided by internet instructions. Some may prefer feedback offered via a pedometer, whereas others would benefit from the social support of a walking group.

In several intervention programs walk leaders have emerged as an important component of the walking group. The Walking the Way to Health Initiative (2005) found that their exercise leaders were important in retaining walkers and crucial to the long-term success of the program. They found that without the walk leaders the program would not have been as successful. Others have suggested that walking leaders are the single most important factor for retaining participants (Turner, Rejeski & Brawley 1997).

SCT provides a model whereby the dynamic interaction of the individual and their environment are considered. Consideration of the physical and social environment provides a comprehensive approach to planning health intervention. So, in summary there are many factors that need to be considered when designing a physical activity intervention for older adults. It should be easy to access, with the cost being within reach of participants (Souder 1992; Corti et al. 1995; Godin et al. 1994). The participants need to understand the program (Souder 1992) and the program organizers need to understand the commitments of participants. In addition, the program's frequency, intensity and duration should be appropriate for the participants, with friendly instructors, consistency of instruction and peer support provided (Warren-Findlow, Prohaska & Freedman 2003; Dishman 1994; Corti et al. 1995).

2.11.2 Attrition from intervention programs

Even when physical activity is commenced it is not maintained, with approximately 50% of sedentary adults dropping out of exercise programs within the first 6 months (Dishman 1994; Resnick & Spellbring 2000). Intervention programs aimed at mobilising older populations and understanding associated factors have been less than impressive, with reported attrition rates ranging from 22% to 76% within the first year of starting a new program (Schmidt et al. 2000; Prohaska, Peters & Warren 2000), with the greatest number of drop-outs occurring in the first three months (Schmidt et al. 2000).

Person-based determinants associated with dropping out of physical activity programs are broad and varied for the older adult. For example, overweight adults are less likely to stay with a vigorous physical activity program (Dishman 1991), whereas lower education levels have been linked to attrition (Van Beijsterveldt et al. 2002; Jacomb et al. 2002; Ettinger et al. 1997), along with being older (Jacomb et al. 2002; Chatfield, Brayne & Matthews 2005; Van Beijsterveldt et al. 2002) and being separated (Garcia & King 1991; Martin & Sinden 2001). Other reported determinants of attrition are fear of injury and illness (King, Rejeski & Buchner 1998), low mental health score (Van Beijsterveldt et al. 2002; Jacomb et al. 2002; Chatfield, Brayne & Matthews 2005), being less healthy (Chatfield, Brayne & Matthews 2005; Van Beijsterveldt et al. 2002), having lower social participation (Chatfield, Brayne & Matthews 2005), living alone (Wilson & Webber 1976; Chatfield 2005) and depression (Martin & Sinden 2001). A review of over 20 randomised controlled trials found that being fitter, having a history of being active and a high exercise self–efficacy were associated with greater adherence (Martin & Sinden 2001).

Strategies to optimise adherence are important. The WALC (walk, address pain, fear and fatigue during exercise) program in the United States encouraged older adults to walk (mean age 88). Eighteen participants either walked on their own or were provided with the option of joining a walking group. A nurse practitioner provided

support by visiting participants to discuss issues related to fatigue, pain and fear of falling. The intervention was based on Social cognitive theory whereby there was goal setting, encouragement, feedback on progress and physiological responses, practicing of skills and the opportunity to see others being active. The intervention significantly increased overall physical activity levels and there was a retention rate of 90%. This is a high adherence rate but the intervention was intensive and dealt with only a small sample (Resnick 2002).

Loss of subjects from research projects is a serious concern since it can potentially introduce bias and render a study less representative over time. When poor compliance affects statistical power, additional methods are required to recruit subjects that can be costly and time consuming (Martin & Sinden 2001). Keeping older people in physical activity intervention programs can contribute to the understanding of exercise behaviour. Moreover, physical activity is seen as an economically attractive health management approach for the ageing population (Wanzhu et al. 2004).

2.12 Social cognitive theory

Social cognitive theory (SCT) underpins this health intervention research. Within this theoretical framework, the research examines self-referent and contextual processes that influence participation in physical activity programs (Bandura 1986). The social cognitive approach to understanding physical activity by older adults provides a framework whereby cognition, action and motivation are recognised, and assumes that people reflect, regulate and help shape their environment. The SCT perspective is that people are not driven solely by inner forces and are not automatically shaped or controlled by external influences. Rather, human behaviour can be explained by reciprocal determinism, which is human behaviour, cognitive and other personal factors and environmental events all operating as interacting determinants of each other (Bandura 1986). Bandura (1986, 1997) hypothesised that all behavioural changes are mediated by the cognitive mechanism termed self-efficacy and

suggested that it is behaviour specific. Other major constructs include outcome expectations, reinforcement (motivation/incentives), and the environment. All of these constructs have implications for interventions.

Outcome expectation occurs when people learn that certain events are likely to occur as a result of certain behaviour in a particular situation, such as the perception that engaging in physical activity will prevent illness. Expectations regarding physical activity are learnt from a) previous experience; b) observing others; c) social persuasion; and d) emotional and physical responses to the behaviours. An example may be that older adults may observe others around them being active and this in turn will encourage them to be active. Positive reinforcement (incentives and motivation) is another construct that increases the likelihood of the behaviour being repeated**.** Also, observing the positive feedback that someone receives on their ability to walk increasing distances or to perform a particular exercise will assist with observer learning and perhaps increase the likelihood that the observed behaviour will be adopted. This is referred to as vicarious reward or experience (Glanz, Rimer & Lewis 2002).

The environment is external to the individual and may support positive physical activity behaviour or inhibit behaviour. Examples of the social environment include family, friends and peers who interact and influence the individual. The physical environment is the neighbourhood, such as green spaces and other recreational facilities; these external forces interact with the individual and influence behaviour. Environment and the individual provide an ecological framework for understanding behaviour that acknowledges multiple levels of influence on behaviour, with consideration given to the environmental factors (Sallis et al. 1997). Ecological models emphasise the effect of social systems, public policies and the physical environment (Ball et al. 2001). This framework extends thinking away from simply the individual and realises that behaviour is a far more complex interaction.

Self-efficacy, a major construct of SCT theory, has been shown to predict physical activity choices, adherence and behaviour among older adults (Duncan & McAuley 1993). Self-efficacy cognition, which has been studied as determinants of exercise behaviour, has been identified as a potential mediating mechanism that might explain the effects of exercise on various aspects of psychosocial functioning. Several studies have supported the notion that successful participation in regular exercise activity should serve to enhance perception of physical capabilities, and therefore enhance psychological and emotional well-being (Bozoian, Rejeski & McAuley 1994; Mihalko, McAuley & Bane 1996).

The determination of how older individuals maintain high levels of efficacy and the extent to which compromised efficacy can be enhanced are primary issues in the study of ageing and physical activity. SCT provides a basis for understanding ageing and health behaviour, especially in physical activity in a personal context, which regards age, health, education and cultural background as all interacting with personal experiences and beliefs about ageing itself.

2.12.1 Theoretical planning framework

The Precede-Proceed model for health program planning was selected as the planning framework for the project (Green & Kreuter 2005), because it is one of the most influential models for the planning of health programs. Its use provides for consideration of the shortcomings and strengths of previous community-based physical activity interventions, and ensures that there is thorough consultation and comprehensive planning. It is consistent with the social ecological framework (Sallis et al. 1997).

The framework systematically considers the social and situational circumstances of the target group, relevant epidemiological data, environmental and behavioural (lifestyle) factors, and factors that influence these behaviours and the environments in which they occur (i.e. predisposing, enabling and reinforcing factors) (Howat et al.

1997). Predisposing factors are the motivators for physical activity and include knowledge, attitudes and beliefs, which may be addressed through relevant education. Enabling factors are characteristics of the environment, such as accessibility and cost of a program, as well as skills to accomplish activities. Reinforcing factors include rewards for the physical activity behaviour, such as support from walk leaders, peers and family.

Identification of predisposing, enabling and reinforcing factors was based on relevant components of: a) the health belief model (e.g. perception of barriers and facilitators to physical activity behaviour) (Glanz, Rimer & Lewis 2002); b) SCT (e.g. to measure influences of the social environment on health behaviours) (Bandura 1986; Bandura 1997); and c) SCT's central construct of self-efficacy. Increasing confidence to participate and maintain physical activity is enhanced via education, reinforcement and opportunity to practice and to experience success with physical activity (Glanz, Rimer & Lewis 2002; McAuley & Blissmer 2000; McAuley et al. 2003). SCT emphasises the dynamic interaction of the individual's characteristics, their behaviour and the environment in which they function. An effective intervention program should respond to these interactions.

2.13 Conclusions

Recommending physical activity to people over 65 years is a recognised cost-effective public health strategy, because there is now irrefutable evidence clearly demonstrating the risk reduction of all cause mortality in those achieving recommended levels of at least moderate intensity physical activity on most days of the week. It is estimated that half of all physical decline associated with age is preventable if adequate levels of physical activity are maintained.

However, as people age they become increasingly inactive and there is a narrowing of involvement in types of physical activity. It is estimated that almost half of people

aged over 65 years are insufficiently active. In Australia, this inactivity is associated with 8,000 preventable deaths and costs the community around $377 million annually.

The literature is replete with a vast number of correlates of physical activity, attempting to understand, explain and predict physical activity behaviour, which seemingly indicates the complexity of physical activity behaviour. The documented motivators, enablers and barriers to physical activity are broad and varied within the literature, with the evidence related to physical activity interventions remaining inconclusive. However, there are some components that are considered important for ensuring success in recruiting older adults into, and retaining them in, physical activity. These include the design of the intervention and a supportive social and physical environment.

To ensure that the factors that influence behaviour are considered, it is imperative that an intervention program be based on sound theory. The SCT enables considerations of the complex interplay of the individual, with his/her social and physical environment when attempting to design an appropriate and, hopefully, successful physical activity intervention program.

CHAPTER 3

Methodology

3.1 Study design

This research was a 6-month quasi-randomised controlled trial evaluating the establishment, impact and feasibility of a physical activity intervention with 65 to 74 year olds living in the Perth Metropolitan area. Data collection and intervention implementation are summarised in Table 3.1 below.

Table 3.1 Intervention process

Treatment Group					
	0 months		3 months		6 months
	Baseline	Intervention	Mid-test	Intervention	Post-test
Physical Activity Intervention	O_1	X_1	O_2	X_1	O_3
Control	O_1		O_2		O_3

O = observation X = intervention

3.2 Suburb selection

Following a stratified quasi-random sampling frame, 60 Perth metropolitan suburbs were selected from a pool of 388 neighbourhoods within the greater Perth metropolitan area, the capital of Western Australia, a city with a population of 1.5 million people (Australian Bureau of Statistics 2004b). Selection criteria were: a) the population to be comprised of at least 11% of 65 year olds and above, reflecting the state average (Australian Bureau of Statistics 2001); b) the neighbourhood to contain at least 100 people aged 65 years, to ensure a large enough sample size for matching of telephone numbers to the electronic white pages and; c) the neighbourhood to not be within one-kilometre of a waterway, to minimise 'coastal effects' on physical activity (Bauman et al. 1999). The distance was calculated by using a Geographical Information System (GIS).

An additional criterion for excluding suburbs from the potential sample is: those suburbs not within the Australian Electoral Commission Perth urban boundaries for the Federal divisions (see Table 3.2 below).

Table 3.2 Reasons for exclusion by number of suburbs

Reason for exclusion	Number of suburbs
Less than 11% are 65 years+	221
Less than 1 km to a waterway	79
Fewer than 100 people 65 years+	16
Non-urban	16

The study design aimed to avoid the impact of 'coastal effects', as described by Bauman et al. (1999), as well as avoiding suburbs with substantial river exposure. However, a large number of Perth suburbs have at least a small part of their boundary adjacent to the Swan River or one of its tributaries. Due to a limit in the number of suburbs that met the criteria, it was necessary to include some suburbs that had some river exposure.

The total number of suburbs that met all the criteria was 56. The suburbs of Wilson, Riverton, Bentley and Bayswater were added to the sample, because 60 suburbs were required. These suburbs were randomly selected from the riverside suburbs. The suburbs were then randomly assigned to the intervention groups or control group using a table of random numbers (see Table 3.3).

Using the Socio-Economic Index for Area (SEIFA) (Australian Bureau of Statistics, 1998), a value derived from income, educational attainment, employment status and skill level, neighbourhoods were matched for low, medium

and high levels of socio-economic status (SES), by creating cut-off points representing one third of the total number of suburbs. The 60 suburbs were then assigned to either the intervention group (n=30) or the control group (n=30) using a table of random numbers.

Table 3.3 Suburbs in study

Intervention group suburbs	**Control group suburbs**
High SES (n=10)	*High SES (n=10)*
Bibra Lake	Alfred Cove
Booragoon	Ardross
Como	Bull Creek
Floreat	Inglewood
Gooseberry Hill	Lesmurdie
Kalamunda	Melville
Mt Hawthorn	Mt Lawley
Riverton	Subiaco
Warwick	Wembley Downs
Wembley	Woodlands
Middle SES (n=10)	*Middle SES (n=10)*
Balcatta	Dianella
Bayswater	Ferndale
Bedford	Innaloo
Doubleview	Lathlain
Joondanna	Morley
Kewdale	Myaree
Lynwood	North Perth
Shenton Park	Palmyra
Wilson*	Stirling
Yokine	Wanneroo
Low SES (n=10)	*Low SES (n=10)*
Bassendean	Belmont
Bentley	Cannington
Embleton	Carlisle
Gosnells	Cloverdale
Midland	Coolbellup
Nollamara	Hilton
Osborne Park	Queens Park
Tuart Hill	Redcliffe
Westminister	St James
Willagee	White Gum Valley

3.3 Subject selection

Permission was sought from the Australian Electoral Commission for access to the Federal Electoral Roll (FER). The FER provides a comprehensive pool of potential subjects, because all Australian residents must be registered. Permission to access FER data is only available to reputable health projects and payment for the information was required. From the FER 120 subjects were randomly selected from each suburb. It was calculated from a pilot study that this would maximise the chance of securing a sample of 12 to 15 subjects per neighbourhood. Equal numbers of 65 to 69 year olds and 70 to 74 year olds were generated for each suburb.

Prospective subjects were required to meet the following criteria: a) be aged 65 to 74 years; b) be 'insufficiently active' (This was defined as less than 30 minutes of moderate physical activity on at least 5 days per week) (Department of Health and Aged Care 1999); and (c) healthy to the degree that participation in a low stress walking program would not place them at risk or exacerbate any existing health condition.

3.4 Procedure

A total of 7378 potential subjects were randomly generated from the FER using a table of random numbers. The University of Western Australia (UWA) Health Survey Research Centre was contracted to match these names to a telephone number using the Perth White Pages, yielding 6409 contacts (86.8% matching rate). Prior to the initial contact, a postcard was sent to participants providing information on the program and informing them that someone would phone them within the next two weeks.

The UWA Health Survey Research Centre contacted potential subjects and if the selection criteria were met, the study requirements and benefits were explained to the individuals' and they were invited to participate in the study. If they consented to participate, contact information was obtained and recorded. The Survey Research Centre ceased phoning when 15 subjects per suburb had agreed to take part in the study.

Seven hundred and thirty-four subjects initially agreed to enter the study (intervention n=352, control n=382). However, a total of 573 subjects (intervention n=260, control n=313) completed the questionnaire and thereby technically entered the program.

Those who consented to take part in the intervention (Appendix B, Consent) were sent a questionnaire (Appendix C, Questionnaire) with a covering letter (Appendix D, Cover letter), along with an information brochure explaining the designated program, its time-line, benefits of walking and information on appropriate shoes and clothing. They were informed that their walk leader would contact them within the week. The walk leader then telephoned and welcomed them, establishing preferred times and venues for their suburb-based group and requesting that they bring reading glasses and a pen to complete paperwork on the first meeting. Thus participants completed a 'Readiness for Physical Activity Questionnaire' before commencement of the program.

Those assigned to the control group were sent a questionnaire, with a self-addressed envelope (n=313). All subjects in the control group who completed the questionnaire had an opportunity to win one of three $50.00 gift vouchers from a large grocery chain. Over the 6-month intervention the controls were required to complete three self-completing questionnaires.

3.5 Instrument development

3.5.1 Focus groups

The development of the Perth Active Living Seniors measurement instrument occurred over a period of four months. The instrument was a composite of previously validated instruments, and it was reviewed by two focus groups located in two Perth suburbs. These focus groups provided feedback on the questions contained in the survey and changes were made accordingly. Twenty- five people aged 65 to 75 years attended a focus group meeting.

Results

- The majority of participants from the focus groups found the questionnaire easy to follow and answer.
- They found the layout, font size and length appropriate, taking 20 to 30 minutes to complete the questionnaire.
- Focus group members discussed the terms 'moderate' and 'vigorous' at some length for several reasons. The participants explained that this age group does not enjoy exercise at a vigorous level, preferring to avoid the sensations of a fast beating heart and breathlessness. They prefer to pace their activities to avoid these sensations. For this reason the term 'vigorous' physical activity was excluded from the questionnaire and only 'moderate' was used.
- The understanding of moderate physical activity was discussed, with a request for an explanation of this term within the questionnaire. Suggested examples were incorporated into the questionnaire.
- There was some discussion about the aspect of 'social desirability' when completing the physical activity questions. It was felt that a self-completed questionnaire minimised this threat to validity.

- There was discussion regarding the appropriateness of the income question. This remained in the questionnaire but was deemed optional.
- The focus groups were useful in the following ways: Assessing difficulties in readability and comprehension of the questions; identifying the appropriateness of the questions; considering how the questions were interpreted; and identifying questions that required rewording.

3.5.2 Test-retest

A self-completed mail test-retest was conducted two weeks apart, with 75 subjects within the Perth Metropolitan Area randomly selected from the Federal Electoral Roll. These subjects were not included in the main study. The aim was to invite them to assess the recruitment process and to determine the reliability of the instrument. Statistical analysis (kappa and interclass correlation) was conducted on the two sets of questions. The test-retest results were reviewed by a statistician and found to be within acceptable ranges. The test-retest results are presented in Chapter 8, 'Effectiveness of a Physical Activity Program for Seniors'.

3.6 Measures

The questionnaire took approximately 30 minutes to complete; it was modified from those developed for use in a study conducted by the Oregon Research Institute in the USA (Fisher, Pickering & Li 2002), incorporating other validated instruments. The measures included psychosocial assessments and self-report physical activity assessments. Approval for their use was obtained from the author/s and a fee paid for one instrument under copyright. Table 3.4 below describes the outcome variables and how they relate to the project's measurement instrument.

Table 3.4 Survey instruments

Outcome variable	Measurement Instrument
Physical activity frequency, intensity, duration and context	International physical activity questionnaire (Craig et al. 2003)
Self-efficacy	McAuley Self-efficacy for exercise scale (McAuley 1993)
Mental & physical health	Short Form 12v2 Health Outcome Scale (Ware, Kosinski & Keller 1996)
Social support	Dukes Social Support Scale (Goodger, Byles & Higganbotham 1999) Sallis Social Support for Physical Activity (Sallis et al. 1987)
Satisfaction with life	Satisfaction with Life Scale (Pavot & Diener 1993)
Loneliness	UCLA Loneliness Scale (Russell 1996)
Perception of physical environment	Aesthetics, convenience & safety (Ball et al. 2001)
Depression	Geriatric Depression Scale (Rinaldi et al. 2003)
Demographics	Age, body mass index, education, country of birth, marital status, perceived struggle
Qualitative data	One-on-one interviews

3.7 Components of survey instrument

The International Physical Activity Questionnaire (IPAQ) has undergone extensive reliability and validity testing and has acceptable measurement properties for use in population studies of physical activity participation (Craig et al. 2003). The instrument measured frequency and duration of 'walking for recreation', 'walking for transport' and 'other moderate physical activity'. A moderate level of physical activity was chosen because, as mentioned above, focus group participants deemed this level would avoid the sensation of a fast beating heart. An explanation of moderate activity preceded the question, which consisted of two parts: (a) "In a usual week, how many times do you do moderate physical activity for at least 10 minutes, such as swimming, dancing or cycling?" (b) "In a usual week, what do you estimate is the total time you spend doing these activities?" For IPAQ, overall the intraclass correlations coefficient (ICC) were moderate to high (.58-.94), and no significant differences were found between the first and second survey results (t-test p ranged from .051 to .595), further supporting the reproducibility of the questionnaire. Levels of physical activity were divided into 'sufficient' and 'insufficient', with sufficient physical activity being defined as achieving 30 minutes of moderate physical activity on at least five days per week, according to the National Physical Activity Guidelines (Department of Health and Aged Care 1999).

Exercise self-efficacy (McAuley 1993) is the confidence to act in a way that will produce a desirable outcome and is associated with the formation of intention and maintenance of exercise. Two measures are employed to assess self-efficacy cognition of exercise behaviour: the first is 'exercising in the face of barriers', as determined through attributional analysis and individuals' reasons for dropping out of exercise (cronbach alpha 0.85); the second is used to determine 'efficacy with continued exercise participation'. These measures can be combined to form a summary score representing overall exercise efficacy (cronbach alpha 0.90).

The Medical Outcomes Study Short-Form Health Survey (SF-12v2) (Ware, Kosinski & Keller 1996) is a shorter version of the Medical Outcomes Short-Form Health Survey (SF-36) and is recommended as an appropriate substitute for the SF-36. This is a standard international instrument that gives a generic measure of health status. It is comprised of two summary scales: the physical component summary (PCS) score, and the mental component summary (MCS) score. Within these scores are eight dimensions measuring health and well-being: bodily pain; vitality, social functioning, physical functioning, mental health and role limitation.

Dukes Social Support Scale (DSSI) (Goodger, Byles & Higganbotham 1999) is a subjective evaluation of the type and number of social interactions and has been validated for use with older people. The instrument contains two sub-scales that measure social interaction and satisfaction. It has good internal consistency (cronbach alpha of 0.77) and test-retest scores (0.70 to 0.81).

Social Support for Physical Activity (Sallis et al. 1987) provides a measure of perceived social support for exercise behaviour, and includes both positive and negative influences from family, friends and acquaintances. The validity and reliability of the items are acceptable (range 0.55-0.86; range for alpha=0.61-0.91).

The Satisfaction with Life Score (SWLS) (Pavot and Diener 1993) measures pleasant and unpleasant effect and has a cognitive component. 'Life satisfaction' is a conscious cognitive judgement of one's life in which the criteria for judgement are up to the person. The scale has good convergent validity with other scales and with other types of assessment of subjective well-being.

The UCLA Loneliness Scale (Russell 1996) is an instrument commonly used across a variety of populations, including older people and in mailed surveys. It assesses subjective feelings of loneliness. It draws on the concept of loneliness

and is uni-dimensional in structure, assessing both the frequency and intensity of salient aspects and events of the lonely experience. Results indicate that the measure is highly reliable both in terms of internal consistency and test-retest reliability.

Perception of Physical Environment (Ball et al. 2001) is an ecological model, which acknowledges that behaviour can be influenced by the individual interaction with the social and physical environment. Thirteen items assess various aspects of the physical and social environment, including aesthetics, safety, and convenience of facilities.

The Geriatric Depression Scale (GDS) (Rinaldi et al. 2003) is a five-item scale that was developed from a 15 item scale and is found to be reliable and effective and a better screening agent in the ambulatory setting (less frail older person) in cognitively intact older individuals. It is recommended as a useful instrument for epidemiological studies. The five-item GDS has a good sensitivity and specifity and good inter-rater reliability (0.88) and test retest (0.84).

Socio-Economic Index for Area (SEIFA) (Australian Bureau of Statistics 1998) is related to socio-economic aspects of geographic area. The index is obtained by summarising social and economic characteristics of families and households. It is derived from income, educational attainment, employment status, and skill level.

Self-reported Body Mass Index (BMI) is calculated as weight in kilograms divided by height in meters squared (Cameron et al. 2003). Those with a BMI of 18.5–24.9 kg/m2 were classified as normal weight; 25.0–29.9 kg/m2 were classified as overweight and those exceeding 30.0 kg/m2 were classified as obese. Demographic information sought included: gender, age, education level, relationship status, country of birth and perceived financial struggle.

3.8 Sample size and power calculations

Power calculations were based on a multilevel logistic regression model and the assumption that 70% complete data across the three assessments due to attrition and non-respondents. In the power analyses effect sizes of interest are associated with the correlation coefficient and R2. For the logistic regression-based analyses, a sample size of N = 600 (150 per gender by intervention condition) provided sufficient power (80%) to detect a medium effect size (accounting for approximately 16% of the variance) for gender by age interactions at a single time point without covariate adjustment. Power for detecting these same interactions for three assessments is sufficient to detect a smaller effect, accounting for approximately 11% of the variability.

3.9 Data analysis

All data were coded and analysed using SPSS for Windows package version 12. Participants' demographic and health characteristics were collected and descriptive statistics were used to summarize these characteristics. Univariate statistics, such as chi-square, and t tests were first applied to compare the intervention group with the control group. For the hierarchical data (repeated measurements of individuals nested within suburb/neighbourhood groups) collected over the 6-month observational period, multilevel logistic regression and generalised estimating equations were used to quantify the effects of intervention on the repeated outcome variables of interest. The GEE model of physical activity times was fitted using the STATA statistical package (STATA 2006). The multilevel regression model accounted for the inherent correlation of the observations via random (suburb) effects, whereas the generalised estimating equations, with suitably defined correlation structure, accommodated the data dependency by providing robust standard errors for the regression coefficients. Such statistical methods provided correct statistical inferences concerning the effects of covariates, especially intervention on the outcomes. Analyses were also undertaken using repeated measures ANOVA and other appropriate tests.

3.10 Ethics

Informed consent was obtained from the participants after informing them: that participation in the study was entirely voluntary; that the participants had the right to withdraw at any stage; the purpose of the research; the type of involvement required of them; who was conducting the research; and that confidentiality would be respected. This study and access to the FER data base, were approved by the Curtin University Human Research Ethics Committee, ethics number HR 69/2002 (Appendix E, Ethics Approval).

3.10.1 Confidentiality and data storage

Codes only and master lists of codes identified data. Names of subjects were kept in locked cabinets accessible only to the candidate and her supervisors. Data on computer were protected by password accessible to the project staff. Subjects were not identified by name in any publication or report. The raw data and tapes were stored in the secure office space provided while still being used and then transferred to the School of Public Health archives.

3.11 Qualitative data

To better understand older adults' perceptions and experience of physical activity from an historical, current and future context a qualitative interview schedule was developed and 16 participants interviewed.

3.11.1 Participants in qualitative study

The participants were 11 females and five males aged 65 to 74 living in the Perth metropolitan area, Western Australia. Participants were purposefully selected from the Australian Federal Electoral Roll (FER) to ensure they were drawn from a

breadth of socio-economic backgrounds (low, medium and high). This was determined by the Socio-Economic Index for Area (SEIFA) (Australian Bureau of Statistics 1998). Participants were required to be "insufficiently active", defined as not achieving 30 minutes of moderate physical activity on at least 5 days per week, according to the Australian National Physical Activity Guidelines (Department of Health and Aged Care 1999). Their perception of their health ranged from fair to excellent.

3.11.2 Procedure

Potential participants for the qualitative study were contacted by phone to establish eligibility and informed consent. They were interviewed in their home or at a convenient location, by a single interviewer. Formal interviews averaging 60 to 90 minutes were conducted. Permission was sought for the recording of interview and a $20.00 gift voucher was provided to subjects in appreciation of their participation.

3.11.3 Interview schedule

An interview schedule was created to provide some structure to the interview, but it was not adhered to rigidly. The interview schedule was developed after consulting experts in the area and reviewing the literature. The interview was based on the participants' perceptions of physical activity and physical activity over the life course (see table 3.5 for example questions).

Table 3.5 Interview schedule

When I talk about physical activity, what does it mean to you?
What types of activities do you do?
What stops you from being physically active or more physically active?
What makes you want to do more physical activity?
How important are the influences of family and friends on you being physically active?
What do your think that society in general thinks about physical activity and people your age?
Do any of these attitudes encourage you or discourage you from being physically active?
Do these expectations affect the types of physical activity that you do?
How would you describe your past experiences with physical activity?
What types of physical activity did you participate in when you were younger?
How has physical activity changed for you over the years?
What types of physical activity/ies would you like to return to?
What new types of physical activity/ies would you like to try now?
How would you describe your general health?
Do you have any health issues?
How do you manage your health?

3.11.4 Data analysis

Each interview was fully transcribed and read several times during which qualitative content analysis was conducted. The coded data were managed by NVivo 7 (QSR International Pty Ltd 2006). The analysis process involved the breaking down of transcribed data into smaller units (sentences and occasionally paragraphs), coding the data according to the content and then categorising the

material. Paragraphs were used so that the contextual information was not lost. The categorised data were organised around two major headings: a) beliefs and perceptions of physical activity; and b) life course ageing and physical activity.

3.12 Physical activity intervention

3.12.1 Walk leaders

Thirty walk leaders were recruited to lead the walking groups. A number of sources were contacted to secure these walk leaders, including suburban walking groups, volunteer associations, local government, the Positive Ageing Association, Marathon Club, Office of Seniors Interests and Senior Citizen Groups. However, discussion and promotion through these community agencies was not successful in securing group leaders from a similar age group as the study participants.

Following this, a new course of action was required. This led to three academic institutions being approached to promote the program and the walk leader positions:

- Curtin University of Technology – Physiotherapy, Podiatry and Health Promotion Departments
- University of Western Australia – Human Movement
- Edith Cowan University, Joondalup Campus, School of Public Health.

Training

Walk leaders were an integral part of the program. They were interviewed and selected on their personality, enthusiasm and empathy for older people. A personal reference was required from an experienced academic in their school, supporting their suitability to the program.

Walk leaders underwent three two-hour training seminars. A Management Committee member with extensive experience in aged care and physical activity conducted the three seminars, on the following topics:

Seminar 1 - Introduction and overview of program

Seminar 2 - Introduction to the walking manual and program

Seminar 3 - Update on walking procedures and program

Walk leaders also received a 'Walking Leader's Manual' that provided information on the: Physical and mental benefits of physical activity, ageing and physical activity; example exercises; information on safety issues; effective communication strategies; measurement procedures, such as assessing pulse rates, the estimates of perceived exertion using the Borg Scale and the 6-minute walk tests; documentation procedures, such as attendance sheets, following-up on non-attendees, distribution of program materials to walkers, weekly prescriptive walking and exercise schedule, and; meeting point map for walkers and map of the area.

As part of their role, the walk leaders were required to organise social breakfasts and morning teas and also followed-up on non-attendance. All walk leaders received a reimbursement of $30.00 per week towards the cost of conducting two walk sessions.

3.12.2 Program design

The 6-month prescriptive walking and exercise intervention, designed by an exercise gerontologist, commenced at a very low level and provided a graduated and standardised program for the previously inactive older adults. The program was led by the walk leader and on the first meeting day commenced with 5 minutes of low intensity walking and two stretches (calf and hamstring stretch). By

week 3 participants were warming up together for 5 minutes (additional stretches included shin and quadriceps stretch) and walking at their own pace for 10 to 15 minutes.

In week 10 participants completed a 5 minute group walk, received instruction on some stretching exercises and then completed 30 minutes of walking at their own pace. By week 20 participants were encouraged to aim for 45 to 55 minutes of physical activity in total. This was comprised of a 5-minute warm up walking together, stretches and then walking at their own pace for 45 to 50 minutes and, finishing off with a group stretch.

Various stretching, strengthening and balance exercises were incorporated into the program, including quadriceps stretch and balance, hamstring stretch and balance, gluteal stretch, wrist stretch, hug stretch, ham string stretch, calf stretch, straight body push up, hip extension, dips, stomach lift, long lunges and reaches. Emphasis was placed on core stability, strength and balance. Commencing in week 11, the groups were encouraged to vary their warm up program by introducing ball games, such as side twist leader ball and circle ball. To reinforce these activities participants were provided with an exercise sheet depicting each exercise and encouraged to practice the exercises at home.

A number of tools were used throughout the program so that participants could receive feedback and monitor their progress. These included six minute walk tests, the Borg Scale of Perceived Exertion and assessment of pulse rates. All walk leaders were provided with a pedometer to conduct the six minute walk tests. These were conducted in week 1, 7, 15 and 22. The results were recorded and feedback provided to participants. The Borg Scale was introduced in week 5 along with monitoring of heart rate via the radial pulse. The procedure for these measures were explained and recorded by the walk leader throughout the intervention.

The groups met twice per week in a local area and the program was free of charge. Having the program locally based improved access and reduced the need for transport. Participants were encouraged to swap contact details so that social support, connectiveness and community safety were enhanced. Participants were also encouraged to walk one additional day during the week but this was not monitored.

Walking group participants were provided with incentives that included a regular newsletter containing up-to-date health information presented in a chatty format. This was supported by information on injury prevention, pedestrian safety, diabetes, and cardiovascular disease and cancer prevention. Profiles and photographs of walk leaders and walking groups were included, providing additional stimulus for group discussion. In addition walkers were provided with exercise calendars and exercise sheets to encourage the development of a home exercise program, as well as incentives in the form of Christmas cards, birthday cards and small gifts (gift vouchers, lottery tickets).

The walk leaders were also responsible for the monitoring of participant attendance. When participants did not attend they were contacted to determine the reason and if required encouraged to return. Full attendance was considered when all walking sessions were attended. Approximately 19% of participants attended all session with 93% attending at least half of the sessions.

Establishing walking venues

The groups were locally based at suitable suburban meeting point for the walkers. These meeting points were established through close liaison with local government and through promotion via the Physical Activity Taskforce. Twelve Local Governments were contacted and permission obtained for the use of local parks and their facilities. Within these Local Government Areas, thirty meeting sites were established. Sites for walking were chosen so that there was access to seating,

toilets and green space. The Local Governments and associated suburbs involved in the program are listed in Table 3.6. below.

Table 3.6 List of local government areas involved in the program

Local Government Area	Suburb
Melville City Council	Alfred Cove
	Ardross
	Bull Creek
	Melville
	Myaree
	Palmyra
City of Bayswater	Morley
City Council of Belmont	Belmont
	Cloverdale
	Redcliffe
Canning City Council	Cannington
	Ferndale
	Queens Park
Cockburn City Council	Coolbelup
City of Stirling	Dianella
	Inglewood
	Innaloo
	Mt Lawley
	Stirling
	Wembley Downs
	Woodlands
City of Fremantle	Hilton
	White Gum Valley
Town of Vincent	North Perth
City of Wanneroo	Wanneroo
City of Subiaco	Subiaco
Town of Victoria Park	Carlisle
	Lathlain
	St James
Kalamunda Shire Council	Lesmurdie

CHAPTER 4

Perceptions of physical activity by older adults: an exploratory qualitative study

Perceptions of physical activity by older adults: an exploratory qualitative study

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Objective: To identify issues and perceptions concerning physical activity in older adults.

Design: Qualitative study.

Setting: Perth Western Australia.

Methods: Sixteen adults aged 65 to 74 years were interviewed in their own homes using a semi structured interview schedule. Data were analysed using a descriptive qualitative methodology.

Results: Participants believed that physical activity provided health benefits and reflected positively on physical activity experiences when they were younger, with many expressing a desire in less age appropriate activities. The major barrier to physical activity was pain. Participants described both positive and negative examples related to society's support of physical activity.

Conclusions: A number of issues were raised. These include the need for more specific information on the benefits of physical activity; the role of pain management in physical activity; the concept that involvement in physical activity in younger years leads to involvement when older; and the expressed desire of older people to engage in less age appropriate physical activities.

Key words: ageing, physical activity, knowledge, health promotion

4.1 Introduction

Older people have much to gain both mentally and physically from being active, with suggestions that 50 percent of frailty can be reversible with appropriate and adequate physical activity levels[1].Unfortunately, between 50 and 60 percent of older people worldwide are insufficiently active[2, 3].

People increase their physical activity levels if there is much to gain and little to lose, or have the capability to complete the task (self-efficacy)[4]. As people age they become less active and believe that the benefits associated with physical activity are outweighed by the hardships or barriers, or that the environment does not offer attractive physical activity options. Social Cognitive Theory postulates that individuals learn through observation and reinforcement[5]. Engaging in physical activity with others can help to establish positive social norms for physical activity within social networks[6].

There is a wealth of documented information on the health benefits of physical activity as related to the prevention of chronic illnesses[7], including cardiovascular disease[8], diabetes[9], depression[10], osteoporosis, arthritis [11] and injury [12]. However, little evidence has suggested that older adults can comprehend such information[13-15].

Over 80 percent of older people acknowledge at least one barrier to physical activity [14]. These barriers include insufficient time, lack of facilities and money, [16] poor Health[14, 17, 18], fatigue, lack of interest, a lack of company, enjoyment and knowledge, inclement weather, injury[19], joint pain [20] and a perception of being too old [21].

In Australia, older people participate in fewer types of activities, but certain activities such as walking, bowls, yard work, golf and cycling do not suffer the same

disengagement[22]. The reduction in activity types is often viewed as a natural phenomenon of ageing[23] and because older people are seeking the most enjoyable age appropriate activity[24]. Moreover, they may lack the appropriate skills[15, 25] , or do not have realistic role models[13].

Although the evidence continues to emerge concerning the social, mental and physical benefits of physical activity, little attention has been given to mobile independent living older people and the factors that influence their physical activity behaviour. This study investigated the physical activity perceptions of 65-74 year olds, along with associated barriers and motivators, as well as past experience and desire for future participation.

4.2 Methods

To understand older adults' perceptions and experience of physical activity from an historical, current and future context, a qualitative interview schedule was developed and 16 participants were interviewed.

4.2.1 Participants

The participants were 11 females and five males aged 65 to 74 years living in the Perth metropolitan area; see Table 4.1. Participants were purposefully selected to represent various socio-economic backgrounds (low, medium and high), as determined by the Socio-Economic Index for Area (SEIFA)[26]. They were also required to be "insufficiently active", defined as not achieving 30 minutes of moderate physical activity on at least 5 days per week, according to the National Physical Activity Guidelines[27].

Table 4.1 Characteristics of subjects (n=16)

Subjects	Gender	Perception of health	Stated health issues	Socioeconomic level
Lyn	female	fair/good	hypertension	middle
Eric	male	good	arthritis	middle
Fran	female	fair	arthritis	high
Terry	male	good	hypertension, cholesterol	middle
Jill	female	very good	arthritis	middle
Norma	female	good	cholesterol, osteoarthritis	high
Jeff	male	fair	heart disease, hyperthyroidism	middle
Stan	male	good	hypertension, tinnitus, arthritis	middle
Jan	female	excellent	cholesterol, hyperthyroidism	low
Mary	female	good	hypertension, diabetes	low
Max	male	good	cholesterol	low
Val	female	good	not stated	middle
Ruth	female	poor	hypertension, emphysema	low
Dot	female	fair/good	arthritis	low
Phyl	female	good	hypertension, cholesterol	low
Gwen	female	fair	hypertension, leukaemia, arthritis, diabetes	middle

4.2.2 Procedure

Potential participants were initially contacted by phone to establish eligibility and informed consent. They were interviewed in their home or at a convenient location by a single interviewer. These formal interviews took about 60 to 90 minutes to complete. Permission was sought for the recording while a $20 gift voucher was offered to each subject as an incentive.

4.2.3 Interview schedule

An interview schedule was created to provide structure. It was developed after a comprehensive literature review and drawing from our experience in physical activity research. The interview focused on perceptions of physical activity and physical activity over the life course. The main questions are listed in Table 4.2.

