Like a breath of fresh air: Yoga and Tai Chi for Frail Older People in Residential Care: A mixed methods study

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A thesis submitted for the degree of PhD (Nursing and Midwifery)

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2014
Declaration

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. I give consent to this copy of my thesis, when deposited in the University Library, being made available for loan and photocopying subject to the provisions of the Copyright Act 1968.

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I hereby certify that the work embodied in this thesis is the result of original research and has not been submitted for a higher degree at any other University or Institution

Padmapriya Saravanakumar………………………………………………
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**Abbreviations**

**ADL:** Activities of daily living  
**BBS:** Berg Balance Scale  
**DEMQoL:** Dementia Quality of life  
**VDS:** Verbal descriptor scale  
**RACF:** Residential aged care facility
Publications arising from this thesis

**Article**

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**Abstracts**

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Abstract

Older people who live in residential aged care settings are at a high risk for falls; many of them are frail with high levels of dependence. Fall injuries, if not fatal, can result in permanent disability, loss of independence and poor quality of life for those affected. Many older people develop an ongoing fear of falling and are at high risk of subsequent falls. In addition, there can be delayed recovery from fall injuries with much pain, sleep disturbances, and depression. Older people with poor balance function are at risk of fall injuries. The management of falls in residential care is a major concern with the monitoring of falls and prevention strategies one of the mainstays of care in this setting. The importance of exercise interventions for improvement in balance for older people has been recognised and as a mechanism for fall prevention in residential care facilities.

The aims of the research reported in this thesis were to implement, “map” and evaluate a 14 week program of yoga and tai chi for frail older adults in residential care. The objectives were: to determine the feasibility of conducting randomised clinical trial (RCT) in a residential aged care facility (RACF) with frail older people to test the hypotheses that 1) a 14 week modified yoga program is more effective than usual RACF activity program in improving balance function, quality of life, pain experience and in reducing number of falls in a RACF and 2) a 14 week modified tai chi program is more effective than usual activity programs in improving balance function, quality of life, pain experience and in reducing number of falls in a RACF. Other objectives were to explore the participant (the residents and staff) perspectives on whether the 14 week modified program of tai chi and yoga was feasible and appropriate and to observe and map the implementation of modified approaches of yoga and tai chi with older people in a RACF.

The study used a concurrent mixed methods design, incorporating a RCT and qualitative focus group (FG) interviews to explore the residents’ and staffs’ perspectives on whether the 14 week modified program of tai chi and yoga was feasible and appropriate. The qualitative arm of the study utilised FG interviews with the participants.
of the study and descriptive analysis based on the tenets of naturalistic inquiry. The qualitative arm of the study was designed to complement the findings of the RCT by providing a broader perspective of the program, thereby adding richness to the research. Both quantitative and qualitative findings determined that the modified yoga and tai chi programs are feasible in the RACF. The quantitative indicators of feasibility were as follows: recruitment of 33 participants, high attendance (≥70%) and completion rates (28/33).

The RCT demonstrated that a 14-week modified yoga and tai chi program was feasible in a residential aged care setting, and provided evidence that yoga and tai chi may be associated with improvement in balance, pain and quality of life. These findings support growing evidence that interventions such as yoga and tai chi could reduce fall risk factors and also have holistic benefits. The qualitative findings showed that practicing yoga and tai chi led to perceived improvements in multiple wellness domains. This suggests that these interventions provide opportunities for frail and dependent older residents to experience enhanced quality of life and active aging. The qualitative findings also revealed important insights concerning what was most valued by the participants and the factors that motivated their participation in the programme. In particular, it identified lack of suitable physical activity and social isolation as key issues to be addressed in order to improve quality of life. Attributes of the yoga and tai chi programmes such as the instruction, group exercise, such as mindfulness, slow movements and guided imagery were important aspects motivating participation and facilitating confidence.

The study reported in this thesis makes an important contribution to the literature. It is the first RCT with an embedded qualitative study to examine a 14-week tai chi and yoga program implemented in an Australian residential care facility. The mixed method design was appropriate in addressing the aim and research questions because it led to a comprehensive understanding of the feasibility and appropriateness of the yoga and tai chi intervention for older adults in residential aged care setting. The methods used in this study also resulted in the development of a comprehensive pictorial and explanatory
map of suitable forms of yoga and tai chi for use with frail and dependent older adults in RACFs.
Chapter 1 Introduction
With the exponential growth in an ageing population worldwide, falls amongst older adults has become a global public health concern (World Health Organization (WHO), 2007). Fall injuries amongst older people are a leading cause of death and disability, especially for people aged 80 years and above (Australian Bureau of Statistics (ABS) 2012; Centers for Disease Control and Prevention (CDC), 2012) and over one-third of people 65 years and over fall each year; two-thirds of those who fall will fall again within 6 months (Chang, Lynn, & Glass, 2010). It is widely known that there are many causes for older people having falls. Whilst falling is not a typical feature of ageing, older people, particularly those over the age of 80 years, are more likely to fall because of neurological changes associated with loss of sensory responses and reflexes, and musculoskeletal problems such as loss of bone density and mass, use of medications affecting balance, impaired thinking and memory, impaired vision, and environmental hazards such as slippery floors, uneven surfaces, stairs, poor lighting, and loose rugs. In addition, many older people, especially people 80 and above, do not do regular exercise so that they lose muscle tone, strength, and flexibility (ABS, 2006b; Chang et al., 2010). Of importance is that all of these changes affect walking and balance and predispose older people to having a fall.

Whilst many older people continue to live in their own homes as they age, and have falls, there are many older people who, because of frailty or cognitive deficits, live in long term care or residential aged care settings. The older people who reside in residential aged care facilities experience all of the above concerns and have few opportunities and options for regular exercise.
Of concern to this thesis is that people who live in residential aged care settings are at a high risk for falls because there is a high proportion of people aged 85-89 years (Australian Institute of Health and Welfare (AIHW), 2012b; Caffrey, Sengupta, & Park-Lee, 2012; Centre for Policy on Ageing, 2012) and many of them are frail with high levels of dependence.

Fall injuries, if not fatal, can result in permanent disability, loss of independence and poor quality of life for those affected (WHO, 2007). In addition many will develop an ongoing fear of falling and they will be at an increased risk of subsequent falls. There can be delayed recovery from the fall injury itself with much pain, sleep disturbances, and depression (Grimm & Mion, 2011). The management of falls in residential care settings has been a concern since their inception with the monitoring of falls and prevention strategies one of the mainstays of care in this setting. The importance of exercise interventions for improvement in balance for older people has been recognised as a mechanism for fall prevention in residential care facilities (Crocker et al., 2013).

The increased vulnerability to falls and fall injuries in older adults appears to be associated with age related alterations in body systems that lead to impaired balance function (Rubenstein, 2006; Viljanen et al., 2009). Balance is defined as exertion of postural control that provides a stable base of support while remaining stationary or during movement (Winter, Patla, & Frank, 1990). Balance impairment affects independence in activities of daily living and mobility, and increases vulnerability to fall during the body’s positional displacement (Lee & Scudds, 2003). Balance and related measures such as coordination, proprioception, lower limb muscle strength and
gait are recommended as exercise interventions to prevent falls in older people. Although exercise interventions are deemed vital in fall prevention programmes (Howe Tracey, Rochester, Neil, Skelton Dawn, & Ballinger, 2011), careful consideration regarding the choice of exercise is warranted especially in frail older adults due to their high fall risk (Cameron et al., 2010).

Yoga and tai chi qi gong (referred to hence forth as tai chi) are two forms of complementary medicine (CM) approaches that have shown potential in improving balance and preventing falls in older adults (Taylor-Piliae et al., 2010; Zettergren, Lubeski, & Viverito, 2011). Tai chi is a form of martial art and a low intensity exercise that is practiced with an emphasis on deep breathing, mental imagery, and slow, graceful movements to promote flexibility, balance and overall wellbeing (Chyu et al., 2010; Wolf, Barnhart, Kutner, McNeely, Coogler, & Xu, 1996). Yoga is a generic term for a physical, mental and spiritual discipline, the practice of which involves emphasis on postures (asanas), breathing techniques (pranayama) and meditation (dhyana) (Evans, Tsao, Ternlieb, & Zeltzer, 2009) and having positive effects on balance, muscle strength, endurance, flexibility and gait (DiBenedetto et al., 2005; Fan & Chen, 2011a). Despite growing research interests in CM approaches such as yoga and tai chi, there are still gaps in the evidence. For example, most studies that have reported benefits of tai chi and yoga have been conducted in a relatively healthy community dwelling older adult population (DiBenedetto et al., 2005; Howe Tracey et al., 2011; Patel, Newstead, & Ferrer, 2012). Current evidence on use of exercise interventions like yoga and tai chi is scarce and inconclusive for frail older people in residential care settings (Cameron...
Moreover, there is only limited understanding of the mechanisms involved in implementation of these programmes, including the factors affecting compliance and broader programme outcomes.