Table 4.2 Interview schedule

When I talk about physical activity what does it mean to you?
What types of activities do you do?
What stops you from being physically active or more physically active?
What makes you want to do more physical activity?
How important are the influences of family and friends on you being physically active?
What do you think that society in general thinks about physical activity and people your age?
Do any of these attitudes encourage you or discourage you from being physically active?
Do these expectations affect the types of physical activity that you do?
How would you describe your past experiences with physical activity?
What types of physical activity did you participate in when you were younger?
How has physical activity changed for you over the years?
What types of physical activity/ies would you like to return to?
What new types of physical activity/ies would you like to try now?
How would you describe your general health?
Do you have any health issues?
How do you think you can manage your health?

4.2.4 Data analysis

Each interview was fully transcribed verbatim and read at least six times in order to establish a broader understanding of the meaning of the participants' dialogue, during which qualitative content analysis was conducted. The analysis process involved the breaking down of transcribed data into smaller units. Units or topics of information were sentences and occasionally paragraphs that conveyed discrete information. Paragraphs were used so that the contextual meaning was not lost. The data was then coded according to the content and then the material was categorised. The coded data were managed by Nvivo 7[(28)]. The categorised data were organised around two major headings: a) Beliefs and perceptions of physical activity and; b) life course ageing and physical activity.

4.3 Results

4.3.1 Beliefs and perceptions of physical activity

Three main themes have emerged: i) beliefs about physical activity; ii) barriers to physical activity; and iii) perception of societal support for physical activity.

4.3.1.1 Beliefs about physical activity

The majority of participants felt that physical activity should be engaged in throughout their life, and universally acknowledged the benefits of being physically active. Their knowledge of the health benefits of physical activity were broad and included keeping muscles toned, improving cardio-respiratory fitness, improving circulation, maintaining body weight, and improving general well being.

(Dot) You breathe better. It keeps you trim and certainly gets your bowels moving. The blood circulates better and that helps your skin.

(Ruth) It keeps your muscles toned up and your body fit. Walking keeps you going as you get older. It would just make you feel better.

These positive beliefs were well established and in many cases built upon positive reflections of physical activity undertaken during their early years. Participants were capable of identifying the general benefits but were less able to identify specific activity related to improved health benefits.

4.3.1.2 Barriers to physical activity

The general aches and pains associated with being active reduced the enjoyment of an activity and often stopped subjects from being active. These included 'crook backs', 'pains in legs', 'spurs under feet', 'arthritis' and 'leg ulcers'. Moreover, there were reports of lost flexibility, lack of balance and confidence, shortness of breath and poor body image. Inclement weather was also nominated as a barrier with heat, cold, heavy rain and forceful winds inhibiting activity.

> *(Jan) Oh pain most of the time. It's actually a spur underneath my foot and on the back of my foot. It's a dull ache most of the time.*

> *(Max) I have got a crook back, which is my own fault, so I got to learn to live with it.*

4.3.1.3 Societal support for physical activity

Perception of society's general attitude to ageing and physical activity revealed mixed views. Two participants mentioned that society did not impact on their behaviour. A few participants felt supported and encouraged to maintain physically activity. However, just as many felt unsupported and marginalised, believing that society had essentially "*written them off*". They reported that negative comments were directed at them when they attempted to exercise and that they were considered obstructions to others doing physical activity.

Positive responses

(Stan) I think they (society) encourage it (physical activity). Most people would encourage other people to get out and do whatever they can instead of sitting around, like I am doing.

(Eric) No, why should other people stop me from doing what I want to do. Just because we are older it doesn't mean you can't do what you want. An 80 year old woman dropping out of an airplane… and she thoroughly enjoy it.

Negative responses

(Jeff) We don't exist and we can exercise as long as we don't get in their way.

(Val) Young girls in their twenties can be quite rude, but you can still snap back at them if you have a keen mind …It's just self absorbed people that dump you in a pile, you're old, we can't be bothered with that sort of attitude….

4.3.2 Life course ageing and physical activity

Responses to the life course questions were related to the participants' view of physical activity. The positive recollections were also characterised by a gap in physical activity during their working years and the re-emergence of physical activity later in life. Three main themes emerged describing life course ageing and physical activity in older adults: i) past experiences with physical activity; ii) ageing and physical activity; and iii) a desire to pursue new activities.

4.3.2.1 Past experiences with physical activity

Past physical activity experiences mainly drew on those from their years at school and the period that preceded commitments to partners and children. The participants discussed a broad range of activity types that they were involved in and conveyed

many positive experiences on past physical activity. Some example comments are: *"I loved my sports', "so we would leave our bikes at their house…then sail into the hall".*

> *(Jan) I played netball for many years and I played softball only at school. I went ten pin bowling for years and years. I was school champion at tennis for three years at the convent. I've always loved sports.*
>
> *(Eric) I liked to ride my pushbike. I also played junior cricket and tennis. We used to ride to school and the beach. We'd have to make our own fun.*

The activities cited included netball, tennis, squash, dancing, badminton, cricket, swimming, football and basketball. Many participants reported a desire to return to these activities. However, on consideration of their current situation and their functional ability, their perceived physical activity options were greatly reduced.

Participants indicated a better opportunity for incidental physical activities when they were younger. These included activities such as cycling to work or to recreational facilities. They found that the less complicated lifestyle and simpler infrastructure supported such incidental activities.

> *(Ruth) We had to ride so many miles everyday, to school, to work. Sometimes we would go to a dance or a ball. The balls would be 8 miles away and we'd have to pin our dresses up to our waists and ride our bikes. We knew somebody out there so we would leave our bikes at their house and let our dresses down, then sail into the hall.*

4.3.2.3 Ageing and physical activity

Over the years physical activity has changed, along with the reasons for being physically active. Generally, injuries and diminishing functional ability reduced their ability to pursue activities that these older adults had previously enjoyed. Any desire to be more physically active was limited by discomfort due to pain and recognition

of reduced capacity in psychomotor skills, such as balance. There were those who accepted the change, whereas others with limited function found it frustrating.

(Val) Well, I gave up my tennis and my horse riding. But I kept up with aerobics. Then when I gave up the aerobics I took up walking and yoga. So the velocity has lessened just to suit my age and my body… I've reduced it even more now and it's at a point now that I should gear up to do more.

4.3.2.4 Desire to pursue new activities

Many participants expressed a desire to pursue new activities. A range of physically challenging activities was discussed in a fervent manner. Often, at the end of the discussion they identified a limitation that would inhibit them from attempting the activity. Some of the identified activities were 'one off', such as white water rafting and horse riding. Others, such as ice-skating and dancing, were activities older adults would like to have initiated and maintained. The majority of participants acknowledged the limitations of their ageing body, while others were not prepared to do anything.

(Gwen) I'm not that game to try anything now.

(Mary) My daughter and her husband and their little six-year old go roller-skating. I would love to go roller-skating, but I can't do it. When I can't sleep at night I think about skating - it is the most wonderful motion. I wouldn't have the balance.

4.4 Discussion

4.4.1 Perceived benefits and barriers

The older adults believed that physical activity provided mental and physical health benefits, kept muscles active and the blood circulating. Consistent with the literature, it seems that they have a good overall understanding of the benefits of physical activity[15, 20]. However, there was little acknowledgement of the many recognised

specific benefits, such as the positive health outcomes related to diabetes and osteoporosis. It is important to provide older adults with information on the direct benefits of being active, its value in the management of specific disease and maintaining function. With less than 50 percent of older adults currently physically active,[8] there is scope for improvement, especially older women who deserve attention owing to their increased longevity and social vulnerability[15].

The major barrier to being physically active was pain. Chronic pain is a prominent issue for older people, with almost 50 percent of Australians aged 65 and above suffering from arthritis and all reporting at least one long-term health condition[29]. Two issues are relevant, namely, the role of physical activity in pain management and the management of pain itself, so that people can remain active. Older adults need guidance on how to manage their symptoms and reassurance about the benefits of physical activity in alleviating joint and muscle pain[20]. Health professionals are key players here, but they require appropriate training and support so that it becomes a recognised service priority.

4.4.2 Societal support

Descriptions of perception of societal support for physical activity were conflicting. Some subjects felt that society had "*written them off*", while others felt quite supported. The social environment has been consistently found to influence participation in physical activity[30-32]. However, older people generally receive less

encouragement regarding their exercise habits [33] and there is little observable support for exercise[13]. In addition, they reported being confronted by ageist stereotypes that impacted adversely on their physical activity behaviour. It is important that older people feel supported in physical activity pursuits.

4.4.3 Past and current physical activity

When describing past physical activity experience it was with warmth and longing. The subjects participated in a range of physical activities when they were young. The diverse activities would have resulted in the development of an array of skills but which appeared not to transfer to later life. This contrasts with sport socialisation research that suggests that adult participation in physical activity is influenced by early life experiences, such as childhood encouragement and organised sport participation[15, 25].

When participants discussed activities that they would like to try, their ideas bubbled over and the dialogue again revealed a sense of longing and vitality. However, the enthusiasm was accompanied by an overwhelming acknowledgement of personal barriers associated with their deteriorating bodies.

The sense of joy associated with physical activity involvement in the past was lost when current physical activity was discussed. The participants recognised that physical activity had become less intense while the motivation for being physically active has changed over the years. There were expressions of interest for health reasons, rather than enjoying being physically active. However, if physical activity is to be prescribed for the prevention of specific physical and or psychological ailments, consideration must be given to how aspects of socialisation, interaction and the nature of the physical activity can be enhanced to maximise these features. Attention should be paid to the relationship between enjoyment and physical activity. Enjoyment has been implicated as a determinant of physical activity[24].

The expressed desire to participate in activities that are not generally considered appropriate for older people, along with sport modification, need further investigation. The life course described by many participants identified a physical activity void during their working years. Research is required to identify whether such deficiency is a common phenomenon for different generations.

4.4.4 Limitations

The findings of this study should be viewed in light of its limitations. The sample of adults aged 65 to 74 years was not large and their views may not represent the wider community. However, the perspectives expressed by this sample will certainly contribute to our knowledge of older adults' understanding of physical activity.

4.5 Conclusions

With a rapidly ageing population it is important to understand the issues concerning physical activity for older people. The quality and depth of the information provided on the health benefits of physical activity currently being delivered to older adults should be reassessed. Specific and prescriptive information may assist some older people to become more active.

Pain is considered a major barrier to physical activity. Health professionals play a key role in relating the value of physical activity for pain management and maintaining function. Conversely, proper pain management would encourage older adults to be more active. Therefore, it is vital for health professionals to receive support and training in this area.

Finally, the expressed desires for involvement in various types of physical activity should be acknowledged, as well as the feasibility of developing a range of modified activity types suitable for older adults. An increased focus on making physical activity a joyful experience would increase participation. Physical activity must become the 'norm' so that older people feel supported in their pursuits.

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References

1. O'Brien Cousins S, Gillis M. "Just do it... before you talk yourself out of it": the self-talk of adults thinking about physical activity. Psychology of Sport and Exercise, 2005; 6(3): 313-334.
2. McAuley E, Jerome G, Elavsky S, Marquez D, Ramsey S. Predicting long term maintenance of physical activity in older adults. Preventive Medicine, 2003; 37: 110-118.
3. Matsudo S, Matsudo V, Andrade D, Araugo T etal. Physical activity promotion: Experiences and evaluation of the Agita Sao Paulo program using the ecological mobile model. Journal of Physical Activity and Health, 2004 (1): 81-97.
4. Glanz K, Rimer B, Lewis F. Health behavior and health education: theory, research and practice. 3rd ed. San Francisco: Jossey-Bass; 2002.
5. Bandura A. Self efficacy: the exercise of control. New York: Freeman; 1997.
6. McNeill L, Kreuter M, Subramanian S. Social environment and physical activity: A review of concepts and evidence. Social Science and Medicine, 2006; 63: 1011-1022.
7. Singh N. Exercise comes of age: rationale and recommendations for a geriatric exercise prescription. Journal of Gerontology, 2002; 57A(5): M262-M282.

8. Bauman A. Updating the evidence that physical activity is good for health: an epidemiological review 2000-2003. Journal of Science and Medicine in Sport, 2004;7(1 suppl): 6-19.

9. Jonker J, De Laet, C. Franco, O, Peeters, A, Mackenbach, J, Nusselder, W,. Physical activity and life expectancy with and without diabetes. Diabetes Care, 2006; Jan 29(1): 39-43.

10. Harris A, Cronkite, R, Moss, R. Physical activity, exercise coping, and depression in a 10 year cohort study of depressed patients. Journal of Affective Disorders, 2006; 93: 79-95.

11. Cyarto E, Moorhead G, Brown W. Updating the evidence relating to physical activity intervention studies in older people. Journal of Science and Medicine in Sport, 2004; 7(1): 30-38.

12. Melzer I, Benjuya N, Kaplanski J. Effects of regular walking on postural stability in the elderly. Gerontology, 2003; 49(4): 240-245.

13. Allender S, Cowburn G, Foster C. Understanding participation in sport and physical activity among children and adults: a review of qualitative studies. Health Education Research, 2006; 21(6): 826-835.

14. Schutzer K, Graves S. Barriers and motivation to exercise in older adults. Preventive Medicine, 2004; 39: 1056-1061.

15. O'Brien Cousins S. "My heart couldn't take it": Older women's beliefs about exercise benefits and risks. Journal of Gerontology, 2000; 55B(5): P283-P294.

16. Godin G, Desharnais R, Valois P, Jobin J, Bradet R. Differences in perceived barriers to exercise between high and low intenders: Observations among different populations. American Journal of Health Promotion, 1994; 8(4): 279-285.

17. Boyette L, Lloyd A, Boyette J. et al. Personal characteristics that influence exercise behaviour of older adults. Journal of Rehabilitation and Research and Development, 2002; 39(1): 95-103.

18. Martin K, Sinden A. Who will stay and who will go? A review of older adults' adherence to randomised controlled trials of exercise. Journal of Aging and Physical Activity, 2001; 9(2): 91-114.

19. Cohen-Mansfield J, Marx M, Guralnik J. Motivators and barriers to exercise in an older community dwelling population. Journal of Aging and Physical Activity, 2003; 11: 242-253.

20. Crombie I, Irvine L, Williams B. et al. Why older people do not participate in leisure time physical activity: A survey of activity levels, beliefs and deterrents. Age and Aging, 2004; 33: 287-292.

21. Booth M, Bauman A, Owen N, Gore C. Physical activity preferences, preferred sources of assistance, and perceived barriers to increased activity among physically inactive Australians. Preventive Medicine, 1997; 26: 131-137.

22. Australian Sports Commission. Participation in exercise, recreation and sport annual report 2003; 2003.

23. Thurston M, Green K. Adherence to exercise in later life: how can exercise on prescription programmes be made more effective? Health Promotion International, 2004; 19(3): 379-387.

24. Salmon J, Owen N, Crawford D, Bauman A, Sallis J. Physical activity and sedentary behaviour: A population based study of barriers, enjoyment, and preference. Health Psychology, 2003; 22(2): 178-188.

25. O'Brien Cousins S. Elderly tomboys? sources of self-efficacy for physical activity in late life. Journal of Aging and Physical Activity 1997; 5: 229-243.

26. Australian Bureau of Statistics. Census of population and housing: socio-economic indexes for areas (SEIFA) 1996, information paper. Canberra: ABS; 1998.

27. Department of Health and Aged Care. An active way to better health: n ational physical activity guidelines for Adults. Canberra: Australian Government; 1999.

28. QSR International Pty Ltd. NVivo 7. 2006.

29. Australian Bureau of Statistics. National Health Survey: 2004-2005; 2006. Report No: 4364.0.

30. Chogahara M, O'Brien Cousins S, Wankel L. Social influences on physical activity in older adults: A review. Journal of Aging and Physical Activity, 1998; 6: 1-17.

31. Clark D. Identifying psychological, physiological, and environmental barriers and facilitators to exercise among older low income adults. Journal of Clinical Geropsychology, 1999; 5(1): 51-62.

32. Stahl T, Rutten A, Nutbeam D. et al. The importance of the social environment for physically active lifestyle - results from an international study. Social Science and Medicine, 2001; 52: 1-10.

33. Hayslip B, Weigand D, Weinberg R, Richardson P, Jackson A. The development of new scales for assessing health belief model constructs in adulthood. Journal of Aging and Physical Activity, 1996; 4(4): 307-323.

CHAPTER 5

Effective recruitment and retention of older adults in physical activity research: PALS study

Effective recruitment and retention of older adults in physical activity research: PALS study

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Objectives: To develop strategies to recruit and retain inactive older adults into a physical activity program. Methods: Names of 7378 older adults were obtained from 60 neighborhoods. Then, 6401 potential subjects were matched to telephone numbers and phoned. Subjects meeting the screening criteria were invited to join the program (n = 4209). Walk leaders and social support were used to enhance retention. Results: Five hundred seventy-three subjects were recruited (260 intervention and 313 control). The respective participation rate was 12.6% (260/2056) and 14.5% (313/2153), with low attrition of 31.9% (83/260) and 24.6% (77/313). Conclusion: Effective recruitment and retention strategies were identified.

Key words: recruitment; intervention; physical activity, older adults

5.1 Introduction

There is overwhelming evidence demonstrating the risk reduction of all cause mortality in those achieving recommended levels of at least moderate-intensity physical activity on most days of the week, when compared to those who are inactive or sedentary.[1-5] These benefits are particularly pronounced in older women.[2] An estimated half of all physical decline associated with age is preventable if adequate levels of physical activity are maintained.[6]

Recruitment into physical activity programs presents many challenges. There is a reasonable amount of literature on program participation and outcome, but reports on effective means of recruiting older participants into intervention programs are scarce.[7] Even though the success of intervention research depends on the recruitment and retention, few researchers elaborate on recruitment experiences, thereby making it difficult to determine successful and unsuccessful strategies. This is despite the fact that often a great deal of the budget is allocated to recruitment, with estimates being in the range of 6% to 46% of the project's total direct costs.[8]

Recruiting is time-consuming and expensive, with the number of older adults agreeing to participate in a study generally being significantly lower than younger adults.[9] Studies investigating participation in research have found that older adults who refuse to take part tend to be older, male, and come from lower socio-economic groups.[10] Conversely, those who agree to participate appear to be generally younger, more highly educated, and more likely to report healthier patterns.[11]

When designing intervention research, investigators need to consider barriers to initial recruitment, as well as factors that affect early attrition.[12] King and colleagues[13] divided factors affecting recruitment attrition into three categories: person-based factors,

environmental factors, and program intervention factors. The barriers contained in each of these categories need to be considered and where possible addressed, such as the need for participants to understand the program,[14] and the program organizers need to consider the commitments of participants. The program's frequency, intensity, and duration must be appropriate for the participants, with the friendliness of the instructor and consistency of instruction being of great importance.[15] The use of incentives, provision of regular feedback, and instruction on rating of perceived exertion during exercise are also acknowledged as imperative.[16] The environment needs to be supportive with consideration given to location, access, and cost.[5]

Mills and colleagues[17] suggested that the characteristics of the recruitment strategy and the intervention are the most influential factors affecting participation in physical activity programs. Therefore, such programs can benefit from a better understanding of how to effectively recruit older people into programs.[18] This paper describes the effective recruitment strategies used by the Perth Active Living Seniors Project (PALS), a randomized controlled trial of a neighborhood-based walking program for insufficiently active older adults aged 65 to 75 years. Some discussion is also included on strategies adopted to minimize subject attrition.

5.2 Methods

5.2.1 Neighborhood selection

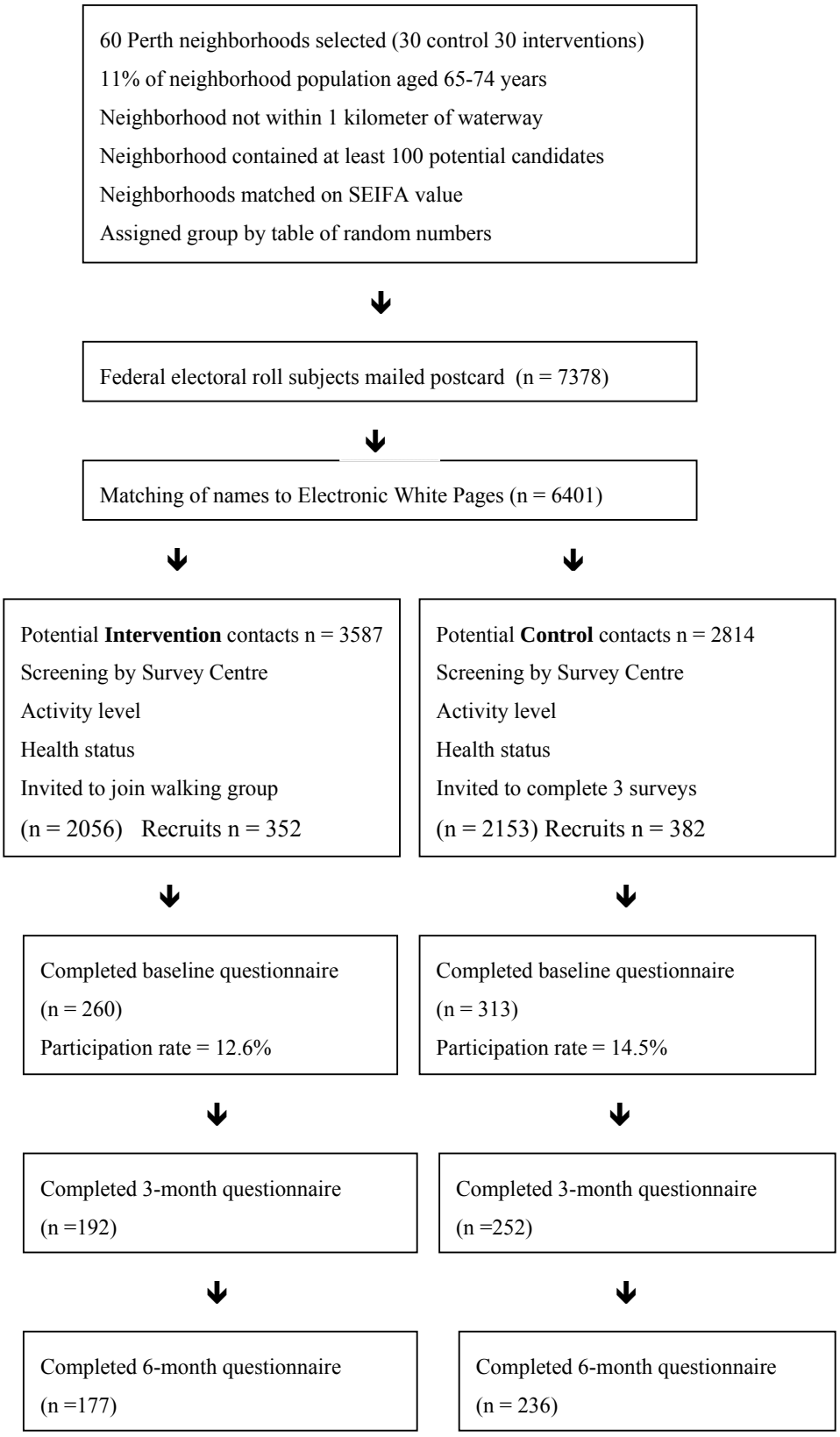
Following a stratified quasi-random sampling frame, 60 Perth metropolitan neighborhoods were selected from a pool of 388 neighborhoods within the greater metropolitan area of Perth, the capital of Western Australia, a city with a population of 1.4 million people.[19] Selection criteria were as follows: (1) the population was composed of at least 11% of older adults aged 65 years and above, reflecting the State average;[20] (2) the neighborhood contained at least 100 people aged 65 years, to ensure a

large enough sample size for matching of telephone numbers to the electronic white pages; and (3) the neighborhood was not within one kilometer of a waterway, namely a river or beach, to minimize "coastal effects" on physical activity.[21] Distance was calculated based on a geographical information system. Using the Socio-Economic Index for Area (SEIFA),[22] a value derived from income, educational attainment, employment status, and skill level, neighborhoods were arbitrarily matched for low, medium and high levels of socioeconomic status. The 60 neighborhoods were then assigned to either the intervention group (n=30) or the control group (n=30) using a table of random numbers.

5.2.2 Subject selection

Permission was sought from the Australian Electoral Commission for access to the Federal Electoral Roll (FER). (The FER provides a comprehensive pool of potential subjects, as all Australian residents must be registered). Approval for use of this data is only given for legitimate health research. The FER provides an up-to-date list of people and contains information on place of residence and age. From the FER a sample of 7378 potential subjects were randomly generated from the 60 neighborhoods. Our pilot study suggested that approximately 120 subjects per neighborhood would be needed to recruit 12 to 15 older adults per neighborhood. Equal numbers of older adults aged 65 to 69 years and 70 to 74 years were generated. The pool of potential subjects was then matched to the Perth Electronic White Pages by a survey center specializing in health research. This telephone matching had an 85% success rate in identifying potential telephone contacts. The process resulted in 6401 names of which 3587 were allocated to the intervention group and 2814 to the control group for telephone recruitment (Figure 5.1).

Figure 5.1 Summary of recruitment process



5.2.3 Recruitment procedure

Potential participants were sent a postcard explaining that their name had been randomly selected for potential involvement in a health project that would consist of either a 6-month walking program or the completion of a number of health status questionnaires. The postcard detailed who were the investigators and that a researcher may call within the next 2 weeks. Trained recruiters phoned potential participants and established eligibility and informed consent, following the postcard invitations. Prospective subjects were required to meet the following 3 criteria: (1) be aged 65 to 75 years; (2) be "insufficiently active", defined as not achieving 30 minutes of moderate physical activity on at least 5 days per week, according to the Australian National Physical Activity Guidelines;[23] and (3) be healthy to the extent that participation in a low-stress walking program would not place them at risk or exacerbate any existing health condition. In view of the correlation between self-reported health and actual health,[24] potential subjects were excluded if they believed the walking program would adversely affect their health, based on the question "Do you have any medical conditions that would make it dangerous for you to do moderate walking twice per week?"

A maximum of 6 call-backs were made if residents were unable to be reached. During telephoning, 56 subjects in the "walk" neighborhoods requested time to consider their commitment. The names of these potential subjects were recorded, and they were contacted a few days later with 50% deciding to join. Seven hundred and thirty-four subjects initially agreed to participate (352 for intervention, 382 for control; see Table 5.1). On average, 9 phone contacts were required to recruit one intervention subject but only 5 contacts for a control. All participants gave their informed consent, and ethical approval was obtained from the human research ethics committee of the researchers' institution.

Table 5.1 Phone recruitment outcomes

Outcomes	**Intervention**		**Control**		**Total**	
Total sample	3587		2814		6401	
	n	%	n	%	n	%
Generated but not required*	303	8.45	492	17.48	795	12.42
Deceased	6	0.17	9	0.32	15	0.23
Screening questions						
Sufficiently Active *	1121	31.25	510	18.12		
Not Healthy Enough*	410	11.43	151	5.37		
Quota full for neighborhoods*	170	4.74	272	9.66	442	6.91
Refused at phone screening*	297	8.28	93	3.31		
Refused in survey*	329	9.17	79	2.80		
Other reasons						
No answer*	311	8.67	647	22.99		
Phone disconnected	63	1.75	65	2.31		
Not correct age*	53	1.48	12	0.43		
Engaged*	2	0.06	13	0.46		
Fax (not phone)	8	0.22	1	0.04		
Language (not English)	85	2.37	70	2.49		
Unable to contact	25	0.70				
Absence *	48	1.34	17	0.60		
Business phone number	4	0.11	1	0.04		
Initially Recruited*	352		382		734	

Note * P<0.01

A walk leader was appointed to each intervention neighborhood group, whose first task was to phone subjects recruited within that group to establish preferred times and days to meet. A total of 161 recruited subjects decided not to join the walking groups, resulting in 2 neighborhoods' losing 75% of their subjects. A variety of reasons were given and are summarized in Table 5.2. The loss made it difficult for these 2 walking groups to operate, with one group failing. The final 573 participants with mean age 70 years (SD 2.89) completed the baseline questionnaire and thereby technically entered the program. A small incentive was offered to encourage completion of the questionnaire - an opportunity to win gift vouchers from a large variety store.

Table 5.2 Reasons for not commencing intervention

Reasons	**n = 161**	**%**
Too busy	57	35
Walks too early	23	14
Illness	22	14
Caring husband/relative/grandchild	12	8
Injury	11	7
No reason	10	6
Don't like questionnaire	8	5
Unsure	7	4
Can't be bothered	5	3
Away a lot	3	2
Not recommended by GP	2	1.2
Relative staying	1	0.8

The cost of recruitment for each of the 573 subjects was estimated as $30, with the total cost being A$16 967, which included the cost of the electoral roll compact disc ($287), postage and postcards ($3022), telephone recruitment and screening ($8602), incentives ($200), newspaper advertisement ($256), and project staff time ($4600).

5.2.4 The intervention neighborhoods

The 6-month prescriptive walking intervention, designed by an exercise gerontologist, commenced at a very low level and provided a graduated and standardized program for the previously inactive older adults. The program was led by the walk leader and started with 10 minutes of low-intensity walking, building up to 45 minutes of walking and increasing in intensity level over the 6-month period. The program included balance, strength, and flexibility components. The groups met twice per week, were locally based for easy access, and involved minimal transport costs, which aimed to enhance a sense of community and safety for the participants.

These walk leaders were health science or physiotherapy students who were required to undertake a comprehensive training program and possess a reference supporting their suitability. All walk leaders were volunteers similar in age. They offered expert advice, reassurance, encouragement, feedback, education in a range of health areas, and information on skills, such as rating of perceived exertion with exercise. They also followed up on non-attendance and provided a critical link between researchers and subjects. All participants also received non-monetary incentives, such as Christmas cards and small gifts as well as attractive educational material and a walker's newsletter. Enhancement of social support was a planned component of the program, which aimed to reduce the attrition rate of subjects.

5.2.5 The control neighborhoods

The control neighborhoods received no program materials. They completed the questionnaires at the same time as the intervention neighborhoods and were provided with incentives for questionnaire completion.

5.2.6 Statistical analysis

All data were screened, and outlying entries were confirmed prior to statistical analysis. Descriptive statistics were used to summarize participant characteristics, and univariate statistics including chi-square and t tests were applied to the data. All statistical analyses were undertaken using the SPSS for Windows package version 11.

5.3 Results and discussion

5.3.1 Sample representation

The sample recruited to the PALS study was reasonably representative of the Western Australian population between 65 and 74 years of age (Table 5.3). However, there were more females (63%) than males (37%). Males have been shown to be more resistant to recruitment into research studies[25] and into walking programs in particular, with data indicating that more females walk for recreation and transport[26, 27]. Interestingly, the PALS study attracted a greater proportion of "obese" older adults (27%) relative to the state average and when compared to the controls ($P<0.05$). This is in contrast to previous findings that research tends to recruit healthier individuals[28].

Studies that have included older minority groups have generally concluded that ethnicity has no significant bearing on exercise participation once other factors such as health status, exercise beliefs, and demographic characteristics are taken into account.[25] The PALS study obtained a higher representation of overseas born people than the state average, even though the phone recruitment indicated that 2.4% (n=155) of people contacted were ineligible due to a language barrier. Fortunately, the vast majority of Western Australians (84%) speak English at home.[20]

Previous research has found that it is more difficult to recruit less educated people into health research programs.[10, 25] To overcome the problem, the PALS program ensured that recruitment was conducted equally in high, medium, and low socio-economic status neighborhoods according to SEIFA values. It also attempted to reduce self-selection by minimizing the use of advertisements.[28] Nevertheless, the PALS group still consisted of a larger proportion (27%) of tertiary educated people when compared to the state average (8%).

Table 5.3 Demographics by walkers and controls

	Walkers		Controls		Total		WA
	%	n	%	n	%	n	%
Gender							
Male	33	(86)	41	(127)	37	(213)	45[20]
Female	67	(174)	59	(186)	63	(360)	55
Age							
60s	50	(130)	51	(160)	51	(290)	
70s	50	(130)	50	(153)	50	(283)	
BMI*							
Acceptable	23	(60)	34	(106)	29	(166)	39[32]
Overweight	45	(117)	43	(136)	44	(253)	44
Obese	32	(83)	23	(71)	27	(154)	16
Education Level							
Primary	12	(30)	13	(40)	12	(70)	28[33]
Secondary	59	(153)	62	(195)	61	(348)	64
Tertiary	29	(77)	25	(78)	27	(155)	8
Relationship status							
Partner							
No partner	67	(173)	71	(223)	69	(369)	70[34]
	33	(87)	29	(90)	31	(177)	30
Country of birth							
Australia	67	(174)	59	(185)	63	(359)	67[35]
Non Australian	33	(86)	41	(128)	37	(214)	33
SEIFA Value							
Low	33	(86)	32	(102)	33	(188)	
Medium	32	(84)	32	(100)	32	(184)	
High	35	(90)	36	(111)	35	(201)	

* P=0.01

5.3.2 Cost-effectiveness of the recruitment approach

Evidence related to recruitment processes and specifically numbers associated with recruitment are scant. Rowland et al[7] and Warren-Findlow et al[15] reported their recruitment process and described the original pool of potential subjects as well as the final number of subjects recruited. The recruitment process of Rowland et al[7] was similar to that of PALS but less efficient, with only 1% of the original sample being recruited. PALS successfully recruited 12.6% for the intervention group and 14.5% for the control group. PALS actively recruited from a community-based population that had not been involved in a physical activity program.

The PALS study employed a recruitment procedure that facilitated the selection of a reasonably representative sample of older people. First, by being able to access the FER, the correct age group was directly targeted, thus reducing the number of phone contacts needed. It took approximately 9 calls to recruit an intervention subject and 5 calls per control subject. These results were favorable when compared to the recruitment of Rowland et al,[7] which required an average of 5 phone calls to speak to a live person and an additional 14.5 calls to speak to a person aged over 65 years. Further calculations revealed that the recruitment of one intervention subject required 101 phone calls, whereas securing a control subject required 83 calls.

The relatively few number of phone contacts made had a positive effect on the budget with the cost per recruit estimated at only A$30. The PALS procedure was more cost-effective than other studies, which reported recruitment costs ranging from $50 to over $900, and some studies spending in excess of $300 per participant recruited.[8]

The use of postcards to provide background information about the project and to forewarn individuals of the subsequent phone call was also beneficial to recruitment.

It enabled potential recruits to be aware of the reason for the phone call in advance, and to be assured of the program's legitimacy. It also provided an opportunity for subjects to contact the researchers and assess the project's credibility prior to anyone's contacting them. This method has previously been found to be successful in increasing response rates[29,30] and is relatively inexpensive.

Experienced research staff, well versed in health issues, conducted the telephone recruitment. The staff members provided additional information to potential recruits who were deliberating whether to join the program and followed up these nondeciders with a second phone contact. Phone coverage in Australia is widespread with 94.5% of the population having a telephone in their home,[31] thereby limiting selection bias by telephone recruitment.

By the end of the 6-month walking program, only 32% of the intervention group and 25% of the control group had dropped out (a dropout is a subject who did not complete the posttest) resulting in an overall dropout rate of 28%. Although the control group had a lower attrition rate than the intervention group, the difference was not statistically significant but rather marginal (P=0.052). The difference was understandable considering the demands placed on each group. The intervention group had to commit to the prescribed walking program for 6 months, whereas the controls were only required to complete 3 questionnaires over a 6-month period. When the demographic characteristics of those intervention subjects who dropped out of the program and those who remained were compared, the 2 groups were similar with respect to age, gender, education level, relationship status, and country of birth. However, significant differences were found in terms of body mass index ($P<0.05$) and SEIFA ($P<0.01$).

Subjects were encouraged by the walk leader to attend both sessions each week and considered to be in the program if they were walking at least once per week at the end of

the program. Of those 177 walkers who stayed with the program, their attendance was reasonable, with the majority of participants (93%) attending at least half of the sessions, while 70% attended at least 85% of the sessions over the 6-month period. The attendance rates demonstrated the commitment of individuals upon agreement to participate in the program. This cohort comprised individuals who were predominantly retired, mobile, and with reduced family responsibilities. "Holidays" was cited as the main reason (n = 67) for not attending walking sessions. Other reasons for not attending included illness (n = 52), family commitments (n = 40), "slept-in" (n = 27), injury (n = 23), and work commitments (n = 11). These reasons appear to be valid and not easily prevented.

The provision of trained walk leaders who accompanied each walking group was our main strategy to minimize attrition in the intervention group. The walkers indicated that it was their walk leader (n = 43) and the companionship (n = 49) that they liked most about PALS. The vast majority of walkers (> 99%) strongly agreed or agreed that their walk leader was "encouraging," "gave helpful guidance," and "treated everyone as an individual," with all other responses being positive. Evaluation of the walk leaders indicated that they had a high level of commitment to the program, as well as having attributes well suited to deal with older adults. The age or background of these volunteers had no impact on the outcome of the walking group.

5.3.3 Limitations and recommendations

The PALS program was less successful in recruiting and retaining male subjects. Future research is required to identify physical activity programs that appeal to men. Experimentation around activities that are more goal orientated, challenging, and competitive or that utilize traditional sporting equipment should be considered. In addition, 161 potential subjects changed their mind and dropped out of the program prior to the first scheduled walking session. Although failure to turn up is difficult to prevent, over recruitment is one possibility to rectify the problem. A "cooling-off" period, by

following up recruits a few days later by phone to confirm their involvement, may be another strategy worth considering. However, these will increase the cost of recruitment.

In retrospect, data concerning health status of subjects and their medication usage could provide further insight. Due to time and financial constraints and the desire not to focus on ill health, such information was not collected.

5.4 Conclusions

Recruiting older adults into physical activity programs involves a great deal of effort. The recruitment method used by the PALS program was cost-effective and relatively efficient. The Australian Federal Electoral Roll provided a comprehensive database from which to randomly select a representative sample of potential subjects. The use of postcards was an excellent way to provide background information to potential subjects, establish program credibility, and prepare them for the impending telephone invitation to join the project.

Several factors within the program design contributed to the retention of participants. First, the walk leaders played a key role in creating a sense of belonging within each walking group. The volunteer leaders were enthusiastic and committed to the project and had sufficient training that enabled them to competently deliver the education components. Second, the physical activity program was graduated and varied, creating challenges that produced a sense of achievement. Walkers also received regular feedback so that progress could be monitored. Finally, having the program based within the walkers' neighborhood contributed to the cohesiveness of the group and commitment to the program.

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References

1. Lee I, Skerrett, P. Physical activity and all-cause mortality: what is the dose-response relation? *Med Sci Sports and Exer*. 2001;33(6):s459-s471.

2. Anderson L, Schnohr, P, Schroll, et al. All-cause mortality associated with physical activity during leisure time, work, sports, and cycling to work. *Arch Intern Med*. 2000;160(11):1621-1628.

3. Crespo C, Palmieri M, Perdomo R, et al. The relationship of physical activity and body weight with all-cause mortality: Results from the Puerto Rico heart health program. *Ann Epidemiol*. 2002;12(8):543-552.

4. Wannamethee S, Shaper A, Walker M. Physical activity and mortality in older men with diagnosed coronary heart disease. *Circulation* 2000;102(12):1358-1363.

5. Nies A, Chruscial MA, Hepworth JT. An intervention to promote walking in sedentary women in the community. *Am J Health Behav*. 2003;27(5):524-535.

6. O'Brien Cousins S. Grounding theory in self-referent thinking: conceptualizing motivation for older adult physical activity. *Psychology of Sport and Exercise* 2003;4:81-100.

7. Rowland R, Fisher K, Green M, et al. Recruiting inactive older adults to a neighbourhood walking trial: The SHAPE project. *Journal of Aging Studies* 2004;18(3):353-368.

8. Ory M, Lipman P, Karlen P, et al. Recruitment of older participants in frailty/injury prevention studies. *Prev Sci*. 2002;3(1):1-22.

9. Ballard E, Nash F, Raiford K, et al. Recruitment of black elderly for clinical research studies of dementia: The CERAD experience. *Gerontologist* 1993;33(4):561-565.

10. Wilson A, Webber I. Attrition in a longitudinal study of an aged population. *Exp Aging Res*. 1976;2(5):367-387.

11. O'Neill T, Marsden, D, Silman, A. Differences in the characteristics of responders and non-responders in a prevalence survey of vertebral osteoporosis. *Osteoporos Int*. 1995;(5):327-334.

12. Preloran H, Browner C, Lieber E. Strategies for motivating Latino couples' participation in qualitative health research and their effects on sample construction. *Am J Public Health*. 2001;91(11):1832-1841.

13. King A, Blair S, Bild D, et al. Determinants of physical activity and interventions in adults. *Med Sci Sports Exer*. 1992;26(6):S221-S236.

14. Souder J. The consumer approach to recruitment of elder subjects. *Nurs Res*. 1992;41(5):314-316.

15. Warren-Findlow J, Prohaska T, Freedman D. Challenges and opportunities in recruiting and retaining underrepresented populations into health promotion research. *Gerontologist*. 2003;43:37-46.

16. Petosa Rl, Suminski R, Hortz R. Predicting vigorous physical activity using social cognitive theory. *Am J Health Behav*. 2003;27(4):301-310.

17. Mills K, Stewart A, McLellan B, et al. Evaluation of enrollment bias in a physical-activity-promotion program for seniors. *J Aging Phy Act*. 2001;9(4):398-413.

18. King A, Rejeski W, Buchner D. Physical activity interventions targeting older adults: a critical review and recommendations. *Am J Prev Med*. 1998;15(4):316-333.

19. Australian Bureau of Statistics (ABS). Population by age and sex, Western Australia 2003-4. AS catalogue no. 3235.5.55.001. Canberra: Australian Government Publishing Service, 2004.

20. Australian Bureau of Statistics (ABS). 2001 census of basic community profile and snapshot. Canberra: Australian Government Publishing Service, 2001.

21. Bauman A, Smith B, Stoker L, Booth M. Geographical influences upon physical activity participation: Evidence of a 'coastal effect'. *Aust NZ J Public Health*. 1999;23(3):322-324.

22. Australian Bureau of Statistics (ABS). 1996 census of population and housing: socio-economic indexes for areas (SEIFA) 1996, information paper. Canberra: Australian Government Publishing Service, 1998.

23. Department of Health and Aging. An active way to better health: National physical activity guidelines for adults. Canberra: Australian Government Publishing Service, 1999.

24. Ware J, Kosinski M, Keller S. A 12-item short-form health survey. *Medical Care* 1996;34(3):220-233.

25. Arean P, Gallagher-Thompson, D. Issues and recommendations for the recruitment and retention of older ethnic minority adults into clinical research. J *Consult Clin Psychol*. 1996;64(5):875-880.

26. Bull F, Milligan R, Rosenberg M, et al. Physical activity levels of Western Australian adults 1999. Perth: Health Department of Western Australia and Sport and Recreation Way2Go, Western Australian Government, Perth: Western Australia; 2000.

27. McCormack G, Milligan R, Giles-Corti B, et al Physical activity levels of Western Australian Adults 2002: results from the adult physical activity survey and pedometer study. Perth, Western Australia: Western Australian Government; 2003.

28. Klesges R, Williamson J, Somes G, et al. A population comparison of participants and nonparticipants in a health survey. *Am J Public Health*. 1999;89(8):1228-1231.

29. Iredell H, Shaw T, Howat P, et al. Introductory postcards: do they increase response rate in a telephone survey of older persons? *Health Ed Res*. 2004;19(2):1-6.

30. Adamson L, Chojenta, C, Lee, C. Telephone contact of existing participants in longitudinal surveys. *Aust NZ J Public Health*. 2005;29(2):188-189.

31. Australian Bureau of Statistics (ABS). Household telephone connection, Australia. ABS catalogue no. 4110.0. Canberra: Australia Government Publishing Service, 1991.

32. Getting Western Australians more active - A strategic direction report from the premier's physical activity taskforce. Perth, Western Australia: Department of the Premier and Cabinet; 2001.

33. Australian Bureau of Statistics (ABS). 2001 Usual residents profile community profile series - usual resident profile: Western Australia. ABS catalogue no. 2004.0. Canberra: Australian Goernment Publishing Service, 2003.

34. Australian Bureau of Statistics (ABS). 2001 community profile series-usual resident profile. Western Australia, ABS catalogue no. 2003.0 Canberra: Australian Government Publishing Service, 2003.

35. Australian Bureau of Statistics (ABS). Australian social trends 2002: Population, population composition: Older overseas-born Australians. Canberra: Australian Government Publishing Services, 2002

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CHAPTER 6

Reducing attrition in physical activity programs for older adults

Reducing attrition in physical activity programs for older adults

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This study investigated attrition in a 6-month physical activity intervention for older adults. The program was based on the social cognitive theory incorporating self-efficacy factors. Two hundred and forty-eight insufficiently active 65 to 74 year olds were recruited from the Australian Federal Electoral Roll. The intervention comprised of walking, strength and flexibility exercises and was conducted in 30 local neighborhoods where participants resided. Characteristics of individuals lost to attrition (n=86, 35%) were compared with program completers (n=162, 65%). Logistic regression analysis showed that those lost to attrition came from areas of lower socio-economic status, were overweight and less physically active, and had a lower walking self-efficacy score and a higher loneliness score. The results suggest that early assessment of these characteristics should be undertaken to identify individuals at risk of attrition, to improve retention and to avoid potential bias.

Key words: attrition, intervention, older people, physical activity

6.1 Introduction

It is estimated half of all physical decline associated with aging is preventable if adequate levels of physical activity are maintained (O'Brien Cousins, 2003). Industrialized societies seem to disregard this compelling evidence and continue to be attracted to an inactive lifestyle, especially in the older age groups (Bauman, Bellew, Vita, Brown, & Owen, 2002; Resnick, 2001). This increase in inactivity among older people is associated with potential adverse health affects (Anderson, Schnohr, Schroll, & Hein, 2000; Crespo et al., 2002; Lee & Skerratt, 2001; Wannamethee, Shaper, & Walker, 2000) and has resulted in an increased focus on encouraging and maintaining physical activity in the burgeoning older population.

Studies attempting to identify and understand factors associated with physical activity have been limited, especially with respect to longitudinal data (Wanzhu, Stump, Damush, & Clark, 2004). Intervention programs aimed at mobilizing older populations and understanding associated factors have been variable, with reported attrition rates ranging from 22% to 76% within the first year of starting a new program (Prohaska, Peters, & Warren, 2000; Schmidt, Gruman, King, & Wolfson, 2000) and the greatest number of drop outs occurring in the first 3 months (Schmidt et al., 2000). In previous studies of sedentary older age groups, approximately 50% drop out within the first 6 months of involvement (Dishman, 1994; Ettinger et al., 1997; Resnick & Spellbring, 2000), suggesting that older adults are particularly susceptible to exercise attrition (Prohaska et al.).

The social cognitive approach to understanding physical activity by older adults provided the conceptual framework for this Perth Active Living Seniors (PALS) study. Social Cognitive Theory (SCT) defines human behavior as a dynamic interaction of personal factors, behavior, and the environment, although all forces are not necessarily of equal strength (Bandura, 1986). From the SCT perspective, people are not driven solely by inner forces and are not automatically shaped or controlled by external influences. Rather, human behavior can be explained by reciprocal

determinism, which involves human behavior, cognitive and other personal factors and environmental events all operating as interacting determinants of each other (Bandura, 1997). SCT hypothesized that all behavioral changes are mediated by the cognitive mechanism termed self-efficacy and suggested that it is behavior specific (Bandura, 1986, 1997).

Self-efficacy refers to an individual's belief in his or her capabilities to carry out a specific course of action and has been identified as an important predictor of exercise adoption and maintenance (Bandura, 1986). Self-efficacy is theorized to influence one's choice of activity, the effort expended and persistence (Bandura, 1986; McAuley & Mihalko, 2003; Resnick & Spellbring, 2000). It is recognized to decrease with age (Resnick, Palmer, Jenkins, & Spellbring, 2000) and links to personal well-being (Bandura, 1997). According to SCT, successful participation in regular exercise activity should serve to enhance the perception of physical capabilities, consequently enhancing psychological and emotional well-being (Mihalko & McAuley, 1996; Treasure & Newberry, 1998). On the other hand, a person's mood may influence his or her perception of self-efficacy, with a low mood disturbance and better overall mental health being associated with greater self-efficacy (Resnick, 2001).

According to King et al. (1992), factors affecting program attrition can be divided into three categories: environmental factors, program intervention factors and person-based factors. Person-based factors include demographics and individual perception and beliefs about exercise. Environmental factors include both the physical and social environment, such as social support and where the program is set. Program factors encompass program design, recruitment processes, and inclusion and exclusion criteria.

Although the design of a program (Mills et al., 2001) and to a certain extent the physical environment in which the program is set can be controlled by the investigators, serious consideration during the planning phase is required (Preloran, Browner, & Lieber, 2001) to ensure that attrition is minimized. The intervention program should be easy to access, with the cost being within reach of participants (Corti et al., 1995; Godin, Desharnais, Valois, Jobin, & Bradet, 1994; Souder, 1992). The participants need to understand the program (Souder), and the program organizers need to understand the commitments of participants. In addition, the program's frequency, intensity and duration should be appropriate for the participants, with friendly instructors, consistency of instruction and peer support provided (Corti et al.; Dishman, 1994; Warren-Findlow, Prohaska, & Freedman, 2003).

The social environment such as friends and family has been consistently found to influence participation in physical activity (Chogahara, O'Brien Cousins & Wankel, 1998; Clark, 1999; Sallis, Bauman & Pratt, 1998; Stahl et al., 2001). Older people, however, generally receive less encouragement from others regarding their exercise habits (Hayslip, Weigand, Weinberg, Richardson, & Jackson, 1996). This is of particular concern, because support may be of greater importance to older adults (Chogahara,et al.). There is also evidence suggesting that the reception and effect of social support is mediated by one's degree of self-efficacy (McAuley, Jerome, Elavsky, Marquez, & Ramsey, 2003). Social support and inculcated values have been shown to be significant predictors of exercise later in life (O'Brien Cousins, 2003).

Person-based determinants associated with physical activity are broad and varied for older adults. For example, overweight adults are less likely to stay with a vigorous physical activity program (Dishman, 1991), and lower education levels have been linked to attrition (Jacomb, Jorm, Korten, Christensen, & Henderson, 2002; Van Beijsterveldt et al., 2002), along with being older (Chatfield, Brayne, & Matthews, 2005; Jacomb et al.,

2002; Van Beijsterveldt et al.) and being separated from one's spouse (Garcia & King, 1991; Martin & Sinden, 2001). Conversely, demographics are found to be inconsistent predictors of adherence (Martin & Sinden). Other reported determinants of attrition are fear of injury and illness (King, Rejeski, & Buchner, 1998), low mental health score (Chatfield et al; Jacomb et al.; Van Beijsterveldt et al.), being less healthy (Chatfield et al.; Van Beijsterveldt et al.), having lower social participation (Chatfield et al.), living alone (Chatfield et al.; Wilson & Webber, 1976), and depression (Martin & Sinden). A review of over 20 randomized controlled trials found that being fitter, having a history of being active and a high exercise self–efficacy were associated with greater adherence (Martin & Sinden). The effect of prior exercise behavior on subsequent exercise behavior has been disregarded, even though it may be a main source of self-efficacy information (McAuley et al., 2003).

Loss of participants from research projects is a serious concern since it can potentially introduce bias and render a study less representative over time. When poor compliance affects statistical power, additional methods are required to recruit participants that can be costly and time-consuming (Martin & Sinden, 2001). Keeping older people in physical-activity-intervention programs can contribute to the understanding of exercise behavior. Moreover, physical activity is seen as an economically attractive health management approach for the aging population (Wanzhu et al., 2004).

Minimizing attrition is known to be critical in physical activity research involving older adults. The PALS study aimed to investigate this issue by identifying factors associated with non-adherence in a neighborhood-based physical activity intervention. It was anticipated that the outcomes would contribute to an improved understanding of older adults' physical activity behavior.

6.2 Methods

6.2.1 Neighborhood selection

Following a stratified quasi-random sampling frame, 60 neighborhoods were selected from a pool of 388 neighborhoods within the greater metropolitan area of Perth, the capital of Western Australia, a city with a population of 1.4 million people. Selection criteria were (a) the neighborhood was composed of at least 11% of older adults 65 years of age or older, reflecting the State average (Australian Bureau of Statistics, 2001); (b) the neighborhood contained at least 100 people age >65 years, to ensure a large enough sample size for matching of telephone numbers to the electronic white pages and; (c) the neighborhood was at least 1 km away from waterways, namely a river or beach, to minimize "coastal effects" on physical activity (Bauman, Smith, Stoker, & Booth, 1999). Distance was calculated via a Geographical Information System. Using the Socioeconomic index for area (SEIFA) (Australian Bureau of Statistics, 1998), a value derived from income, educational attainment, employment status and skill level, neighborhoods were arbitrarily matched for low, medium and high levels of socio-economic status. The neighborhoods were then assigned to either the intervention group or the control group of 30 neighborhoods each using a table of random numbers.

6.2.2 Participant selection

Permission was sought from the Australian Electoral Commission for access to the federal electoral roll, which provides a comprehensive pool of potential participants, as all Australian citizens must be registered. From the roll approximately 120 participants per neighborhood were randomly selected. Equal numbers of 65 to 69 year olds and 70 to 74 year olds were generated. Based on a pilot study this would enable the securing of a sample of 12 to 15 participants per neighborhood. The pool of potential participants was then matched to the Perth Electronic White Pages (a directory of addresses and telephone numbers) by a survey center specializing in health research.

6.2.3 Recruitment procedure

Potential participants were sent a postcard explaining that their name had been randomly selected for potential involvement in a health project that would consist of either a six-month walking program or the completion of three questionnaires. The postcard detailed who was conducting the research and that a researcher may call within the next 2 weeks. Over a 2-week period, trained recruiters telephoned potential participants and established eligibility. Prospective participants were required to meet the following criteria: be aged 65 to 74 years and to be healthy in the sense that participation in a low stress walking program would not place them at risk or exacerbate any existing health condition. A maximum of six call-backs were made. The participants were randomly assigned to the intervention and control groups. Written consent was then sought from each participant. Ethical approval was obtained from the human research ethics committee of the researchers' institution.

6.2.4 Survey instrument

The PALS questionnaire comprised of previously validated instruments. The composite instrument was assessed for face and content validity by an expert panel and two focus groups representative of the target population. A test-retest study was conducted on a sample of 75 participants aged 65-74 years over a two-week period to determine reliability of the questionnaire. Intraclass correlation coefficients (ICCs) and paired sample *t*-tests were used respectively to examine correlations and differences of means between the first and second survey.

The International Physical Activity Questionnaire (IPAQ) has undergone extensive reliability and validity testing and has acceptable measurement properties for use in population studies of physical activity participation (Craig et al., 2003). The instrument

measured frequency and duration of 'walking for recreation', 'walking for transport' and other moderate physical activity. A moderate level of physical activity was chosen because responses from focus group participants indicated such preference to avoid the sensation of a fast beating heart. An explanation of moderate activity preceded the question, which consisted of two parts: "In a usual week how many times do you do moderate physical activity for at least 10 minutes, such as swimming, dancing or cycling?" and "In a usual week what do you estimate is the total time you spend doing these activities?" For IPAQ, overall the ICCs were moderate to high (.58-.94), and no significant differences were found between the first and second survey results (*t*-test *p* ranged from .051 to .595), further supporting the reproducibility of the questionnaire. Levels of physical activity were divided into sufficient and insufficient, with sufficient physical activity being defined as achieving 30 min of moderate physical activity on at least 5 days per week, according to the National Physical Activity Guidelines (Department of Health and Aged Care, 1999).

Walking self-efficacy refers to measures directed at assessing an individual's belief regarding their capabilities to successfully complete incremental bouts of physical activity (McAuley & Mihalko, 2003). The scale consisted of six items measuring the degree of confidence to perform walking over increasing periods of time (in minutes) on a likert scale of 1 to 10. The scores were summed and divided by the number of questions, with a higher score indicating greater walking efficacy. Our test-retest showed that walking self-efficacy was a highly reliable measure (ICC .85, *t*-test *p* .084).

The UCLA Loneliness Scale is an instrument commonly used across a variety of populations, including older people and in mail surveys (Russell, 1996). It measures subjective feelings of loneliness. It draws on the concept of loneliness being unidimensional in structure, assessing both the frequency and intensity of salient aspects and events of the lonely experience. The instrument consists of 20 items. The scale

ranges from *never* to *always*. A higher total score indicates increased loneliness (ICC .72, t-test p .576).

The SEIFA (Australian Bureau of Statistics, 1998) is related to socio-economic aspects of geographic area. The index is obtained by summarizing social and economic characteristics of families and households. It is derived from income, educational attainment, employment status, and skill level.

Self-reported body mass index (BMI) is calculated as weight in kilograms divided by height in meters squared (Cameron et al., 2003). A BMI of 18.5–24.9 kg/m2 were classified as normal weight; 25.0–29.9 kg/m2 were classified as overweight and those exceeding 30.0 kg/m2 were classified as obese. Demographic information sought included gender, age, education level, relationship status, country of birth and perceived financial struggle. Finally, the participants were asked the qualitative questions "What have you liked the most about the PALS Project?" and "What do you think we could do to improve the PALS Project?"

6.2.5 Intervention

The prescriptive walking intervention, designed by an exercise gerontologist, commenced at a very low level. The intervention was conducted over a period of 6 months, providing a graduated program twice per week for insufficiently active older adults. The program contained aerobic activities as well as balance, strength and flexibility components. It was free of charge, locally based for easy access and conducted in attractive and safe environments, thus enhancing a sense of community and safety. Trained walk leaders offered expert advice, reassurance, encouragement, feedback and education in a range of health areas. They also monitored non-attendance and provided a critical link between researchers and participants. All participants received non-monetary

incentives, such as small gifts, a walker's newsletter, as well as attractive educational material. Enhancement of social support, such as organized social gatherings, was a planned component of the program, which aimed to reduce the attrition rate of participants.

6.2.6 Statistical analysis

All data were screened and outlying entries were confirmed and deleted prior to statistical analysis. Univariate statistics including chi-square and t tests were applied to the intervention group data, followed by logistic regression analysis to determine factors affecting attrition of the walking program. Significance levels of 5% and 1% were used for statistical tests. All statistical analyses were undertaken using the SPSS for windows package version 11.

6.2.7 Exit interviews

A sample of 8 participants who had dropped out was purposely chosen from randomly selected neighborhoods within the intervention group to participate in exit interviews. A researcher with experience in interviews and data transcription contacted these participants and sought their approval for the exit interview. After obtaining informed consent, an interview time was arranged, either at the participant's home or at a convenient location. All interviews were conducted and tape-recorded by the same researcher. Each interview took about one 1 hr and focused on reasons for dropping out of the PALS program, how the participant felt about attrition and how the program could be more appealing. The relevant questions asked are provided in the Appendix. Verbatim transcriptions were typed for each interview. Data were analyzed using a thematic analysis approach in order to explore the dialogue for reasons for attrition.

6.3 Results

When potential participants were contacted to determine willingness to be involved in the program, the initial refusal rate for participation was 87.9% (248 recruited out of 2056 contacted) for the intervention group and 85.5% (313 recruited out of 2153 contacted) for the control group. The intervention group comprised of 248 participants, with 162 completing the program and 86 dropping out. This attrition rate of 34.7% was significantly higher ($p < .01$) than the 31.9% reported in the control group. Of those that dropped out of the intervention group, the majority of attrition occurred within the first 3 months (n=66, 77%). Table 6.1 provides the sample descriptive statistics and compares the attrition rates for selected variables of interest in the intervention group. The majority of the intervention group participants were female (66%) and highly educated (30%). The drop outs and completers were similar in demographics, namely, age, gender, education level, relationship status and country of birth. However, significant differences in attrition rates were found with respect to SEIFA ($p < .05$), BMI ($p < .05$) and physical activity level ($p < .01$). The mean walking self-efficacy scores of drop outs (7.45, SD = 2.35) and completers (8.70, SD = 1.57) were significantly different according to two-sample t test ($p < .01$). The mean UCLA loneliness score of drop outs (40.12, SD = 9.59) was also significantly higher ($p < .01$) than that of completers (36.58, SD = 8.87).

Table 6.1 Sample of characteristics and attrition rates, n(%)

Characteristics	Drop outs (n = 86)	All walkers (n=248)	Attrition rate
Age			
66-69 years	45 (52%)	122 (49%)	37%
≥ 70 years	41 (48%)	126 (51%)	33%
Gender			
Female	56 (65%)	163 (66%)	34%
Male	30 (35%)	85 (34%)	35%
Education level			
Primary	14 (16%)	32 (13%)	43%
Secondary	47 (55%)	141 (57%)	33%
Tertiary	25 (29%)	75 (30%)	33%
Relationship status			
Partner	53 (62%)	166 (67%)	32%
No partner	33 (38%)	82 (33%)	40%
Country of birth			
Australian born	54 (63%)	166 (67%)	33%
Non-Australian born	32 (37%)	82 (33%)	39%
SES Area *			
Low	36 (42%)	82 (33%)	44%
Medium	29 (34%)	79 (32%)	37%
High	21 (24%)	87 (35%)	24%
Body mass index*			
Normal	12 (14%)	58 (23%)	21%
Overweight	42 (49%)	111 (45%)	38%
Obese	32 (37%)	79 (32%)	41%
Physical activity**			
Insufficient	61 (71%)	134 (54%)	46%
Sufficient	25 (29%)	114 (46%)	22%

*$p < .05$ **p , .01

Table 6.2 presents logistic regression results of factors affecting attrition, which were measured at baseline. The findings confirm those of the univariate analysis. Accounting for age and gender of the participants, the adjusted odds ratios of medium and high SEIFA indexes were 0.74 and 0.40, respectively. In particular, older adults residing in high socio-economic neighborhoods were less likely to drop out relative to those from low socio-economic areas ($p < .05$). Conversely, the risk of drop out was about twice for overweight people when compared with their normal weight counterparts ($p < .05$). Similarly, older adults that reported 'insufficient physical activity' had a higher likelihood of dropping out of the program ($p < .01$). The two continuous variables, walking self-efficacy and the UCLA loneliness score, were also significantly related to attrition. Participants with a greater walking self-efficacy had better adherence to the walking program ($p < .01$), whereas those who felt lonely, as reflected by an increased loneliness score, appeared to have a significantly higher risk of attrition ($p < .05$).

Table 6.2 Logistic regression results of factors affecting attrition

Factor	Odd Ratio	95% confidence interval
Age		
66-69 years	1	
≥70 years	1.21	(0.66, 2.19)
Gender		
Female	1	
Male	1.19	(0.63, 2.23)
Socio-economic index for area		
Low	1	
Medium	0.74	(0.37, 1.47)
High*	0.40	(0.19, 0.83)
Body-mass index		
Normal	1	
Overweight*	2.29	(1.01, 5.19)
Obese	1.88	(0.79, 4.45)
Physical activity		
Sufficient	1	
Insufficient**	2.40	(1.30, 4.43))
Walking self-efficacy**	0.77	(0.66, 0.89)
Loneliness*	1.03	(1.01, 1.07)

*$p < .05$ **$p < .01$

Of those walkers that responded to the qualitative questions, the majority believed the group provided motivation to exercise (n = 73), enjoyed the companionship of other walkers (n = 64), and liked their walk leader (n = 43). They agreed that their walk leader was "encouraging" (99.5%), "provided helpful guidance" (99%) and believed that the walk leader "kept them going to the group" (88%). Only 3.4% disagreed that their walk

leader "influenced their participation". With regard to improvement to the program, respondents indicated that "the program should remain the same" (n = 51), "the number of walks should be increased" (n = 21) and that "walk leaders should remain attached to the program" (n = 10).

Qualitative data gathered from exit interviews provided further insight into the reasons for attrition. 'Health problems' was given as a major reason for dropping out of the program. "We enjoyed it, both of us (referring to her husband); it's just that I have this bad heel." Others who dropped out indicated that there were competing priorities, such as work and travel commitments. "I enjoyed the walking program, but we go away for a few months over the Christmas holiday period." Some walkers found the time unsuitable: "It (the walk) was too early in the morning." Walking groups did meet early in the morning, between 6.30am and 7.30am for approximately one hour, while it was relatively cool and also to reduce interference with other planned activities.

6.4 Discussion

Prior research has documented a range of characteristics associated with attrition. However, this study found that age (Chatfield et al., 2005; Lui & Anthony, 1989; Van Beijsterveldt et al., 2002), relationship status (Garcia & King, 1991), level of education (Lui & Anthony, 1989; Jacomb et al., 2002; Van Beijsterveldt et al.) and gender (Rejeski, Brawley, Ettinger, Morgan, & Thompson, 1997) were not significantly related to attrition. Our results concur with others that certain demographic variables tend to be unstable predictors of exercise adherence (Martin & Sinden, 2001).

Several factors found to affect attrition in this study were consistent with previous research. SEIFA was identified as significant, with greater risk of attrition occurring in

low and medium socio-economic areas, which supported literature findings (Boyette et al., 2002; Dishman, 1991; Ford et al., 1991). Overweight was also significantly associated with attrition, similar to previous studies (Dishman, 1991). It has been well documented that the greater the BMI, the greater the likelihood of being 'insufficiently active' (Bauman et al., 2002; Bull, Milligan, Rosenberg, & MacGowan, 2000). Past history of exercise participation has been found to influence exercise adherence among older adults (Boyette et al.). Participants in our study who had a poor history of physical activity were twice more likely to drop out.

As with previous studies (Martin & Sinden, 2001; O'Brien Cousins, 2003; Resnick, 2001), walking self-efficacy appeared to affect exercise adherence. A person's mood may influence perception of walking efficacy, with better overall mental health being linked to a stronger self-efficacy (Resnick). This notion is particularly pertinent as a higher loneliness score was found to be associated with attrition.

Loneliness is subjective and is related to the perception of social situation, where individuals assess the quality and quantity of relationships. Individuals are often reluctant to acknowledge deficiencies in their relationships that lead to feeling lonely (Russell, 1996). Therefore, the UCLA Loneliness Score does not use the term *loneliness* in any of its questions. Instead, it subtly determines those individuals that perceive their situation to be less than satisfactory, by way of feeling alone or not connecting with others. Previous research has demonstrated the connection between adherence to health intervention and psychological states (Martin & Sinden, 2001), such as depression (Rejeski et al., 1997) and decreased cognition (Chatfield et al., 2005). The concept that such individuals are not suited to the group environment warrants further consideration.

Two-thirds (65%) of the walkers completed the PALS program and 35% were lost to attrition. This is a moderate, acceptable attrition rate when compared to other programs

involving older persons (Dishman, 1994; McAuley, Courneya, Rudolph, & Lox, 1994; Morey et al., 2003). Of those that dropped out, the majority of attrition (77% of the drop outs; and 27% of total sample) occurred within the first 3 months. Once again, this is an acceptable figure when compared to other studies that reported between 20% (Warren-Findlow et al., 2003) and 36% (Schmidt et al., 2000) attrition of the total sample in the initial 3 months. Only 23% of the attrition occurred after this period, suggesting the initial three months as critical in terms of loss prevention for older adults.

There are a number of factors that may have influenced the attrition rate. First, this study did not recruit through advertising, a method that tends to reach self-selecting, highly motivated volunteers (Mills et al., 2001). Instead, a multi-stage strategy with a known population base was used. It aimed to access a more representative sample, which in turn may lead to the recruitment of a less motivated and less self-selecting population. Second, because the recruits were less physically active, with perhaps limited exercise experience, this might have meant that they had unrealistic expectations of the program and its content (Warren-Findlow et al., 2003). Third, it has been suggested that early program drop out can be related to program details and its fit with participants' capabilities and expectations (Warren-Findlow et al.). This intervention tailored the program to suit the older, insufficiently active adults, but perhaps such a goal is difficult to achieve with random selection to groups. Fourth, randomization may have influenced early drop outs, some participants indicated that they did not care whether they were allocated to the control or the walking group but really would have preferred to be controls.

The PALS intervention program was designed to address acknowledged barriers to physical activity, such as program suitability, instructor and peer support (Corti et al., 1995; Dishman, 1994; Warren-Findlow et al., 2003). Consideration was given to

access and cost of the program (Souder, 1992) and to the aesthetics of the environment (Corti, Donovan, & Holman, 1996) and its safety (Booth, Bauman, Owen & Gore, 1997). Qualitative data from exit interviews supported the suitability of the program. The main reasons cited for dropping out were health problems, competing priorities and the walks being too early. The first two factors were not program related and the walking time was made early in the morning so as not to interfere with other daily activities.

This study considered individual factors, program factors and environmental factors that may have impacted on the loss of participants from the physical activity intervention program. The environmental factors were not statistically significant. This is expected, however, as the neighborhoods selected for this program contained at least 11% of people aged over 65 years old, so these suburbs were likely to be more established, with sound infrastructure, including parks suitable for the walk groups.

6.5 Conclusion

The PALS study, based on SCT, demonstrated the complex interplay of factors that influence attrition. Early identification of physically inactive participants who are from low socioeconomic areas, have high BMI and loneliness score, and have low walking self-efficacy, will assist in the control of attrition. Several issues demand further investigation. For example, walking self-efficacy has been shown to affect exercise adoption and maintenance. Therefore, intervention programs should develop and nurture this characteristic to enable individuals to continue with the program. The concept of loneliness also requires more investigation, as being in a group, yet feeling unfulfilled and isolated, is potentially problematic. These individuals may require more encouragement, affirmation and feedback. Older adults are heterogeneous, so new strategies are needed to mobilize them.

Figure 6.1 Relevant questions asked at the exit interview

During the program you stopped attending – was there any particular reason for this?

How did you feel when you did not attend the program?

Do you think you were encouraged?

Was there anything else that could have been done to make you stay with the walking program?

Can you think of any way we could have changed or improved the program to make it more appealing?

What do you think would be a good or appropriate physical activity program?

References

Anderson, L., Schnohr, P., Schroll, M., Hein, H. (2000). All-cause mortality associated with physical activity during leisure time, work, sports, and cycling to work. *Archives of Internal Medicine, 160*(11), 1621-1628.

Australian Bureau of Statistics. (1998). *Census of population and housing: socio-economic indexes for areas (SEIFA) 1996, information paper (2039.0)*. Canberra: Australian Bureau of Statistics.

Australian Bureau of Statistics. (2001). *Census of basic community profile.* Canberra: Australian Bureau of Statistics.

Australian Department of Health and Aged Care. (1999). *National physical activity guidelines for Australians*. Canberra: Australian Government Publishing Service.

Bandura, A. (1986). *Social foundations of thought and action*. Englewoods Cliffs, NJ: Prentice Hall.

Bandura, A. (1997). *Self efficacy: the exercise of control*. New York: Freeman.

Bauman, A., Bellew, B., Vita, P., Brown, W., & Owen, O. (2002). *Getting Australia active: Towards better practice for the promotion of physical activity*. Melbourne, Australia: National Public Health Partnership.

Bauman, A., Smith, B., Stoker, L., & Booth, M. (1999). Geographical influences upon physical activity participation: Evidence of a "coastal effect". *Australian and New Zealand Journal of Public Health, 23*(3), 322-324.

Booth, M., Bauman, A., Owen, N., & Gore, C. (1997). Physical activity preferences, preferred sources of assistance, and perceived barriers to increased activity among physically inactive Australians. *Preventive Medicine, 26*, 131-137.

Boyette, L., Lloyd, A., Boyette, J., Watkins, E., Furbush, L., Dunbar, S., et al. (2002). Personal characteristics that influence exercise behaviour of older adults. *Journal of Rehabilitation and Research and Development, 39*(1), 95-103.

Bull, F., Milligan, R., Rosenberg, M., & MacGowan, H. (2000). *Physical activity levels of Western Australian adults 1999*. Perth:Western Australia: Health Department of Western Australia, Western Australian Government,.

Cameron, A., Welborn, T., Zimmet, P., Dunstan D., Owen, N., Salmon, J., et al. (2003). Overweight and obesity in Australia: the 1999-2000 Australian diabetes, obesity and lifestyle study (AusDiab). *Medical Journal of Australia, 178*(9), 427-432.

Chatfield, M., Brayne, C., & Matthews, F. (2005). A systematic literature review of attrition between waves in longitudinal studies in the elderly shows a consistent pattern of drop out between differing studies. *Journal of Clinical Epidemiology, 58*, 13-19.

Chogahara, M., O'Brien Cousins, S., & Wankel, L. (1998). Social influences on physical activity in older adults: A review. *Journal of Aging and Physical Activity, 6*, 1-17.

Clark, D. (1999). Identifying psychological, physiological, and environmental barriers and facilitators to exercise among older low income adults. *Journal of Clinical Geropsychology, 5*(1), 51-62.

Corti, B., Donovan, R., Castine, R., D'Arcy, C., Holman, J., & Shilton, T. (1995). Encouraging the sedentary to be active everyday: Qualitative formative research. *Health Promotion Journal of Australia, 5*(2), 10-17.

Corti, B., Donovan, R., & Holman, C. (1996). Factors influencing the use of physical activity facilities: Results from qualitative research. *Health Promotion Journal of Australia, 6*(1), 16-21.

Craig, C., Marshall, A., Sjostrom, M., Bauman, A., Booth, B., et al. (2003). International physical activity questionnaire: 12 country reliability and validity. *Medical Science Sports Exercise, 35*(8), 1381-1395.

Crespo, C., Palmieri, M., Perdomo, R., McGee, D., Smit, E., Sempos, C., et al. (2002). The relationship of physical activity and body weight with all-cause mortality: Results from the Puerto Rico heart health program. *Annals of Epidemiology, 12*(8), 543-552.

Dishman, R. (1991). Increasing and maintaining physical activity and exercise. *Behavioural Therapy, 41*, 3-15.

Dishman, R. (1994). Motivating older adults to exercise. *Southern Medical Journal, 87*(5), S79-S82.

Ettinger, W., Burns, R., Messier, S., Applegate, W., Rejeski, W., Morgan, T., et al. (1997). A randomised trial comparing aerobic exercise and resistance exercise with a health education program in older adults with knee osteoarthritis. *Journal of the American Medical Association, 277*, 25-31.

Ford, E., Merritt, E., Heath, G., Powell, K., Walshburn, R., Kriska, A., & Haile, G. (1991). Physical activity behaviours in lower and higher socioeconomic status populations. *American Journal of Epidemiology, 133*, 1246-1256.

Garcia, A., & King, A. (1991). Predicting long-term adherence to aerobic exercise: a comparison of two models. *Journal of Sport and Exercise Psychology, 13*, 394-410.

Godin, G., Desharnais, R., Valois, P., Jobin, J., & Bradet, R. (1994). Differences in perceived barriers to exercise between high and low intenders: Observations among different populations. *American Journal of Health Promotion, 8*(4), 279-285.

Hayslip, B., Weigand, D., Weinberg, R., Richardson, P., & Jackson, A. (1996). The development of new scales for assessing health belief model constructs in adulthood. *Journal of Aging and Physical Activity, 4*(4), 307-323.

Jacomb, P., Jorm, A., Korten, A., Christensen, H., & Henderson, A. (2002). Predictors of refusal to participate: a longitudinal health survey of the elderly in Australia. *BMC Pubic Health, 2*(4), 1-6.

King, A., Blair, S., Bild, D., Dishman, R., Dubbert, P., Marcus, B., et al. (1992). Determinants of physical activity and interventions in adults. *Medicine and Science in Sports and Exercise, 26*(6), S221-S236.

King, A., Rejeski, W., & Buchner, D. (1998). Physical activity interventions targeting older adults: a critical review and recommendations. *American Journal of Preventive Medicine, 15*(4), 316-333.

Lee, I., & Skerrett, P. (2001). Physical activity and all-cause mortality: what is the dose-response relation? *Medicine and Science in Sports and Exercise, 33*(6), s459-s471.

Lui, I., & Anthony, J. (1989). Using the "mini-mental state" examination to predict elderly subjects' completion of a follow-up interview. *American Journal of Epidemiology, 130*, 416-422.

Martin, K., & Sinden, A. (2001). Who will stay and who will go? A review of older adults' adherence to randomised controlled trials of exercise. *Journal of Aging and Physical Activity, 9*(2), 91-114.

McAuley, E., Courneya, K., Rudolph, L., & Lox, C. (1994). Enhancing exercise adherence in middle-aged males and females. *The Gerontologist, 23*(4), 498-506.

McAuley, E., Jerome, G., Elavsky, S., Marquez, D., & Ramsey, S. (2003). Predicting long term maintenance of physical activity in older adults. *Preventive Medicine, 37*, 110-118.

McAuley, E., & Mihalko, S,. (2003). Measuring exercise-related self-efficacy. In J. Duda (Ed.). *Advances in sport and exercise psychology Measurement* (pp. 371-390). Morgantown, WV: Fitness Information Technology.

Mihalko, S., & McAuley, E. (1996). Strength training effects on subjective well-being and physical function in the elderly. *Journal of Aging and Physical Activity, 4*, 56-68.

Mills, K., Stewart, A., McLellan, B., Verboncoeur, C., King, A., & Brown, B. (2001). Evaluation of enrollment bias in a physical-activity-promotion program for seniors. *Journal of Aging and Physical Activity, 9*(4), 398- 413.

Morey, M., Dubbert, P., Doyle, M., MacAller, H., Crowley, G., Kuchibhatla, M., et al. (2003). From supervised to unsupervised exercise: factors associated with exercise adherence. *Journal of Aging and Physical Activity, 11*(3), 351-368.

O'Brien Cousins, S. (2003). Grounding theory in self-referent thinking: conceptualizing motivation for older adult physical activity. *Psychology of Sport and Exercise, 4*, 81-100.

Preloran, H., Browner, C., & Lieber, E. (2001). Strategies for motivating Latino couples' participation in qualitative health research and their effects on sample construction. *American Journal of Public Health, 91*(11), 1832-1841.

Prohaska, T., Peters, K., & Warren, J. (2000). Sources of attrition in a church-based exercise program for older African-Americans. *American Journal of Health Promotion, 14*(6), 380-385.

Rejeski, W., Brawley, L., Ettinger, W., Morgan, T., & Thompson, C. (1997). Compliance to exercise therapy in older participants with knee osteoarthritis: Implications for treating disability. *Medicine and Science in Sports and Exercise, 29*, 977-985.

Resnick, B. (2001). Testing a model of exercise behaviour in older adults. *Research in Nursing and Health, 24*, 83-92.

Resnick, B., Palmer, M., Jenkins, L., & Spellbring, A. (2000). Efficacy expectations and exercise behavior in older adults: a path analysis. *Journal of Advanced Nursing, 32*, 16-23.

Resnick, B., & Spellbring, A. (2000b). Understanding what motivates older adults to exercise. *Journal of Gerontological Nursing, 26*(3), 34-42.

Russell, D. (1996). UCLA loneliness scale (version 3): Reliability, validity, and factor structure. *Journal of Personality Assessment, 66*(1), 20-40.

Sallis, J., F, Bauman, A, & Pratt, M.P. (1998). Environment and policy interventions to promote physical activity. *American Journal of Preventive Medicine, 15*(4), 379-397.

Schmidt, J., Gruman, C., King, M., & Wolfson, L. (2000). Attrition in an exercise intervention: A comparison of early and later dropouts. *Journal of American Geriatrics Society, 48*(8), 952-960.