Recognition of the importance of exercise interventions for improvement in balance for older people and as a mechanism for fall prevention have led to their use in residential care facilities (Australian Council for Safety and Quality in Health Care (ACSQHC), 2009). However, the prevalence of falls amongst older people in this setting continues to be a major problem in RACFs (AIHW, 2012b; Bradley, 2012a; Cripps R, 2001). Hence research is required to determine which fall prevention programmes are appropriate for older people in RACFs.

1.1 Aims, objectives and hypotheses of the study

The aims of the research reported in this thesis were to implement, “map” and evaluate a 14 week programme of yoga and tai chi for frail older adults in a RACF.

The objectives of the research were:

Objective 1:

To determine the feasibility of conducting a three arm RCT in a RACF with frail older people that tests the following hypotheses:

Hypothesis 1:

A 14 week modified yoga programme is more effective than usual RACF activity programme in improving balance function, quality of life, pain experience and in reducing number of falls in a RACF.
Hypothesis 2:

A 14 week modified tai chi programme is more effective than usual RACF activity programme in improving balance function, quality of life, pain experience and in reducing number of falls in a RACF.

Objective 2:

To explore the participant (the residents and staff) perspectives on whether the 14 week modified programme of tai chi and yoga was feasible and appropriate.

Objective 3:

To observe and map the implementation of modified approaches of yoga and tai chi with older people in a RACF.

In addressing these objectives, the study used a concurrent mixed methods design, incorporating a Randomised Controlled Trial (RCT) and qualitative focus group (FG) interviews to explore the participant (the residents and staff) perspectives on whether the 14 week modified programme of tai chi and yoga was feasible and appropriate. RCTs are considered the gold standard for evaluating procedures (Kao, Tyson, Blakely, & Lally, 2008). The qualitative arm of the study utilised FG interviews with the participants of the study and descriptive analysis based on the tenets of naturalistic inquiry (Creswell, 1997). The qualitative arm of the study was designed to complement the findings of the RCT by providing a broader perspective of the programme, thereby adding richness to the research (Creswell, 1997). In addressing the third objective, ‘the forms of yoga and tai chi’ that were deemed appropriate for the older residents in a RACF were mapped with the collaborative efforts of the stakeholders.

My personal interest in the topic stemmed from a variety of experiences in my own life. First and foremost, I had always felt that I should do something for my parents. Coming from an Indian background, there is a cultural understanding that children care for their elders. My parents, both frail older people in their 80s, have lived with significant pain
and discomfort for a long time. So much so that they have assumed that living with discomfort is a norm. I have been particularly inspired by my mother who has lived with chronic pain ever since she was struck by a car and injured 15 years ago. Her injuries have resulted in impaired balance and from that a loss of independence and mobility in general. My mother was outgoing and active in life has now become restricted in her mobility and is now housebound. Despite this she still endeavours to do all domestic duties herself. Her only relief from pain comes from complementary therapies that she employs numerous times a day. My hope in doing this research is that I might be able to provide my parents, particularly my mother, and older people in general with another avenue that provides relief from chronic pain.

Coming from a nursing background, I saw the opportunity to broaden my skills in the area of wellbeing of the older generation. Anecdotally, I had observed a number of patients benefit from complementary therapies including yoga, ayurveda and acupuncture. This experience in my professional practice made me curious and hopeful that complementary medicine might hold answers where traditional medicine had failed. In addition to this, I personally know of a number of people who have benefited from regular practice of yoga in their everyday life. Benefits included improved breathing and sleep, reduced anxiety, improved balance, and a general feeling of wellbeing.

Contemplating my personal experience of complementary therapies led me to approach my current supervisor. Her research team was interested in pursuing a similar avenue of study involving yoga and tai chi for frail older people in residential aged care facilities. Our similar interests married beautifully and led directly to my undertaking of this research project.

Outline of the thesis

This thesis is presented in eight chapters. In Chapter One, the introduction, the problem of falls in frail older people in residential care settings is outlined. The objectives and general aims of the thesis are then outlined. In Chapter Two, a detailed analysis of
background literature is presented, with particular focus on the broader benefits of complementary medicine. Yoga and tai chi are explored as interventions having potential benefits to reduce falls in older people in general. In Chapter Three, I present a critical review of the relevant and recent literature of yoga and tai chi with respect to balance, pain and quality of life, specifically in the residential aged care population. In Chapter Four, I provide a detailed discussion of the mixed method design that was employed in this study. I also discuss the ethical considerations and outline the methodological challenges of the study.

In Chapter Five and Six, the findings of the study are presented. Both these chapters address the main study aim of determining the feasibility of yoga and tai chi interventions using quantitative and qualitative methods. The quantitative results showed a high degree of compliance and demonstrated feasibility of the study. The qualitative findings also highlighted aspects that were unique to yoga and tai chi as well as factors that motivated the frail older persons’ participation in the programme. In Chapter Seven, I present the modified approaches of yoga and tai chi that were used in this study. This was derived using a collaborative approach involving relevant stakeholders. Finally, in Chapter Eight, I integrate the findings of the quantitative and qualitative components, discuss in the light of relevant literature and draw conclusions. In addition, I discuss the study’s limitations, as well as implications and significance for yoga and tai chi in residential aged care settings.
Chapter 2 Background to the study
2.1 Introduction

In this chapter, I present a review of background literature on key issues related to the present study’s aims, design, interventions, outcome measures, analysis and discussion of results. I start with an overview of ageing and related challenges to older people in an international and then the local context, then explain the concepts of active ageing, wellness and theories that relate to successful adaptation to ageing. Moving from the wider context of the general older population, I then focus on older people in residential aged care facilities (RACF) and the problem of falls. I then present a brief picture of the residential aged care service in Australia and their philosophies of care. This is followed by a discussion and critique of fall prevention interventions including exercise for the RACF population, and factors that affect motivation to engage in exercise interventions. I then present an overview of complementary medicine, mind body interventions, yoga and tai chi. Finally, I discuss the literature on yoga and tai chi interventions and their benefits for older adults.

2.2 Ageing

The world population is ageing rapidly and this trend is seen globally, in developed and developing countries as a result of sustained low fertility rates (live births per woman) and increasing life expectancy (Department of economic and social affairs: Population Division-UN, 2001). Over the past 50 years, the average life expectancy at birth has increased globally by nearly 20 years, though this figure differs between developed and developing countries (World Health Organization & US National Institute of Aging, 2011; World Health Organization (WHO)). While the global older adult population of 60 years of age has doubled since 1980 and is projected to reach 2 billion by 2050, the older population aged 80 and above is expected to quadruple in the period 2000 to 2050, nearing 400 million in 2050 (World Health Organization & US National Institute of Aging, 2011; World Health Organization (WHO)). Similar to most developed countries, Australia’s population is ageing rapidly. In the last two decades, while the proportion of people aged 65 years and over has increased from 11.5% to 14.2%, the proportion of
people aged 85 years and over has doubled from 0.9% to 1.9% (Australian Bureau of Statistics (ABS), 2012). Continuing declines in death rates among older people have resulted in an increase in the number of centenarians (Australian Bureau of Statistics (ABS), 2012; World Health Organization & US National Institute of Aging, 2011). Due to increasing higher life expectancy for females and higher male mortality rates at younger ages for males, there are twice as many females than males in the 85 and above age group (Australian Bureau of Statistics (ABS), 2012) and this is reflected in the older population in residential care facilities (RACF) in developed countries (Australian Institute of Health and Welfare (AIHW), 2012b; Ribbe et al., 1997).

2.3 Functional decline and multi-morbidity

Increased age, that is people over the age of 60, is frequently associated with decline in physical function that has significant impact on an individual’s health, independence and quality of life (World Health Organization & US National Institute of Aging, 2011). Multiple morbidity, cognitive impairment, depression, limited lower extremity function, infrequent social contact, low level of physical activity and poor self-perceived health have been reported as related to functional decline amongst community dwelling older adults (Stuck et al., 1999).