Souder, J. (1992). The consumer approach to recruitment of elder subjects. *Nursing Research, 41*(5), 314-316.

Stahl, T., Rutten, A., Nutbeam, D., Bauman, A., Kannas, L., Abel, T., et al. (2001). The importance of the social environment for physically active lifestyle - results from an international study. *Social Science and Medicine, 52*, 1-10.

Treasure, D., & Newberry, D. (1998). Relationship between self-efficacy, exercise intensity, and feeling states in a sedentary population during and following an acute bout of exercise. *Journal of Sport and Exercise Psychology, 20*, 1-11.

Van Beijsterveldt, C., Van Boxtel, M., Bosma, H., Houx, P., Buntinx, F., & Jolles, J. (2002). Predictors of attrition in a longitudinal cognitive aging study: The Maastricht Aging Study (MAAS). *Journal of Clinical Epidemiology, 55*, 216-223.

Wannamethee, S., Shaper, A., & Walker, M. (2000). Physical activity and mortality in older men with diagnosed coronary heart disease. *Circulation, 102*(12), 1358-1363.

Wanzhu, T., Stump, T., Damush, T., & Clark, D. (2004). The effects of health and environment on exercise-class participation in older, urban women. *Journal of Aging and Physical Activity, 12*, 480-496.

Warren-Findlow, J., Prohaska, T., & Freedman, D. (2003). Challenges and opportunities in recruiting and retaining underrepresented populations into health promotion research. *The Gerontologist, 43*, 37-46.

Wilson, A., & Webber, I. (1976). Attrition in a longitudinal study of an aged population. *Experimental Aging Research, 2*(5), 367-387.

CHAPTER 7

A physical activity program to mobilize older people: A practical and sustainable approach

A physical activity program to mobilize older people: A practical and sustainable approach

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Purpose: Despite the documented benefits of physical activity, it remains difficult to motivate older adults to start and maintain regular physical activity. This study tested an innovative intervention for mobilizing older adults into a neighborhood-based walking program.

Design and Methods: A total of 260 healthy but insufficiently active adults, aged 65 to 74 years and randomly selected from the Australian electoral roll, were recruited from 30 Perth metropolitan neighborhoods. The design of the program was guided by Social cognitive theory. Both qualitative and quantitative data were collected to inform the development, together with ongoing process evaluation.

Results: A total of 65% of participants completed the program. Their mean weekly walking time for recreation was increased by about 100 minutes, and 80% of participants reported that they would continue to walk twice per week upon program completion.

Implications: This practical program is potentially effective and sustainable with respect to mobilizing physically inactive older people.

Gerontologist Accepted and awaiting publication.

Keywords: Exercise promotion, program planning, community based intervention, social, behavioral

7.1 Introduction

Western societies are attracted to the luxuries of a modern lifestyle that facilitates inactivity, especially in the older age groups (DiPietro, 2001). The World Health Organization (Matsudo, 2004) estimated that the prevalence of insufficient physical activity (less than 2.5 hrs per week of moderate activity) ranges from 31% to 51%, with other reports of up to 80%. In the United States (US), Healthy People 2010 (US Department of Health and Human Services, 2000) indicated that 51% of adults older than 65 years are inactive. These figures are similar in Australia, where 46% of adults aged 60 to 75 years are inactive and about one-third of these are completely sedentary (Bauman, Bellew, Vita, Brown, Owen, 2002). Only 40% of people in this age group indicate they have "any intention to be more physically active" (Bauman, et al., 2002; p26).

Physical activity for people older than 65 years is a recognized public health strategy (Bauman, et al., 2002), as the evidence clearly demonstrates the risk reduction of all-cause mortality in those achieving recommended levels of at least moderate-intensity physical activity (Anderson, Schnohr, Schroll, & Hein, 2000; Crespo et al., 2002; Lee & Skerret, 2001; Wannamethee, Shaper, & Walker, 2000). An estimated half of all physical decline associated with age is preventable if adequate levels of physical activity are maintained (O'Brien Cousins, 2003).

Some have suggested that the design of the intervention is one of the most influential factors affecting participation in physical activity programs (Mills et al., 2001). A review of eight general physical activity intervention programs by Cyarto, Moorhead, & Brown (2004) found that the program designs ranged from broad-based community promotion to one-on-one counseling with a health practitioner. These interventions were based in the United States, Australia and Europe and had varying sample sizes (20 to 700). The majority used self-reporting measures, were conducted in a supervised setting, and incorporated specialized equipment. The

researchers found that interventions that were more tailored and aimed to reduce barriers to physical activity were likely to be more successful. However, most of the positive results occurred with 'volunteer' participants, recruited through advertising (Baranowski, Anderson & Carmack, 1998). Baranowski and colleagues (1998) also found greater success with volunteers, after reviewing 25 physical activity interventions.

A more recent focus has been on the influence of the physical environment on activity levels. A review by Humpel and colleagues (2004) found that access to facilities such as a local park, safe walking paths, and a local attractive area was important for physical activity. Giles-Corti and Donovan (2003) also reported the positive influence of facility access on physical activity, but concluded that the individual and the social environment outweigh the influence of the physical environment on achieving recommended levels of physical activity.

The design of a physical activity intervention needs to consider the individual and he or she interacts with the social environment (Spence & Lee, 2003) Participants need to understand the program (Souder, 1992) and program organizers need to understand the participants' commitment. The frequency, intensity and duration of the program must be suitable for the program participants. The friendliness of the instructor and consistency of instruction are purportedly of exceptional importance (Warren-Findlow, Prohaska, & Freedman, 2003). Cost is also relevant (Nies & Kershaw, 2002) and as older people generally receive less encouragement for physical activity (Hayslip, Weigand, Weinberg, Richardson, & Jackson, 1996), the use of incentives and provision of regular feedback and instruction during exercise are imperative (Petosa, Suminski, & Hortz, 2003).

Given the increasing attention focused on the value of physical activity as a treatment and health management tool for the burgeoning older population, it is essential

program planners confront the multiple levels of influence, so as to increase long-term exercise maintenance.

7.2 Theoretical planning framework

We selected the PRECEDE-PROCEED model for health program planning as the overall conceptual framework for the project (Green & Kreuter, 2005), as it is one of the most influential models for the planning of health programs. Its use provides for consideration of the shortcomings and strengths of previous community-based physical activity interventions, and ensures that there is thorough consultation and comprehensive planning. It is consistent with the social ecological framework (Sallis, Johnson, Calfras, Caparosa, & Nichols, 1997).

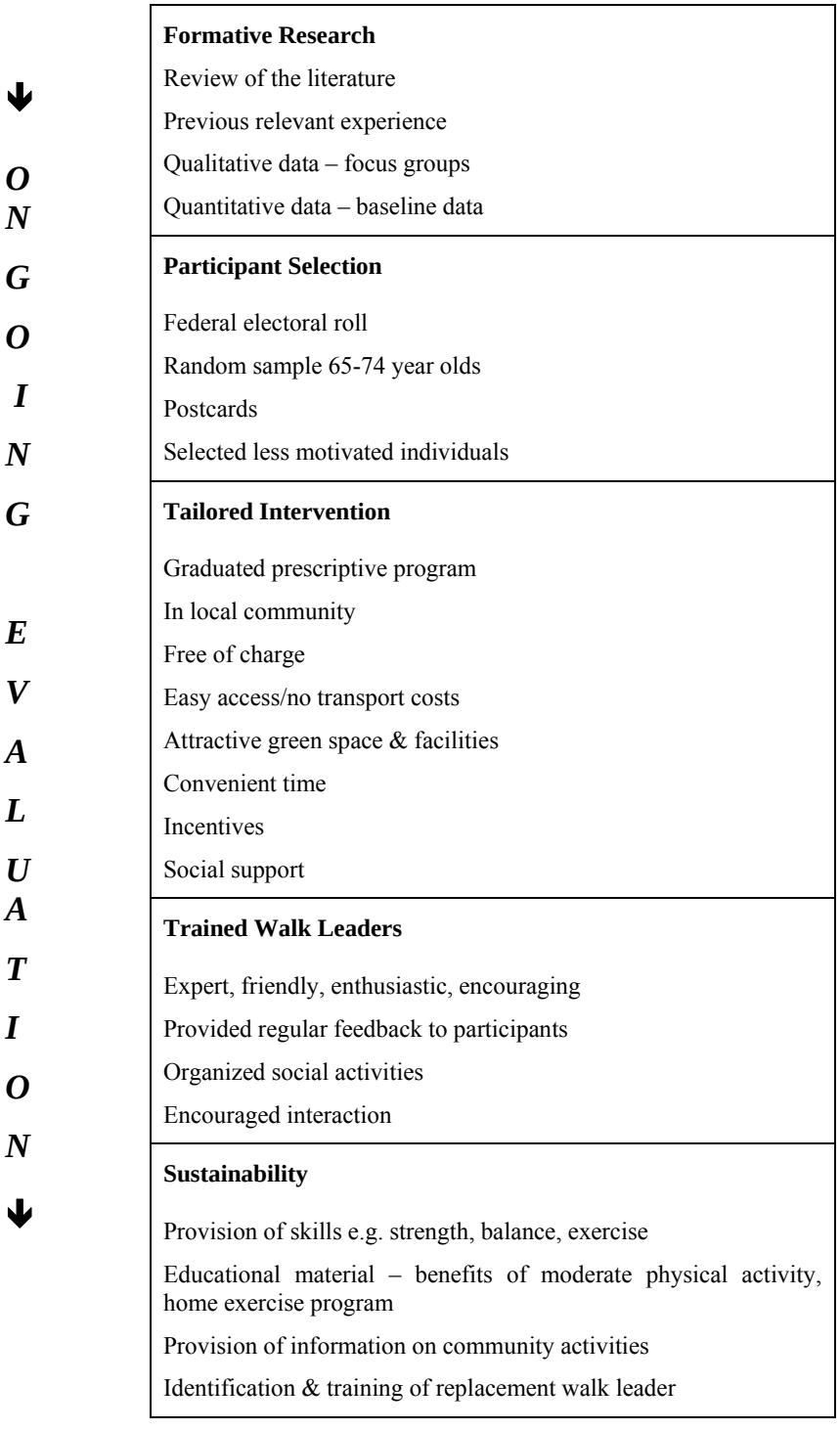
The framework systematically considers the social and situational circumstances of the target group, relevant epidemiological data, environmental and behavioral (lifestyle) factors, and factors that influence these behaviors and the environments in which they occur (i.e. predisposing, enabling and reinforcing factors) (Green & Kreuter, 2005; Howat, Jones, Hall, Cross & Stevenson 1997, 1997). Predisposing factors are the motivators for physical activity and include knowledge, attitudes and beliefs that may be addressed through relevant education. Enabling factors are characteristics of the environment, such as accessibility and cost of a program, as well as skills to for accomplishing activities. Reinforcing factors include rewards for the physical activity behavior, such as support from walk leaders, peers and family.

We identified predisposing, enabling and reinforcing factors based on relevant components of the health belief model, (e.g. perception of barriers and facilitators to physical activity behavior) (Glanz, Rimer, & Lewis, 2002) and social cognitive theory (SCT) e.g. (to measure influences of the social environment on health behaviors) (Bandura, 1986, 1997), along with SCT central construct of self-efficacy. Increasing confidence to participate and maintain physical activity is enhanced via education, reinforcement and opportunity to practice and to experience success with

physical activity (Glanz et al., 2002; McAuley & Blissmer, 2000; McAuley, Jerome, Marquez, & Steriani, 2003). Social cognitive theory emphasizes the dynamic interaction of the individual's characteristics, his or her behavior and the environment in which they function. An effective intervention program should respond to these interactions.

This article presents selected process evaluation data to illustrate the program's development and structure. The purpose is to provide a practical approach for practitioners when designing neighbourhood-based physical activity programs involving older people, with particular emphasis on sustainability. Figure 7.1 summarizes the components of the program.

Figure 7.1 Program components



7.3 Formative research

7.3.1 Literature review

The literature review identified the theoretical basis relevant to the program model. It gave an opportunity to identify the barriers and enablers to commencing and maintaining physical activity, as well as to consider how an individual and the environment interact. It provided valuable direction for the focus groups, identifying issues that required exploration and further clarification that would inform the development of the intervention program.

7.3.2 Research expertise

The research team drew on its experience in intervention research (Howat et al., 1997) and physical activity programs (Clarke & Gordon, 2001; Fisher, Li, Michael & Cleveland, 2004; Foreman, Walsh, Brown, Marshall & Abernethy, 2003). Results from previous studies concerning older adults indicated that a range of neighborhood factors, such as social cohesion and access to facilities, are associated with increased walking (Fisher et al., 2004; Li et al., 2005).

7.3.3 Qualitative data

Qualitative data obtained from focus groups provided an opportunity to explore aspects of the program that the older adults considered important. Researchers recruited 25 participants aged 65-74 years via the Positive Aging Association (an association for older people) and pensioner groups. They were purposely drawn from low to medium socio-economic neighborhoods, as determined by Socio-Economic Index for Area values (Australian Bureau of Statistics, 1998). An experienced researcher conducted the focus groups, which lasted approximately 1 hr, at a location convenient to the participants. Researchers obtained informed consent, and each participant received a reimbursement of A$10 for travel costs incurred. The

researchers obtained permission to record the discussions and then made verbatim transcriptions. They analyzed the data using qualitative content thematic analysis. This approach is most suitable for qualitative descriptive studies, as it draws on the tenets of naturalistic enquiry (Sandelowski, 2000).

The aims of the focus groups were to determine (a) attitudes toward physical activity and barriers and motivators to joining a walking group; (b) the preferred structure of a walking group; and (c) salient social supports. The Appendix gives the relevant questions asked. The information helped inform the program planning and design. In particular, there was a need to change the mind set about walking capacity and the importance of providing older people with social experience and group support. In addition, being able to access the walking location was another popular issue, along with easy access to facilities such as toilets and resting spots.

7.3.4 Quantitative data

Quantitative data collected from a baseline mail survey gave further insights into the uniqueness and potential fragility of the sample. The researchers were mindful that for an older cohort of volunteers (Chatfield, Brayne, & Matthews, 2005; Jacomb, Jorm, Korten, Christensen, & Henderson, 2002) with a history of being physically less active (Martin & Sinden, 2001) and not highly motivated were less likely to complete the program. The baseline data showed that the participants had a higher than average body mass index (Dishman, 1991) and a lower mental health score (mean = 48.1) (Chatfield et al., 2005; Jacomb et al., 2002; van der Bij, Laurant, & Wensing, 2002) when compared to the population mean of 51.6 for this age group (Ware, Kosinski, & Keller, 1996). A higher exercise self-efficacy score is generally linked to greater adherence (Martin & Sinden, 2001) and activity maintenance (Resnick & Spellbring, 2000). However, self-efficacy decreases as age increases (Resnick, Palmer, Jenkins, & Spellbring, 2000). The mean exercise efficacy score for the sample participants was 6.5 (SD 2.04) on a likert scale of 1 to

10 (McAuley & Mihalko, 2003). In effect, these factors emphasize the importance of encouragement and reassurance to the older people (Hayslip et al., 1996), and the need to enhance social support.

7.4 Participant selection for intervention

Researchers randomly selected program participants from 30 neighborhoods within metropolitan Perth, the capital of Western Australia. Neighborhoods in the study were required (a) to be composed of at least 11% persons 65 years olds or older, reflecting the State average (Australian Bureau of Statistics, 2001); (b) to contain at least 100 people older than 65 years; (c) to have a boundary not within 1 km of a waterway (i.e., a river or beach) in order to minimize the impact of the physical environment, or the so called 'coastal effect' on physical activity (Bauman, Smith, Stoker, & Booth, 1999). Researchers selected the distance of 1 km after considering the definition of a walkable neighborhood (Pikora et al., 2002) and calculated it via a Geographical Information System. Researchers assigned neighborhoods to low, medium, or high levels of socioeconomic status using the Socio-Economic Index for Area (SEIFA) (Australian Bureau of Statistics, 1998).

Researchers sought written permission for access to the Federal Electoral Roll, which contains the name, age and address of Australian citizens older than 18 years of age. To be eligible, participants were required to be (a) aged 65 to 74 years (b) insufficiently active (defined as not achieving at least 30 min of moderate physical activity on at least 5 days a week (Lim & Taylor, 2005) and (c) healthy to the extent that participation in a low-stress walking program would not place them at risk for, or exacerbate any existing health condition. The pool of potential participants, drawn from the Federal Electoral Roll (n=7378), then matched to the Perth Electronic Telephone Directory (n=6401). This telephone matching had an 86% success rate in identifying potential telephone contacts. Approximately nine phone calls were

needed to recruit one participant, with the aim of recruiting 12 to 15 walkers per neighborhood.

Potential participants received a postcard explaining that their name had been randomly selected from the Australian electoral roll for involvement in a 6-month walking program. The postcard detailed who was conducting the research and that a phone call should be expected within the next fortnight. Consequently, potential recruits were aware of the project when contacted and knew that the program was legitimate. This method is successful at improving response rates (Iredell, Shaw, Howat, James, & Granich, 2004). The researchers later sought written consent from each participant on attendance at the first walking group session. Ethical approval was obtained from the Human Research Ethics Committee of the researchers' institution. A total of 260 participants completed the baseline questionnaire and thereby technically entered the 6-month intervention program. The mean age of participants was 69 years (SD 2.89) years, the majority were female (67%, n=174), had a partner (66%, n=172) and were Australian born (67%, n=174). All participants were found to be insufficiently active when recruited.

7.5 Tailored intervention

The intervention program was designed to address motivators and barriers to physical activity. In particular, the local neighborhood meeting points were aesthetically pleasing (Ball, Bauman, Leslie, & Owen, 2001), safe (Booth, Mayer, Sallis, & Ritenberg, 2001) and had facilities such as toilets and park seating available for resting (Brawley, Rejeski, & King, 2003). The research team selected these meeting points by consulting a street directory and locating green spaces within the neighborhood. The team then visited the sites to assess suitability. The exercise locations were easily accessible (Ball et al., 2001; Booth, Owen, Bauman, Clavisi, & Leslie, 2000), thereby avoiding transport difficulties and costs associated with inconvenient locations (Corti et al., 1995; Godin, Desharnais, Valois,

Jobin, & Bradet, 1994). The researchers contacted the Council (local government) responsible for each meeting place and informed it of the program. The team obtained support and permission to access facilities such as toilets.

The walking groups met twice a week for 26 weeks. The walk leaders received a prescriptive progressive weekly exercise program that contained written information on the appropriate length for the walking program, illustrations for stretching exercises, and suitable ball skills, such as side twist leader ball. The graduated and standardized physical activity program commenced at a very low level and was designed to cater for the previously inactive older adults. The first meeting comprised of 10 min of walking and two stretching exercises. By the end of 6-month the group was physically active for one hour, which consisted of walking for 45 minutes, plus doing flexibility and ball drills. This range of activities aimed to improve endurance, balance and flexibility.

Moreover, individual tailoring enabled flexibility of the program. The walk leaders were able to modify the prescribed program to suit the needs of the individuals within their group. For example, the less able participants were provided with walking shortcuts, whereas the more able participants were encouraged to walk further and complete a greater number of exercises. This was possible because walk leaders were aware of the program's objectives (having undergone training, interacting), interacted closely with each of the walkers, and monitored their behavior.

Besides considering the factors of fatigue (Corti et al., 1995), the graduated program incorporated aerobic, strength and flexibility training for increased health benefits and to maintain interest. Throughout the course of the program, the walkers leaders provided the walkers with new skills and regular feedback via 6-minute walk tests (Bautmans, 2004), a tool suitable for assessing the exercise capacity of older people, as well as the Rating of Perceived Exertion (RPE) (Borg, 1998). The Borg scale is

based on physical sensations experienced while exercising, such as increased heart rate, increased respiration and fatigue. Participants received instruction in the procedure and how to monitor their pulse rate.

7.6 Walk leaders

The volunteer walk leaders were young students recruited from Western Australian universities who were required to commit to the 6-month program. After interviewing them, the research team selected them based on their personality, enthusiasm, leadership quality and empathy for older people.

The research team established a crucial link with the walk leaders. This successful relationship was achieved by maintaining support and open communication channels. Leaders and researchers remained in contact via telephone, e-mail or postal mail on a weekly basis. The leaders were thus able to readily consult with the research team should any issues arise. This ensured that problems or queries were dealt with quickly and the intervention operated at its optimal level. The research team was aware of how important the walk leaders were to the program, so it spent time supporting them and forging relationships.

The walk leaders were required to inform the research team whenever they were unavailable. All walk leaders exchanged personal information so that another leader could be contacted to fill a position if necessary. A total of 30 regular walk leaders and 3 backup leaders were available. However, replacements for leaders were seldom required and no walk leaders were lost during the program. All leaders had formed a relationship with their walkers and "cared about the members of their group".

The walk leaders attended three 2-hr training sessions and received a 'Walking Leader's Manual' on (a) the health benefits of physical activity (b) example

exercises (c) safety issues (d) effective communication strategies and (e) measurement and documentation procedures. They also received a suggested meeting point, a map of their neighborhood, and a pedometer to monitor the distances walked. They were also informed that the research team would conduct on site spot checks to ensure the program was being implemented as intended.

To increase their commitment to the program, the research team award the trained walk leaders a small remuneration to cover transport costs and incidental expenses. The walk leaders appeared to be significant in motivating the walking group. Postintervention survey of the participants indicated that they perceived that their walk leader was "encouraging" (99%, n=162) and "motivated them to continue with the program" (88%, n=156).

Walk leaders coordinated the distribution of nonmonetary incentives such as Christmas cards and small gifts to each participant. They were also responsible for delivering and explaining any educational material. These materials were provided over the course of the program and included program pamphlets, exercise sheets, a calendar of suggested activities, health information and a fortnightly 'chatty' walker's newsletter. An exercise gerontologist who was a member of the research team produced all materials, including the newsletter.

7.6.1 Social support

The fortnightly newsletter provided specific information on health, walking and exercise, and contained profiles of walk leaders and researchers. Walkers were encouraged to contribute news items and photographs. The newsletter enhanced communication between the research team and the walking groups and was a valuable resource based on the anecdotal feedback from the participants. Indeed, 83% of respondents (n=98) found the newsletter "interesting",

52% (n=62) reported that it "encouraged them to keep walking" and 55% (n=65) believed it "helped them feel part of the walking group". The majority of participants had at least one positive response to the newsletter.

Enhancement of social support was a planned component of the program aimed at encouraging group cohesiveness and physical activity maintenance. The walk leaders provided expert advice, reassurance, encouragement and feedback to participants. They were also responsible for organizing social activities such as breakfasts and morning teas. These activities fostered social support and facilitated group cohesiveness (Corti et al., 1995; Warren-Findlow et al., 2003), which in turn are related to exercise adherence, intentions to be physically active, and perceived behavioral control (Carron, Hausenblas, & Mack, 1996; Chogahara, O'Brien Cousins, & Wankel, 1998). Research has consistently found that the social environment and friends influence participation in physical activity (Chogahara et al., 1998; Stahl et al., 2001), especially for the older adults (O'Brien Cousins, 1995; Stahl et al., 2001).

Having the opportunity to be physically active in their own neighborhood with members of their local community appeared attractive and motivating to this older cohort, as it led to the development of social networks. For the older population, social networks are associated with higher levels of physical and mental health (Bennet, Schneider, Tang, Arnold, & Wilson, 2006; Grant, Todd, Aitchison, Kelly, & Stoddart, 2004; Wenger, 1990). Furthermore, friendships at a neighborhood level are vital because of mobility restraints related to both health and transport in this age group (Wenger, 1990). Social networking has additional benefits that flow to the community by improving the health of the whole neighborhood (Fisher et al., 2004).

7.7 Sustainability

A total of 65% of walkers completed the program. This is a reasonable adherence rate when compared to other programs with older persons (Dishman, 1994; McAuley, Courneya, Rudolph, & Lox, 1994; Morey et al., 2003). At least half of the walking sessions were attended by 93% of participants, and more than 85% of participants attended 70% of the walking sessions over the 6-month period. All groups continued to meet until the completion of the program. In terms of group size, 6 to 10 walkers was considered optimal based on feedback from the walk leaders.

The self-completed International Physical Activity Questionnaire (IPAQ) (Craig et al., 2003) indicated that the baseline mean walking time for recreation was 1 hr (SD 1.65), increasing to 2.69 hr (SD 2.02) per week by the end of the program. Results of the self-completed postal satisfaction survey showed that the majority of walkers "felt fitter" (81%, n=143), were "able to get more done in a day" (59%, n=102) and were "more aware of health and well-being" (77%, n=136). The participants acknowledged that they generally became more active (68%, n=121), with some becoming involved in additional physical activities (26%, n=46). The responses demonstrated the positive attitudes of the participants that served to reinforce continuing participation. The majority of walkers indicated that they would continue to walk twice a week when the program concluded (80%, n=141) and in 6-months time (70%, n=124). The research team conducted a separate follow-up postal survey 12 months post program. For those 113 respondents who completed the questionnaire, the mean weekly walking time for recreation was 2.51 hr (SD 3.60).. However, information on who actually kept walking was unavailable for non-respondents.

The program incorporated a range of strategies to extend its life beyond the 6-month intervention. Firstly, participants received health education as a scientific rationale for being physically active. Second, they learned skills on correct stretching and

strength exercises and how to effectively warm up and cool down, as well as techniques to monitor their physiological responses. Third, the small walking group environment enabled the walkers to interact with each other and form social networks in their local neighborhood. Fourth, walkers interested in leading their group were identified and encouraged to do so post intervention.

This intervention was funded for A$200,000. The estimated costs to replicate the intervention include salary for a part-time coordinator intervention materials and incentives ($30/week/group) postage ($5/person) walk leader reimbursement ($30/week/group) walk leaders training ($500/day) leader manual ($40 each) balls ($5 each) pedometers (optional, $21 each) administration costs ($10/person) and process evaluation ($5/person).

7.7.1 Study limitations

We should address several limitations. The selected neighborhoods were required to have at least 11% people older than 65 years. These were older suburbs with more established infrastructure supportive of physical activity, which might compromise the generalizability of the findings. Data on control group and program drop-outs were unavailable. However, there was a reasonable adherence rate as 65% of participants completed the program. This research team successfully accomplished this project within the available budget, but replication of the study on a large scale would require substantially more resources, funding and volunteers. It would also require the careful selection of walk leaders and admission to the networks to access them. Most tertiary institutions have students of high caliber to provide a pool of walk leaders.

7.8 Conclusions and recommendations

The physical activity intervention program described in this article was specifically tailored for the older adult. Its development followed detailed consideration of the literature and careful consultation with the target group. The researchers placed an emphasis on creating a supportive social and physical environment for physical activity. The program content was responsive to the dynamic interaction of the individual and the environment. It provided updated skills and social networks in order to increase the likelihood of continued physical activity and its program sustainability.

The program provided a practical community based method for mobilizing older people. It should be a useful guide for others intending to implement similar interventions. This article has highlighted several factors for consideration in future studies. These include: the value of tertiary students as a skilled resource; the use of volunteers to contain cost; the importance of a tailored progressive program; the appropriateness of walking as a form of physical activity for this age group; the enjoyment associated with being in a walking group; the receptiveness to learning new skills with regard to exercises and ball drills; and the usefulness of the social support.

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copy of the self-completed questionnaire is available from the corresponding author upon request.

Figure 7.2 Relevant focus group questions

When you think about walking, what makes it unappealing?
If you were invited to join a walking program – what would stop you?
What would make you want to join a walking group?
What would make it easier for you to participate in a walking programme?
How would you like the program set up?
What kind of information or educational material would you like?
What would you like in regard to social activities or social supports?

References

Anderson, L., Schnohr, P, Schroll, M,Hein, H,. (2000). All-cause mortality associated with physical activity during leisure time, work, sports, and cycling to work. *Archives of Internal Medicine, 160*(11), 1621-1628.

Australian Bureau of Statistics. (1998). *Census of population and housing: socio-economic indexes for areas (SEIFA) 1996, information paper*. Canberra: Australian Bureau of Statistics.

Australian Bureau of Statistics. (2001). *Census of basic community profile and snapshot:* Cat no. 2015.0. Canberra: Australian Government Publishing Services.

Ball, K., Bauman, A., Leslie, E., & Owen, N. (2001). Perceived environmental aesthetics and convenience and company are associated with walking for exercise among Australian adults. *Preventive Medicine, 33*(5), 434-440.

Bandura, A. (1986). *Social foundations of thought and action*. Englewoods Cliffs, NJ: Prentice Hall.

Bandura, A. (1997). *Self efficacy: the exercise of control*. New York: Freeman.

Baranowski, T., Anderson, C., & Carmack, C. (1998). Mediating variable framework in physical activity interventions: How are we doing? How might we do better? *American Journal of Preventive Medicine, 15*(4), 266-297.

Bauman, A., Bellew, B., Vita, P., Brown, W., & Owen, O. (2002). *Getting Australia active: Towards better practice for the promotion of physical activity*. Melbourne, Victoria: National Public Health Partnership.

Bauman, A., Smith, B., Stoker, L., & Booth, M. (1999). Geographical influences upon physical activity participation: Evidence of a 'coastal effect'. *Australian and New Zealand Journal of Public Health, 23*(3), 322-324.

Bautmans, I., Lamber, M., & Mets, T. (2004). The six-minute walk test in community dwelling elderly: Influence of health status. *BMC Geriatrics, 4*(6), 1-9.

Bennet, A., Schneider, J., Tang, X., Arnold, S., & Wilson, R. (2006). The effect of social networks on the relation between alzheimers's disease pathology and level of cognitive function in older people: a longitudinal cohort study. *Lancet, 5*, 406-412.

Booth, M., Owen, N., Bauman, A., Clavisi, O., & Leslie, E. (2000). Social-cognitive and perceived environmental influences associated with physical activity in older Australians. *Preventive Medicine, 31*, 15-22.

Booth, S., Mayer, J., Sallis, J., & Ritenberg, C. (2001). Environmental and societal factors affect food choice and physical activity: Rationale, influences, and leverage points. *Nutrition Reviews, 59*(3), S21-S37.

Borg, G. (1998). *Perceived exertion and pain scales*. Champaign (IL): Human Kinetics.

Brawley, L., Rejeski, W., & King, A. (2003). Promoting physical activity for older adults: The challenges for changing behaviour. *American Journal of Preventive Medicine, 25*(3), 172-183.

Carron, A., Hausenblas, H., & Mack, D. (1996). Social influence and exercise: A meta-analysis. *Journal of Sport and Exercise Psychology, 18*, 1-16.

Chatfield, M., Brayne, C., & Matthews, F. (2005). A systematic literature review of attrition between waves in longitudinal studies in the elderly shows a consistent pattern of dropout between differing studies. *Journal of Clinical Epidemiology, 58*, 13-19.

Chogahara, M., O'Brien Cousins, S., Wankel, L. (1998). Social influences on physical activity in older adults: A review. *Journal of Aging and Physical Activity, 6*, 1-17.

Clarke, A., & Gordon S. (2001) Oct. *The Walking Buddy Project: maximising adherence to physical activity.* Paper presented at the Proceedings of the 2001 Science and Medicine in Sport. Canberra, Australia.

Corti, B., Donovan, R., Castine, R., D'Arcy, C., Holman, J., & Shilton, T. (1995). Encouraging the sedentary to be active everyday: Qualitative formative research. *Health Promotion Journal of Australia, 5*(2), 10-17.

Craig, C., Marshall, M., Sjostrom, A., Bauman, A., Booth, B., Ainsworth, B. et al. (2003). International physical activity questionnaire: 12 country reliability and validity. *Medical Science Sports Exercise, 35*(8), 1381-1395.

Crespo, C., Palmieri, M., Perdomo, R., McGee, D., Smit, E., Sempos, C., et al. (2002). The relationship of physical activity and body weight with all-cause mortality: Results from the Puerto Rico heart health program. *Annals of Epidemiology, 12*(8), 543-552.

Cyarto, E., Moorhead, G., & Brown, W. (2004). Updating the evidence relating to physical activity intervention studies in older people. *Journal of Science and Medicine in Sport, 7*(1), 30-38.

DiPietro, L. (2001). Physical activity in aging: Changes in patterns and their relationship to health and function. *Journal of Gerontology, 56A*(11), 13-22.

Dishman, R. (1991). Increasing and maintaining physical activity and exercise. *Behavioural Therapy, 41*, 3-15.

Dishman, R. (1994). Motivating older adults to exercise. *Southern Medical Journal, 87*(5), S79-S82.

Fisher, J., Li, F., Micheal, Y., & Cleveland, M. (2004). Neighborhood-level influences on physical activity among older adults: a multivariate analysis. *Journal of Aging and Physical Activity, 11*, 45-63.

Foreman, R., Walsh, A., Brown, W., Marshall, A., & Abernethy, P. (2003). *'Just walk it': A physical activity success story preliminary results from a comprehensive longitudinal impact evaluation.* Brisbane: The University of Queensland National Heart Foundation.

Giles-Corti, B., & Donovan, R. (2003). The relative influence of individual, social environmental and physical environmental correlates of walking. *American Journal of Public Health, 93*(9), 1583-1589.

Glanz, K., Rimer, B., & Lewis, F. (2002). *Health behavior and health education: theory, research and practice* (3rd ed.). San Francisco: Jossey-Bass.

Godin, G., Desharnais, R., Valois, P., Jobin, J., & Bradet, R. (1994). Differences in perceived barriers to exercise between high and low intenders: Observations among different populations. *American Journal of Health Promotion, 8*(4), 279-285.

Grant, S., Todd, K., Aitchison, T., Kelly, P., & Stoddart, D. (2004). The effects of a 12-week group exercise programme on physiological and psychological variables and function in overweight women. *Public Health, 118*(31-42).

Green, L. W., & Kreuter, M.W. (2005). *Health program planning: An educational and ecological approach.* (4th ed.). New York: McGraw Hill.

Hayslip, B., Weigand, D., Weinberg, R., Richardson, P., & Jackson, A. (1996). The development of new scales for assessing health belief model constructs in adulthood. *Journal of Aging and Physical Activity, 4*(4), 307-323.

Howat, P., Iredell, H., Grenade, L., Nedwetzky, A., & Collins, J. (2004). Reducing social isolation amongst older people - implications for health professionals. *Geriaction, 22*(1), 13-20.

Humpel, N., Owen, N., Leslie, E., Marshall, A., Bauman, A., & Sallis, J. (2004). Associations of location and perceived environmental attributes with walking in neighborhoods. *American Journal of Health Promotion, 18*(3), 239-242.

Iredell, H., Shaw, T., Howat, P., James, R., & Granich, J. (2004). Introductory postcards: Do they increase response rate in a telephone survey of older persons? *Health Education Research, 19*(2), 1-6.

Jacomb, P., Jorm, A., Korten, A., Christensen, H., & Henderson, A. (2002). Predictors of refusal to participate: a longitudinal health survey of the elderly in Australia. *BMC Pubic Health, 2*(4), 1-6.

Lee, I., & Skerrett, P. (2001). Physical activity and all-cause mortality: What is the dose-response relation? *Medicine and Science in Sports and Exercise, 33*(6), s459-s471.

Li, F., Fisher J., Bauman A., Ory M., Chodzko-Zajko, W., Harmer P. et al. (2005). Neighbourhood influences on physical activity in middle-aged and older adults: A multilevel perspective. *Journal of Aging and Physical Activity, 13*, 87-114.

Lim, K., & Taylor L. (2005). Factors associated with physical activity among older people - a population based study. *Preventive Medicine, 40*, 33-40.

Martin, K., & Sinden, A. (2001). Who will stay and who will go? A review of older adults' adherence to randomised controlled trials of exercise. *Journal of Aging and Physical Activity, 9*(2), 91-114.

Matsudo, S., Matsudo V., Andrade D., Araugo T. et al. (2004). Physical activity promotion: Experiences and evaluation of the Agita Sao Paulo program using the ecological mobile model. *Journal of Physical Activity and Health*(1), 81-97.

McAuley, E., & Blissmer, B. (2000). Self-efficacy determinants and consequences of physical activity. *Exercise and Sports Science Reviews, 28*(2), 85-88.

McAuley, E., Courneya, K., Rudolph, L., & Lox, C. (1994). Enhancing exercise adherence in middle-aged males and females. *The Gerontologist, 23*(4), 498-506.

McAuley, E., Jerome, G., Marquez, M., & Steriani, E. (2003). Exercise self-efficacy in older adults: Social, affective and behavioural influences. *Annals of Behavioural Medicine, 25*(1), 1-7.

McAuley, E., & Mihalko, S. (2003). Measuring exercise-related self-efficacy. In J. Duda (Ed.), *Advances in sport and exercise psychology Measurement.* p. 371-390. Morgantown, WV: Fitness Information Technology.

Mills, K., Stewart, A., McLellan, B., Verboncoeur, C., King, A., & Brown, B. (2001). Evaluation of enrollment bias in a physical-activity-promotion program for seniors. *Journal of Aging and Physical Activity, 9*(4), 398-413.

Morey, M., Dubbert, P., Doyle, M., MacAller, H., Crowley, G., Kuchibhatla, M. et al. (2003). From supervised to unsupervised exercise: Factors associated with exercise adherence. *Journal of Aging and Physical Activity, 11*(3), 351-368.

Nies, M., & Kershaw, T. (2002). Psychosocial and environmental influences on physical activity and health outcomes in sedentary women. *Journal of Nursing Scholarship, 34*(3), 243-249.

O'Brien Cousins, S. (1995). Anticipated exertion for exercise activities among women over 70. *Canadian Woman Studies, 15*(4), 74-77.

O'Brien Cousins, S. (2003). Grounding theory in self-referent thinking: Conceptualizing motivation for older adult physical activity. *Psychology of Sport and Exercise, 4*, 81-100.

Petosa, R., Suminski, R., & Hortz, R. (2003). Predicting vigorous physical activity using social cognitive theory. *American Journal of Health Behavior, 27*(4), 301-310.

Pikora, T., Bull, F., Jamrozik, K., Knuiman, M., Giles-Corrti, B., & Donovan, R. (2002). Developing a reliable audit instrument to measure the physical environment for physical activity. *American Journal of Preventive Medicine, 23*(3), 187-194.

Resnick, B., Palmer, M., Jenkins, L., & Spellbring, A. (2000). Efficacy expectations and exercise behavior in older adults: A path analysis. *Journal of Advanced Nursing, 32*, 16-23.

Resnick, B., & Spellbring, A. (2000). Understanding what motivates older adults to exercise. *Journal of Gerontological Nursing, 26*(3), 34-42.

Sallis, J., Johnson, M., Calfras, K., Caparosa, S., & Nichols, J. (1997). Assessing perceived physical environmental variables that may influence physical activity. *Research Quarterly for Exercise and Sport, 68*(4), 345-348.

Sandelowski, M. (2000). Focus on research methods: Whatever happened to qualitative description? *Research in Nursing and Health, 23*, 334-340.

Souder, J. (1992). The consumer approach to recruitment of elder subjects. *Nursing Research, 41*(5), 314-316.

Spence, J., & Lee, R. (2003). Toward a comprehensive model of physical activity. *Psychology of Sport and Exercise, 4*, 7-24.

Stahl, T., Rutten, A., Nutbeam, D., Bauman, A., Kannas, L., Abel, T., et al. (2001). The importance of the social environment for physically active lifestyle - results from an international study. *Social Science and Medicine, 52*, 1-10.

US Dept Health and Human Services. (2000). *Healthy people 2010 objectives*. Washington DC: U.S. Government Publishing Office.

van der Bij, A., Laurant, M., & Wenseng, M. (2002) Effectiveness of physical activity interventions for older adults: A review. *American Journal of Preventive Medicine*, 22 (2), 120-133.