In Australia, more than 50% of adults over 65 years of age experienced a disability that restricted everyday activities in 2003 (AIHW, 2010). A similar situation exists in the US where it is estimated that 80% of older adults have at least one chronic health condition and 50% have at least two chronic condition (Centers for Disease Control and Prevention (CDC), 2007). The term ‘burden of disease’ is used to denote the amount of ill health, disability and premature death caused by individual disease or health conditions (Australian Institute of Health and Welfare (AIHW), 2007). The following are ranked as leading causes of burden of disease for adults aged 65 and above: Ischemic heart disease, Lung cancer, Type 2 Diabetes, Prostate cancer, Breast cancer, Adult-onset hearing loss, Chronic obstructive pulmonary disease, Stroke, Colorectal cancer, Dementia, Parkinson’s disease and Osteoarthritis (Australian Institute of Health
and Welfare (AIHW), 2007). Common diagnoses among the oldest old are sleeping problems, constipation, stroke, hypertension, impaired vision, dementia, heart failure (von Heideken Wagert et al., 2006), depression (Mänty, Rantanen, Era, & Avlund, 2012) and fatigue (Yu, Lee, & Man, 2010). Hip fracture and urinary tract infection are also common among women, as is malignancy among men (von Heideken Wagert et al., 2006). The increase in average life span and associated physical decline implies that the older population with physical or cognitive impairments and multiple diseases is also growing. This impacts the residential care system as an increasing number of older people with physical and cognitive decline who are unable to live independently are likely to enter RACFs.

It is evident from the above literature that older adults in residential care settings are likely to be dependent for self-care owing to several limitations that are age-related and from multi morbidity. In the following section, I present a brief picture of the current practice of residential aged care and then discuss the problems faced by older people in residential care settings.

2.4 Residential aged care- current practice

Traditionally care of older people had been the responsibility of family members and was provided within the extended family home. This situation has changed in Western countries where older people who are dependent for activities of daily living are cared for in specialised institutions called residential care facilities. Although these changes have affected Western countries first, they are now increasingly affecting Asian countries as well (Huang, Thang, & Toyota, 2012).

In Australia, the Aged Care Act 1997 ("The Aged Care Act," 1997) resulted in a restructuring of the residential aged care system by amalgamating services offered by former hostel and nursing home programmes with the aim of providing individualized care and to aid ‘ageing in place’(Department of Human Services and Aged Care Services: Victoria, 2000). The previous two-tiered system catered to individuals who
conformed to a certain level of dependency, where individuals had to be transferred from hostels to nursing homes when their level of dependency increased requiring high level of care. ‘Aging in place’ refers to provision of a diverse range of services to meet individual needs and to stay in familiar surroundings with their family and friends as their care needs change, instead of having to relocate to obtain the needed service (Commonwealth Department of Health and Ageing, 2002). On 30th June 2012, 59% of residential aged care services were operated by not for profit organisations, 11% were operated by local and state government, and 30% were privately run (Australian Institute of Health and Welfare (AIHW)).

The term ‘residential care facility’ has been used synonymously with nursing homes, homes for the aged, care homes and long-term facilities in the literature. RACFs are special-purpose facilities that provide accommodation and other types of support, including assistance with day-to-day living, intensive forms of care, and assistance towards independent living, to frail and aged residents (Metadata Online Registry(METeOR)).

Older persons are assessed and recommended by Aged Care Assessment Teams (ACATs) to determine eligibility for admission to RACFs based on their level of dependency and need for services. Residential aged care services are offered on a permanent or respite basis. Permanent care is offered at two levels of care: low-care and high-care, depending on a person’s assessed needs. While low care caters to accommodation and personal care needs, high care caters to 24-hour nursing, accommodation and personal care needs. Respite care provides short-term care.

2.5 Residential aged care

Prolonged hospitalisation, diagnosis of dementia or stroke, older age, unplanned admission to a hospital, and being in palliative care before discharge from hospital are significant predictors associated with admission to RACFs (Australian Institute of Health and Welfare (AIHW), 2013b). Increased age, increased dependency, increased
burden of disease, and frailty are demographic characteristics common to older persons in RACFs. A recent survey showed that the largest proportion of residential aged care population in Australia were aged over 85 years and 75% of permanent RACF residents required high level of care based on activities of daily living, behaviour and complex health care domains (Australian Institute of Health and Welfare (AIHW), 2012b) indicating a larger proportion of frail older adults. RACFs in the UK and USA have similar proportions of frail older residents (Caffrey et al., 2012; Centre for Policy on Ageing, 2012). Among the health conditions of permanent residents of RACF in order of prevalence were circulatory system diseases (27%), diseases of the musculoskeletal system and connective tissue (17%) and endocrine, nutritional and metabolic disorders (9%). The majority 68% of older permanent residents were reported as having dementia or a mental illness (Australian Institute of Health and Welfare (AIHW), 2012a). An estimated 298,000 Australians had dementia in 2011, almost all of whom were aged 75 or over. The number of people with dementia is estimated to reach almost 400,000 by 2020, and around 900,000 by 2050 (Australian Institute of Health and Welfare (AIHW)). A 2011 survey shows that out of 180,300 older people aged 65 years and over and living in non-private dwellings, a major proportion (67%) lived in residential aged care facilities (ABS, 2013). Increasing incidence of health problems result in increased number of drugs prescribed for older people, especially in RACFs. A cross-sectional study involving 1,449 nursing home residents with advanced cognitive impairment from 8 countries that participated in the Services and Health for Elderly in Long Term Care (SHELTER) project reported polypharmacy (use of 5-9 drugs) in 50.7% and excessive polypharmacy (≥10 drugs) in 16.9% of the total participants (Vetrano et al., 2013). Use of multiple drugs, especially psychotropic drugs, is associated with balance impairment and falls in older people. The use of multiple drugs also suggests the increased prevalence of multiple health problems in the older people in RACF and their increased risk to fall injuries.

The above evidence suggests that a major proportion of RACF population are likely to be frail. The term ‘frail’ is frequently used in this thesis to denote the vulnerability and
dependency of older adults (for self-care) in RACF settings. The literature shows several interpretations and attempts to measure frailty. A discussion regarding frailty, a common feature of older adults in RACFs follows.

2.5.1 Frailty

Frailty is a complex and a vulnerable condition that encompasses bio-psycho-social dimensions and includes cognitive status, social support and other environmental factors (Kaufman, 1994). Frailty is associated with a combination of multi-morbidity, decreased reserves and functional capacity, and dependency on others for activities of daily living (ADL) (Fried, Ferrucci, Darer, Williamson, & Anderson, 2004; Wick, 2011). While frailty may not be a consequence of ageing, it is increasingly prevalent in older adults and is reported to have important outcomes in terms of dependence for self-care, falls, quality of life, admission to residential care and mortality (Heppenstall, Wilkinson, Hanger, Keeling, & Pearson, 2011; Shamliyan, Talley, Ramakrishnan, & Kane, 2012).

In the absence of a consensus on a definition of frailty, two dominant views on frailty exist: biomedical and psychosocial. According to the biomedical view, frailty is considered a phenotype that develops as a consequence of complex biological interactions promoting cell senescence, leading to a cumulative decline in multiple physiological systems (Walston et al., 2006). This decline results in a loss of homeostatic reserve which can ultimately and adversely affect the whole person, resulting in a vulnerability to a sudden health state change that can be triggered by relatively minor stressor events (Clegg, Young, Iliiffe, Rikkert, & Rockwood, 2013). Sarcopenia, regarded as a key physical aspect of frailty is defined as age associated loss of skeletal muscle mass and function (Fielding et al., 2011). The other clinical characteristics of frailty are anorexia, osteoporosis, fatigue, risk of falls, and poor physical health (Strandberg & Pitkala, 2007), unintentional weight loss, self-reported exhaustion, muscle weakness (Chin et al., 2003), slow walking speed, and low level of physical activity (Castell et al., 2013). The natural course of frailty is progressive, that
results in a spiral of decline that leads to greater disability and decreased survival over time (Shamliyan et al., 2012). Within the biomedical literature, there exist different definitions of frailty. While some researchers have associated frailty as common with old age, others define frailty as a collection of signs and symptoms, a syndrome. Bergman et al. (2007) explain that the different views defining frailty exist in a continuum, where on one end is the interpretation that frailty is accelerated ageing, and the other end an entity with its own distinct pathophysiology. Gill, Gahbauer, Allore, and Han (2006) suggest that frailty is a dynamic process of movement between the stages of frailty, while progressive decline over time is a constant feature that occurs throughout all stages (Raudonis & Daniel, 2010).