Wannamethee, S., Shaper, A., & Walker, M. (2000). Physical activity and mortality in older men with diagnosed coronary heart disease. *Circulation, 102*(12), 1358-1363.

Ware, J., Kosinski, M., & Keller, S. (1996). A 12-item short-form health survey. *Medical Care, 34*(3), 220-233.

Warren-Findlow, J., Prohaska, T., & Freedman, D. (2003). Challenges and opportunities in recruiting and retaining underrepresented populations into health promotion research. *The Gerontologist, 43*, 37-46.

Wenger, G. (1990). The special role of friends and neighbors. *Journal of Aging Studies, 4*(2), 149-169.

CHAPTER 8

Effectiveness of a physical activity program for seniors

The effectiveness of a physical activity intervention for seniors

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Purpose: To determine whether a tailored 6-month neighborhood based physical activity intervention for 65-74 year olds could increase their total physical activity level, and to identify factors associated with physical activity times.

Design: A longitudinal prospective intervention study.

Setting: Perth, Western Australia.

Subjects: 573 older adults recruited from 30 intervention (n=260) and 30 control (n=313) neighborhoods. Response rates were 74% interventions (260/352) and 82% controls (313/382). 413 subjects (177 and 236, respectively) completed the program.

Intervention: A neighborhood based physical activity intervention.

Measures: A self-reported questionnaire administered at three time points. Physical activity levels were measured using the International Physical Activity Questionnaire. Personal and demographic information, including perceived financial struggle and proximity to friends were collected.

Analysis: Descriptive statistics, repeated measures analysis of variance and generalized estimating equations (GEE).

Results: The intervention resulted in a significant increase in total average physical activity times of 2.25 hours per week ($p < .001$). The GEE analysis confirmed

significant increases in physical activity from baseline to midpoint ($p = .002$) and postintervention ($p = .031$). Perception of financial struggle was positively associated with physical activity time spent by participants, whereas having no friends and acquaintances living nearby had a significant negative correlation. The main limitation of this study was the restricted duration of the intervention.

Conclusion: The program was successful in increasing weekly mean time for physical activity in seniors and in identifying factors that affect their commitment to physical activities.

Keywords: Behavioral, Local Community, Physical Activity, Prevention Research, Seniors. Manuscript format: research; Research purpose: intervention testing/program evaluation; Study design: quasi-experimental; Outcome measure: behavioral; Setting: local community; Health focus: fitness/physical activity; Strategy: skill building/behavior change; Target population age: seniors; Target population circumstances: education/income level, geographic location

8.1 Purpose

Regular participation at recommended levels of physical activity can minimize physiological changes associated with aging, increase longevity and decrease the risk of many diseases.[1]

Many factors influence physical activity behavior. Women are less likely to report regular activity, but people with higher educational levels report increased activity.[2] Younger age,[3] lower body mass, fewer chronic illnesses, greater levels of self-efficacy, and belief in the importance of physical activity are all associated with being active.[2]

Higher socioeconomic status (SES) is associated with greater leisure time physical activity,[2] whereas individuals from lower SES report more time walking for transportation.[4] Social support is frequently cited as a correlate, with friends and family members influencing participation in physical activity.[5]

This paper aims to determine whether a tailored neighborhood based physical activity intervention directed at seniors could increase their physical activity levels and to identify factors associated with their physical activity participation. Social Cognitive Theory underpins the intervention. It emphasizes the dynamic interactions of the individual's cognitive and personal factors, along with their environment, termed reciprocal determinism.[6] The intervention aimed to create a supportive social and physical environment using the constructs of social support, behavioral capability and reinforcement.

8.2 Methodology

8.2.1 Design

In this longitudinal prospective study, 60 neighborhoods were randomly selected from the Perth metropolitan area. The neighborhoods were required to be comprised of at least 11% of seniors (age ≥ 65 years), reflecting the State average; to contain at least 100 seniors, to ensure sufficient sample size; and to be at least 1 kilometer away from a waterway to minimize coastal effects on physical activity.[7] The neighborhoods were matched by SEIFA value, a value derived from income, educational attainment, employment status and skill level of neighborhood residents and randomly assigned to either intervention (n = 30) or control group (n = 30).[8]

8.2.2 Sample

Randomly selected names from the Australian Federal Electoral Roll were matched to the Perth Electronic White Pages of telephone numbers (85% success rate). Potential participants were sent a postcard explaining the program and informing them that they would be contacted within the next fortnight. On the initial phone contact the following information of each prospective participant was confirmed: aged 65 to 74 years; insufficiently active, defined as not achieving 30 minutes of moderate physical activity on at least 5 days per week; and of sufficient health that participation in a low stress physical activity program would not place them at risk or exacerbate any existing health conditions. Participants were excluded if they were too active or perceived themselves as unhealthy. A total of 260 intervention subjects and 313 controls were recruited.

8.2.3 Measures

A self-completed questionnaire was used to collect data at baseline, mid-point (3 months), and postintervention (6 months). The instrument was initially assessed for face and content validity by an expert panel and two focus groups representative of the target population. A test-retest study was then conducted on 75 participants aged 65 to 74 years; intraclass correlation coefficients (ICC) and paired sample *t*-tests used to determine the reliability of the questionnaire.

Physical activity was assessed using the long-form International Physical Activity Questionnaire (IPAQ), which measured frequency and duration of walking for recreation, walking for transport and other moderate physical activities. A total physical activity score (h/wk) was calculated by adding these three domains. The ICC of the IPAQ was moderate (.58) to high (.94), and no significant differences were evident (*t*-test *p* 0.051-0.595).

Personal and demographic information was collected, including gender, age, relationship status (with or without partner), country of birth (Australia or elsewhere), educational attainment (primary school secondary school or university), and self-reported body mass index (BMI). Perceived financial struggle over the life course (struggle or no struggle), with test-retest kappa of .76, was a face-valid subjective measure of the perception of making ends meet financially. It correlates well with other financial measures in older adults. Social support was assessed using the subjective measure of proximity to friends (friends nearby or no friends nearby), with a test-retest kappa of .75.

8.2.4 Intervention

The 6-month prescriptive intervention, designed by an exercise gerontologist, commenced at a low level, providing a graduated and standardized program. It was supervised by the group leader, it started with 10 minutes of low intensity walking, built up to 45 minutes of walking, and increased intensity over the 6-month period. The exercise program included balance, strength and flexibility components. The groups met twice per week, were locally based for easy access and incurred minimal transport costs, all of which aimed to foster a sense of community and enhance social support.[8]

8.2.5 Analysis

Statistical analyses were undertaken using SPSS and STATA packages. Univariate statistics were first applied to compare the intervention and control groups. The main objective was to assess program effectiveness while accounting for demographic and confounding factors that could affect physical activity participation. The outcome variable was total physical activity time (h/wk) at baseline, midpoint and postintervention. Generalized estimating equations (GEE) with exchangeable

correlation structure were considered appropriate for evaluation, because the three observations

collected from the same individual were correlated. The GEE approach extends the standard multiple regression model by accommodating the inherent correlation of the panel data, and it provides robust standard errors for the parameter estimates, thus avoiding misleading inferences due to violation of the independence assumption. Differences among participants, as a source of extra random variation were accommodated and adjusted within the GEE model. The changes in physical activity engagement over time was assessed by the regression coefficients that corresponded to midpoint and postintervention survey results, relative to their robust standard errors. Pertinent factors affecting total physical activity times were also identified.

8.3 Results

8.3.1 Characteristics of sample

Data from the self-completed postal survey conducted 2 weeks postintervention showed that 177 intervention participants and 236 control participants with complete data were available for analysis. The 160 participants excluded because of incomplete survey data had similar demographic characteristics, baseline physical activity levels, and self-reported health status as those of program completers. Among the completers, several outliers were removed after confirming that their reported outcomes were excessive or erroneously entered. The retention rates for the intervention (68%) and the control (75%) groups were considered reasonable.

The participants were aged 65 to 74 years; 48.4% of them were ≥ 70 years of age. The majority of participants were female (64.9%), were born in Australia (63.1%), and had a partner (70.5%) or friends living nearby (56.4%). Most of them completed secondary education (89.0%), yet 54.7% of these older adults perceived financial struggle. BMI responses indicated that one-third of the participants were within the

normal weight range; 43% were overweight and 24.4% were obese. Demographic characteristics of the

intervention and control participants were similar, except for a difference in BMI rates between the groups. The intervention group contained a higher proportion of obese and overweight participants than the control group (p = .05).

8.3.2 Change in total physical activity

Table 1 compares the total weekly physical activity times between the two groups. In the intervention group, the mean time for all physical activities increased from baseline by 2.25 hours per week at the completion of the program. This large increase was statistically significant according to repeated measures analysis of variance (ANOVA; p < .001). In contrast, the mean time for physical activities remained stable for the control group (p= .625).

Table 8.1 Total physical activity times (hours per week) over the three time points

	Control	**Intervention**	**T test for differences**
Time	Mean (SD)	Mean (SD)	
Baseline	5.28 (8.57)	3.95 (4.89)	t= 3.357, df=571, p= 0.01
Mid-point	5.76 (10.28)	6.28 (6.18)	t= -0.706, df=439, p= 0.48
Post-intervention	5.29 (6.19)	6.20 (5.01)	t= -0.596, df=412, p= 0.11
Repeated measures ANOVA	F = 0.447 df = (2,468) p = 0.625	F = 16.187 df = (2,336) p > 0.001	

8.3.3 Factors associated with physical activity change

The change in physical activity engagement over the intervention period was assessed, and personal factors and demographic variations among the study participants were taken into account. Table 8.2 summarizes results from applying the multivariate GEE model to the panel data. The group-effect variable was used to adjust for the baseline disparities between the intervention and control groups. The results showed significant increases in total physical activity times from baseline to mid-point (p = .002) and post intervention (p = .031) in the intervention group. The perception of financial struggle by the individuals in the cohort was positively associated with total physical activity times, whereas no friends or acquaintances living nearby had a significant negative effect. However, demographic factors such as age, gender and education level appeared to have little impact on their time devoted to physical activities.

Table 8.2 Results of fitting general estimating equation model to total physical activity times

Factors	Coefficients	Standard error	p
Constant	6.467	6.526	0.322
Age	-0.040	0.090	0.065
Gender (male)	0.673	0.592	0.255
Australian born	-0.852	0.568	0.134
With partner	0.719	0.630	0.254
No friends nearby	-0.848	0.408	0.037*
Perceived financial struggle	1.315	0.564	0.020*
Education			
Secondary	0.526	0.915	0.565
Tertiary	0.148	0.988	0.881
BMI			
Overweight	0.765	0.641	0.233
Obese	-1.279	0.736	0.082
Group	0.122	0.556	0.827
Mid-point	1.138	0.366	0.002*
Post-intervention	0.976	0.453	0.031*

*p < 0.05

8.4 Discussion

8.4.1 Change in physical activity levels

By the end of the 6-month program, the intervention group significantly increased the mean time spent in physical activities by 2.25 hours per week, whereas the control group remained stable. It is unlikely that this difference is attributable to a regression-to-the-mean effect, and the results compared favorably with other community based physical activity interventions. The outcome demonstrates scope for improvement that is possible among older adults over a 6-month period.

8.4.2 Factors affecting physical activity time

The GEE analysis confirmed that demographic factors have little influence on the time participants devoted to physical activities. However, a positive association with physical activity was found for perception of financial struggle, a subjective measure that relates to a person's perception of making ends meet financially over the life course. Determining the economic status of older people is not straightforward, as income, occupation and education, may not reflect their true financial status. The relationship between SES and physical activity is not clear. It has been reported that individuals from lower SES undertake insufficient physical activity for health benefits,[4] whereas greater levels of leisure time activity are often related to higher SES.[4,9] Conversely, high levels of incidental physical activity, such as walking for transport, has been shown to be correlated with lower SES.[4, 10]

Having 'no friends or acquaintances living nearby' had a negative effect on the time devoted to physical activities. Previous research has documented that a supportive environment is a strong correlate of physical activity.[5] This intervention may have assisted participants in establishing a network of new friends from their local area who

provided companionship and were supportive of their physical activity commitment. Indeed, having friends living within walking distance can provide places to walk to.[10]

8.5 Summary

This 6-month neighborhood based physical activity intervention provided the ingredients to motivate participants to be more active. It was initiated in the participants' local areas, encouraging a sense of community and enhancing social support. The intervention was successful in achieving its aim of increasing physical activity. Physical activity time was negatively associated with not having friends and acquaintances living nearby, but conversely, was positively associated with a perception of financial struggle over the life course. The study provides useful information regarding community intervention programs that focus on physical activity promotion.

8.5.1 Limitations

The program was restricted to 6 months. Nevertheless, the length of the study period should be sufficient to reflect behavior change.[3] Similar to other intervention programs, self-selection bias is another issue of concern. Although all participation was voluntary, selection bias was minimized through our quasi-randomized study design and the procedure adopted to recruit participants. Reporting bias is an inherent risk in self reported physical activity due to overestimation[9]. However, the literature have suggested that self reporting is sufficiently reliable for monitoring changes in activity levels, which forms the basis of our evaluation.

8.6 Significance

This neighborhood based, physical activity intervention was specifically tailored to seniors. It provided a practical, community-based method for mobilizing older people and

should be a useful guide for health promotion practitioners intending to implement such interventions. The intervention was successful in raising the overall physical activity levels of seniors. The study highlights the important effects of social support and the perception of financial struggle on physical activity.

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References

1. Christensen U, Stovring N, Schultz-Larsen K, Schroll M, Avlund, K. Functional ability at 75: is there an impact of physical inactivity from middle age to early old age? Scand J Med Sci Sports. 2006;16:245-251.

2. Boyette L, Lloyd A, Boyette J, et al. Personal characteristics that influence exercise behaviour of older adults. J Rehabil Res Dev. 2002;39(1):95-103.

3. Stigglebout M, Hopman-Rock M, Cone M, Lechner L, van Mechelen, W. Predicting older adults maintenance in exercise participation using an integrated social psychological model. Health Edu Res. 2006;21(1):1-14.

4. Giles-Corti B, Donovan R. Socioeconomic status differences in recreational physical activity levels and real and perceived access to a supportive physical environment. Prev Med. 2002;35:601-611.

5. Stahl T, Rutten A, Nutbeam D, et al. The importance of the social environment for physically active lifestyle - results from an international study. Soc Sci Med. 2001;52:1-10.

6. Glanz K, Rimer B, Lewis F. Health behavior and health education: theory, research and practice. 3rd ed. San Francisco: Jossey-Bass; 2002.

7. Bauman A, Smith B, Stoker L, Booth M. Geographical influences upon physical activity participation: Evidence of a 'coastal effect'. Aust N Z J Public Health. 1999;23(3):322-324.

8. Jancey J, Clarke A, Howat P, Lee A, Shilton T. A physical activity program to mobilize older people: A practical and sustainable approach. Gerontologist. 2007;Accepted for publication May 25 2007.

9. Gidlow C, Johnston L, Crome D, Ellis N, James D. A systemic review of the relationship between socio-economic position and physical activity. Health Educ J. 2006;65(4):338-367.

10. Miles R, Panton, L. The influence of the perceived quality of community environments on low-income women's efforts to walk more. J Community Health. 2006;31(5):379-392.

CHAPTER 9

Conclusions and recommendations

Intervention research has contributed to our understanding of physical activity behaviour. However, there still remain questions around how to increase people's activity levels, especially in the older age groups. The desirability of increasing levels of physical activity for this group has become more relevant due to the burgeoning ageing population, their increased levels of chronic disease, and the decreased levels of functioning that usually accompany ageing. Older people have much to gain both mentally and physically from being active. Unfortunately, in older age groups physical inactivity represents normative behaviour.

This research investigated physical activity through both qualitative and quantitative research methods, exploring and identifying factors related to recruitment, retention and physical activity behaviour. A number of conclusions can be drawn from the study, along with recommendations for future research and practice with older adults and physical activity.

9.1 Conclusions

1. Perceptions of physical activity and ageing

The qualitative research outlined in Chapter 4 (Jancey et al. 2007a) revealed that the older adults believe that physical activity provides mental and physical health benefits, keeps muscles active and the blood circulating. However, there was little acknowledgement of the many recognised specific benefits that can be achieved through being physically active, such as the positive health outcomes for diabetes and osteoporosis. This suggests that older adults require more information on the direct benefits of being active, along with its value in the management of specific disease and maintaining function.

Chronic pain is a prominent issue for older people, with almost 50% of Australian adults aged 65 and above suffering from arthritis. The participants in this research identified pain as the major barrier to being physically active. Two issues are

relevant, namely, the role of physical activity in pain management and the management of pain itself, so that people can remain active. This indicates that older adults may need guidance on how to manage their symptoms and reassurance about the benefits of physical activity in alleviating joint and muscle pain.

Descriptions of perception of societal support for physical activity were conflicting. Some subjects felt that society was supportive while others did not. The participants also reported that they were confronted by ageist stereotypes and at time felt marginalised, which impacted adversely on their physical activity behaviour. The social environment has been consistently found to influence participation in physical activity. However, older people generally receive less encouragement regarding their exercise habits. It is imperative that older people feel supported in their physical activity pursuits.

Participants described past physical activity experience with warmth and longing. The activities cited included tennis, squash, dancing, badminton, cricket and swimming. The involvement in these diverse activities would have resulted in the development of an array of skills, but these skills did not appear to transfer to later life. When participants discussed activities that they would like to try, they were enthusiastic. However, the enthusiasm was accompanied by an overwhelming acknowledgement of personal barriers associated with their deteriorating bodies.

2. Effective approaches to recruit and retain older adults in physical activity interventions

It has been suggested that the recruitment strategy of an intervention is one of the most influential factors affecting participation in physical activity research programs (Mills et al. 2001). Therefore, programs can benefit from better understanding how to recruit older adults. Recruiting older adults into a physical activity program requires a great deal of effort. The recruitment methods described in Chapter 6 (Jancey et al.

2006) provide a cost-effective and relatively efficient model, when compared to other studies. The Australian Federal Electoral Roll (FER) provided a comprehensive database from which to randomly select a representative sample of potential subjects of the exact age group, thereby reducing the number of required phone contacts, and, in turn, the overall cost. The use of post cards prior to phoning provided background information to the potential subjects, established program credibility, and prepared potential participants for the impending phone invitation to join the project. The program ensured that recruitment was implemented equally in high, medium and low socioeconomic status neighbourhoods, according to SEIFA values. It also lessened the amount of self-selection by minimising advertising.

The representative participation rate for the intervention research was 12.6% for intervention and 14.5% for controls, which compares favourably with other like studies. The recruitment procedure facilitated the selection of a reasonably representative sample when compared to state averages. However, the study did recruit a greater number of females than males, as with other research. In addition a total of 161 recruited subjects decided not to join the program. The main reasons for non-attendance were, 'too busy'; 'walks too early', 'illness', 'caring for others' and 'injury', which are similar to those reported by other studies.

3. Characteristics found to be associated with physical activity program maintenance and attrition

Loss of participants from a research program is of serious concern because it can potentially introduce bias and render a study less representative over time. Minimising attrition from physical activity research involving older adults is critical. Documented characteristics associated with attrition are broad and varied. The results from this study, as reported in Chapter 5 (Jancey et al. 2007b), did not find age, relationship status, education level, country of birth or gender to be related to attrition, with dropouts and completers being similar in these areas. These results concur with those of others that certain demographics are unstable predictors of

exercise adherence. However, after accounting for age and gender the adjusted odds ratio of medium and high SEIFA indexes were 0.74 and 0.40 respectively. The risk of dropping out was about twice for overweight people than for normal weight people ($p < .05$), and adults who reported insufficient physical activity also had a higher likelihood of dropout ($p < .01$). Participants with a greater walking self-efficacy score had a better adherence to the program ($p < .01$), whereas those who were considered lonely, reflecting a high UCLA loneliness score, had a significantly higher risk of attrition ($p < .05$).

By the end of the 6-month program only 32% of the intervention and 25% of the control group had dropped out. The attrition rate for the intervention group was marginally higher, as would be expected, due the greater commitment required by the intervention group when compared to the control group over the 6-month intervention. However, this is a moderate, acceptable attrition rate when compared to other programs involving older persons. Two thirds of the walkers completed the program, with most of the attrition occurring in the first 3 months (77% of dropouts and 27% of total sample). Only 23% of attrition occurred after this period. Data gathered from exit interviews indicated that 'health problems' was the major reason for dropping out, as well as 'competing priorities' and 'travel commitments'.

4. Establishing suburb- based walking groups

Research has shown that the design of a physical activity intervention needs to be multifaceted and there needs to be consideration of the individual and how they interact with the social and physical environment. With less than 50% of older Australians currently achieving the recommended levels of physical activity for health benefits, it is a priority to find ways to get people active. The development and design of the physical activity program outlined in Chapter 7 (Jancey et al. 2007c) was specifically tailored for the older adult. Its development followed detailed

consideration of the literature and careful consultation with the target group. The data from the focus group research indicated that it was important to provide the group with a social experience and social support. In addition, being able to access the walking location was another important issue, along with program costs. Quantitative data gave further insight into the uniqueness and potential fragility of the sample, emphasising the importance of encouragement and reassurance to this older group.

The program aimed to create a supportive social and physical environment. The program was easy to access, free of charge and conducted at a convenient time and in an attractive green space. The graduated program was led by a trained walk leader who provided incentives, regular feedback, and encouragement, organised social activities and distributed a regular newsletter. To increase the likelihood of sustained physical activity, there was information on local activities, identification of a replacement walk leader, an opportunity to practice learnt skills and the nurturing of social networks. Most of the participants indicated that they would continue to walk twice per week when the program concluded (80% n=141) and in six months' time (70% n=124).

5. Changes in physical activity levels and associated factors

It is well established that regular participation at recommended levels of physical activity can minimize physiological changes associated with ageing, increase longevity, and decrease the risk of many common diseases. Chapter 8 (Jancey et al. 2007d) reports on the effectiveness of the 6-month neighbourhood-based intervention to promote an increase in overall physical activity. The results reveal that by the end of the 6-month program, the intervention group had significantly increased the mean time spent in physical activity by 2.25 hours per week, whereas the control group remained stable. This significant increase in physical activity level compares favourably with other community-based physical activity interventions. The outcome demonstrates the extent to which older individuals can increase their levels of

physical activity and the scope for improvement that is possible among older adults over a 6-month period.

It is acknowledged that there was a difference in physical activity level between the control and intervention groups at baseline (p= 0.01), which was statistically accounted for. However, the research was investigating change over time and a statistically significant improvement was observed in the intervention group while the controls remained the same, highlighting the effectiveness of the intervention.

In this study the GEE analysis indicated that demographic factors such as age, gender, partner, education level and country of birth had little influence on the time participants devoted to physical activity. However, a positive association with physical activity was found for the factor, perception of financial struggle (p = .020), a subjective measure that relates to a person's perception of making ends meet financially over a life course. The factor, having no friends or acquaintances living nearby (p=. 037) had a negative effect on the time devoted to physical activity. Previous research has documented that a supportive social environment is a strong correlate of physical activity.

9.2 Recommendations

9.2.1 Recommendations for practice

It is important to find ways to encourage older adults to increase their levels of physical activity. However, older people are not a homogenous group, so there needs to be a comprehensive approach that incorporates a range of strategies.

1. Education

Older adults consider pain a major barrier to physical activity. They need guidance on how to manage their symptoms and reassurance about the benefits of physical activity in alleviating joint and muscle pain. Health professionals play a key role in relating the value of physical activity for pain management and maintaining function. Conversely, proper pain management should encourage older adults to be more active. Therefore, it is vital that health professionals receive support and training in this area so that it becomes a recognised service priority.

The quality and depth of the information provided on the health benefits of physical activity currently being delivered to older adults should be reassessed. Specific and prescriptive information needs to be developed because this may assist some older people to become more active. Health professionals also need support and guidance.

2. Recruitment and attrition

Before the first physical activity session of this intervention commenced, 161 potential subjects changed their mind and dropped out. It is difficult to prevent subjects not turning up, but strategies need to be employed to reduce this impact on study numbers. Over recruitment is a possibility; so too is providing a 'cooling off' period by following up recruits a few days later by phone to confirm their involvement. Of course these additional recruitment costs would need to be factored into the budget.

When recruiting for physical activity programs, researchers need to seek early identification of participants with characteristics (low and medium socio-economic areas, high BMI, poor history of physical activity, high loneliness score and low levels of walking self-efficacy) that have been found to be associated with attrition. These individuals may require more affirmation, encouragement and feedback. The early stages of the program need to be recognised as a time of high risk of attrition. Therefore, there should be an emphasis on given to supporting these participants.

3. Physical activity program

This program provides a practical community-based approach for mobilising older people. It could be used as a guide for others intending to implement similar interventions. Several factors have been highlighted for consideration. These include: the use of tertiary students as program leaders of older people; the use of volunteers to contain costs; the importance of a tailored progressive program; the appropriateness of walking as a form of physical activity for this age group; the enjoyment associated with a walking group; the receptiveness to learning new skills with exercises and ball drills; and the role of the social support. However, physical activities that appeal to individuals needs to be considered, with a focus on making physical activity a joyful experience. The expressed desires for involvement in various types of physical activity should be acknowledged, as well as the feasibility of developing a range of modified activity types suitable for older adults.

9.2.2 Recommendations for further research

The quantitative and qualitative research in this study brought to light a number of areas that warrant further investigation.

The participants expressed a desire to participate in activities that are not generally considered appropriate for older adults. There needs to be further investigation into alternative physical activities, along with sport modification, so that participation is possible for the older age group in a wide range of activities. Older adults also reported a physical activity void during their working years. Research is required to identify whether such a deficiency is a common phenomenon for different generations and how the void may be alleviated.

There needs to be identification and evaluation of alternative methods of recruitment and program delivery. A randomised controlled trial should be established to assess the role of minimal intervention and motivational interviewing to encourage

increased involvement in physical activity. Research should be conducted with strategies that incorporate mailed information and approaches that utilise the telephone and internet. Consideration should also be given to expanding physical activity intervention to include a nutrition component.

This research highlights several issues related to attrition and/or retention that deserve further investigation. There is a need to explore methods to reduce the impact of participants who agree to participate in a program and then change their minds. As with other programs walking self-efficacy appeared to affect exercise adoption and maintenance. Methods of nurturing and developing this characteristic need to be investigated. The concept of loneliness and its influence on participation in physical activity, and the impact of physical activity programs on loneliness, require further investigation.

Australia, like the rest of the world, has an ageing population. There needs to be ongoing research into strategies that will encourage increased physical activity for older adults, as it is increasingly seen as a tool for the prevention and management of chronic disease associated with ageing. There needs to be experimentation with program content so as to make it more appealing, especially in regard to males. Older adults appear to be a heterogenous group so a variety of strategies are needed to mobilise them.

References

A Report of the Surgeon General Executive Summary 1996, *Physical activity and health*, US Department of Health and Human Services; Centers for Disease Control and Prevention; National Centre for Chronic Disease Prevention and Health Promotion.

Adamson, L, Chojenta, C & Lee, C 2005, 'Telephone contact of existing participants in longitudinal surveys', *Australian and New Zealand Journal of Public Health,* vol. 29, no. 2, pp. 188-189.

Ainsworth, A., Bassett, D, Strath, S, Swartz, A, O'Brien, W, Thompson, R, Jonnies, D, Macera C & Kimsey, C 2000, 'Comparison of three methods for measuring the time spent in physical activity', *Medicine and Science in Sports and Exercise,* vol. 32, pp. S547-464.

Allender, S, Cowburn, G & Foster C 2006, 'Understanding participation in sport and physical activity among children and adults: a review of qualitative studies', *Health Education Research,* vol. 21, no. 6, pp. 826-835.

American College of Sports Medicine 1998, 'American college of sports medicine position stand: The recommended quantity and quality of exercise for developing and maintaining cardiorespiratory and muscular fitness, and flexibility in healthy adults', *Medicine & Science in Sports & Exercise,* vol. 30, no. 6, pp. 916-920.

Anderson, L, Schnohr, P, Schroll, M & Hein, H 2000, 'All-cause mortality associated with physical activity during leisure time, work, sports, and cycling to work', *Archives of Internal Medicine,* vol. 160, no. 11, pp. 1621-1628.

Arean, P & Gallagher-Thompson, D 1996, 'Issues and recommendations for the recruitment and retention of older ethnic minority adults into clinical research', *Journal of Consulting and Clinical Psychology,* vol. 64, no. 5, pp. 875-880.

Armstrong, T, Bauman, A & Davies, J 2000, *Physical activity patterns of Australian adults: Results of the 1999 national physical activity survey*, Australian Institute of Health and Welfare, Canberra.

Australian Bureau of Statistics 1991, *Household telephone connection, Australia*, Australian Bureau of Statistics, Canberra, cat no. 4110.0.

Australian Bureau of Statistics 1998, *Census of population and housing: socio-economic indexes for areas (SEIFA) 1996, information paper*, Australian Bureau of Statistics, Canberra, cat. no. 2039.0.

Australian Bureau of Statistics 2001, *Census of basic community profile and snapshot: 5 Western Australia*, Australian Bureau of Statistics, Canberra, cat. no. 2015.0.

Australian Bureau of Statistics 2002, *Australian social trends 2002: Population, population composition: Older overseas-born Australians*, Australian Bureau of Statistics, Canberra.

Australian Bureau of Statistics 2003, *2001 community profile series - usual residents profile community profile; Western Australia*, Australian Bureau of Statistics, Canberra, cat. no. 2004.0.

Australian Bureau of Statistics, 2004a, *Population by age and sex, Western Australia 2003-2004,* ABS, Canberra, cat. no. 3235.5.55.001.

Australian Bureau of Statistics 2004b, *Year book Australia: health - health risk factors among adults*, Australian Bureau of Statistics, Canberra, cat no. 4833.0.55.001.

Australian Bureau of Statistics 2005, *Health of older people in Australia: A snapshot 2004-5*, Australian Bureau of Statistics, Canberra, cat. no. 4833.0.55.001.

Australian Bureau of Statistics 2006, *National health survey: 2004-2005*, Australian Bureau of Statistics, Canberra, cat. no. 4364.0.

Australian Institute of Health and Welfare 2002, *Diabetes: Australian facts 2002*, Australian Institute of Health and Welfare and National Heart Foundation of Australia, Canberra.

Australian Institute of Health and Welfare 2004a, *Australia's Health 2004*, Australian Institute of Health and Welfare, Canberra.

Australian Institute of Health and Welfare 2004b, *Heart stroke and vascular diseases-Australian facts. CVD Canberra, Australian Institute of Health and Welfare and National Heart Foundation of Australia*, Australian Institute of Health and Welfare, Canberra.

Australian Sports Commission 2003, *Participation in exercise, recreation and sport survey 2003: Annual Report*, Australian Government, Canberra.

Ball, K, Bauman, A, Leslie, E & Owen, N 2001, 'Perceived environmental aesthetics and convenience and company are associated with walking for exercise among Australian adults', *Preventive Medicine,* vol. 33, no. 5, pp. 434-440.

Ballard, E, Nash, F, Raiford, K & Harrell, L 1993, 'Recruitment of black elderly for clinical research studies of dementia: The CERAD experience', *The Gerontologist,* vol. 33, no. 4, pp. 561-565.

Bandura, A 1986, *Social foundations of thought and action*, Prentice Hall, Englewoods Cliffs, NJ.

Bandura, A 1997, *Self efficacy: the exercise of control*, Freeman, New York.

Baranowski, T, Anderson, C & Carmack, C 1998, 'Mediating variable framework in physical activity interventions: How are we doing? How might we do better?', *American Journal of Preventive Medicine,* vol. 15, no. 4, pp. 266-297.

Bassey, E 2006, 'The benefits of physical activity for health in older people: an update', *Reviews in Clinical Gerontology*, pp. 1-8.

Bauman, A 2004, 'Updating the evidence that physical activity is good for health: An epidemiological review 2000-2003.' *Journal of Science and Medicine in Sport,* vol. 7, no. 1 suppl, pp. 6-19.

Bauman, A, Bellew, B, Vita, P, Brown, W & Owen, O 2002, *Getting Australia active: Towards better practice for the promotion of physical activity*, National Public Health Partnership, Melbourne, Victoria.

Bauman, A & Owen, N 1999, 'Physical activity of adult Australians: Epidemiological evidence and potential strategies for health gain', *Journal of Science and Medicine in Sport,* vol. 2, no. 1, pp. 30-41.

Bauman, A, Sallis, J, Dzewaltowski, D & Owen, N 2002, 'Toward a better understanding of the influences on physical activity: The role of determinants, correlates, causal variables, mediators, moderators, and confounders', *American Journal of Preventive Medicine,* vol. 23, no. 2, pp. 5-14.

Bauman, A, Smith, B, Stoker, L & Booth, M 1999, 'Geographical influences upon physical activity participation: Evidence of a 'coastal effect'', *Australian and New Zealand Journal of Public Health,* vol. 23, no. 3, pp. 322-324.

Bautmans, I, Lamber M & Mets T 2004, 'The six-minute walk test in community dwelling elderly: Influence of health status.' *BMC Geriatrics,* vol. 4, no. 6, pp. 1-9.

Bennet, A, Schneider, J, Tang, X, Arnold, S & Wilson, R 2006, 'The effect of social networks on the relation between Alzheimers's disease pathology and level of cognitive function in older people: A longitudinal cohort study.' *Lancet Neurology,* vol. 5, pp. 406-412.

Bezner, J, Adams, T & Whistler, L 1999, 'The relationship between physical activity and indicators of perceived wellness', *American Journal of Health Studies,* vol. 15, no. 3, pp. 130-138.

Bijnen, F, Feskers, E & Caspersen, C 1999, 'Baseline and previous physical activity in relation to mortality in elderly men - Tge Utphen Elderly Study', *American Journal of Epidemiology,* vol. 150, pp. 1289-1296.

Blair, S, Cheng, Y & Holder, S 2001, 'Is physical activity or physical fitness more important in defining health benefits', *Medicine and Science in Sports and Exercise*, pp. S379-S399.

Blair, S, Kampert, J, Kohl, H, Barlow, C, Macera, C, Paffenbarger, R & Gibbons, L 1996, 'Influences of cardiorespiratory fitness and other precursors on cardiovascular disease and all-cause mortality in men and women', *JAMA,* vol. 276, no. 3, pp. 205-210.

Booth, M, Bauman, A, Owen, N & Gore, CJ 1997, 'Physical activity preferences, preferred sources of assistance, and perceived barriers to increased activity among physically inactive Australians', *Preventive Medicine,* vol. 26, pp. 131-137.

Booth, M, Owen, N, Bauman, A, Clavisi, O & Leslie, E 2000, 'Social-cognitive and perceived environmental influences associated with physical activity in older Australians', *Preventive Medicine,* vol. 31, pp. 15-22.

Booth, M, Owen, N, Bauman, A & Gore, CJ 1996, 'Retest reliability of recall measures of leisure-time physical activity in Australian adults', *International Journal of Epidemiology,* vol. 25, no. 1, pp. 153-159.

Booth, S, Mayer, J, Sallis, J & Ritenberg, C 2001, 'Environmental and societal factors affect food choice and physical activity: Rationale, influences, and leverage points', *Nutrition Reviews,* vol. 59, no. 3, pp. S21-S37.

Bopp, M, Wilcox, S, Laken, M, Butler, K, Carter, R, McClorin, L & Yancey, A 2006, 'Factors associated with physical activity among African-American men and women', *American Journal of Preventative Medicine,* vol. 30, no. 4, pp. 340-346.

Borg, G. 1998, *Perceived exertion and pain scales*, Human Kinetics, Champaign (IL).

Boyette, L, Lloyd, A, Boyette, J, Watkins, E, Furbush, L, Dunbar, S & Brandon, J 2002, 'Personal characteristics that influence exercise behaviour of older adults', *Journal of Rehabilitation and Research and Development,* vol. 39, no. 1, pp. 95-103.

Bozoian, S, Rejeski, W & McAuley, E 1994, 'Self-efficacy influences feeling states associated with acute exercise', *Journal of Sport and Exercise Psychology,* vol. 16, pp. 326-333.

Brawley, L, Rejeski, W & King, A 2003, 'Promoting physical activity for older adults: The challenges for changing behaviour', *American Journal of Preventive Medicine,* vol. 25, no. 3, pp. 172-183.

Briffa, T, Maiorana, A, Sheerin, N, Stubbs, A, Oldenburg, B, Sammel, N & Allan, R 2006, 'Physical activity for people with cardiovascular disease: Recommendations of the National Heart Foundation of Australia', *Medical Journal of Australia,* vol. 184, no. 2, pp. 71-75.

Brownson, R, Hagood, L, Lovegreen, S, Britton, B Caito, N, Elliot, M & Emery, J 2005, 'A multilevel ecological approach to promoting walking in rural communities', *Preventive Medicine,* vol. 41, pp. 837-842.

Bruce, D, Devine, A. & Prince, R 2002, 'Recreational physical activity levels in health older women: The importance of fear of falling', *Journal of American Geriatics Society,* vol. 50, pp. 84-89.

Bull, F 2003, 'Defining physical activity', *The Lancet,* vol. 361, pp. 258-259.

Bull, F, Bauman, A, Bellew, B & Brown, W 2004, *Getting Australia active II: An update of evidence on physical activity and health*, National Public Health Partnership, Melbourne, Australia.

Bull, F, Milligan, R, Rosenberg, M & MacGowan, H 2000, *Physical activity levels of Western Australian adults 1999*, Health Department of Western Australia, Western Australian Government, Perth:Western Australia.

Bunker, S, Colquhoun, D, Esler, M, Hickie, I, Hunt, D, Jelinek, V, Oldenburg, B, Peach, H, Ruth, D, Tennant, C. & Tonkin, A 2003, 'Stress and coronary heart disease: Psychosocial risk factors. National Heart Foundation of Australia position statement update', *Medical Journal of Australia,* vol. 178, pp. 272-276.

Cameron, A, Welborn, T, Zimmet, PZ, Dunstan DW, Owen, N, Salmon, J, Dalton, M, Jolley, D & Shaw, JE 2003, 'Overweight and obesity in Australia: the 1999-2000 Australian Diabetes, Obesity and Lifestyle Study (AusDiab)', *Medical Journal of Australia,* vol. 178, no. 9, pp. 427-432.

Campbell, A, Robertson, M, Gardnert, M, Norton, R & Buchner, D 1999, 'Falls prevention over two years: A randomized controlled trial in women 80 years and older', *Age and Aging,* vol. 28, pp. 513-518.

Carron, A, Hausenblas, H & Mack, D 1996, 'Social influence and exercise: A meta-analysis', *Journal of Sport and Exercise Psychology,* vol. 18, pp. 1-16.

CATI Technical Reference Group: National Public Health Partnership 2003, *Population health monitoring and surveillance: question development background paper. Physical activity in Australia*, Canberra, ACT.

Centres for Disease Control and Prevention 1999, 'Neighbourhood safety and the prevalence of physical inactivity - selected states, 1996', *Morbidity and Mortality Weekly Report,* vol. 48, no. 7, pp. 143-146.

Chatfield, M, Brayne, C & Matthews, F 2005, 'A systematic literature review of attrition between waves in longitudinal studies in the elderly shows a consistent pattern of dropout between differing studies', *Journal of Clinical Epidemiology,* vol. 58, pp. 13-19.

Chogahara, M 1999, 'A multidimensional scale for assessing positive and negative social influences of physical activity in older adults', *Journal of Gerontology,* vol. 54B, pp. S356-S367.

Chogahara, M, O'Brien Cousins, S & Wankel, L 1998, 'Social influences on physical activity in older adults: A review', *Journal of Aging and Physical Activity,* vol. 6, pp. 1-17.