The psychosocial view holds that frailty is socially constructed (Becker, 1994; Kaufman, 1994). Recent evidence reports that social factors, including social networks and socioeconomic status may also have a relationship with frailty (Andrew, Mitnitski, & Rockwood, 2008; Studenski et al., 2004). In a study conducted by Studenski et al. (2004) focus groups involving older persons, their family members and geriatric clinicians identified the following psychosocial markers of frailty: self-efficacy, emotions, interest and motivation, ability to tolerate stress, social and vocational role function, interest and interactions with others. Social researchers point out that frailty is a negative and unhelpful stereotype (Becker, 1994). Inappropriate ‘labelling’ of older persons as frail can alter their self-concept and the way others view them. This may have deleterious effects on their physical (Hausdorff, Levy, & Wei, 1999) and cognitive performance (Levy, 1996) and affect health related decision making (Levy, Ashman, & Dror, 1999).

Conceptualisations of frailty, whether biomedical or psychosocial, that does not regard all aspects of holistic health is disadvantageous and may not serve its purpose in dealing with the problem. Integrating both views is necessary as provision of prompt ‘medical attention’ is important to prevent fatal consequences; and being mindful of the psychosocial aspects in provision of care is important in promoting positive and holistic health. In a study that aimed to arrive at a consensus on important constituents of frailty,
psychosocial domains were perceived as priority by older adults and their family members (Studenski et al., 2004). However, the difficulty in measuring these aspects limited its feasibility as a clinical measure of frailty in geriatric clinicians’ opinion who rated the following domains as vital markers of frailty: mobility (walking, transfers, stairs, and devices), balance (falls, fear of falling, balance performance), ADL (basic, instrumental, advanced) and strength (grip, upper/lower).

Based on the above theories of frailty it is clear that many older adults in RACFs are frail. For example they are of an increased age, have a high prevalence of multi morbidity, dementia, decline in physical function, impaired balance and mobility, and higher dependency for activities of daily living (ADL)(Australian Institute of Health and Welfare (AIHW), 2012a). As a consequence, most older people in RACFs live a sedentary life and a progressive decline in physical activity is observed with increasing age (Prohaska et al., 2006). The conditions that are associated with sedentary lifestyle are, for example, type 2 diabetes, hypertension (Singh, 2004; Stewart, 2005), depression, low self-efficacy, sarcopenia, reduced endurance capacity, reduced muscle strength, and impaired gait and balance (Singh, 2004; Singh, 2002). Dementia, highly prevalent in RACFs (Australian Institute of Health and Welfare (AIHW), 2012a), is associated with physical impairments and reduced function (Wang, Larson, Bowen, & van Belle, 2006), increased risk of falling (van Iersel et al., 2006), declining basic motor performance, such as walking and mobility (Buchman & Bennett, 2011) and poor recovery (Ortiz-Alonso et al., 2012). In addition to physical decline, viewing older residents as ‘frail’ by RACF staff and family members, and insufficient resources or opportunities to promote physical activity could negatively impact on the older persons staying physically active. Physical inactivity and its consequences have been recognised as major contributors to frailty, disability and poor quality of life for older adults in RACFs (Delbaere, Crombez, Vanderstraeten, Willems, & Cambier, 2004; World Health Organization, 2002).

As suggested by the above evidence, physical and cognitive decline, and physical inactivity predisposes older adults in RACF settings to falls and related injuries. In the
following sections, literature on definitions of falls, the problem of falls and its many consequences are presented. Subsequent discussion focuses on fall related issues such as balance, pain and quality of life which are of interest to the research reported in this thesis.

2.5.2 Falls definition

Several definitions were found for ‘falls’ in the international literature. There is no universally accepted definition for ‘falls’. However, different researchers have defined ‘falls’ to suit the purpose of their study. A popular definition of fall by Kellogg Group (Gibson, 1987) is as follows: “A fall is an event which results in a person coming to rest inadvertently on the ground or other lower level and other than as a consequence of the following: sustaining a violent blow, loss of consciousness, sudden onset of paralysis, as in a stroke, an epileptic seizure.” A study on comparison among the views of seniors, health care providers and the literature highlights vital components in the definition like: motor control, loss of balance, injury, environmental landing point and body position change (Aleksandra A. Zecevic, 2006). Further, it contrasts the perception of falls of seniors from that of researchers: while the seniors commonly refer to the antecedents to falling and fall consequences, the researchers focused on the description of the event of fall. For the purpose of this thesis, the following definition put forward by the World Health Organisation (World Health Organization (WHO), 2007) is used: ‘A fall is an event which results in a person coming to rest inadvertently on the ground or floor or other lower level, excluding intentional change in position to rest in furniture, wall or other objects.’

2.5.3 The problem of falls

According to the World Health Organization (WHO) (2007), unintentional falls are a major public health problem, increasing mortality and morbidity amongst older people globally. Falls are common amongst older people and are a leading cause of death (Australian Bureau of Statistics (ABS) 2012; Centers for Disease Control and
Prevention (CDC), 2012). The rate of death from falls is much higher for people aged 75 years and over and particularly so for people aged 80 years and over (Australian Bureau of Statistics (ABS), 2006a). This is a concern for RACFs given that a recent survey showed that most people in RACF in Australia were aged over 85 years and most (75%) permanent RACF residents were frail owing to requirements of high level care (Australian Institute of Health and Welfare (AIHW), 2012b). RACFs in the UK and USA have similar proportions of frail older residents (Caffrey et al., 2012; Centre for Policy on Ageing, 2012).

Fall injuries, if not fatal, can result in disability, fear of falling, delayed recovery, increased risk of subsequent falls, pain, sleep disturbances, depression, loss of independence and poor quality of life (World Health Organization (WHO), 2007). Frail older persons can suffer serious consequences from even a mild fall due to the interaction of factors such as biological changes of ageing, comorbidities and weak resistance to injury (Rubenstein, 2006). The most common fall injuries among older people are fractures of the hip, spine, upper arm, forearm, bones of the pelvis, hand and ankle, with some hip injuries being fatal. Older adults also sustained more frequent head/neck injuries, chest injuries and pelvis/extremity injuries when compared with younger fall patients (Bradley, 2012b; Sterling, 2001). Among the fatal fall injuries, closed head injury was the most common cause of death (Sterling, 2001). Other physical injuries that result from falls include fractures, contusions and lacerations (Schiller, Kramarow, & Achintya, 2007).

The consequences of hip fracture are: mobility decline, increased dependency and difficulty in performing ADL, being permanently institutionalized and mortality (Andersen, Osei-Boamah, & Gambert, 2010; Panula et al., 2011). Half of the people who sustain a hip fracture suffered substantial decline in physical function even after two years (Norton, Butler, Robinson, Lee-Joe, & Campbell, 2000). Older people who have fallen suffer from a fear of falling, which limits their activities, delays recovery and increases their risk of subsequent falls (Milat et al., 2011). Excessive fear of falling, which is frequently associated with depression also increases the risk of falls (Iaboni &
Both depression and fear of falling are associated with impairment of gait and balance, and this association is mediated through cognitive, sensory, and motor pathways (Iaboni & Flint, 2013). Fall injuries could also lead to poor quality of life from distressing consequences such as pain, sleep disturbances, depression and loss of independence (Milat et al., 2011).

### 2.5.4 Risk factors for falls

There are many studies on causes and risk factors for falls in older people. Akyol (2007) identified common intrinsic and extrinsic factors responsible for falls (Akyol, 2007). The intrinsic factors include (i) the normal physiologic changes of ageing that decrease the functional reserve and make the older person more at risk for falls and (ii) the presence of any disabling disease like disorders of the Nervous system, Cardiovascular system, Gastrointestinal system, Genitourinary system, musculoskeletal system, metabolic disorders, disorders of the eye, ear, and psychological disorders. Psychotropic medication, recent acute illness, and polypharmacy add to the risk of falling among older persons (Abram, 1995; Fuller, 2000). Of particular significance in predicting falls, are the weakness of muscles and gait disorders (Rubenstein, 2006). A decrease in grip strength (Miller, Giles, Crotty, Harrison, & Andrews, 2003), hand reaction time (signal detection time plus motor response time plus movement time), walking speed, and proximal leg strength (ability and seconds to rise from a chair without using one’s arms) are other predictors of injurious falls in older persons (Michael C. Nevitt, 1991). Cognitive impairment leads to inability to focus attention on balance and gait during dual task situations like ‘talking while walking’ amongst older people. This means that distraction can also be a precipitating factor for falls (Haggard, Cockburn, Cock, Fordham, & Wade, 2000).

The extrinsic factors that can precipitate a fall include all environmental hazards like, uneven surface, clutter, slippery floors, poor lighting, low and light chairs, etc (Akyol, 2007). Rubenstein (2006) identified the interactive relation between identifiable environmental hazards and increased individual susceptibility to hazards from
accumulated effects of age and disease and notes the most likely causes of falls in older adults from 12 studies that evaluated older persons after a fall. They include: accident/environment related, gait/balance disorders or weakness, dizziness/vertigo, drop attack, confusion, postural hypotension, visual disorder, syncope, incontinence and other causes (that included: arthritis, acute illness, drugs, alcohol, pain, epilepsy and falling from bed), and unknown. It is evident from the literature that there is no single isolated cause or risk factor but a complex interaction of various factors that result in injurious falls in older adults.

The risk factors for older adults in RACFs are different to those in older individuals who live in the community. Several studies point out that older adults in residential facilities have a greater risk for falls than those in the community. A study on institutionalized people in Japan found that suboptimal performance of activities of daily living, presence of dementia and low body weight as independent risk factors for fall injuries (Nakamura et al., 2009). In a recent study (Wilson et al., 2011) involving 602 ambulatory older adults in RACFs with an age range of 70-107, the fall rate increased if the individual was male, cognitively impaired, had depressive symptoms, had a history of falls in the past year, suffered from incontinence and had a walking speed of less than 0.6 ms⁻¹. Fall rates were highest in those with intermediate balance; in those who could stand using their arms and lowest in those with poor and good balance. Notably, older people with poor balance function have a greater risk of fall injuries in intermediate-care hostels than in high-care nursing home environment due to relatively more independence, less available assistance and supervision for daily living activities (Chen et al., 2009).

2.5.5 Balance

Balance is defined as exertion of postural control that provides a stable base of support while remaining stationary or during movement (Winter et al., 1990). Balance is required for maintaining a position, remaining stable while moving from one position to another, walking, performing activities of daily living, and moving freely (Lee &
Scudds, 2003). Age related alterations in body systems that lead to impaired balance function appears to be associated with increased vulnerability to falls and fall injuries in older adults (Rubenstein, 2006; Viljanen et al., 2009). Here, I discuss the age associated changes that predispose older persons to impaired balance and gait.

The body movements used to maintain postural balance can vary from simple contractions to complex series of movements depending on the demands of the task and the environment. Central adaptive processes are needed to modify the sensory and motor components so that stability can be maintained under changing conditions. Research on the systems involved in postural control has shown that age-related changes may occur within or between the subsystems involved in postural control and these decrements contribute to the deterioration in balance abilities seen among older adults (Alexander, 1994).

Many visual functions deteriorate with increasing age and it has been shown that visual impairment could initiate the pathway to physical disability (West et al., 2002). The changes in visual function induced by ageing include degeneration of the retina, crystalline lens opacification, progressive optical aberrations and loss of pupillary reactivity that alter the way in which the visual signal is propagated to the retina (Bonnel, Mohand-Said, & Sahel, 2003). Such reductions in visual acuity and contrast sensitivity cause problems in contour and depth perception, which are critical for postural control. Structural, age-related changes in vestibular organs and vestibulonuclear-complex cause alterations in vestibular function (Lopez, Honrubia, & Baloh, 1997; Rosenhall, 1973; Rosenhall & Rubin, 1975). A loss of vestibular function with increasing age may lead to problems dealing with conflicting information coming from the other sensory systems (Anand, Buckley, Scally, & Elliott, 2003; Liston et al., 2014; Manchester, Woollacott, Zederbauer-Hylton, & Marin, 1989). Along with deterioration in sensory input the ability to weigh conflicting information from sensory sources and select optimal responses may alter with increasing age (Horak & Nashner, 1986). This can explain older adults often having problems with adapting their use of sensory inputs to varying task and environmental situations such as walking in dimly lit
areas or on unusual support surfaces like ramps thick carpets or grass (Woollacott & Tang, 1997).

With ageing the performance of tasks requiring central nervous system processing are slowed, with particular slowing in information integration and in response preparation processes (Salthouse & Somberg, 1982). This slowing of motor skills may be critical in maintaining balance, particularly in challenging situations (Horak & Nashner, 1986). Differences between young and older adults in producing motor responses for maintaining balance have been found. Research on movement strategies has indicated that three different kinds of reactive postural responses exist: an ankle strategy a hip strategy and a stepping strategy (Horak & Nashner, 1986). The ankle strategy is used to compensate for small amounts of sway whereas the strategy involving higher amounts of movement at the hip joint is used to compensate for larger shifts of the body’s centre of gravity (Horak & Nashner, 1986; Woollacott & Shumway-Cook, 1996). When perturbation displaces the centre of gravity beyond the limits of stability, the stepping strategy, that is to say that is taking a step to either side or front to back, is used in order to avoid a fall. It has been shown that older adults tend to use the hip strategy in conditions where young adults rely on the ankle strategy, indicating that decreased muscle strength or reduction in the range of movement or in sensation around ankle joint will lead to a different response (Manchester et al., 1989; Woollacott & Shumway-Cook, 1996). Age-related changes in the ability to activate muscle response strategies in an anticipatory manner have been noted. Longer onset latencies in postural muscles, as well as altered activation patterns and contraction amplitudes have been found in older compared to young adults (Inglin & Woollacott, 1988; Stelmach, Phillips, DiFabio, & Teasdale, 1989).

Increasing age is associated with decrease in muscle strength, particularly in the lower extremities (Doherty, 2001; Goodpaster et al., 2006; Reid et al., 2014). Isometric and concentric strength tests revealed lower strength levels in older persons that further reduced with increasing age compared to young adults. Reductions in power and muscle explosive force capacity with age might influence postural abilities in older persons,
particularly responses to sudden, severe perturbations (Skelton, Kennedy, & Rutherford, 2002). Whipple, Wolfson, and Amerman (1987) found that in fallers the strength of the dorsiflexors of the ankle was 7.5 times less than in the group of non-fallers. It has been assumed that the muscle weakness partly explains the poorer functioning of the postural control system in older persons (Horlings, van Engelen, Allum, & Bloem, 2008).

Regulation of postural balance is also dependent on information from the proprioceptive and mechano-receptive organs. Several aspects of proprioception such as position sense and movement detection threshold have been found to deteriorate due to ageing (Horak, Shupert, & Mirka, 1989; Robbins, Waked, & Mclaran, 1995; Skinner, Barrack, & Cook, 1984). This impaired proprioception has been linked with balance problems which in turn have been associated with the higher risk of falls in older adults (Ganz, Bao, Shekelle, & Rubenstein, 2007; Horak & Nashner, 1986; Lord & Ward, 1994; Manchester et al., 1989; Teasdale, Stelmach, & Breunig, 1991; Woollacott, 2000). The deterioration in function of proprioceptive receptors located in muscles, tendons and joints affect postural control through diminished information about the position of the limbs and body to each other and the distension of muscles (Quoniam, Hay, Roll, & Harlay, 1995). These losses make movement detection difficult and reduce precision of reconfiguration or recovery of posture, leading to poorer balance control (Hay, Bard, Fleury, & Teasdale, 1996; McChesney & Woollacott, 2000; Thelen, Brockmiller, Ashton-Miller, Schultz, & Alexander, 1998). Receptors in cutaneous and subcutaneous tissue, particularly pressoreceptors in the sole of the foot derive exteroceptive information, and hence less accurate input with ageing may cause difficulties in maintaining balance (Latash, 1998). It has been suggested that one in five older persons would show evidence of peripheral neuropathy (Richardson, Ashton-Miller, Lee, & Jacobs, 1996).

During recent years more attention has been paid to aspects of consciousness such as attention, cognition and memory that are important for optimal balance function (Brauer, Woollacott, & Shumway-Cook, 2002; Manckoundia et al., 2006; Shumway-Cook, Woollacott, Kerns, & Baldwin, 1997). For older persons with balance deficits,
even very simple cognitive tasks can have further impact on balance ability. It has been suggested that with ageing these processes may not integrate as well and/or quickly, with the result that in order to maintain balance and avoid falling older people may have to give a greater proportion of their attention to maintaining their balance during activities (Shumway-Cook et al., 1997).

The previous literature shows how age related factors affect balance function in older people. Decreased muscle strength, poor proprioception (sense of position and movement detection), deficits in attention, cognition, and memory are some of the factors that are prevalent in the older population in RACFs, increasing their risk for falls. In the following section, I discuss pain, its prevalence and impact in older people in RACFs.