Christensen, U, Stovring N, Schultz-Larsen, K, Schroll, M & Avlund, K 2006, 'Functional ability at 75: Is there an impact of physical inactivity from middle age to early old age?' *Scandinavian Journal of Medicine Science and Sports,* vol. 16, pp. 245-251.

Church, T, Earnest, C, Skinner, J & Blair, S 2007, 'Effect of different doses of physical activity on cardiorespiratory fitness among sedentary, overweight or obese postmenopausal women with elevated blood pressure', *JAMA,* vol. 297, no. 19, pp. 2081-2091.

Clark, D 1999, 'Identifying psychological, physiological, and environmental barriers and facilitators to exercise among older low income adults', *Journal of Clinical Geropsychology,* vol. 5, no. 1, pp. 51-62.

Clarke, A, & Gordon S 2001 October, 'The Walking Buddy Project: maximising adherence to physical activity.' in *Proceedings of the 2001 Science and Medicine in Sport*, ed. G. C. Ackland T, Sports Medicine Australia, Canberra, Australia.

Cohen-Mansfield, J, Marx, MS & Guralnik, JM 2003, 'Motivators and barriers to exercise in an older community dwelling population', *Journal of Aging and Physical Activity,* vol. 11, pp. 242-253.

Colditz, G, Cannuscio, C & Frazier, A 1997, 'Physical activity and reduced risk of colon cancer', *Cancer Causes Control,* vol. 8, no. 4, pp. 649-667.

Corti, B, Donovan, R, Castine, R, D'Arcy, C, Holman, J. & Shilton, T 1995, 'Encouraging the sedentary to be active everyday: Qualitative formative research', *Health Promotion Journal of Australia,* vol. 5, no. 2, pp. 10-17.

Corti, B, Donovan, R & Holman, C 1996, 'Factors influencing the use of physical activity facilities: Results from qualitative research', *Health Promotion Journal of Australia,* vol. 6, no. 1, pp. 16-21.

Craig, C, Marshall, M, Sjostrom, A, Bauman, A, Booth, B, Ainsworth, M, Pratt, U, Ekelund, A, Yngve, J, Sallis, J & Oja, P 2003, 'International physical activity questionnaire: 12 country reliability and validity', *Medical Science Sports Exercise,* vol. 35, no. 8, pp. 1381-1395.

Crespo, C, Palmieri, M, Perdomo, R, McGee, D, Smit, E, Sempos, C, Lee, I & Sorlie, P 2002, 'The relationship of physical activity and body weight with all-cause mortality: Results from the Puerto Rico Heart Health Program', *Annals of Epidemiology,* vol. 12, no. 8, pp. 543-552.

Cress M, Prohaska, T, Rimmer, J, Brown, M, Macera, C, DePietro, L & Chodzko-Zajko, W 2005, 'Physical activity programs and behaviour counseling in older adult populations', *Journal of Aging and Physical Activity,* vol. 13, no. 1, pp. 61-74.

Crombie, I, Irvine, L, Williams, B, McGinnis, A, Slane, P, Alder, E & McMurdo, E 2004, 'Why older people do not participate in leisure time physical activity: A survey of activity levels, beliefs and deterrents', *Age and Aging,* vol. 33, pp. 287-292.

Cyarto, E, Moorhead, G & Brown, W 2004, 'Updating the evidence relating to physical activity intervention studies in older people', *Journal of Science and Medicine in Sport,* vol. 7, no. 1, pp. 30-38.

Delbaere, K, Crombez, G, Vanderstraeten, G, Wilems, T & Cambier, D 2004, 'Fear-related avoidance of activities, falls and physical frailty: A prospective community-based cohort study', *Age and Aging,* vol. 33, pp. 368-373.

Department of Health and Aged Care 1999, *An active way to better health: National physical activity guidelines for Adults,* Australian Government Publishing, Canberra.

Diabetes Prevention Program research Group 2002, Reduction in the incidence of type 2 diabetes with lifestyle intervention of metformin, *New England of Medicine*, vol. 346, no 6, pp. 393-403.

DiPietro, L 2001, 'Physical activity in aging: Changes in patterns and their relationship to health and function', *Journal of Gerontology,* vol. 56A, no. 11, pp. 13-22.

Dishman, R 1991, 'Increasing and maintaining physical activity and exercise', *Behavioural Therapy,* vol. 41, pp. 3-15.

Dishman, R 1994, 'Motivating older adults to exercise', *Southern Medical Journal,* vol. 87, no. 5, pp. S79-S82.

Dishman, RE 1988, *Exercise adherence: Its impact on public health*, Human Kinetics Books, Champaign, Illinois.

Duncan, M, Spence, J & Mummery, K 2005, 'Perceived environment and physical activity: A meta-analysis of selected environmental characteristics.' *International Journal of Behavioural Nutrition and Physical Activity,* vol. 2, no. 11, pp. 1-9.

Duncan, T & McAuley, E 1993, 'Social support and efficacy cognitions in exercise adherence: A latent growth curve analysis', *Journal of Behavioral Medicine,* vol. 16, pp. 199-218.

Egger, G, Donovon, R, Swinburn B, Giles-Corti, B & Bull, F 1999, *'Physical activity guidelines for Australians: Scientific background report, Report to the Commonwealth Department of Health and Aged Care'.*

Enright, P 2003, 'The six-minute walk test', *Respiratory Care,* vol. 48, no. 8, pp. 783-785.

Ettinger, W, Burns, R, Messier, S, Applegate, W, Rejeski, W, Morgan, T. Shumaker, S, Berry, M, O'toole, M, Monu, J & Craven, T 1997, 'A randomised trial comparing aerobic exercise and resistance exercise with a health education program in older adults with knee osteoarthritis', *Journal of the American Medical Association,* vol. 277, pp. 25-31.

Eyler, A, Wilcox, S, Matson-Koffman, D, Evenson, K, Sanderson, B, Thompson, J, Wilbur, J & Rohm-Young, D 2002, 'Correlates of physical activity among women from diverse racial/ethnic groups', *Journal of Women's Health & Gender-Based Medicine,* vol. 11, no. 3, pp. 239-253.

Fisher, J, Li, F, Micheal, Y & Cleveland, M 2004, 'Neighborhood-level influences on physical activity among older adults: a multivariate analysis', *Journal of Aging and Physical Activity,* vol. 11, pp. 45-63.

Fisher, K, Pickering, MA & Li, F 2002, 'Healthy aging through active leisure: Design and methods of SHAPE - a randomised controlled trial of a neighbourhood-based walking project', *World Leisure,* vol. 1, pp. 19-28.

Flicker, L, Lautenschlager, N & Almeida, O 2006, 'Healthy mental ageing', *Journal of the British Menopause Society,* vol. 12, no. 3, pp. 92-96.

Ford, E, Merritt, E, Heath, G, Powell, K, Walshburn, R, Kriska, A & G H 1991, 'Physical activity behaviors in lower and higher socioeconomic status populations', *American Journal of Epidemiology,* vol. 133, pp. 1246-56.

Foreman, R, Walsh, A, Brown, W, Marshall, A & Abernethy, P 2003, *'Just walk it': A physical activity success story preliminary results from a comprehensive longitudinal impact evaluation*, The University of Queensland National Heart Foundation, Brisbane.

Garcia, A & King, A 1991, 'Predicting long-term adherence to aerobic exercise: A comparison of two models', *Journal of Sport and Exercise Psychology,* vol. 13, pp. 394-410.

Getting Western Australians more active - A strategic direction report from the premier's physical activity taskforce, 2001, Department of the Premier and Cabinet, Perth, Western Australia.

Gidlow, C, Johnston L, Crome D, Ellis N & James D 2006, 'A systemic review of the relationship between socio-economic position and physical activity', *Health Education Journal,* vol. 65, no. 4, pp. 338-367.

Giles-Corti, B & Donovan, R 2002, 'Socioeconomic status differences in recreational physical activity levels and real and perceived access to a supportive physical environment', *Preventive Medicine,* vol. 35, pp. 601-611.

Giles-Corti, B & Donovan, R 2003, 'The relative influence of individual, social environmental and physical environmental correlates of walking', *American Journal of Public Health,* vol. 93, no. 9, pp. 1583-1589.

Glanz, K, Rimer, B & Lewis, F 2002, *Health behavior and health education: theory, research and practice,* 3rd edn, Jossey-Bass, San Francisco.

Godin, G, Desharnais, R, Valois, P, Jobin, J & Bradet, R 1994, 'Differences in perceived barriers to exercise between high and low intenders: observations among different populations', *American Journal of Health Promotion,* vol. 8, no. 4, pp. 279-285.

Goodger, B, Byles, J & Higganbotham, N 1999, 'Assessment of a short scale to measure social support among older people', *Australian and New Zealand Journal of Public Health,* vol. 23, pp. 260-265.

Goodrich, D, Larkin, A, Lowery, J, Holleman, R & Richardson, C 2007, 'Adverse events among high-risk participants in a home-based walking study: A descriptive study.' *International Journal of Behavioural Nutrition and Physical Activity,* vol. 4, no. 20, pp. 1-12.

Gordis, L 2004, *Epidemiology*, Elesevier Inc, Philadelphia.

Grant, S, Todd, K, Aitchison, T, Kelly, P & Stoddart, D 2004, 'The effects of a 12-week group exercise programme on physiological and psychological variables and function in overweight women', *Public Health,* vol. 118, no. 31-42.

Green, LW & Kreuter, MW 2005, *Health program planning: An educational and ecological approach,* 4th edn, McGraw Hill, New York.

Gregg, E, Cauley, J, Stone, K, Tjompson, T, Bauer, D, Cummings, S & Ensrud, K 2003, 'Relationship of changes in physical activity and mortality among older women', *Journal of American Medical Association,* vol. 289, no. 18, pp. 2379-2386.

Harada, N, Chiu, V & Stewart, A 1999, 'Mobility-related functioning older adults: Assessment with a 6-minute walk test', *Archives of Physical and Medical Rehabilitation,* vol. 80, no. July, pp. 837-841.

Harris, A, Cronkite, R & Moss, R 2006, 'Physical activity, exercise coping, and depression in a 10 year cohort study of depressed patients', *Journal of Affective Disorders,* vol. 93, pp. 79-95.

Haskell, W, Lee, I, Pate, R, Powell, K, Blair, S, Franklin, B, Macera, C, Heath, G, Thompson, P, Bauman A 2007, 'Physical activity and public health: updated recommendations for adults from the American College of Sports Medicine and American Heart Association', *Circulation*, vol 116, pp. 1-113.

Hayslip, B, Weigand, D, Weinberg, R, Richardson, P & Jackson, A 1996, 'The development of new scales for assessing health belief model constructs in adulthood', *Journal of Aging and Physical Activity,* vol. 4, no. 4, pp. 307-323.

Hill, K, Vrantsidis, F, Haralambous, Fearn, M, Smith, R, Murray, K & Sims, J 2004, *An analysis of research on preventing falls and falls injury in older people: Community, residential care and hospital settings. 2004 Update*, Report to the Australian Government, Department of Health and Ageing, Injury Prevention Section, Melbourne.

Hillsdon, M, Foster, C & Thorogood, M 2005, *Interventions for promoting physical activity*, Cochrane Database of Systematic Reviews (1).

Hirvensalo, M, Rantanen, T & Heikkinen, E 2000, 'Mobility difficulties and physical activity predictors of mortality and loss of independence in the community living older population', *JAM Geriatric Society,* vol. 48, pp. 493-498.

Howat, P, Iredell, H, Grenade, L, Nedwetzky, A & Collins, J 2004, 'Reducing social isolation amongst older people - implications for health professionals', *Geriaction,* vol. 22, no. 1, pp. 13-20.

Howat, P, Jones, S, Hall, M, Cross, D & Stevenson, M 1997, 'Adaptation of the PROCEED-PRECEDE framework for planning a child pedestrian injury prevention program', *Injury Prevention,* vol. 3, pp. 282-287.

Hu, G, Tuomilehto, J, Borodulin, K & Jousilahti, P 2007, 'The joint associations of occupational, commuting, and leisure-time physical activity, and the Framingham risk score on the 10 year risk of coronary heart disease', *European Heart Journal,* vol. 28, pp. 492-498.

Humpel, N, Owen, N, Leslie, E, Marshall, A, Bauman, A & Sallis, J 2004, 'Associations of location and perceived environmental attributes with walking in neighborhoods', *American Journal of Health Promotion,* vol. 18, no. 3, pp. 239-242.

Iredell, H, Shaw, T, Howat, P, James, R & Granich, J 2004, 'Introductory postcards: Do they increase response rate in a telephone survey of older persons?', *Health Education Research,* vol. 19, no. 2, pp. 1-6.

Jacomb, P, Jorm, A, Korten, A, Christensen, H & Henderson, A 2002, 'Predictors of refusal to participate: a longitudinal health survey of the elderly in Australia', *BMC Public Health,* vol. 2, no. 4, pp. 1-6.

Jancey, J, Howat, P, Lee, A, Clarke, A, Shilton, T & Iredell, H 2006, 'Effective recruitment of older adults in physical activity research', *American Journal of Health Behavior,* vol 30, no.2, pp. 626-635.

Jancey, J Clarke, A, Howat, P, Maycock, B & Lee, A 2007a, 'Perceptions of physical activity by older adults: An exploratory study', *Health education Journal,* accepted for publication October 11 2007.

Jancey, J, Lee, A, Howat, P, Clarke, A, Wang, K & Shilton, T 2007b, 'Reducing attrition in physical activity programs for older adults', *Journal of Aging and Health,* vol. 15, no. 2, pp. 152-165.

Jancey, J, Clarke, A, Howat, P, Lee, A & Shilton, T 2007c, 'A physical activity program to mobilize older people: A practical and sustainable approach.' *The Gerontologist,* accepted for publication May 25 2007.

Jancey, J Lee, A, Howat, P, Clarke, A, Kui Wang & Shilton T 2007d, 'The effectiveness of a physical activity intervention for seniors', *American Journal of Health Promotion,* accepted for publication July 17 2007.

Jonker, J, De Laet, C, Franco, O, Peeters, A, Mackenbach, J & Nusselder, W 2006, 'Physical activity and life expectancy with and without diabetes', *Diabetes Care,* vol. Jan 29, no. 1, pp. 39-43.

Kahn, E, Ramsey, L, Brownson, R, Heath, G, Howze, E, Powell, K, Stone, E, Rajab, M & Corso, P 2002, 'The effectiveness of interventions to increase physical activity: A systematic review', *American Journal of Preventive Medicine,* vol. 22, pp. 73-107.

Kamphuis, C, van Lenthe, F, Giskes, K, Brug, J & Mackenbach. J 2007, 'Perceived environmental determinants of physical activity and fruit and vegetable consumption among high and low socioeconomic groups in the Netherlands', *Health & Place,* vol. 13, pp. 493-503.

Keenan, A, Tennant, A, Fear, J, Emery, P & Gonaghan, P 2006, 'Impact of multiple joint problems on daily living tasks in people in the community over fifty-five', *Arthritis & Rheumatism,* vol. 55, no. 5, pp. 757-764.

King, A, Blair, S, Bild, D, Dishman, R, Dubbert, P, Marcus, B, Oldridge, N, Paffenbarger, R, Powell, K & Yeager, K 1992, 'Determinants of physical activity and interventions in adults', *Medicine and Science in Sports and Exercise,* vol. 26, no. 6, pp. S221-S236.

King, A, Oman, R, Brassington, G, Bliwise, D & Haskell, W 1997, 'Moderate-intensity exercise and self-rated quality of sleep in older adults: A randomised control trial', *Journal of American Medical Association,* vol. 277, no. 1, pp. 32-37.

King, A, Rejeski, W & Buchner, D 1998, 'Physical activity interventions targeting older adults: A critical review and recommendations', *American Journal of Preventive Medicine,* vol. 15, no. 4, pp. 316-333.

Klesges, R, Eck, L, Mellon M, Fulliton, W, Somes, G, Hanson, C 1990, 'The accuracy of self-report of physical activity', *Medicine & Science in Sports & Exercise,* vol. 22, pp. 690-697.

Klesges, R, Williamson, J, Somes, G, Talcott, G, Lando, H & Haddock, K 1999, 'A population comparison of participants and nonparticipants in a health survey', *American Journal of Public Health,* vol. 89, no. 8, pp. 1228-1231.

Kritz-Silverstein, D, Barrett-Connor, E & Corbeau, C 2001, 'Cross-sectional and prospective study of exercise and depressed mood in the elderly', *American Journal of Epidemiology,* vol. 153, no. 6, pp. 596-603.

Kushi, L, Fe, T & Folsom, A 1997, 'Physical activity and mortality in post-menopausal women', *Journal of American Medical Association,* vol. 277, pp. 1287-1292.

Landi, F, Graziano, O, Carpenter, I, Cesari, M, Soldato, M & Bernabei, R 2007, 'Physical activity prevented functional decline among frail community-living elderly subjects in an international observational study', *Journal of Clinical Epidemiology,* vol. 60, pp. 518-524.

Lauder, W, Mummery, K, Jones, M & Caperchione, C 2006, 'A comparison of health behaviours in lonely and non-lonely populations.' *Psychology, Health & Medicine,* vol. 11, no. 2, pp. 233-245.

Lee, I & Skerrett, P 2001, 'Physical activity and all-cause mortality: what is the dose-response relation?', *Medicine and Science in Sports and Exercise,* vol. 33, no. 6, pp. s459-s471.

Lee, L, Arthur, A & Avis, M 2007, 'Evaluating a community-based walking intervention for hypertensive older people in Taiwan: a randomised controlled trial.' *Preventive Medicine,* vol. 44, no. 2, pp. 160-169.

Legters, K 2002, 'Fear of falling', *Physical Therapy,* vol. 82, pp. 264-272.

Leino-Arjas, P, Solovieva, S, Riihimaki, H, Kirjonen, J & Telama, R 2004, 'Leisure time physical activity and strenuousness of work as predictors of physical functioning: A 28 year follow up of a cohort of industrial employees', *Occupational Environmental Medicine,* vol. 61, pp. 1032-1038.

Li, F, Fisher J, Bauman A, Ory, M, Chodzko-Zajko, W, Harmer, P, Bosworth, M & Cleveland M 2005, 'Neighbourhood influences on physical activity in middle-aged and older adults: A multilevel perspective', *Journal of Aging and Physical Activity,* vol. 13, pp. 87-114.

Lim, K & Taylor L 2005, 'Factors associated with physical activity among older people - a population based study', *Preventive Medicine,* vol. 40, pp. 33-40.

Lui, I & Anthony, J 1989, 'Using the "mini-mental state" examination to predict elderly subjects' completion of a follow-up interview', *American Journal of Epidemiology,* vol. 130, pp. 416-422.

Martin, K & Sinden, A 2001, 'Who will stay and who will go? A review of older adults' adherence to randomised controlled trials of exercise', *Journal of Aging and Physical Activity,* vol. 9, no. 2, pp. 91-114.

Matsudo, S, Matsudo, V, Andrade, D & Araugo, T 2004, 'Physical activity promotion: experiences and evaluation of the Agita Sao Paulo program using the ecological mobile model', *Journal of Physical Activity and Health*, no. 1, pp. 81-97.

McAuley, E 1993, 'Self-efficacy and the maintenance of exercise participation in older adults', *Journal of Behavioural Medicine,* vol. 16, pp. 103-113.

McAuley, E & Blissmer, B 2000, 'Self-efficacy determinants and consequences of physical activity', *Exercise and Sports Science Reviews,* vol. 28, no. 2, pp. 85-88.

McAuley, E, Blissmer, B, Katula, J & Duncan, T 2000a, 'Exercise environment, self-efficacy, and effective responses to acute exercise in older adults', *Psychology and Health,* vol. 15, pp. 341-355.

McAuley, E, Blissmer, B, Marquez, D, Jerome, G, Kramer, A & Katula, J 2000b, 'Social relations, physical activity and well-being in older adults', *Preventive Medicine,* vol. 31, pp. 608-617.

McAuley, E, Courneya, K, Rudolph, L & Lox, C 1994, 'Enhancing exercise adherence in middle-aged males and females', *The Gerontologist,* vol. 23, no. 4, pp. 498-506.

McAuley, E, Elavsky, S, Jerome, G, Konopack, J & Marquez D 2005, 'Physical activity related well-being in older adults; social cognitive influences.' *Psychology and Aging,* vol. 20, no. 2, pp. 295-302.

McAuley, E, Jerome, G, Elavsky, S, Marquez, D & Ramsey, S 2003a, 'Predicting long term maintenance of physical activity in older adults', *Preventive Medicine,* vol. 37, pp. 110-118.

McAuley, E, Jerome, G, Marquez, M & Steriani, E 2003b, 'Exercise self-efficacy in older adults: Social, affective and behavioural influences', *Annals of Behavioural Medicine,* vol. 25, no. 1, pp. 1-7.

McAuley, E & Mihalko, S, 2003, 'Measuring exercise-related self-efficacy', in J. Duda, (ed.) *Advances in sport and exercise psychology measurement*, vol. Chpt 22, Fitness Information Technology, Morgantown, WV, pp. 371-390.

McCormack, G, Milligan, R, Giles-Corti, B & Clarkson, J 2003, *Physical activity levels of Western Australian Adults 2002: Results from the adult physical activity survey and pedometer study*, Western Australian Government, Perth.

McNeill, L, Kreuter, M & Subramanian, S 2006, 'Social environment and physical activity: A review of concepts and evidence', *Social Science and Medicine,* vol. 63, pp. 1011-1022.

Melzer, I, Benjuya, N & Kaplanski, J 2003, 'Effects of regular walking on postural stability in the elderly', *Gerontology,* vol. 49, no. 4, pp. 240-245.

Mihalko, S & McAuley, E 1996, 'Strength training effects on subjective well-being and physical function in the elderly', *Journal of Aging and Physical Activity,* vol. 4, pp. 56-68.

Mihalko, S, McAuley, E & Bane, S 1996, 'Self-efficacy and affective response to acute exercise in middle aged adults', *Journal of Social Behaviour and Personality,* vol. 11, no. 2, pp. 375-385.

Miles, R & Panton, L 2006, 'The influence of the perceived quality of community environments on low-income women's efforts to walk more', *Journal of Community Health,* vol. 31, no. 5, pp. 379-392.

Miller, M, Rejeski, W & Reboussin, B 2000, 'Physical activity, functional limitations, and disability in older adults', *Journal of the American Geriatric,* vol. 48, pp. 1264-1272.

Mills, K, Stewart, A. McLellan, B. Verboncoeur, C, King, A & Brown, B 2001, 'Evaluation of enrollment bias in a physical-activity-promotion program for seniors', *Journal of Aging and Physical Activity,* vol. 9, no. 4, pp. 398-413.

Morey, M, Dubbert, P, Doyle, M, MacAller, H, Crowley, G, Kuchibhatla, M, Schenkman, M & Horner, R 2003, 'From supervised to unsupervised exercise: Factors

associated with exercise adherence', *Journal of Aging and Physical Activity,* vol. 11, no. 3, pp. 351-368.

Morgan, K & Bath, P 1998, 'Customary physical activity and psychological well-being: a longitudinal study', *Age and Ageing,* vol. 27, no. Supp 3, pp. s34-s40.

Morris, J & Hardman, A 1997, 'Walking to health', *Sports Medicine,* vol. 23, no. 5, pp. 306-332.

Morris, J. & Crawford 1958, 'Coronary heart disease an physical activity of work', *British Medical Journal,* December 20, 2(5111), 1495-1496

Munro, J, Brazier, J, Davey, R & Nicholl, J 1997, 'Physical activity for the over-65s: Could it be a cost-effective exercise for the NHS?', *Journal of Public Health Medicine,* vol. 19, no. 4, pp. 397-402.

Nelson, M, Rejeski, W, Blair, S, Duncan, P, Judge, J, King, A, Macera, C & Castaneda-Sceppa, C 2007, 'Physical activity and public health in older adults: Recommendations from the American College of Sports Medicine and the American Heart Foundation', *Medicine & Science in Sports & Exercise,* vol. 39, no. 8, pp. 1435-1445.

Netz, Y, Meng-Jia, W, Becker, B & Tenenbaum, G 2005, 'Physical activity and psychological well-being in advanced age: A meta-analysis of intervention studies', *Pscyhology and Aging,* vol. 20, no. 2, pp. 272-284.

Nies, A, Chruscial MA & Hepworth JT 2003, 'An intervention to promote walking in sedentary women in the community', *American Journal of Health Behaviour,* vol. 27, no. 5, pp. 524-535.

Nies, M & Kershaw, T 2002, 'Psychosocial and environmental influences on physical activity and health outcomes in sedentary women', *Journal of Nursing Scholarship,* vol. 34, no. 3, pp. 243-249.

Nies, M & Partridge, T 2006, 'Comparison of 3 interventions to increase walking in sedentary women', *American Journal of Health Behavior,* vol. 30, no. 4, pp. 339-352.

O'Brien Cousins, S 1995, 'Anticipated exertion for exercise activities among women over 70', *Canadian Woman Studies,* vol. 15, no. 4, pp. 74-77.

O'Brien Cousins, S 1997, 'Elderly tomboys? Sources of self-efficacy for physical activity in late life', *Journal of Aging and Physical Activity,* vol. 5, pp. 229-243.

O'Brien Cousins, S 2000, 'My heart couldn't take it: Older women's beliefs about exercise benefits and risks', *Journal of Gerontology,* vol. 55B, no. 5, pp. P283-P294.

O'Brien Cousins, S 2003, 'Grounding theory in self-referent thinking: Conceptualizing motivation for older adult physical activity', *Psychology of Sport and Exercise,* vol. 4, pp. 81-100.

O'Brien Cousins, S & Gillis, M 2005, 'Just do it... before you talk yourself out of it: The self-talk of adults thinking about physical activity', *Psychology of Sport and Exercise,* vol. 6, no. 3, pp. 313-334.

Ogilvie, D, Foster, C, Rothnie, H, Cavill, N, Hamilton, V, Fitzsimons, C & Mutrie, N 2007, 'Interventions to promote walking: Systematic review', *BMJ Research,* vol. downlowaded from BMJ.com on 27 June 2007.

O'Neill, T, Marsden, D & Silman, A 1995, 'Differences in the characteristics of responders and non-responders in a prevalence survey of vertebral osteoporosis', *Osteoporosis International,* vol. 5, pp. 327-334.

Ory, M, Lipman, P, Karlen, P, Gerety, M, Stevens, V, Singh, M & Buchenr, D 2002, 'Recruitment of older participants in frailty/injury prevention studies', *Prevention Science,* vol. 3, no. 1, pp. 1-22.

Paffenbarger, R, Wing, A & Hyde R 1995, 'Physical-activity as an index of heart attack risk in college alumni', *American Journal of Epidemiology,* vol. 142, no. 9, pp. 889-903.

Pate, R, Pratt, M, Blair, S, Haskell, W, Macera, C, Bouchard, C & Buchner, D 1995, 'Physical activity and public health: A recommendation from the Centres for Disease Control and Prevention and the American College of Sports Medicine', *Journal of American Medical Association,* vol. 273, no. 5, pp. 402-407.

Pavot, W & Diener, E 1993, 'Review of the satisfaction with life scale', *Psychological Assessment,* vol. 5, no. 2, pp. 164-172.

Penedo, F, Schneiderman, N, Dahn, J & Gonzalez, J 2004, 'Physical activity interventions in the elderly: Cancer and comorbidity', *Cancer Investigation,* vol. 22, no. 1, pp. 51-67.

Petosa, R, Suminski, R & Hortz, R 2003, 'Predicting vigorous physical activity using social cognitive theory', *American Journal of Health Behavior,* vol. 27, no. 4, pp. 301-310.

Pikora, T, Bull, F, Jamrozik, K, Knuiman, M, Giles-Corrti, B & Donovan, R 2002, 'Developing a reliable audit instrument to measure the physical environment for physical activity', *American Journal of Preventive Medicine,* vol. 23, no. 3, pp. 187-194.

Pratt, M, Macera, C, Sallis, J, O'Donnell, L & Frank, L 2004, 'Economic interventions to promote physical activity: Application of the sloth model', *American Journal of Preventive Medicine,* vol. 27, pp. 136-145.

Preloran, H, Browner, C & Lieber, E 2001, 'Strategies for motivating Latino couples' participation in qualitative health research and their effects on sample construction', *American Journal of Public Health,* vol. 91, no. 11, pp. 1832-1841.

Prohaska, T, Peters, K & Warren, J 2000, 'Sources of attrition in a church-based exercise program for older African-Americans', *American Journal of Health Promotion,* vol. 14, no. 6, pp. 380-385.

QSR International Pty Ltd 2006, 'NVivo 7.' QSR International Pty Ltd.

Rejeski, W, Brawley, L, Ettinger, W, Morgan, T & Thompson, C 1997, 'Compliance to exercise therapy in older participants with knee osteoarthritis: Implications for treating disability', *Medicine and Science in Sports and Exercise,* vol. 29, pp. 977-985.

Rejeski, W & Mihalko, S 2001, 'Physical activity and quality of life in older adults', *Journal of Gerontology,* vol. 56A, no. 11, pp. 23-35.

Resnick, B 2001, 'Testing a model of exercise behavior in older adults', *Research in Nursing and Health,* vol. 24, pp. 83-92.

Resnick, B 2002, 'Testing the effect of the WALC intervention on exercise adherence on older adults', *Journal of Gerontological Nursing,* vol. 28, no. 6, pp. 40-49.

Resnick, B, Palmer, M, Jenkins, L & Spellbring, A 2000, 'Efficacy expectations and exercise behavior in older adults: A path analysis', *Journal of Advanced Nursing,* vol. 32, pp. 16-23.

Resnick, B & Spellbring, A 2000, 'The factors that influence exercise behavior in older adults', *Journal of Gerontological Nursing,* vol. 26, no. 34-42.

Rinaldi, P, Mecocci, P, Benedetti, C, Ercolani, S, Bregnocchi, M & Menculini, G 2003, 'Validation of the five-item geriatric depression scale in elderly subjects in three different settings', *Journal of American Geriatrics Society,* vol. 52, pp. 694-698.

Roddy, E, Zhang, W, Doherty, M, Arden, K, Barlow, J, Birrell, F, Carr, A, Chakravarty, K, Dickson, J, Hay, E, Hosie, G et al 2005, 'Evidence-based recommendations for the role of exercise in the management of osteoarthritis of the hip or knee-the move consensus', *Rheumatology,* vol. 44, no. 1, pp. 67-73.

Ross, C 2000, 'Walking, exercise, and smoking: does neighborhood matter?,' *Social Science and Medicine,* vol. 51, pp. 265-274.

Rowland, R, Fisher, K, Green, M, Dunn, A, Pickering, M & Li, F 2004, 'Recruiting inactive older adults to a neighbourhood walking trial: The SHAPE project', *Journal of Aging Studies,* vol. 18, no. 3, pp. 353-368.

Russell, D 1996, 'UCLA loneliness scale (version 3): Reliability, validity, and factor structure', *Journal of Personality Assessment,* vol. 66, no. 1, pp. 20-40.

Sallis, J, F, Bauman, A & Pratt, M 1998, 'Environment and policy interventions to promote physical activity', *American Journal of Preventive Medicine,* vol. 15, no. 4, pp. 379-397.

Sallis, J, Grossma, R, Pinski, R, Patterson, T & Nader, P 1987, 'The development of scales to measure social support for diet and exercise behaviours', *Preventive Medicine,* vol. 16, pp. 825-836.

Sallis, J, Johnson, M, Calfras, K, Caparosa, S & Nichols, J 1997, 'Assessing perceived physical environmental variables that may influence physical activity', *Research Quarterly for Exercise and Sport,* vol. 68, no. 4, pp. 345-348.

Salmon, J, Owen, N, Crawford, D, Bauman, A & Sallis, J 2003, 'Physical activity and sedentary behaviour: A population based study of barriers, enjoyment, and preference', *Health Psychology,* vol. 22, no. 2, pp. 178-188.

Sandelowski, M 2000, 'Focus on research methods: Whatever happened to qualitative description?', *Research in Nursing and Health,* vol. 23, pp. 334-340.

Schmidt, J, Gruman, C, King, M & Wolfson, L 2000, 'Attrition in an exercise intervention: A comparison of early and later dropouts', *Journal of American Geriatrics Society,* vol. 48, no. 8, pp. 952-960.

Schuit, A 2006, 'Physical activity, body composition and healthy ageing', *Science and Sports,* vol. 21, pp. 209-213.

Schutzer, K & Graves, S 2004, 'Barriers and motivation to exercise in older adults', *Preventive Medicine,* vol. 39, pp. 1056-1061.

Shepard, R 2003, 'Limits to the measurement of habitual physical activity by questionnaires', *British Journal of Sports Medicine,* vol. 37, pp. 197-206.

Siegel, P, Brackbill, R & Heath, G 1995, 'The epidemiology of walking for exercise: Implications for promoting activity among sedentary groups', *American Journal of Public Health,* vol. 85, no. 5, pp. 706-710.

Sims, J, Hill, K, Hun, S, Haralambous, B, Brown, A, Engel, L, Huang, N, Kerse, N & Ory, M 2006, *National physical activity recommendations for older Australians: discussion document*, Report to the Australian Government Department of Health.

Singh, N 2000, 'Exercise and depression in the older adult', *Nutrition in Clinical Care,* vol. 3, no. 4, pp. 197-208.

Singh, N 2002, 'Exercise comes of age: Rationale and recommendations for a geriatric exercise prescription', *Journal of Gerontology,* vol. 57A, no. 5, pp. M262-M282.

Souder, J 1992, 'The consumer approach to recruitment of elder subjects', *Nursing Research,* vol. 41, no. 5, pp. 314-316.

Spangler, J & Konen, J 1993, 'Predicting exercise and smoking behaviours in diabetic and hypertensive patients. Age, race, sex, and psychological factors', *Archives of Family Medicine,* vol. 2, no. 2, pp. 149-155.

Spence, J & Lee, R 2003, 'Toward a comprehensive model of physical activity', *Psychology of Sport and Exercise,* vol. 4, pp. 7-24.

Stahl, T, Rutten, A, Nutbeam, D, Bauman, A, Kannas, L, Abel, T, Luschen, G, Rodriquez, D, Vinck, J & van der Zee, J 2001, 'The importance of the social environment for physically active lifestyle - results from an international study', *Social Science and Medicine,* vol. 52, pp. 1-10.

STATA 2006, *Stata statistical software: release 9.2*, Stata Corporation, College Station.

Stephenson, J, Bauman, A, Armstrong, T, Smith, B & Bellew, B 2000, 'The cost of illness attributable to physical inactivity in Australia; A preliminary study.' The Commonwealth Department of Health and Aged Care and Australian Sports Commission, Canberra, ACT.

Stigglebout, M, Hopman-Rock M, Cone M, Lechner L, van Mechelen W. 2006, 'Predicting older adults maintenance in exercise participation using an integrated social psychological model', *Health Education Research,* vol. 21, no. 1, pp. 1-14.

Strawbridge, W, Deleger, S, Roberts, R, Kaplan, G 2002, 'Physical activity reduces the risk of subsequent depression for older adult', *American Journal of Epidemiology,* vol 156, no 4, pp. 328-334

Takano, T, Nakamura, K & Watanabe, M 2002, 'Urban residential environments and senior citizens' longevity in megacity areas: The importance of walkable green spaces', *Journal of Epidemiology and Community Health,* vol. 56, no. 12, pp. 913-918.

Taylor, A, Cable, G, Faulkner, G, Hillsdon, M, Narici, M & Van Der Bij, A 2004, 'Physical activity and older adults: A review of health benefits and the effectiveness of interventions', *Journal of Sport Sciences,* vol. 22, pp. 703-725.

The Countryside Agency 2005, *Walking your way to health 2000-2005: Summary of local health walk evaluations*, United Kingdom.

Thurston, M & Green, K 2004, 'Adherence to exercise in later life: How can exercise on prescription programmes be made more effective?', *Health Promotion International,* vol. 19, no. 3, pp. 379-387.

Treasure, D & Newberry, D 1998, 'Relationship between self-efficacy, exercise intensity, and feeling states in a sedentary population during and following an acute bout of exercise', *Journal of Sport and Exercise Psychology,* vol. 20, pp. 1-11.

Tuomilehto, J, Lindstrom, J & Ericksson, J 2001, 'The Finnish diabetes prevention study: Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance', *New England Medical Journal,* vol. 344, pp. 1343-1350.

Turner, E, Rejeski, W & Brawley, L 1997, 'Psychological benefits of physical activity are influenced by the social environment', *Journal of Sport and Exercise Psychology,* vol. 19, pp. 119-130.

United States Department of Health and Human Services 1996a, *Physical activity and health: A report of the Surgeon General executive summary*, Centers for Disease Control and Prevention, Atlanta, USA.

US Dept Health and Human Services 2000, *Healthy people 2010 objectives*, U.S. Government Publishing Office, Washington DC.

Van Beijsterveldt, C, Van Boxtel, M, Bosma, H, Houx, P, Buntinx, F & Jolles, J 2002, 'Predictors of attrition in a longitudinal cognitive aging study: the Maastricht Aging Study (MAAS)', *Journal of Clinical Epidemiology,* vol. 55, pp. 216-223.

Van den Brink, C, Picavet, H, Van den Bos G, Giampaoli, S, Nissinen, A & Kromhout, D 2005, 'Duration and intensity of physical activity and disability among European elderly men', *Disability Rehabilitation,* vol. 27, pp. 341-347.

van der Bij, A, Laurant, M & Wensing, M 2002, 'Effectiveness of physical activity interventions for older adults: A review', *American Journal of Preventive Medicine,* vol. 22, no. 2, pp. 120-133.

Van Gool, C, Penninx, B, Kempen, G, Miller, G, van Eijk, T, Pahor, M & Messier, S 2006, 'Determinants of high and low attendance to diet and exercise interventions among overweight and obese older adults: Results from the arthritis, diet and activity promotion trial', *Contemporary Clinical Trials,* vol. 27, pp. 227-237.

Victor, C & Howse, K 2000, *Promoting the health of older people: setting the agenda*, Health Education Authority, London, UK.

Wankel, L, Mummery, K, Stephens, T & Craig, C 1994, 'Prediction of physical activity intention from social psychological variables: Results from the Campbell's survey of well-being', *Journal of Sport and Exercise Psychology,* vol. 16, pp. 56-69.

Wannamethee, S, Shaper, A & Walker, M 2000, 'Physical activity and mortality in older men with diagnosed coronary heart disease', *Circulation,* vol. 102, no. 12, pp. 1358-1363.

Wanzhu, T, Stump, T, Damush, T & Clark, D 2004, 'The effects of health and environment on exercise-class participation in older, urban women', *Journal of Aging and Physical Activity,* vol. 12, pp. 480-496.

Ware, J, Kosinski, M & Keller, S 1996, 'A 12-item short-form health survey', *Medical Care,* vol. 34, no. 3, pp. 220-233.

Warren-Findlow, J, Prohaska, T & Freedman, D 2003, 'Challenges and opportunities in recruiting and retaining underrepresented populations into health promotion research', *The Gerontologist,* vol. 43, pp. 37-46.

Wenger, G 1990, 'The special role of friends and neighbors', *Journal of Aging Studies,* vol. 4, no. 2, pp. 149-169.

WHO 2000, *Obesity: Prevention and managing the global epidemic*, World Health Organisation, Geneva.

WHO 2002, *Active ageing: a policy framework*, Second United Nations World Assembly on Ageing, Madrid, Spain.

WHO 2006a, *Facts on physical activity,* Geneva (26th May 2007).

WHO 2006b, *Physical activity and health in Europe: evidence for action*, Copenahagen, Denmark.