2.5.6 Pain

Pain is a subjective and complex response that is distinctive to individual persons who respond distinctively to different stimuli and in different situations or at different moments. Pain is defined by the International Association for the Study of Pain (IASP) as an ‘unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage’ (International association for the study of pain (IASP), 2014). IASP also notes the subjective quality of pain and the difficulty in differentiating physiological pain from psychological pain experience. The importance of acknowledging self-reported pain is also noted (Mc Caffery & Pasero, 1999, p.17). This uniqueness of pain experience is validated by neuroscience studies that found increased activation of cerebral cortical regions (anterior cingulate cortex, somatosensory cortex and prefrontal cortex) in individuals highly sensitive to pain (Coghill, McHaffie, & Yen, 2003; Nishigami et al., 2014).

The prevalence of chronic pain is known to increase with advancing age, with up to 80% of older adults residing in RACFs suffering some form of persistent or recurring
pain (Takai, Yamamoto-Mitani, Okamoto, Koyama, & Honda, 2010). Prevalence of chronic non-cancer pain and neuropathic pain increases with age (Dieleman, Kerklaan, Huysgen, Bouma, & Sturkenboom, 2008; Elliott, Smith, Penny, Cairns Smith, & Alastair Chambers, 1999) with nearly 80% of women and 50% of men in the 70 years age group getting affected (Bergh et al., 2003). Chronic pain is reported by approximately 60% of people aged 75 and over in the UK (Craig & Mindell, 2012). A recent review that included 64 studies conducted in Europe, North America, South America, Asia, Australia, Africa, and multiple countries found prevalence of chronic pain ranged from 83–93% amongst older people in RACF settings (Abdulla et al., 2013). A cross-sectional study in RACF settings (Achterberg et al., 2010) that included 8, 31, and 64 facilities in the Netherlands, Finland, and Italy respectively, found that in nearly 50% of the sample population, pain was present daily and severity ranged from moderate to severe. The pain experience was universal regardless of cultural and other differences between the different settings.

Common medical conditions associated with pain amongst older people in RACFs are musculoskeletal disorders such as arthritis, fracture, osteoporosis, pressure ulcers (Proctor & Hirdes, 2001), ADL impairment, clinical depression, diagnosis of osteoporosis (Achterberg et al., 2010) and stroke (Torvik, Kaasa, Kirkevold, & Rustøen, 2009). Older adults with Alzheimer’s disease and front temporal dementia suffer increased levels of pain due to pathological structural changes in the brain such as atrophy and white matter lesions (Scherder, Sergeant, & Swaab, 2003). Older people in RACFs have increased vulnerability to neuropathic pain (Dieleman et al., 2008), prolonged recovery from tissue and nerve injury, prolonged hyperalgesia (Gagliese, 2009).

Insufficient detection and management of pain despite high prevalence is reported widely (Brown, Kirkpatrick, Swanson, & McKenzie, 2011; Ferrell, Ferrell, & Rivera, 1995; Herr, 2010; Higgins, 2008; Higgins, Madjar, & Walton, 2004) and older residents with cognitive impairment are particularly vulnerable owing to poor self-reporting of pain (Reynolds, Hanson, DeVellis, Henderson, & Steinhauser, 2008). Older people are
found to underreport their pain, because of their acceptance of pain as ‘normal’ in ageing and for fear of being prejudiced by others, fear of side effects of medication, risk of addiction and tolerance (Jones et al., 2005). The other factors that make it more difficult to detect pain are (Herr & Garand, 2001): visual, hearing deficits and motor deficits. Conditions such as dementia, aphasia, delirium, and injury to brain affect pain expression (Herr & Garand, 2001). Unrelieved pain increases the risk of cognitive failure, specifically memory and attention span (Kewman, Vaishampayan, Zald, & Han, 1991). Uncontrolled pain leads to problems with sleep and decrease pain thresholds (Lamberg, 1999). Uncontrolled pain is associated with loss of physical function, increased depression and greater mod disturbances (Lamberg, 1999). Attention and the ability to perform ADL are diminished with severe chronic pain (Eccleston, 1994).

The consequences of persistent pain in older people are numerous. Depression, anxiety, decreased socialization, sleep disturbance, impaired ambulation (AGS Panel on persistent pain in older persons, 2002). Advanced age is also associated with interference of pain that often leads to in RACFs opting to remain immobile (van Herk et al., 2009), and ‘guarding’ due to pain during postural change increased the risk of fall injuries and further exacerbation of pain (Gibson, 1987). Fear of falling, that is prevalent amongst older adults in RACFs is frequently associated with pain and affects mobility and performance of ADL (Blyth, Cumming, Mitchell, & Wang, 2007). Pain also affects participation in recreational activities and social events. It can lead to a decrease in activities of daily living, increased dependence and poor quality of life (Chen et al., 2007; Jakobsson, Hallberg, & Westergren, 2007). The increased burden of disease, functional decline and dependence for ADL associated with frailty make the pain suffering multi-fold in older people in RACFs.

Age associated deficits in cognition and older persons’ poor coping mechanisms in residential aged care setting, increased prevalence of pain, and multiple chronic conditions make the older people in RACFs most vulnerable to great suffering which is reported undetected and hence not managed. The association between fall injuries, fear of falling and pain is evident. This highlights the need for studies that investigate
effectiveness of fall prevention interventions to also assess influence on pain in addition to measurements of physical parameters such as balance and gait. In the following section, a discussion on quality of life (QoL), the different interpretations of constituents of QoL is discussed with relevance to older people in RACFs.

2.5.7 Quality of life

Although ageing is often associated with declines in physical and psychological functioning, there has been a shift in the recent decades towards a positive outlook on ageing in the global health agenda (World Health Organization & US National Institute of Aging, 2011). This has led to increased interest in enhancement of quality of life (QoL) in older age (Healthy Ageing Task Force, 2000; World Health Organization & US National Institute of Aging, 2011). QoL is a complex, multidimensional construct and is defined by the World Health Organization (1995) as ‘individuals’ perceptions of their position in life in the context of the culture and value systems in which they live, and in relation to their goals, expectations, standards and concerns’ (World Health Organization, 1995). The concept QoL has multiple interpretations (Bowling et al., 2003; Haas, 1999; Vaapio, Salminen, Ojanlatva, & Kivela, 2009). From the biomedical and behavioural science perspective, QoL outcomes reflect physical, mental and social indicators of health. From the psychological perspective, measures of QoL relate to holistic aspects such as satisfaction with life (McAuley et al., 2006).

Ageing is associated with individual’s functional ability, coping and independence. With advanced age, the individual’s ability to maintain independence largely determines their QoL (World Health Organization, 2002). Rowe and Kahn, 1997 defined successful ageing as comprising three main components: avoiding disease and disability, maintaining a high physical and cognitive function and active engagement with life (Rowe & Kahn, 1997). Studies that explored older people’s perception of quality of life agree with the above definition. In a study by Bowling et al. (2003) that involved a survey of community dwelling older people who were 65 years and above, social
relationships and health were identified as determining QoL. In another study involving older people with disability, socialisation, and perceived level of control and independence were considered significant contributors to QoL (Bowling, Sectai, Morris, & Ebrahim, 2007). The above information illustrate that determinants of successful ageing are congruent with determinants of QoL such as improved physical, psychological, social function, and autonomy.

Scientific evidence indicates that physical activity may be one of the most significant means by which individuals can influence their own health, reduce or prevent further functional decline and disability (Kesaniemi et al., 2001; Keysor, 2003; Mobily, 2013; Nelson et al., 2004) and maintain a high quality of life in advanced age (Miller, Rejeski, Rebourssin, Ten Have, & Ettinger, 2000). Studies found associations between social activity, emotional health, and quality of life (Glass, Leon, Marottoli, & Berkman, 1999; Lawton, Winter, Kleban, & Ruckdeschel, 1999). However, older people are more likely to be at risk for social isolation and loneliness (Age UK, 2010, 2012) and especially older people in RACFs (Australian Institute of Health and Welfare (AIHW), 2013a). Low levels of social activity, poor social support, poor social networks, and loneliness have been associated with increased levels of depression (Cheng, Li, Leung, & Chan, 2011), lower feelings of self-esteem and life satisfaction (Felton & Berry, 1992). Research associating social activity with QoL indicates that older people with low levels of social activity would benefit from increased socialisation (Hussain, Marino, & Coulson, 2005). Group exercise programmes for older people have noted positive social experiences, as group environment provided opportunities to meet and share concerns with similar others in a non-threatening socially supportive environment (Barlow, Williams, & Wright, 1999; Forsman, Nordmyr, & Wahlbeck, 2011).