Wilson, A & Webber, I 1976, 'Attrition in a longitudinal study of an aged population', *Experimental Aging Research,* vol. 2, no. 5, pp. 367-387.

Wolf, S, Barnhart, H, Ellison, G & Coogler, C 1997, 'The effect of tai chi quan and computerized training on postural stability in older subjects', *Physical Therapy*, vol. 77, no. 4, pp. 371-381.

Appendix A

LIST OF PUBLICATIONS AND PUBLISHED ARTICLES

Journal Publications

Jancey, J, Clarke, A, Howat, P, Maycock, B & Lee, A 2007, 'Perceptions of physical activity by older adults: An exploratory study', *Health Education Journal,* accepted for publication October 11 2007.

Jancey, J, Howat, P, Lee, A, Clarke, A, Shilton, T & Iredell, H 2006, 'Effective recruitment of older adults in physical activity research', *American Journal of Health Behavior,* vol 30, no.2, pp. 626-635.

Jancey, J, Lee, A, Howat, P, Clarke, A, Wang, K & Shilton, T 2007, 'Reducing attrition in physical activity programs for older adults', *Journal of Aging and Health,* vol. 15, no. 2, pp. 152-165.

Jancey, J, Clarke, A, Howat, P, Lee, A & Shilton, T 2007, 'A physical activity program to mobilize older people: A practical and sustainable approach.' *The Gerontologist,* vol 48, no.2, pp. 251-257.

Jancey, J Lee, A, Howat, P, Clarke, A, Kui Wang & Shilton T 2007e, 'The effectiveness of a physical activity intervention for seniors', *American Journal of Health Promotion,* vol 22, no 5, pp. 318-321.

Conference Presentations

Jancey J, Howat P, Lee A, Shilton T, Clarke A. Improving adherence to physical activity interventions with older people P*hysical Activity and Obesity International Satellite Conference*, Brisbane, Austrlia, August 31 -September 2, 2006.

Jancey J, Lee A, Howat P, Clarke A, Shilton T. Need for nutrition education in with physical activity. *School of Public Health Seminar Curtin University*, Perth, Western Australia , May 31, 2007 .

Jancey J, Howat P, Clarke A, Lee A, Mayck B. Exploring Older Peoples Perceptions of Physical Activity. *International Union of Health Promotion & Education International Conference*, Vancouver, Canada. June 10-15, 2007

Jancey J, Howat P, Clarke A, Lee A. The Effect of a Physical Activity Intervention for Older Adults. *International Union of Health Promotion & Education International Conference*, Vancouver, Canada, June 10-15, 2007

Jancey J, Howat, P, Lee A, Kerr D, Burke L. Physical Activity research with older people: Implications for intervention programs. *International Society for Behavioral Nutrition & Physical Activity*, Oslo, Norway, June 20-23, 2007

Jancey J, Howat P, Lee A, Clarke A, Shilton T. The Effect of a Physical Activity Intervention for Older Adults. *International Society for Behavioral Nutrition & Physical Activity*, Oslo, Norway, 20-23 June, 2007

Jancey, J, Clarke A, Howat P, Lee A, Maycock B. Perceptions of Physical Activity. *ACHPER* , Perth Western Australia, October 3-6, 2007 .

Jancey J, Howat, P, Lee A, Clarke, Shilton T. The Outcome of a Physical Activity Intervention for Adults Aged 65 to 74 years *Australian Conference of Science and Medicine in Sport, Sixth National Physical Activity Conference and the Fifth National Sports Injury Prevention* Conference, Melbourne, Australia, October 13-16, 2007 . **Winner of best poster in the area of Health Promotion.**

Jancey, J, Clarke A, Howat P, Lee A, Maycock B. What Older People think about Physical Activity. Adults *Australian Conference of Science and Medicine in Sport, Sixth National Physical Activity Conference and the Fifth National Sports Injury Prevention* Conference, Melbourne, Australia, October 13-16, 2007.

Pages 234 to 274 containing publications have been excluded due to copyright.

Appendix B

CONSENT

Suburb allocation
Group:

Perth Active Living for Seniors Project Screening Questions

Interviewer Introduction
Good Morning/afternoon. My name is _____ I am calling on behalf of Curtin University and the National Heart Foundation.

Could I please speak to Mr/Mrs _____?

If the person is not available ask, "What would be an appropriate time to call back Mr /Mrs _____. Record suggested➔Callback date/time.

If person is there, then <u>continue</u>

Good morning/afternoon Mr/Mrs_____
I'm calling on behalf of the Curtin University and the National Heart Foundation. Recently we sent you a postcard about our physical activity program.

If they did not receive the postcard – I am sorry you haven't received it. The postcard was to advise you of this phone call and the purpose of the study. **Proceed with <u>introduction</u>.**
↓
<u>Introduction</u>
We are interested in speaking to people aged 65 to 74 about physical activity and finding out what physical activities, if any, they are currently involved in.

We are not selling anything. The interview is very short and will only take about 5 minutes of your time. Is now a convenient time to answer the questions?

If **Yes 1➔** Thanks and go to screening question 1.
If **No** 2➔
↓

Could I call back at another time? **If yes**
What would be an appropriate time Record date/time
Thanks, I call you then
If No Thank you and close interview

No.	Date	Time	Interviewer Name	Disposition Code	Screening Complete	Call Back date	Call back time
1							
2							
3							
4							
5							
6							

Disposition Codes

a	No answer	**f**	Person too ill/incapacitated to come to the phone
b	Busy Tone	**g**	Not interested in completing
c	Answer machine (residence)	**h**	Moved from this address
d	Phone answered – interviewer not home	**I**	Incapacitated
e	Not convenient time call back	**j**	

Screening Questions
The first question I would like to ask is about your level of physical activity.

1. In a usual week would you do moderate physical activity for at least 30 minutes in total, on at least 5 days?

(Explain moderate physical activity causes some increase in breathing or heart rate.
(Prompt with examples of exercise brisk walking, swimming, tennis, dancing)

Yes	1	Congratulations on being so active – Thank you for your time.
No	2	go to question 2

I would now like to ask you about your health in regard to being able to walk.

2. Do you have any medical conditions that would make it dangerous for you to do moderate walking twice per week?

Yes	1	Thank you for your time.
No	2	Invite them to join program **Their suburb will determine whether they are allocated to the walking group or the control group**

- **If the total amount of exercise they do is greater than <u>150 minutes over the week</u> then they are excluded.**
- **If they consider that they are unable to do moderate walking twice per week then they are excluded.**

Intervention 1 & 2 (Walking Group)

- Program Explanation

Thank you for answering those questions. Your answers indicate that you would be an ideal participant in our health research.

Over the next 6 months, Curtin University and the National Heart Foundation, will be conducting a **free** walking program in your suburb.

The program will involve walking with a small group of people (about 10 people) from your suburb twice per week. The group will be lead by an expert group leader and all participants will receive educational material to support their involvement. The program will provide a wonderful opportunity to become more active and to meet people who live in your area.

If you agree to be part of the Health research program, we require that you fill in a questionnaire prior to commencing the 6-month walking program. Rest assured, any information that you provide to us will be anonymous and confidential. The questionnaire will take about 30 minutes to complete and your participation is entirely voluntary.

If you wish to be part of this program, the group leader for your suburb will contact you in about a week to ask about your preference for meeting days and times to walk.

Would you like to be part of this program?

A	No	☐	Thank you for your time	☐
B	Yes	☐	**Check address details** I will place a questionnaire & self addressed envelope in the mail and your group leader will contact you in about a week.	☐
C	Unsure	☐	Would like time to think about whether you wish to be involved in the program? I could send you some information on the program and phone you in a few days to check what you have decided. **Check Address details**	Yes ☐ No ☐ ☐

So I can send some information to you, can I please check your address?

Name_____
Address _____
Suburb_____ postcode
Phone number _____

Program 0 (Control Group)

- **Program Explanation**

Thank you for answering those questions, your answers indicate that you are the kind of person who has opinions and interests that we would like to know more about.

Older people form a large group in our community, however little is known of their experiences and attitudes in regard to physical activity.

Our health research aims to find out about older peoples' level of physical activity, their attitude to physical activity and the impact that family and friends have on their level of physical activity.

We would be grateful if you would assist us with our health research by agreeing to complete three questionnaires over a 6 month period. The questionnaire takes about 30 minutes to complete and all the information will remain confidential and anonymous.

If you agree to assist us, we could post you the questionnaire and provide you with a self-addressed envelope so that you incur no cost in returning the completed questionnaire.

Do you think you could assist us?

Yes	1	Thank you – I'll place a questionnaire in the mail today If you could complete this questionnaire, and return it, as soon as possible, in the self-addressed envelope Could I please check your postal address _____ Thank you for your time and good-bye
No	2	Thank you for your time and good-bye

Name_____
Street _____
Suburb_____ postcode
Phone number _____

Appendix C

QUESTIONNAIRES

PALS

Perth Active Living for Seniors

Survey 1

Thanks for agreeing to be part of our research project and assisting us by completing this health survey.

When you have completed the survey please place it in the self-addressed envelope provided and return it at your earliest possible convenience.

All returned surveys go into the draw to win one of three **Coles Vouchers worth $50.00.**

Should you require further information please don't hesitate to contact Jonine Jancey on 92663807.

Curtin

Healthway

Healthway. Healthy WA.

Id _____(1-4)
Intervention _____(5)
Survey _____(6)
Suburb_____(6-16)
Postcode _____(17-20)

How Active Are You?

The following questions ask about the kinds of physical activities that people do as part of their everyday lives. Your answers will help us understand the activity level of people your age.

The first two questions ask about the amount of walking that you do for recreation, exercise and to get from place to place.

1a. In a usual week how many times do you walk continuously, for at least 10 minutes, for recreation or exercise.
Please record the number of times and days per week

_____number of times per week (21-23)

_____number of days per week (24)

1b. In a usual week what do you estimate is the total time you spend walking in this way.

_____hours _____minutes (25-28)

OR
If you don't usually walk in this way, please tick ✓ the box ☐ (29)

2a. In a usual week how many times do you walk continuously, for at least 10 minutes, to get from place to place or to do errands.
Please record the number of times and days per week

_____number of times per week (30-32)

_____number of days per week (33)

2b. In a usual week what do you estimate is the total time you spend walking in this way?

_____hours _____minutes (34-37)

OR
If you don't usually walk in this way, please tick ✓ the box ☐ (38)

This question asks about the physical activities you might do in and around your home.

3a. In a usual week how many times do you do gardening or work around the home for at least 10 minutes at a time, such as sweeping, washing windows, raking, digging, shovelling.
Please record the number of times and days per week

_____number of times per week (39-41)

_____number of days per week (42)

3b. In a usual week, what do you estimate is the total time you spend doing these activities around the home.

_____hours_____minutes (43-46)

OR
If you don't usually garden or do work around the home, please tick ✓ the box ☐ (47)

This question asks about all the physical activities that you do in a usual week for structured recreation or exercise. Don't include Walking.

4a. In a usual week, how many times do you do moderate physical activity for at least 10 minutes, such as swimming or dancing or cycling at a regular pace.
Please record the number times and days per week

_____number of times per week (48-50)

_____number of days per week (51)

4b. What types of physical activities or sports are these?
Please write them down.

_____

_____

_____ (52-53)

4c. In a usual week, what do you estimate is the total time you spend doing these physical activities.

_____hours _____minutes (54-57)

OR
If you don't usually do sport or physical activity, please tick ✓ the box ☐ (58)

5. The following question is about the amount of exercise you intend to do in the near future. Circle the number of the statement that best describes your intention.

a.	I currently do not exercise and I do not intend to start exercising in the next 6 months	1
b.	I currently do not exercise but I am thinking about starting to exercise in the next 6 months	2
c.	I currently exercise some but not regularly	3
d.	I currently exercise regularly but I have only begun to do so within the past 6 months	4
e.	I currently exercise regularly and I have done so for longer than 6 months	5

(59)

Activity & Safety

The questions in this section ask about your physical activity and your consideration of safety issues.

6. The following three questions ask how you feel about activity and the possibility of falling. Please read the question and circle '1' for Yes, if you agree or '2' for No, if you disagree. Circle one number for each question.

		Yes	No
a.	Are you afraid of falling	1	2
b.	Do you limit any household activities because you are frightened you may fall	1	2
c.	Do you limit any outside activities because you are frightened you may fall	1	2

(60-62)

7. Now I would like you to think about your behaviour when crossing roads. How often do you find yourself doing the following, when crossing roads as a pedestrian Please circle one number for each statement to show how often you find yourself doing the following.

		Always	Most of the time	Some of the time	Rarely	Never
a.	I find that I prefer to cross at traffic lights (when they are available)	1	2	3	4	5
b.	I find that when I can, I plan to go out at quieter times of the day (outside peak traffic times)	1	2	3	4	5
c.	I find that I cross roads knowing I may not have enough time to finish crossing, but I rely on drivers to allow me to finish	1	2	3	4	5
d.	Before crossing the road at intersections. I try to make eye contact with the driver who is turning, to check he/she has seen me	1	2	3	4	5

(63-66)

About Your Confidence

Written below are some common reasons that prevent people from taking part in physical activity. In some cases, it may cause them to stop being physically active. We want to know how **CONFIDENT** you feel about completing a 30-minute walk, 3 times a week with certain barriers to overcome.

In the following questions confidence means to what extent you believe you are capable of completing the activity (such as walking for 30 minutes, 3 times per week), in the face of an obstacle or a distraction.

HERE IS AN EXAMPLE:

1. I believe that I could walk for 30 minutes, 3 times per week EVEN IF:

a. I had visitors staying with me	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10

If you have ***complete confidence*** that you could walk for 30 minutes, 3 times a week, even if you had visitors staying, you would circle the number 10 (completely confident). If you were sure that you could *not* walk for 30 minutes, 3 times a week if you had visitors staying, you would circle the number 1 (Not confident at all). If your level of confidence is somewhere between circle the appropriate number.

PLEASE START HERE:

8. I believe that I could walk for 30 minutes, 3 times per week EVEN IF:

a. **The weather is poor (hot, humid, rainy, cold)**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10

(67-68)

b. **I am bored by the exercise**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10

(69-70)

I believe that <u>I could walk for 30 minutes</u>, <u>3 times per week</u> EVEN IF:

c. **I am on holidays**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10
										(71-72)
d. **I have to walk alone**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10
										(73-74)
e. **I feel exercise isn't enjoyable or fun**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10
										(75-76)
f. **It is difficult to get to the exercise location**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10
										(77-78)
g. **I don't like the exercise program**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10
										(79-80)
h. **My home or garden work conflicted with the exercise session**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10
										(81-82)
i. **I felt self conscious about my appearance**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10
										(83-84)
j. **I felt the instructor offered me no encouragement**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10
										(85-86)
k. **I was under personal stress**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10
										(87-88)

9. I am confident that I could walk at least 3 times a week, continuously for the following amounts of time:

(Please answer for EACH amount of time from 5 minutes to 40 minutes)

a. **For 5 minutes**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10 (89-90)
b. **For 10 minutes**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10 (91-92)
c. **For 15 minutes**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10 (93-94)
d. **For 20 minutes**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10 (95-96)
e. **For 30 minutes**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10 (97-98)
f. **For 40 minutes**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10 (99-100)

About Your Life

The questions in this section ask how you feel about your life and your health.

10. Below are five statements, you may agree or disagree with. Using the 1- 4 scale below, please indicate how much you agree or disagree with each statement. Circle only one number for each question.

		Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree
a.	In most ways my life is close to my ideal	1	2	3	4
b.	The conditions of my life are excellent	1	2	3	4
c.	I am satisfied with my life	1	2	3	4
d.	So far, I have gotten the important things I want in life	1	2	3	4
e.	If I could live my life over, I would not change a thing	1	2	3	4

(101-105)

11. Below are five statements. Once again you may agree or disagree with them. If you agree circle '1' for Yes, if you disagree circle '2' for No. Circle only one number for each question.

		Yes	No
a.	Are you basically satisfied with your life	1	2
b.	Do you often get bored	1	2
c.	Do you often feel helpless	1	2
d.	Do you prefer to stay at home rather than going out and doing new things	1	2
e.	Do you feel pretty worthless the way you are	1	2

(106-110)

12. The following statements describe how people sometimes feel. For each statement, please indicate how often you feel the way described by circling a number for each statement.

Here is an example: "How often do you feel happy?" If you never feel happy, you would respond "never"; if you always feel happy, you would respond "always" Circle one number on each line

		Never	Rarely	Sometimes	Always
a.	How often do you feel that you are "in tune" with the people around you	1	2	3	4
b.	How often do you feel that you lack companionship	1	2	3	4
c.	How often do you feel that there is no one you can turn to	1	2	3	4
d.	How often do you feel alone	1	2	3	4
e.	How often do you feel part of a group of friends	1	2	3	4
f.	How often do you feel that you have a lot in common with people around you	1	2	3	4
g.	How often do you feel that you are no longer close to anyone	1	2	3	4
h.	How often do you feel that your interests and ideals are not shared by those around you	1	2	3	4
I.	How often do you feel outgoing and friendly	1	2	3	4
j.	How often do you feel close to people	1	2	3	4
k.	How often do you feel left out	1	2	3	4
l.	How often do you feel that your relationship with others is not meaningful	1	2	3	4
m.	How often do you feel that no one really knows you well	1	2	3	4

(111-123)

Continued from previous page

		Never	Rarely	Sometimes	Always
n.	How often do you feel isolated from others	1	2	3	4
o.	How often do you feel you can find companionship when you want it	1	2	3	4
p.	How often do you feel that there are people who really understand you	1	2	3	4
q.	How often do you feel shy	1	2	3	4
r.	How often do you feel that people are around you but not with you	1	2	3	4
s.	How often do you feel that there are people you can talk to	1	2	3	4
t.	How often do you feel that there are people you can turn to	1	2	3	4

(124-130)

About Your Health

The questions in this section ask about your overall health and how it affects your level of activity. Please answer by circling one number for each statement. If you are unsure about how to answer, please give the best answer that you can.

13. In general, would you say your health is:

1	2	3	4	5
Poor	Fair	Good	Very Good	Excellent

(131)

14. The following questions are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

	Yes, Limited a lot	Yes, Limited a little	No, Not Limited at all
a. Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, playing golf	1	2	3
b. Climbing **several** flights of stairs	1	2	3

(132-133)

15. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health

a. Accomplished less than you would like

1	2	3	4	5
All of the time	Most of the time	Some of the time	A little of the time	None of the time

(134)

b. Were limited in the **kind** of work or other activities

1	2	3	4	5
All of the time	Most of the time	Some of the time	A little of the time	None of the time

(135)

16. **During the <u>past 4 weeks</u>, have you had any of the following problems with your work or other regular daily activities <u>as a result of any emotional problems</u> (such as feeling depressed or anxious)**

a. **Accomplished less** than you would like

1	2	3	4	5
All of the time	Most of the time	Some of the time	A little of the time	None of the time

(136)

b. Didn't do work or other activities as **carefully** as usual

1	2	3	4	5
All of the time	Most of the time	Some of the time	A little of the time	None of the time

(137)

17. **During the <u>past 4 weeks</u>, how much did <u>pain</u> interfere with your normal work (including both work outside the home and housework)**

1	2	3	4	5
Not at all	A little bit	Moderately	Quite a bit	Extremely

(138)

18. **These questions are about how you felt and how things have been with you <u>during the past 4 weeks</u>. For each question, please give the one answer that comes closest to the way you have been feeling.**

How much of the time during the <u>past 4 weeks</u>:

a. Have you felt calm and peaceful

1	2	3	4	5
All of the time	Most of the time	Some of the time	A little of the time	None of the time

(139)

How much of the time during the <u>past 4 weeks</u>:

b. Did you have a lot of energy

1	2	3	4	5
All of the time	Most of the time	Some of the time	A little of the time	None of the time

(140)

c. Have you felt downhearted and depressed

1	2	3	4	5
All of the time	Most of the time	Some of the time	A little of the time	None of the time

(141)

19. During the <u>past 4 weeks</u>, how much of the time have your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)

1	2	3	4	5
All of the time	Most of the time	Some of the time	A little of the time	None of the time

(142)

Well done, you are now well over half way through the questions
We appreciate your help
Perhaps it's time for that well earned cuppa!

Friendships & Family

The questions in this section ask about your family and friends.

When answering the following questions, exercise includes any physical activity or movement that includes walking, gardening, swimming, dancing, cycling, yoga, etc. Please circle one number for each question.

20. During a typical week how often do your **family members, who live in your household or nearby** do the following.
If you do not have family members living with you or nearby tick ✓ the box ☐ and **go to question 21.**

	Never	Rarely	Sometimes	Often	Very often
a. Exercise with me	1	2	3	4	5
b. Offer to exercise with me	1	2	3	4	5
c. Give me helpful reminders to exercise	1	2	3	4	5
d. Give me encouragement to stick with exercising	1	2	3	4	5
e. Change schedules so we can exercise together	1	2	3	4	5
f. Discuss exercise with me	1	2	3	4	5
g. Plan for walks or recreational outings	1	2	3	4	5
h. Help plan activities around my exercise	1	2	3	4	5
I. Ask for ideas on how they can join me in exercise	1	2	3	4	5

(143-151)

Continued from previous page

	Never	Rarely	Sometimes	Often	Very often
j. Talk about how much they like to exercise	1	2	3	4	5
k. Take over chores so I can have more time to exercise	1	2	3	4	5
l. Give positive comments about my appearance	1	2	3	4	5
m. Get angry at me for exercising	1	2	3	4	5
n. Criticise or make fun of me for exercising	1	2	3	4	5
o. Give me rewards for exercising	1	2	3	4	5

(152-157)

When answering the following questions, exercise includes any physical activity or movement that includes walking, gardening, swimming, dancing, cycling, yoga, etc. Please circle one number for each question.

21. During a typical week how often do your **friends** or **acquaintances** do the following? If you do not have friends or acquaintances living nearby tick ✓ the box ☐ and **go to Question 22.**

	Never	Rarely	Sometimes	Often	Very often
a. Exercise with me	1	2	3	4	5
b. Offer to exercise with me	1	2	3	4	5
c. Give me helpful reminders to exercise	1	2	3	4	5
d. Give me encouragement to stick with exercising	1	2	3	4	5
e. Change schedules so we can exercise together	1	2	3	4	5

(158-162)

22. The following three questions ask about your relationships with friends and family and how many times you see them. Think about the contact that you have with friends or family and circle one number for each question.

a.	How many persons in this area within one hours travel, do you feel you can depend on or feel very close to. Do not include people in your family	**1** None	**2** 1-2 persons	**3** More than 2 persons

(163)

b.	How many times during the past week did you spend some time with someone who does not live with you, (for example, you went to see them or they came to visit you, or you went out together)	**1** No times	**2** 1-2 times	**3** More than 2 times

(164)

c.	How many times during the week did you talk to someone- friends, relatives or others – on the telephone, (either they called you or you called them)	**1** 1 time or less	**2** 2-5 times	**3** More than 5 times

(165)

23. The questions that follow are about your relationship with friends and family. The answers range from "never" to "all the time". Please indicate how you feel about each question by circling the most suitable answer. Circle only one number for each question.

	Never	Hardly Ever	Some of the time	Most of the time	All of the time
d. Does it seem that your family and friends (that is people who are important to you) understand you	1	2	3	4	5
e. Do you feel useful to your family and friends	1	2	3	4	5
f. Do you know what is going on with your family and friends	1	2	3	4	5
g. When you are talking with your family and friends, do you feel you are being listened to	1	2	3	4	5
h. Do you feel you have a definite role/place in your family and amongst your friends	1	2	3	4	5
I. Can you talk about your deepest problems with at least some of your family and friends	1	2	3	4	5

(166-171)

24. For the final question about friends and family, I would like you to consider your general satisfaction with these relationships and then circle the most suitable answer.

a. How satisfied are you with the kinds of relationships you have with your family and friends

1	2	3	4	5
Extremely dissatisfied	Very dissatisfied	Somewhat dissatisfied	Mostly satisfied	Always satisfied

(172)

About Your Suburb

The following questions ask about where you live.

25. To what extent do you agree or disagree with the following statements when you think about walking in your neighbourhood. Circle one response only for each question.

		Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
a.	Your neighbourhood is friendly	1	2	3	4	5
b.	You find it pleasant walking near your home	1	2	3	4	5
c.	Your local area is attractive	1	2	3	4	5
d.	Shops are in walking distance	1	2	3	4	5
e.	A park or beach is within walking distance	1	2	3	4	5
f.	A cycle path is accessible	1	2	3	4	5
g.	You have someone (or a pet) to walk with in your environment	1	2	3	4	5

(173-179)

26. How safe do you feel in your neighborhood during the day? Indicate by circling one answer only.

1	2	3	4	5
Very Safe	Safe	Neither Safe or unsafe	Unsafe	Very Unsafe

(180)

General Information

The final section contains general information questions. This will help us describe the people who have participated in our survey.

27. Are you male or female?

Male	☐	1
Female	☐	2

(181)

28. What is your date of birth?

____ ____ _____

Day month year

(182-187)

29a. What is your approximate weight in pounds/stones or kilograms?

_____

(188-190)

29b. What is your approximate height in feet/inches or centimetres?

_____

(191-193)

30. Where were you born? Tick ✔ the country.

Australia	☐	1
United kingdom or Ireland	☐	2
Italy	☐	3
Greece	☐	4
Other European	☐	5
Asia	☐	6
Other (please state)	☐	7

_____

(194)

31. What is your marital status? Tick ✔ only one that most applies to you.

Married	☐	1
Defacto	☐	2
Never married	☐	3
Separated	☐	4
Divorced	☐	5
Widowed	☐	6
Refused	☐	7

(195)

32. Which of the following best describes the highest level of education you have completed? Tick ✔ only one answer.

Never attended school	☐	1
Completed primary school	☐	2
Some high school	☐	3
School certificate (Junior)	☐	4
Completed high school (leaving) or 6th form	☐	5
Tafe certificate/diploma	☐	6
University, or other tertiary education	☐	7
Other (specify)	☐	8

(196)

33. Over most of your life, would you say that making ends meet was:

Always a struggle	☐	1
Often a struggle	☐	2
Rarely a struggle	☐	3
Never a struggle	☐	4

(197)

34. Please estimate your yearly household income from <u>all sources</u> (e.g) pensions, superannuation, shares, investments. Tick ✔ only one answer.

Less than $5,000	☐	1
$5,000 to $9,999	☐	2
$10,000 to $19,999	☐	3
$20,000 to $29,999	☐	4
$30,000 to $39,999	☐	5
$40,000 to $49,999	☐	6
$50,000 to $59,999	☐	7
$60,000 or more	☐	8

(198)

Fantastic - you are finished!
Thank you so much for answering the questions.
We really appreciate your time and assistance.

PALS

Perth Active Living for Seniors

Survey Mid-Project

Thanks for continuing to be part of our research project and assisting us by completing this second health survey.

When you have completed the survey please place it in the self-addressed envelope provided and return it at your earliest possible convenience.

All returned surveys go into the draw to win one of three **Coles Vouchers worth $50.00.**

Should you require further information please don't hesitate to contact Jonine Jancey on 92663807.

Curtin

Healthway

Healthway. Healthy WA.

303

Id _____(1-4)
Intervention _____(5)
Survey _____(6)
suburb_____(6-16)
Postcode _____(17-20)

How Active Are You?

The following questions ask about the kinds of physical activities that people do as part of their everyday lives. Your answers will help us understand the activity level of people your age.

The first two questions ask about the amount of walking that you do for recreation, exercise and to get from place to place.

1a. **In a usual week how many times do you walk continuously, for at least 10 minutes, for recreation or exercise.**
Please record the number of times and days per week

_____number of times per week (21-23)

_____number of days per week (24)

1b. **In a usual week what do you estimate is the total time you spend walking in this way.**

_____hours _____minutes (25-28)

OR
If you don't usually walk in this way, please tick ✓ the box ☐ (29)

2a. **In a usual week how many times do you walk continuously, for at least 10 minutes, to get from place to place or to do errands.**
Please record the number of times and days per week

_____number of times per week (30-32)

_____number of days per week (33)

2b. **In a usual week what do you estimate is the total time you spend walking in this way?**

_____hours _____minutes (34-37)

OR
If you don't usually walk in this way, please tick ✓ the box ☐ (38)

This question asks about the physical activities you might do in and around your home.

3a. In a usual week how many times do you do gardening or work around the home for at least 10 minutes at a time, such as sweeping, washing windows, raking, digging, shovelling.
Please record the number of times and days per week

_____number of times per week (39-41)

_____number of days per week (42)

3b. In a usual week, what do you estimate is the total time you spend doing these activities around the home.

_____hours_____minutes (43-46)

OR
If you don't usually garden or do work around the home, please tick ✓ the box ☐ (47)

This question asks about all the physical activities that you do in a usual week for structured recreation or exercise. Don't include Walking.

4a. In a usual week, how many times do you do moderate physical activity for at least 10 minutes, such as swimming or dancing or cycling at a regular pace.
Please record the number times and days per week

_____number of times per week (48-50)

_____number of days per week (51)

4b. What types of physical activities or sports are these?
Please write them down.

_____

_____

_____ (52-53)

4c. In a usual week, what do you estimate is the total time you spend doing these physical activities.

_____hours _____minutes (54-57)

OR
If you don't usually do sport or physical activity, please tick ✓ the box ☐ (58)

5. The following question is about the amount of exercise you intend to do in the near future. Circle the number of the statement that best describes your intention.

a.	I currently do not exercise and I do not intend to start exercising in the next 6 months	1
b.	I currently do not exercise but I am thinking about starting to exercise in the next 6 months	2
c.	I currently exercise some but not regularly	3
d.	I currently exercise regularly but I have only begun to do so within the past 6 months	4
e.	I currently exercise regularly and I have done so for longer than 6 months	5

(59)

Activity & Safety

The questions in this section ask about your physical activity and your consideration of safety issues.

6. The following three questions ask how you feel about activity and the possibility of falling. Please read the question and circle '1' for Yes, if you agree or '2' for No, if you disagree. Circle one number for each question.

		Yes	No
a.	Are you afraid of falling	1	2
b.	Do you limit any household activities because you are frightened you may fall	1	2
c.	Do you limit any outside activities because you are frightened you may fall	1	2

(60-62)

7. Now I would like you to think about your behaviour when crossing roads. How often do you find yourself doing the following, when crossing roads as a pedestrian Please circle one number for each statement to show how often you find yourself doing the following.

		Always	Most of the time	Some of the time	Rarely	Never
a.	I find that I prefer to cross at traffic lights (when they are available)	1	2	3	4	5
b.	I find that when I can, I plan to go out at quieter times of the day (outside peak traffic times)	1	2	3	4	5
c.	I find that I cross roads knowing I may not have enough time to finish crossing, but I rely on drivers to allow me to finish	1	2	3	4	5
d.	Before crossing the road at intersections. I try to make eye contact with the driver who is turning, to check he/she has seen me	1	2	3	4	5

(63-66)

About Your Confidence

Written below are some common reasons that prevent people from taking part in physical activity. In some cases, it may cause them to stop being physically active. We want to know how **CONFIDENT** you feel about completing a 30-minute walk, 3 times a week with certain barriers to overcome.

In the following questions confidence means to what extent you believe you are capable of completing the activity (such as walking for 30 minutes, 3 times per week), in the face of an obstacle or a distraction.

HERE IS AN EXAMPLE:

1. I believe that I could walk for 30 minutes, 3 times per week EVEN IF:

	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident
a. I had visitors staying with me	1	2	3	4	5	6	7	8	9 10

If you have ***complete confidence*** that you could walk for 30 minutes, 3 times a week, even if you had visitors staying, you would circle the number 10 (completely confident). If you were sure that you could *not* walk for 30 minutes, 3 times a week if you had visitors staying, you would circle the number 1 (Not confident at all). If your level of confidence is somewhere between circle the appropriate number.

PLEASE START HERE:

8. I believe that I could walk for 30 minutes, 3 times per week EVEN IF:

	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident
a. **The weather is poor (hot, humid, rainy, cold)**	1	2	3	4	5	6	7	8	9 10 (67-68)
b. **I am bored by the exercise**	1	2	3	4	5	6	7	8	9 10 (69-70)

I believe that I could walk for 30 minutes, 3 times per week EVEN IF:

c. **I am on holidays**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10 (71-72)
d. **I have to walk alone**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10 (73-74)
e. **I feel exercise isn't enjoyable or fun**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10 (75-76)
f. **It is difficult to get to the exercise location**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10 (77-78)
g. **I don't like the exercise program**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10 (79-80)
h. **My home or garden work conflicted with the exercise session**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10 (81-82)
i. **I felt self conscious about my appearance**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10 (83-84)
j. **I felt the instructor offered me no encouragement**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10 (85-86)
k. I was under personal stress	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10 (87-88)

PLEASE ENSURE YOU HAVE CIRCLED AN ANSWER FOR ALL QUESTIONS - 8A TO 8K ?

9. I am <u>confident</u> that <u>I could walk at least 3 times a week, continuously for the following amounts of time</u>:

(Please answer for EACH amount of time from 5 minutes to 40 minutes)

a. **For 5 minutes**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10 (89-90)
b. **For 10 minutes**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10 (91-92)
c. **For 15 minutes**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10 (93-94)
d. **For 20 minutes**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10 (95-96)
e. **For 30 minutes**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10 (97-98)
f. **For 40 minutes**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10 (99-100)

BEFORE YOU MOVE ON – HAVE YOU ANSWERED QUESTION 9A, 9B, 9C, 9D, 9E, 9F ?

About Your Life

The questions in this section ask how you feel about your life and your health.

10. Below are five statements, you may agree or disagree with. Using the 1- 4 scale below, please indicate how much you agree or disagree with each statement. Circle only one number for each question.

		Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree
a.	In most ways my life is close to my ideal	1	2	3	4
b.	The conditions of my life are excellent	1	2	3	4
c.	I am satisfied with my life	1	2	3	4
d.	So far, I have gotten the important things I want in life	1	2	3	4
e.	If I could live my life over, I would not change a thing	1	2	3	4

(101-105)

11. Below are five statements. Once again you may agree or disagree with them. If you agree circle '1' for Yes, if you disagree circle '2' for No. Circle only one number for each question.

		Yes	No
a.	Are you basically satisfied with your life	1	2
b.	Do you often get bored	1	2
c.	Do you often feel helpless	1	2
d.	Do you prefer to stay at home rather than going out and doing new things	1	2
e.	Do you feel pretty worthless the way you are	1	2

(106-110)

12. The following statements describe how people sometimes feel. For each statement, please indicate how often you feel the way described by circling a number for each statement.

Here is an example: "How often do you feel happy?" If you never feel happy, you would respond "never"; if you always feel happy, you would respond "always" Circle one number on each line

		Never	Rarely	Sometimes	Always
a.	How often do you feel that you are "in tune" with the people around you	1	2	3	4
b.	How often do you feel that you lack companionship	1	2	3	4
c.	How often do you feel that there is no one you can turn to	1	2	3	4
d.	How often do you feel alone	1	2	3	4
e.	How often do you feel part of a group of friends	1	2	3	4
f.	How often do you feel that you have a lot in common with people around you	1	2	3	4
g.	How often do you feel that you are no longer close to anyone	1	2	3	4
h.	How often do you feel that your interests and ideals are not shared by those around you	1	2	3	4
I.	How often do you feel outgoing and friendly	1	2	3	4
j.	How often do you feel close to people	1	2	3	4
k.	How often do you feel left out	1	2	3	4
l.	How often do you feel that your relationship with others is not meaningful	1	2	3	4
m.	How often do you feel that no one really knows you well	1	2	3	4

(111-123)

Continued from previous page

		Never	Rarely	Sometimes	Always
n.	How often do you feel isolated from others	1	2	3	4
o.	How often do you feel you can find companionship when you want it	1	2	3	4
p.	How often do you feel that there are people who really understand you	1	2	3	4
q.	How often do you feel shy	1	2	3	4
r.	How often do you feel that people are around you but not with you	1	2	3	4
s.	How often do you feel that there are people you can talk to	1	2	3	4
t.	How often do you feel that there are people you can turn to	1	2	3	4

(124-130)

About Your Health

The questions in this section ask about your overall health and how it affects your level of activity. Please answer by circling one number for each statement. If you are unsure about how to answer, please give the best answer that you can.

13. In general, would you say your health is:

1	2	3	4	5
Poor	Fair	Good	Very Good	Excellent

(131)

14. The following questions are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

	Yes, Limited a lot	Yes, Limited a little	No, Not Limited at all
a. Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, playing golf	1	2	3
b. Climbing **several** flights of stairs	1	2	3

(132-133)

15. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health

a. Accomplished less than you would like

1	2	3	4	5
All of the time	Most of the time	Some of the time	A little of the time	None of the time

(134)

b. Were limited in the **kind** of work or other activities

1	2	3	4	5
All of the time	Most of the time	Some of the time	A little of the time	None of the time

(135)

16. **During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)**

a. **Accomplished less** than you would like

1	2	3	4	5
All of the time	Most of the time	Some of the time	A little of the time	None of the time

(136)

b. Didn't do work or other activities as **carefully** as usual

1	2	3	4	5
All of the time	Most of the time	Some of the time	A little of the time	None of the time

(137)

17. **During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)**

1	2	3	4	5
Not at all	A little bit	Moderately	Quite a bit	Extremely

(138)

18. **These questions are about how you felt and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling.**

How much of the time during the past 4 weeks:

a. Have you felt calm and peaceful

1	2	3	4	5
All of the time	Most of the time	Some of the time	A little of the time	None of the time

(139)

How much of the time during the <u>past 4 weeks</u>:

b. Did you have a lot of energy

1	2	3	4	5
All of the time	Most of the time	Some of the time	A little of the time	None of the time

(140)

c. Have you felt downhearted and depressed

1	2	3	4	5
All of the time	Most of the time	Some of the time	A little of the time	None of the time

(141)

19. During the <u>past 4 weeks</u>, how much of the time have your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)

1	2	3	4	5
All of the time	Most of the time	Some of the time	A little of the time	None of the time

(142)

Well done, you are now well over half way through the questions
We appreciate your help
Perhaps it's time for that well earned cuppa!

Friendships & Family

The questions in this section ask about your family and friends.

When answering the following questions, exercise includes any physical activity or movement that includes walking, gardening, swimming, dancing, cycling, yoga, etc. Please circle one number for each question.

20. During a typical week how often do your **family members, who live in your household or nearby** do the following.
If you do not have family members living with you or nearby tick ✓ the box ☐ and **go to question 21.**

	Never	Rarely	Sometimes	Often	Very often
a. Exercise with me	1	2	3	4	5
b. Offer to exercise with me	1	2	3	4	5
c. Give me helpful reminders to exercise	1	2	3	4	5
d. Give me encouragement to stick with exercising	1	2	3	4	5
e. Change schedules so we can exercise together	1	2	3	4	5
f. Discuss exercise with me	1	2	3	4	5
g. Plan for walks or recreational outings	1	2	3	4	5
h. Help plan activities around my exercise	1	2	3	4	5
I. Ask for ideas on how they can join me in exercise	1	2	3	4	5

(143-151)

Continued from previous page

	Never	Rarely	Sometimes	Often	Very often
j. Talk about how much they like to exercise	1	2	3	4	5
k. Take over chores so I can have more time to exercise	1	2	3	4	5
l. Give positive comments about my appearance	1	2	3	4	5
m. Get angry at me for exercising	1	2	3	4	5
n. Criticise or make fun of me for exercising	1	2	3	4	5
o. Give me rewards for exercising	1	2	3	4	5

(152-157)

When answering the following questions, exercise includes any physical activity or movement that includes walking, gardening, swimming, dancing, cycling, yoga, etc. Please circle one number for each question.