In frail older people in RACFs, multi morbidity and functional disability often result in compromised physical and psychological health, and reduced QoL. People in RACFs differ from older adults who live in community with regard to factors like behaviour, functional status, and cognition which might affect QoL measures (Beerens, Zwakhalen, Verbeek, Ruwaard, & Hamers, 2013). A recent review by Beerens et al. (2013) revealed
that greater dependency on ADL and depressive symptoms were related to lower QoL. From the above evidence, it is apparent that increasing opportunities for older people in RACFs to engage in physical activity and socialise could positively influence their quality of life. In the above sections, I have presented a discussion on frailty, falls, and related problems and then discussed the literature on balance, pain, and quality of life in relation to frail older people. In the following section the literature on fall prevention interventions for the general older population and then specifically for older people in RACFs is presented.

2.6 Fall prevention interventions

The impact of falls among older persons has triggered many studies globally that focus on fall prevention interventions. The ‘Falls Free Coalition’ (USA), ‘ProFaNE’ (The Prevention of Falls Network Europe), ‘The Canadian Falls Prevention Curriculum’, ‘Fallproof!’ certification programme offered by the Center for Successful Ageing at California State University, USA and ‘The Registered Nurses Association of Ontario Prevention of Falls and Fall injuries in the Older Adult Best Practice Guideline’ are some of the evidence based fall prevention schemes adopted by western countries (World Health Organization (WHO), 2007). There is little information on fall prevention programmes in less developed countries in the literature even though they have an increasing ageing population. This could be because implementation of fall prevention practice is made difficult by competing demands for urgent health care issues, shortages of health care providers and inadequate research on unique contributing factors of falls (World Health Organization (WHO), 2007).

Studies on fall prevention strategies, however, have generated several recommendations for best practice. The Australian council for safety and quality in health care (ACSQHC) has established the Australian Falls Prevention Project for residential aged care facilities (Australian Council for Safety and Quality in Health Care (ACSQHC), 2009). ACSQHC recommends multi factorial fall prevention strategies that include supervised exercise interventions. Its best practice guidelines include: standard fall-
prevention strategies, assessment and additionally interventions to suit individual’s fall management needs. The standard fall prevention strategies in the guidelines include:

- Screening all older people for risk of falling as early as possible and then regularly or when a change in functional status is evident;
- Educating and discussing fall prevention risks and strategies with all staff, older people and their carers;
- Recording fall prevention education of staff, older people and their carers;
- Ensuring that a person’s mobility is established and that if they are mobile they can mobilise safely;
- Encourageing participation in functional activities and exercise (minimising prolonged bed rest and encouraging incidental activity);
- Establishing a plan of care to maintain bowel and bladder function;
- Instructing older cognitively intact people who are being discharged or transferring between facilities in details of their medications and supplements;
- Making the environment safe by eliminating all possible environmental hazards;
- Orientating the person to their immediate environment and how they can obtain assistance;
- Instructing and ensuring that cognitively intact older people understand how to use assistive devices prior to them being prescribed;
- Having a policy in place to minimise the use of restraints and bedside rails; and
- Considering vitamin D supplementation with calcium as a routine management strategy in ambulatory older people or if a person lives in a residential aged care facility. If a person sustains a low-trauma fracture, management of osteoporosis should be considered.

Fall prevention interventions for older people have been reviewed extensively in recent years. A summary of recent reviews that included older adults in RACFs is presented here. A recent Cochrane review (Howe Tracey et al., 2011) on fall prevention
interventions in RACFs involved 94 studies with 9,821 participants. Eleven included studies were conducted in institutional settings such as hospitals or RACFs. The fall prevention interventions investigated included 8 categories: gait, balance, co-ordination, and functional tasks, strengthening exercise (including resistance or power training), 3 dimensional (3D) (including tai chi, qi gong, dance, yoga), general physical activity (walking), general physical activity (cycling), computerised balance training using visual feedback, vibration platforms, and multiple intervention types. The findings revealed that exercise programmes involving gait, balance, co-ordination, and functional exercises, muscle strengthening exercise, 3D exercise types and multiple exercise types had positive influence on outcome measures such as Timed up and go test, single leg balance, walking speed, and a global subjective measure of balance, the Berg Balance Score. However, the review could not recommend specific types of exercises suitable for older people in RACFs. Furthermore, the review may not be applicable for older people in RACF settings as studies that investigated older adults with specific conditions (that are highly prevalent in RACFs) such as stroke, cognitive impairment, dementia, osteoporosis, osteoarthritis, hip fracture were excluded.

Another recent Cochrane review (Crocker et al., 2013) was on physical rehabilitation for older people in long term care facilities that included 67 studies, involving 6300 participants. The outcomes of interest for this review were: activities of daily living, strength, flexibility, balance, mood, cognition (memory and thinking), exercise tolerance, fear of falling, and adverse effects. Majority of included studies investigated exercises that targeted specific components of physical fitness such as strength or flexibility. The review’s conclusive finding was that physical rehabilitation for long term care residents may be effective and reduce disability with few adverse events. However, information on sustainability was not available.

From the above reviews, it can be seen that exercise interventions have the potential to impact positively on balance measures for older adults in institutions, modify fall risk factors (Howe Tracey et al., 2011) and be implemented for frail older adults in RACFs.
with few adverse events (Crocker et al., 2013). However, the safety and efficacy of suitable interventions have not been investigated.

In the above section, I presented the problems faced by older people in RACFs with specific focus on falls, their vulnerability due to balance impairment, high prevalence of pain and its impact. I also discussed the notion of quality of life and its relevance to people in RACFs. I then discussed the literature on fall prevention interventions. In the following section, I explain the notion of active ageing, wellness, and opportunities for older people to experience wellness and to age successfully in RACFs.

2.7 Active ageing perspective

The concept of healthy ageing was introduced by the World Health Organization (WHO) in the early 1980s, and later broadened to the more inclusive term Active Ageing in 1999. It is a positive view that ageing is a developmental stage where the individual has opportunity and capacity to grow towards health, wellbeing, and quality of life. The subjective concept of wellness is recognised as important to one’s well-being and integrated into definitions of healthy and active ageing. WHO defines active ageing as “the process of optimizing opportunities for health, participation and security in order to enhance quality of life as people age”. Active ageing involves maintaining autonomy, independence and quality of life for all people, including those who are frail, disabled, and in need of care (World Health Organization & US National Institute of Aging, 2011). The WHO definition recognises mental health and social contacts as important as physical health. This is a major shift from the previous ‘needs-based’ approach when older people were viewed as passive recipients of care to a wholistic and ‘rights-based approach’ geared towards improving the outcomes for ageing individuals and the society by encouraging and acknowledging continued participation in all walks of life (World Health Organization & US National Institute of Aging, 2011). In the USA, government and non-government organisations advocate and promote active ageing programmes nationwide. The Centers for Disease Control and Prevention
(CDC) currently focus on promoting cognitive functioning and addressing impairment through the congressionally supported ‘Healthy Brain Initiative’, and increasing the use of clinical preventive services (Centers for Disease Control and Prevention; Centers for Disease Control and Prevention (CDC), 2013). The International Council on Active ageing (ICAA) recognises active ageing as “living as fully as possible within the dimensions of wellness (physical, spiritual, cognitive/intellectual, social, emotional, environmental, professional/vocational)” (International council on active aging (ICAA)). The European Union and its member states also have adopted active ageing policies, programmes and interventions that target young ‘old’ people. Some of the programmes include developing health promotion activities such as physical fitness, providing opportunities for older people to remain socially engaged and valued through voluntary activities and providing support and advice to carers of very old or disabled family members(Stegeman, Otte-Trojel, Costongs, & Considine, 2012). In Australia the healthy ageing or positive ageing approach has been adopted by the National Strategy for an Ageing Australia, and the Commonwealth, State and Territory Strategy on Healthy Ageing (Healthy Ageing Task Force, 2000). Australia’s agenda for ‘healthy ageing and productive ageing’ suggests provision of a supportive physical environment and for opportunities in the built environment to increase physical and social activity for a healthy life style.