21. During a typical week how often do your **friends** or **acquaintances** do the following? If you do not have friends or acquaintances living nearby tick ✓ the box ☐ and **go to Question 22.**

	Never	Rarely	Sometimes	Often	Very often
a. Exercise with me	1	2	3	4	5
b. Offer to exercise with me	1	2	3	4	5
c. Give me helpful reminders to exercise	1	2	3	4	5
d. Give me encouragement to stick with exercising	1	2	3	4	5
e. Change schedules so we can exercise together	1	2	3	4	5

(158-162)

22. The following three questions ask about your relationships with friends and family and how many times you see them. Think about the contact that you have with friends or family and circle one number for each question.

a.	How many persons in this area within one hours travel, do you feel you can depend on or feel very close to. Do not include people in your family	**1** None	**2** 1-2 persons	**3** More than 2 persons

(163)

b.	How many times during the past week did you spend some time with someone who does not live with you, (for example, you went to see them or they came to visit you, or you went out together)	**1** No times	**2** 1-2 times	**3** More than 2 times

(164)

c.	How many times during the week did you talk to someone- friends, relatives or others – on the telephone, (either they called you or you called them)	**1** 1 time or less	**2** 2-5 times	**3** More than 5 times

(165)

23. The questions that follow are about your relationship with friends and family. The answers range from "never" to "all the time". Please indicate how you feel about each question by circling the most suitable answer. Circle only one number for each question.

	Never	Hardly Ever	Some of the time	Most of the time	All of the time
d. Does it seem that your family and friends (that is people who are important to you) understand you	1	2	3	4	5
e. Do you feel useful to your family and friends	1	2	3	4	5
f. Do you know what is going on with your family and friends	1	2	3	4	5
g. When you are talking with your family and friends, do you feel you are being listened to	1	2	3	4	5
h. Do you feel you have a definite role/place in your family and amongst your friends	1	2	3	4	5
I. Can you talk about your deepest problems with at least some of your family and friends	1	2	3	4	5

(166-171)

24. For the final question about friends and family, I would like you to consider your general satisfaction with these relationships and then circle the most suitable answer.

a. How satisfied are you with the kinds of relationships you have with your family and friends

1	2	3	4	5
Extremely dissatisfied	Very dissatisfied	Somewhat dissatisfied	Mostly satisfied	Always satisfied

(172)

About Your Suburb

The following questions ask about where you live.

25. To what extent do you agree or disagree with the following statements when you think about walking in your neighbourhood. Circle one response only for each question.

		Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
a.	Your neighbourhood is friendly	1	2	3	4	5
b.	You find it pleasant walking near your home	1	2	3	4	5
c.	Your local area is attractive	1	2	3	4	5
d.	Shops are in walking distance	1	2	3	4	5
e.	A park or beach is within walking distance	1	2	3	4	5
f.	A cycle path is accessible	1	2	3	4	5
g.	You have someone (or a pet) to walk with in your environment	1	2	3	4	5

(173-179)

26. How safe do you feel in your neighborhood during the day? Indicate by circling one answer only.

1	2	3	4	5
Very Safe	Safe	Neither Safe or unsafe	Unsafe	Very Unsafe

(180)

About the Walking Project

This final section asks you about your Walking Leader. Your answers will help us improve the program in the New Year.

27. Using the following list of common adjectives, please describe how you find your walking Leader. Circle one response for each question.

I see my Walking Leader as someone who is……

	Extremely inaccurate	Somewhat inaccurate	Neither accurate nor inaccurate	Somewhat accurate	Extremely accurate
a. **Talkative**	1	2	3	4	5
b. **Shy**	1	2	3	4	5
c. **Sympathetic**	1	2	3	4	5
d. **Organised**	1	2	3	4	5
e. **Creative**	1	2	3	4	5

(181-185)

28. Please indicate whether you agree or disagree with the following statements when describing your Walking Leader. Circle one response for each question.

My Walking Leader:

	Strongly disagree	**Disagree**	**Moderately agree**	**Strongly agree**
a. Helps me if I am upset or have a problem	1	2	3	4
b. Encourages me to do well	1	2	3	4
c. Cares about me	1	2	3	4
d. Is fair to me	1	2	3	4
e. Gives me helpful guidance	1	2	3	4
f. Treats me like an individual	1	2	3	4
g. Has patience with our group	1	2	3	4

(186-192)

29. What have you liked the most about the PALS Project? (Write as much as you like)

1. _____

2. _____

3. _____

4. _____

(193-196)

30. What do you think we could do to improve the PALS Project? (Write as much as you like)

1. _____

2. _____

3. _____

4. _____

(197-200)

31a. What is your approximate weight in pounds/stones or kilograms?

_____

(201-203)

32b. What is your approximate height in feet/inches or centimetres?

_____

(204-206)

Fantastic - you are finished!
Thank you so much for answering the questions.
We really appreciate your time and assistance in this important research.

PLEASE TAKE A MINUTE TO CHECK YOU HAVE ANSWERED ALL THE QUESTIONS

PALS

Perth Active Living for Seniors

Final Survey

Thanks for continuing to be part of our research project and assisting us by completing this final health survey.

When you have completed the survey please place it in the self-addressed envelope provided and return it at your earliest possible convenience.

All returned surveys go into the draw to win one of three **Coles Vouchers worth $50.00.**

Should you require further information please don't hesitate to contact Jonine Jancey on 92663807.

Curtin

Healthway

Healthway. Healthy WA.

d:_____(1-4)
Intervention _____(5)
Survey _____(6)
suburb_____(6-16)
Postcode _____(17-20)

How Active Are You?

The following questions ask about the kinds of physical activities that people do as part of their everyday lives. Your answers will help us understand the activity level of people your age.

The first two questions ask about the amount of walking that you do for recreation, exercise and to get from place to place.

1a. **In a usual week how many times do you walk continuously, for at least 10 minutes, for recreation or exercise.**
Please record the number of times and days per week

_____number of times per week (21-23)

_____number of days per week (24)

1b. **In a usual week what do you estimate is the total time you spend walking in this way.**

_____hours _____minutes (25-28)

OR
If you don't usually walk in this way, please tick ✓ the box ☐ (29)

2a. **In a usual week how many times do you walk continuously, for at least 10 minutes, to get from place to place or to do errands.**
Please record the number of times and days per week

_____number of times per week (30-32)

_____number of days per week (33)

2b. **In a usual week what do you estimate is the total time you spend walking in this way?**

_____hours _____minutes (34-37)

OR
If you don't usually walk in this way, please tick ✓ the box ☐ (38)

This question asks about the physical activities you might do in and around your home.

3a. In a usual week how many times do you do gardening or work around the home for at least 10 minutes at a time, such as sweeping, washing windows, raking, digging, shovelling.
Please record the number of times and days per week

_____number of times per week (39-41)

_____number of days per week (42)

3b. In a usual week, what do you estimate is the total time you spend doing these activities around the home.

_____hours_____minutes (43-46)

OR
If you don't usually garden or do work around the home, please tick ✓ the box ☐ (47)

This question asks about all the physical activities that you do in a usual week for structured recreation or exercise. Don't include Walking.

4a. In a usual week, how many times do you do moderate physical activity for at least 10 minutes, such as swimming or dancing or cycling at a regular pace.
Please record the number times and days per week

_____number of times per week (48-50)

_____number of days per week (51)

4b. What types of physical activities or sports are these?
Please write them down.

_____

_____

_____ (52-53)

4c. In a usual week, what do you estimate is the total time you spend doing these physical activities.

_____hours _____minutes (54-57)

OR
If you don't usually do sport or physical activity, please tick ✓ the box ☐ (58)

5. The following question is about the amount of exercise you intend to do in the near future. Circle the number of the statement that best describes your intention.

a.	I currently do not exercise and I do not intend to start exercising in the next 6 months	1
b.	I currently do not exercise but I am thinking about starting to exercise in the next 6 months	2
c.	I currently exercise some but not regularly	3
d.	I currently exercise regularly but I have only begun to do so within the past 6 months	4
e.	I currently exercise regularly and I have done so for longer than 6 months	5

(59)

Activity & Safety

The questions in this section ask about your physical activity and your consideration of safety issues.

6. The following three questions ask how you feel about activity and the possibility of falling. Please read the question and circle '1' for Yes, if you agree or '2' for No, if you disagree. Circle one number for each question.

		Yes	No
a.	Are you afraid of falling	1	2
b.	Do you limit any household activities because you are frightened you may fall	1	2
c.	Do you limit any outside activities because you are frightened you may fall	1	2

(60-62)

7. Now I would like you to think about your behaviour when crossing roads. How often do you find yourself doing the following, when crossing roads as a pedestrian Please circle one number for each statement to show how often you find yourself doing the following.

		Always	Most of the time	Some of the time	Rarely	Never
a.	I find that I prefer to cross at traffic lights (when they are available)	1	2	3	4	5
b.	I find that when I can, I plan to go out at quieter times of the day (outside peak traffic times)	1	2	3	4	5
c.	I find that I cross roads knowing I may not have enough time to finish crossing, but I rely on drivers to allow me to finish	1	2	3	4	5
d.	Before crossing the road at intersections. I try to make eye contact with the driver who is turning, to check he/she has seen me	1	2	3	4	5

(63-66)

About Your Confidence

Written below are some common reasons that prevent people from taking part in physical activity. In some cases, it may cause them to stop being physically active. We want to know how **CONFIDENT** you feel about completing a 30-minute walk, 3 times a week with certain barriers to overcome.

In the following questions confidence means to what extent you believe you are capable of completing the activity (such as walking for 30 minutes, 3 times per week), in the face of an obstacle or a distraction.

HERE IS AN EXAMPLE:

1. I believe that I could walk for 30 minutes, 3 times per week EVEN IF:

a. I had visitors staying with me	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10

If you have ***complete confidence*** that you could walk for 30 minutes, 3 times a week, even if you had visitors staying, you would circle the number 10 (completely confident). If you were sure that you could *not* walk for 30 minutes, 3 times a week if you had visitors staying, you would circle the number 1 (Not confident at all). If your level of confidence is somewhere between circle the appropriate number.

PLEASE START HERE:

8. I believe that I could walk for 30 minutes, 3 times per week EVEN IF:

a. **The weather is poor (hot, humid, rainy, cold)**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10

(67-68)

b. **I am bored by the exercise**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10

(69-70)

I believe that I could walk for 30 minutes, 3 times per week EVEN IF:

	Not confident at all			Not very confident		Somewhat confident		Very confident		Completely confident	
c. **I am on holidays**	1	2	3	4	5	6	7	8	9	10	(71-72)
d. **I have to walk alone**	1	2	3	4	5	6	7	8	9	10	(73-74)
e. **I feel exercise isn't enjoyable or fun**	1	2	3	4	5	6	7	8	9	10	(75-76)
f. **It is difficult to get to the exercise location**	1	2	3	4	5	6	7	8	9	10	(77-78)
g. **I don't like the exercise program**	1	2	3	4	5	6	7	8	9	10	(79-80)
h. **My home or garden work conflicted with the exercise session**	1	2	3	4	5	6	7	8	9	10	(81-82)
i. **I felt self conscious about my appearance**	1	2	3	4	5	6	7	8	9	10	(83-84)
j. **I felt the instructor offered me no encouragement**	1	2	3	4	5	6	7	8	9	10	(85-86)
k. **I was under personal stress**	1	2	3	4	5	6	7	8	9	10	(87-88)

PLEASE ENSURE YOU HAVE CIRCLED AN ANSWER FOR ALL QUESTIONS - 8A TO 8K ?

9. I am <u>confident</u> that <u>I could walk at least 3 times a week, continuously for the following amounts of time</u>:

(Please answer for EACH amount of time from 5 minutes to 40 minutes)

a. **For 5 minutes**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10 (89-90)
b. **For 10 minutes**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10 (91-92)
c. **For 15 minutes**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10 (93-94)
d. **For 20 minutes**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10 (95-96)
e. **For 30 minutes**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10 (97-98)
f. **For 40 minutes**	Not confident at all		Not very confident		Somewhat confident		Very confident		Completely confident	
	1	2	3	4	5	6	7	8	9	10 (99-100)

BEFORE YOU MOVE ON – HAVE YOU ANSWERED QUESTION 9A, 9B, 9C, 9D, 9E, 9F ?

About How You Feel

The questions in this section ask how you feel about your life and your health.

10. Below are five statements, you may agree or disagree with. Using the 1- 4 scale below, please indicate how much you agree or disagree with each statement. Circle only one number for each question.

		Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree
a.	In most ways my life is close to my ideal	1	2	3	4
b.	The conditions of my life are excellent	1	2	3	4
c.	I am satisfied with my life	1	2	3	4
d.	So far, I have gotten the important things I want in life	1	2	3	4
e.	If I could live my life over, I would not change a thing	1	2	3	4

(101-105)

11. Below are five statements. Once again you may agree or disagree with them. If you agree circle '1' for Yes, if you disagree circle '2' for No. Circle only one number for each question.

		Yes	No
a.	Are you basically satisfied with your life	1	2
b.	Do you often get bored	1	2
c.	Do you often feel helpless	1	2
d.	Do you prefer to stay at home rather than going out and doing new things	1	2
e.	Do you feel pretty worthless the way you are	1	2

(106-110)

12. The following statements describe how people sometimes feel. For each statement, please indicate how often you feel the way described by circling a number for each statement.

Here is an example: "How often do you feel happy?" If you never feel happy, you would respond "never"; if you always feel happy, you would respond "always" Circle one number on each line

		Never	Rarely	Sometimes	Always
a.	How often do you feel that you are "in tune" with the people around you	1	2	3	4
b.	How often do you feel that you lack companionship	1	2	3	4
c.	How often do you feel that there is no one you can turn to	1	2	3	4
d.	How often do you feel alone	1	2	3	4
e.	How often do you feel part of a group of friends	1	2	3	4
f.	How often do you feel that you have a lot in common with people around you	1	2	3	4
g.	How often do you feel that you are no longer close to anyone	1	2	3	4
h.	How often do you feel that your interests and ideals are not shared by those around you	1	2	3	4
I.	How often do you feel outgoing and friendly	1	2	3	4
j.	How often do you feel close to people	1	2	3	4
k.	How often do you feel left out	1	2	3	4
l.	How often do you feel that your relationship with others is not meaningful	1	2	3	4
m.	How often do you feel that no one really knows you well	1	2	3	4

(111-123)

Continued from previous page

		Never	Rarely	Sometimes	Always
n.	How often do you feel isolated from others	1	2	3	4
o.	How often do you feel you can find companionship when you want it	1	2	3	4
p.	How often do you feel that there are people who really understand you	1	2	3	4
q.	How often do you feel shy	1	2	3	4
r.	How often do you feel that people are around you but not with you	1	2	3	4
s.	How often do you feel that there are people you can talk to	1	2	3	4
t.	How often do you feel that there are people you can turn to	1	2	3	4

(124-130)

About Your Health

The questions in this section ask about your overall health and how it affects your level of activity. Please answer by circling one number for each statement. If you are unsure about how to answer, please give the best answer that you can.

13. In general, would you say your health is:

1	2	3	4	5
Poor	Fair	Good	Very Good	Excellent

(131)

14. The following questions are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

	Yes, Limited a lot	Yes, Limited a little	No, Not Limited at all
a. Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, playing golf	1	2	3
b. Climbing **several** flights of stairs	1	2	3

(132-133)

15. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health

a. Accomplished less than you would like

1	2	3	4	5
All of the time	Most of the time	Some of the time	A little of the time	None of the time

(134)

b. Were limited in the **kind** of work or other activities

1	2	3	4	5
All of the time	Most of the time	Some of the time	A little of the time	None of the time

(135)

16. **During the <u>past 4 weeks</u>, have you had any of the following problems with your work or other regular daily activities <u>as a result of any emotional problems</u> (such as feeling depressed or anxious)**

a. Accomplished less than you would like

1	2	3	4	5
All of the time	Most of the time	Some of the time	A little of the time	None of the time

(136)

b. Didn't do work or other activities as **carefully** as usual

1	2	3	4	5
All of the time	Most of the time	Some of the time	A little of the time	None of the time

(137)

17. **During the <u>past 4 weeks</u>, how much did <u>pain</u> interfere with your normal work (including both work outside the home and housework)**

1	2	3	4	5
Not at all	A little bit	Moderately	Quite a bit	Extremely

(138)

18. **These questions are about how you felt and how things have been with you <u>during the past 4 weeks</u>. For each question, please give the one answer that comes closest to the way you have been feeling.**

How much of the time during the <u>past 4 weeks</u>:

a. Have you felt calm and peaceful

1	2	3	4	5
All of the time	Most of the time	Some of the time	A little of the time	None of the time

(139)

How much of the time during the <u>past 4 weeks</u>:

b. Did you have a lot of energy

1	2	3	4	5
All of the time	Most of the time	Some of the time	A little of the time	None of the time

(140)

c. Have you felt downhearted and depressed

1	2	3	4	5
All of the time	Most of the time	Some of the time	A little of the time	None of the time

(141)

19. During the <u>past 4 weeks</u>, how much of the time have your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)

1	2	3	4	5
All of the time	Most of the time	Some of the time	A little of the time	None of the time

(142)

Well done, you are now well over half way through the questions
We appreciate your help
Perhaps it's time for that well earned cuppa!

Friendships & Family

The questions in this section ask about your family and friends.

When answering the following questions, exercise includes any physical activity or movement that includes walking, gardening, swimming, dancing, cycling, yoga, etc. Please circle one number for each question.

20. During a typical week how often do your **family members, who live in your household or nearby** do the following.
If you do not have family members living with you or nearby tick ✓ the box ☐ and **go to question 21.**

	Never	Rarely	Sometimes	Often	Very often
a. Exercise with me	1	2	3	4	5
b. Offer to exercise with me	1	2	3	4	5
c. Give me helpful reminders to exercise	1	2	3	4	5
d. Give me encouragement to stick with exercising	1	2	3	4	5
e. Change schedules so we can exercise together	1	2	3	4	5
f. Discuss exercise with me	1	2	3	4	5
g. Plan for walks or recreational outings	1	2	3	4	5
h. Help plan activities around my exercise	1	2	3	4	5
I. Ask for ideas on how they can join me in exercise	1	2	3	4	5

(143-151)

Continued from previous page

	Never	Rarely	Sometimes	Often	Very often
j. Talk about how much they like to exercise	1	2	3	4	5
k. Take over chores so I can have more time to exercise	1	2	3	4	5
l. Give positive comments about my appearance	1	2	3	4	5
m. Get angry at me for exercising	1	2	3	4	5
n. Criticise or make fun of me for exercising	1	2	3	4	5
o. Give me rewards for exercising	1	2	3	4	5

(152-157)

When answering the following questions, exercise includes any physical activity or movement that includes walking, gardening, swimming, dancing, cycling, yoga, etc. Please circle one number for each question.

21. During a typical week how often do your **friends** or **acquaintances** do the following? If you do not have friends or acquaintances living nearby tick ✓ the box ☐ and **go to Question 22.**

	Never	Rarely	Sometimes	Often	Very often
a. Exercise with me	1	2	3	4	5
b. Offer to exercise with me	1	2	3	4	5
c. Give me helpful reminders to exercise	1	2	3	4	5
d. Give me encouragement to stick with exercising	1	2	3	4	5
e. Change schedules so we can exercise together	1	2	3	4	5

(158-162)

22. The following three questions ask about your relationships with friends and family and how many times you see them. Think about the contact that you have with friends or family and circle one number for each question.

a.	How many persons in this area within one hours travel, do you feel you can depend on or feel very close to. Do not include people in your family	**1** None	**2** 1-2 persons	**3** More than 2 persons

(163)

b.	How many times during the past week did you spend some time with someone who does not live with you, (for example, you went to see them or they came to visit you, or you went out together)	**1** No times	**2** 1-2 times	**3** More than 2 times

(164)

c.	How many times during the week did you talk to someone- friends, relatives or others – on the telephone, (either they called you or you called them)	**1** 1 time or less	**2** 2-5 times	**3** More than 5 times

(165)

23. The questions that follow are about your relationship with friends and family. The answers range from "never" to "all the time". Please indicate how you feel about each question by circling the most suitable answer. Circle only one number for each question.

	Never	Hardly Ever	Some of the time	Most of the time	All of the time
d. Does it seem that your family and friends (that is people who are important to you) understand you	1	2	3	4	5
e. Do you feel useful to your family and friends	1	2	3	4	5
f. Do you know what is going on with your family and friends	1	2	3	4	5
g. When you are talking with your family and friends, do you feel you are being listened to	1	2	3	4	5
h. Do you feel you have a definite role/place in your family and amongst your friends	1	2	3	4	5
I. Can you talk about your deepest problems with at least some of your family and friends	1	2	3	4	5

(166-171)

24. For the final question about friends and family, I would like you to consider your general satisfaction with these relationships and then circle the most suitable answer.

a. How satisfied are you with the kinds of relationships you have with your family and friends

1	2	3	4	5
Extremely dissatisfied	Very dissatisfied	Somewhat dissatisfied	Mostly satisfied	Always satisfied

(172)

About Your Suburb

The following questions ask about where you live.

25. To what extent do you agree or disagree with the following statements when you think about walking in your neighbourhood. Circle one response only for each question.

		Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
a.	Your neighbourhood is friendly	1	2	3	4	5
b.	You find it pleasant walking near your home	1	2	3	4	5
c.	Your local area is attractive	1	2	3	4	5
d.	Shops are in walking distance	1	2	3	4	5
e.	A park or beach is within walking distance	1	2	3	4	5
f.	A cycle path is accessible	1	2	3	4	5
g.	You have someone (or a pet) to walk with in your environment	1	2	3	4	5

(173-179)

26. How safe do you feel in your neighborhood during the day? Indicate by circling one answer only.

1	2	3	4	5
Very Safe	Safe	Neither Safe or unsafe	Unsafe	Very Unsafe

(180)

27. What facilities or areas did you use in the last 6 months?
Please tick ✔ the boxes of facilities you have used

Beach	☐	1
Walking or cycle path, not a beach, river or park	☐	2
Golf course	☐	3
Gymnasium, health club or recreation centre	☐	4
Home	☐	5
Natural bushland	☐	6
Public park or oval	☐	7
Public swimming pool	☐	8
River	☐	9
Sailing or boat club	☐	10
Squash courts	☐	11
Streets/footpath	☐	12
Team sport facilities, e.g. basketball, netball	☐	13
Tennis courts	☐	14
Bowling club	☐	15
Other (please specify) _____	☐	16

(181-189)

PALS Program

This section contains a range of questions about the PALS walking program and how you found it affected you

28. Please indicate how you feel about the following statements by circling "1" if you 'strongly agree' through to "5" if you 'strongly disagree'
Circle one number for each question

About your PALS Walking Leader

	Strongly agree	Agree	Unsure	Disagree	Strongly disagree
a. Having a walking leader has kept me going to my walking group	1	2	3	4	5
b. If you were in a group that did not always have a walking leader – Did this influence your participation	1	2	3	4	5
c. Please describe how this influenced your participation in PALS _____ _____ _____					

(190-195)

29. Since starting PALS … how do you feel?

	Strongly agree	Agree	Unsure	Disagree	Strongly disagree
a. I feel fitter since starting PALS	1	2	3	4	5
b. Please describe the most significant changes in your health and fitness _____ _____ _____					

(196-200)

Since starting PALS….. how do you feel? (continued from previous page)

	Strongly agree	Agree	Unsure	Disagree	Strongly disagree
c. I can get more done in a day	1	2	3	4	5
d. I have become more aware of my health and well-being	1	2	3	4	5
e. I am more likely to actually do something about my health and well-being	1	2	3	4	5
f. Please give examples of things you are more likely to do _____ _____ _____					

(201-206)

30. About your physical activity….. since starting PALS

	Strongly agree	Agree	Unsure	Disagree	Strongly disagree
a. I walk more often	1	2	3	4	5
b. I am generally more active	1	2	3	4	5
c. I have become involved in new activities	1	2	3	4	5
d. Please give examples of any activities that you have become involved in _____ _____ _____					

(207-213)

31. About your intentions to be active

	Strongly agree	Agree	Unsure	Disagree	Strongly disagree
a. I believe I will continue to walk twice a week when the program concludes	1	2	3	4	5
b. I believe I will continue to walk twice a week with my group when the program concludes	1	2	3	4	5
c. I believe I will still be walking twice a week in 6 months time	1	2	3	4	5
d. I believe I will still be walking twice a week in 12 months time	1	2	3	4	5

(214-217)

32. What do you estimate was your attendance at your PALS walking sessions over the last 6 months?
Circle the most appropriate percentage

10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Walked less than 4 sessions	Walked 5 - 9 sessions	Walked 10 - 14 sessions	Walked 15 - 18 sessions	Walked half the sessions	Walked 23 - 26 sessions	Walked 27 - 30 sessions	Walked 31 - 35 sessions	Walked 36 - 40 sessions	Walked all sessions

(218)

33. If you did not attend the group at times, what were your reasons for not attending the group? Tick ✔ the appropriate boxes

Illness	☐	1
Injury	☐	2
Holidays	☐	3
Family commitments	☐	4
Work commitments	☐	5
Didn't like the group	☐	6
Slept in	☐	7
Other (please specify) _____	☐	

(219-222)

34. We would welcome any other comments about PALS

_____

_____

_____

_____

_____

_____

_____

_____

(223-227)

General Information

Finally, please complete these final questions.

35. What is your year of birth?

_____

(228—231)

36a. What is your approximate weight in pounds/stones or kilograms?

_____

(232-234)

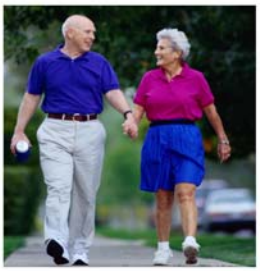
36b. What is your approximate height in feet/inches or centimetres?

_____

(235-237)

Fantastic - you are finished!
Thank you so much for answering the questions.
We really appreciate your time and assistance in this important research.

PLEASE TAKE A MINUTE TO CHECK YOU HAVE ANSWERED ALL THE QUESTIONS



PALS

Perth Active Living for Seniors

Dear PALS Participant

It is now 12 months since the Perth Active Living Seniors (PALS) official program concluded and we would like to know how you are going and what sorts of things you have been doing since PALS ended.

We would appreciate you finding the time to complete the follow-up questionnaire (it will take much less time than the previous ones), and return it to us by June 8th 2005, or at your earliest convenience, in the self-addressed envelope provided.

Curtin University is still investigating ways to build on the PALS program. If we were able to secure funding would you be interested in being part of a new program in the future?

Please indicate by ticking one of the boxes below. Please complete and return the survey even if you are not interested in future programs.

☐ **Yes**, I would be interested in a related PALS Program

☐ **No,** I would not be interested in any related PALS Program (1)

Please be assured that all the information provided to PALS will remain completely confidential. If you have any questions, please call me. I can be contacted on 9266 3807. Thank you again for your willingness to assist with this research.

Yours sincerely

Jonine Jancey
Project Coordinator

Healthway Curtin

349

Id_____(2-5)
Intervention _____(6)
Survey _____(7)
suburb_____(8-16)
Postcode _____(17-20)

How Active Are You NOW?

The following questions ask about the kinds of physical activities that people do as part of their everyday lives. The first two questions ask about the amount of walking that you do for recreation, exercise and to get from place to place.

1a. **In <u>a usual week</u> how many times do you walk continuously, for at least 10 minutes, <u>for recreation or exercise.</u>** Please record the number of times and days per week

_____number of times per week (21-23)

_____number of days per week (24)

b. **In <u>a usual week</u> what do you estimate is the total time you spend walking in this way.**

_____hours _____minutes (25-28)

<u>OR</u> If you <u>don't usually</u> walk in this way, please tick ✓ the box ☐ (29)

2a. **In <u>a usual week</u> how many times do you walk continuously, for at least 10 minutes, to get <u>from place to place or to do errands.</u>**

Please record the number of times and days per week

_____number of <u>times</u> per week (30-32)

_____number of <u>days</u> per week (33)

b. **In <u>a usual week</u> what do you estimate is the total time you spend walking in this way?**

_____hours _____minutes (34-37)

<u>OR</u> If you <u>don't usually</u> walk in this way, please tick ✓ the box ☐ (38)

This question asks about the physical activities you might do in and around your home.

3a. In a usual week how many times do you do gardening or work around the home for at least 10 minutes at a time, such as sweeping, washing windows, or digging.

Please record the number of times and days per week

_____number of times per week (39-41)

_____number of days per week (42)

b. In a usual week, what do you estimate is the total time you spend doing these activities around the home.

_____hours_____minutes (43-46)

OR If you don't usually garden or do work around the home, please tick ✓ the box ☐ (47)

This question asks about all the physical activities that you do in a usual week for structured recreation or exercise. Don't include Walking.

4a. In a usual week, how many times do you do moderate physical activity for at least 10 minutes, such as swimming or dancing or cycling at a regular pace.

Please record the number times and days per week

_____number of times per week (48-50)

_____number of days per week (51)

b. What types of physical activities or sports are these?
Please write them down.

_____

_____

_____ (52-55)

c. In a usual week, what do you estimate is the total time you spend doing these physical activities.

_____hours _____minutes (56-58)

OR If you don't usually do sport or physical activity, please tick ✓ the box ☐ (59)

About Your Health

The questions in this section ask about your overall health and how it affects your level of activity. Please answer by circling one number for each statement. If you are unsure about how to answer, please give the best answer that you can.

5. In general, would you say your health is:

1	2	3	4	5
Poor	Fair	Good	Very Good	Excellent

(60)

6. The following questions are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

	Yes, Limited a lot	Yes, Limited a little	No, Not Limited at all
a. Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, playing golf	1	2	3
b. Climbing **several** flights of stairs	1	2	3

(61-62)

7. During the <u>past 4 weeks</u>, have you had any of the following problems with your work or other regular daily activities <u>as a result of your physical health</u>

a. Accomplished less than you would like

1	2	3	4	5
All of the time	Most of the time	Some of the time	A little of the time	None of the time

(63)

b. Were limited in the **kind** of work or other activities

1	2	3	4	5
All of the time	Most of the time	Some of the time	A little of the time	None of the time

(64)

8. **During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)**

   a. Accomplished less than you would like

1	2	3	4	5
All of the time	Most of the time	Some of the time	A little of the time	None of the time

(65)

   b. Didn't do work or other activities as **carefully** as usual

1	2	3	4	5
All of the time	Most of the time	Some of the time	A little of the time	None of the time

(66)

9. **During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)**

1	2	3	4	5
Not at all	A little bit	Moderately	Quite a bit	Extremely

(67)

10. **These questions are about how you felt and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling.**

    How much of the time during the <u>past 4 weeks</u>:

    a. Have you felt calm and peaceful

All of the time	Most of the time	Some of the time	A little of the time	None of the time

(68)

How much of the time during the <u>past 4 weeks</u>:

   b. Did you have a lot of energy

1	2	3	4	5
All of the time	Most of the time	Some of the time	A little of the time	None of the time

(69)

   c. Have you felt downhearted and depressed

1	2	3	4	5
All of the time	Most of the time	Some of the time	A little of the time	None of the time

(70)

11. During the <u>past 4 weeks</u>, how much of the time have your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)

1	2	3	4	5
All of the time	Most of the time	Some of the time	A little of the time	None of the time

(71)

General Information

This final section contains general information question and seeks your opinion on health related issues.

12. Over the last 12 months from May 2004 to May 2005 .....
(Please circle the most appropriate number)

		1	2	3
a.	**I have ...**	Walked more often	Walked about the same	Walked less Often
b.	**I have felt...**	1 Better overall	2 About the same	3 Worse overall

(72-73)

13. Please indicate how much you agree of disagree with the following statements.

		1	2	3	4	5
a.	At my age, physical activity most days of the week for 30 minutes is an excellent way to maintain my health and well being	Strongly agree	Agree	Unsure	Disagree	Strongly disagree
b.	At my age, good nutrition is an excellent way to maintain my health and well being	Strongly agree	Agree	Unsure	Disagree	Strongly disagree

(74-75)

Below are two questions about what you think of your weight and level of fitness.

If you think you are underweight circle 1. If you think you are very overweight circle number 10. If your weight is somewhere in the middle, circle the appropriate number. Answer the fitness question in the same way

14a . I consider myself to be: (76)

1	2	3	4	5	6	7	8	9	10
Very under weight				Average weight					Very over weight

(77)

14b. I consider myself to be:

1	2	3	4	5	6	7	8	9	10
Very fit				Of average fitness					Very unfit

16. What is your approximate weight in pounds/stones or kilograms? _____ (78-80)

Please take a minute to check you have answered all the questions and return your completed survey in the envelope provided.
Thank you

Appendix D

QUESTIONNAIRE COVER LETTER

Dear
Thanks for agreeing to be part of our health research project and assisting us by completing this survey. The survey is part of a health project being conducted by the National Heart Foundation and Curtin University.

The aim of the project is to learn more about the extent to which physical, social and environmental factors influence the health of people aged 65 to 75 years. We are interested in finding out about your level of physical activity and your general sense of well-being.

Because you are part of a small number of local people who have been selected randomly to give your opinion, your responses are particularly valuable. This is the first of three questionnaires that we would like you to complete over the next 6 months. We need you to complete all three questionnaires so that we can compare responses over time.

The questionnaire should take about 30 minutes to complete. All information will be kept strictly confidential – your name and address will not be available to anyone. Your answers will be combined with those of others to produce the survey results. The identification number on the first page is used simply to check whether we have received your questionnaire back. Please answer the questions honestly and accurately. There are no right or wrong answers.

When you have completed the questionnaire please return it in the self-addressed envelope. It would be helpful to have your questionnaire completed and returned to us by November 14th 2003. By doing so you can place yourself in the running to win one of three $50.00 Coles vouchers.

Should you require further information please don't hesitate to contact Jonine Jancey on 9266 3807.

Thank you for taking the time to be part of this study. Your help is greatly appreciated.

Yours sincerely

Jonine Jancey
Project Coordinator

Appendix E

ETHICS APPROVAL

memorandum

Curtin University of Technology

To	Associate Professor Peter Howat Centre for Health Promotion, Public Health
From	Max Page, Executive Officer, Human Research Ethics Committee
Subject	**PROTOCOL APPROVAL –** **EXTENSION HR 69/2002**
Date	11 April 2005
Copy	

Office of Research and Development
Human Research Ethics Committee
TELEPHONE 9266 2784
FACSIMILE 9266 3793
EMAIL s.darley@curtin.edu.au

The Human Research Ethics Committee acknowledges receipt of your Form B progress report for the project *Physical activity for sedentary seniors.*

Extended approval for this project is for the year to **9/05/2006.**

Your approval number remains **HR 69/2002.** Please quote this number in any further correspondence regarding this project.

Thank you.

SDarley.

MP Maxwell Page
Executive Officer
Human Research Ethics Committee

MINUTE

Curtin
UNIVERSITY OF TECHNOLOGY

To	Associate Professor Peter Howat, Centre for Health Promotion, Public Health
From	Max Page, Executive Officer, Human Research Ethics Committee
Subject	Protocol Approval **HR 69/2002**
Date	27 June 2002
Copy	

Office of Research and Development

Human Research Ethics Committee

TELEPHONE 9266 2784
FACSIMILE 9266 3793
EMAIL t.lerch@curtin.edu.au

Thank you for providing additional information for the project "PHYSICAL ACTIVITY FOR SEDENTARY SENIORS".

The information you have provided has satisfactorily addressed the points raised by the Committee, and final approval is granted.

In answer to your query regarding the one year approval period, I would like to explain the procedures adopted by the Committee. Approvals for projects is granted for an initial one year period. Renewal of approval is annual, and is subject to submission of a Form B (Progress Report Form/Application for Renewal). A Form B will be sent by the Secretary, HREC to the investigator nearer to the time of the expiry date. Upon return of this form to the secretary, approval will be extended by one year. To date this process has not caused problems for projects receiving funding from granting bodies.

Approval of this project remains for the period of twelve months **10/May/2002** to **09/May/2003**. The approval number for your project is **HR 69/2002**. *Please quote this number in any future correspondence.*

Maxwell Page
Executive Officer
Human Research Ethics Committee

J:\OR\HREC\REG99\HR 69/2002

Appendix F

STATEMENT OF CONTRIBUTION OF OTHERS

SCHOOL OF PUBLIC HEALTH

Curtin
UNIVERSITY OF TECHNOLOGY

GPO Box U1987 Perth
Western Australia 6845

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WEB www.curtin.edu.au/curtin/dept/health/

September 15th 2007

To Whom It May Concern

I, Peter Howat, contributed as a Supervisor of the PhD. I had an ongoing close involvement with the research, including contributing to the project proposal, discussing the structure of papers, the reading of drafts and making suggestions for improvements to the papers entitled:

a) Effective recruitment of older adults in physical activity research: PALS study. *American Journal of Health Behaviour;* 2006, 30(6);626-635

b) Reducing attrition in physical activity programs for older adults. *Journal of Aging and Physical Activity*, 2007, 15(2):152-154

c) A physical activity program to mobilize older people: a practical and sustainable approach. *The Gerontologist* 2007 Accepted with publication date to be advised

d) The effectiveness of a physical activity program for seniors. *American Journal of Health Promotion* 2007 Accepted with publication date to be advised.

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September 15th 2007

To Whom It May Concern

I, Andy Lee, contributed as a Supervisor of the PhD. I had an ongoing close involvement with the research, including contributing to the project proposal, discussing the structure of papers, the reading of drafts and making suggestions for improvements to the papers entitled:

a) Effective recruitment of older adults in physical activity research: PALS study. *American Journal of Health Behaviour;* 2006, 30(6);626-635

b) Reducing attrition in physical activity programs for older adults. *Journal of Aging and Physical Activity*, 2007, 15(2):152-154

c) A physical activity program to mobilize older people: a practical and sustainable approach. *The Gerontologist* 2007 Accepted with publication date to be advised

d) The effectiveness of a physical activity program for seniors. *American Journal of Health Promotion* 2007 Accepted with publication date to be advised.

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September 15th 2007

To Whom It May Concern

I, Trevor Shilton, provided advice on the intervention design and measurement instruments to the papers entitled:

a) Effective recruitment of older adults in physical activity research: PALS study. *American Journal of Health Behaviour;* 2006, 30(6);626-635

b) Reducing attrition in physical activity programs for older adults. *Journal of Aging and Physical Activity*, 2007, 15(2):152-154

c) A physical activity program to mobilize older people: a practical and sustainable approach. *The Gerontologist* 2007 Accepted with publication date to be advised

d) The effectiveness of a physical activity program for seniors. *American Journal of Health Promotion* 2007 Accepted with publication date to be advised.

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September 15th 2007

To Whom It May Concern

I, Kui Wang, provided statistical advice and assistance with analysis on the papers entitled:

a) Reducing attrition in physical activity programs for older adults. *Journal of Aging and Physical Activity*, 2007, 15(2):152-154

b) The effectiveness of a physical activity program for seniors. *American Journal of Health Promotion* 2007 Accepted with publication date to be advised.

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October 11, 2007

To Whom It May Concern

I, Bruce Maycock, contributed as an Associate Supervisor of the PhD. My involvement with the qualitative research, included discussing the structure of the paper, the reading of drafts and making suggestions for improvements to the paper entitled:

a) Perception of physical activity by older adults, an exploratory qualitative study.

Bruce Maycock (Associate Supervisor/co-author)

Jonine Maree Jancey (candidate)

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September 15th 2007

To Whom It May Concern

I, Helena Iredell, provided advice and assistance with the methodology for the recruitment of subjects to the paper entitled:

a) Effective recruitment of older adults in physical activity research: PALS study. *American Journal of Health Behaviour;* 2006, 30(6);626-635

Helena Iredell (co-author)

Jonine Maree Jancey (candidate)