2.8 The concept of wellness in health and active ageing

The conceptualisation of health has evolved from the absence of disease and disability, to the ability of an individual to function or perform daily activities. More recently emphasis has been placed on subjective well-being, wellness and quality of life. The WHO definition of health as “a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity” that was put forward in 1948 has been argued in recent decades as inaccurate, as this definition identifies health as a complete state and unattainable by most people (Godlee, 2011). This definition also does not take into account older people, who have an increasing burden of chronic disease, for whom a state of ‘complete health’ is impossible to achieve. Furthermore,
this definition does not consider the older person’s potential to manage life’s changes in the physical, emotional, and social domains and attainment of wellness in spite of health problems and ailments (Godlee, 2011). Older adults are said to have aged successfully if they are robust, resilient individuals who are physically, mentally and socially active, and continue to remain independent (Gattuso, 2003). Recent conceptualisations of health emphasise the ability to adapt and deal with stresses and challenges of the ever changing internal and external environment of an individual (Schuster, Dobson, Jauregui, & Blanks, 2004).

The terms ‘wellness, well-being, and quality of life’ have been used by organisations and researchers interchangeably. Wellness is a lifestyle perspective that integrates an individual’s multiple dimensions (emotional, intellectual, spiritual, physical, social, vocational, and environmental) into positive and meaningful activities that lead to high levels of happiness, positive emotions, and satisfaction (Kiefer, 2008). Schuster et al. (2004) defines wellness as “the generalised self-perception of health” and differentiates wellness as distinct from health-illness. Wellness, well-being and quality of life are prominent issues alongside health, especially for older people with disability on the national health agenda (Goldswain et al., 2006; United States Department of Health and Human Services, 2000; World Health Organization, 2002). New models of health and wellness for people living with disabilities argue that a person can be healthy and well and live long term with disability (Council of Australian Governments, 2011; National Institute on Disability and Rehabilitation Research, 2000). One of the primary indicators of health and well-being in relation to the very old people is the ability to perform activities of daily life with relative ease, to go about their daily routines and social activities (World Health Organization & US National Institute of Aging, 2011). This is supported as an important feature of active ageing for older adults by health policy makers in developed countries (Department of Communities, 2012; Federal Interagency Forum on Aging-Related Statistics, 2012).

Qualitative studies such as phenomenological enquiries and grounded theory studies have been identified as having potential to provide a rich description of the well-being
experience and result in development of theories of wellbeing, which could inform and aid health and wellness promotion efforts.

Here, I present the views of theorists on the concept of wellness, especially in relation to older adults with functional limitations. Mackey 2009 presents a phenomenological perspective of wellness, in a discussion on an ontological theory of wellness. Experience of actual lived wellness is described in relation to harmonious and continuous flow of time, devoid of noticeable disruptions (which would indicate ‘unwell’ experience) (Heidegger, 1962), continuity experienced through structure, process or meaning (for example, a person who feels well in spite of a symptom that does not worsen) (Lindqvist, Widmark, & Rasmussen, 2006) expectations that equip the person with knowledge of when an event (illness or symptom) will happen and containment of perceptions and experiences within certain limits, allowing a person to shift or draw focus toward an experience or perception according to the situation. Mackey refers to wellness as the ‘taken-for-granted state’, when the experience of the body is pushed to the background, away from conscious awareness.

McMahon and Fleury (2012) identify wellness as a concept relevant to older people and their health promotion. Knowledge of the individual’s wellness experience is vital to uncover the strengths of the older person in promoting their ongoing growth and development. The process of wellness is described as complex and multidimensional, with interdependent attributes such as becoming, integrating and relating. ‘Becoming’ refers to identifying potential in every life situation (that keeps changing throughout life) that helps an older individual to move towards a personal goal. This relates to Parse’s humanbecoming theory, in which humans are seen as unique individuals, who cocreate new ways of becoming, and are able to choose from different ways to be (to live) with any situation that arise throughout life (Parse, 1998; Rizzo Parse, 2007). ‘Integrating’ is an attribute of wellness, where new, potential and past experiences that are meaningful to one’s life are balanced with changes such as illness. ‘Relating’ refers to the interactions and transactions between the person and his internal and external environment to facilitate growth and development. On the whole, McMahon describes
the wellness experience as involving exploration of individual goals, expectations, hopes, and strengths in a supportive environment that is created by maintenance of social connections and activities that are meaningful to the older person.

Wellness has been conceptualised in different ways and attempts to quantify and qualitatively describe wellness have been undertaken. In relating the above concepts of wellness to older persons in RACFs, it is apparent that older people with functional limitations and discomfort, could still experience wellness in their own terms, and continue to age successfully. This is a positive concept, considering the fact that it is not realistic to expect effects of ageing or frailty to reverse or disappear for the older person. This is important for people investigating interventions for older people and care providers, as the main aim in older person care is to enable the older person to age successfully, by experiencing wellness. McMahon’s conceptualisation and Parse’s humanbecoming theory highlight the potential for adaptability of the older persons in any given situation. This is of significance to health care providers as it stresses the importance of creating opportunities for older persons to adapt or cope with their challenges.

The following theories relate to older persons’ involvement in physical activity, socialisation and other participatory activities.

According to Activity theory (Havighurst, 1961) people who maintained participatory activity levels and social networks were less likely to withdraw from social contacts or become lonely. Old people who are active will age better, be more satisfied and well-adapted than those who are sedentary (Havighurst, 1968; Lemon, Bengtson, & Peterson, 1972). In contrast to activity theory, disengagement theory argued that withdrawal or ‘disengagement’ is a natural and unavoidable part of ageing, where people become less involved with other people and reject social roles and activities (Cumming & Henry, 1961). Havighurst modified his earlier activity theory and proposed continuity theory to account for typical social behaviour patterns seen throughout the ageing process. Accordingly, a key concept for older people is continuity of beliefs and lifestyles, unique to their personality, through their past, present and future, to cope with changes inevitable to the ageing process.
Continuity is the maintenance of general internal and external patterns of thoughts and actions (Atchley, 1989; Atchley, 2000; Ebersole, Hess, & Luggen, 2003).

2.9 Opportunities for ageing well in RACFs

The objectives for care of older persons in RACFs favour ageing well and improving quality of life through provision of person-centred care. However, there appears to be a gap between the principles and practice of care.

The philosophy of care provided by RACFs is based on a set of broad principles, in the Aged Care Act, Division 2 (objects) (Department of Human Services and Aged Care Services: Victoria, 2000): The main objective is to improve the quality of life of residents. The principles are:

- Promote a high quality of care and accommodation and protect the health and well-being of residents.
- Help residents enjoy the same rights as all other people in Australia.
- Ensure that care is accessible and affordable for all residents.
- Plan effectively for the delivery of aged care services.
- Ensure that aged care services and funding are targeted towards people and areas with the greatest needs.
- Encourage services that are diverse, flexible and responsive to individual needs.
- Provide funding that takes account of the quality, type and level of care.
- Provide respite for families, and others, who care for older people.
- Promote ‘Ageing in Place’ through the linking of care and support services to the places where older people prefer to live.

The policy directives governing residential aged care aim for continuous development and improvement of RACFs in order to provide enhanced quality of life for aged persons (Department of Human Services and Aged Care Services: Victoria, 2000). They are based on the following objectives:
• Respect for residents’ rights and dignity and continuous improvement in their quality of life.

• A residential environment which promotes: a domestic lifestyle, self-respect, independence and social opportunities.

• An environment which meets the objectives of ‘Ageing in Place’.

• Flexibility to cater for residents with a range of frailties, disabilities, support needs and states of confusion which may vary over time.

Person-centeredness is adopted and advertised as central to the care philosophy in improving quality of life of frail older people by residential aged care providers. Person-centred care is regarded as best quality care that upholds holistic human values and promotes independence and wellbeing in the management of older people (Ford & McCormack, 2000; McCormack, 2003; Peek, Higgins, Milson-Hawke, McMillan, & Harper, 2007). Person-centred care is premised on a holistic concept that places the person at the centre of their own care (National Ageing Research Institute, 2006). This concept directs care provided by health services from a bio psychosocial perspective that includes people’s subjective experience of illness and permits frail older persons to be involved in decisions made about practice (BobPrice, 2006). A care environment that is conducive to person-centeredness requires the formation of therapeutic relationships between professionals, residents, and their significant others, and that these relationships be built on mutual trust, dignity, understanding, and sharing of human experiences (McCormack & McCance, 2006). Feelings of wellbeing are an important outcome of person centred care, engendered by a positive care experience, making the older person feel valued (McCance, 2003). However, implementing person-centred care is not without challenges, especially for older people with cognitive impairment, dementia and physical disabilities that limit their decision making (O'Dwyer, 2013; Upchurch & Rainisch, 2014).

An ageing in place approach has led RACF service providers to offer a homey atmosphere, where the structural and care environment is built to give a familiar home space for residents and conducive to person-centred care. However, problems associated
with resource allocation, administration and management of aged care system and staffing, have been identified in the current residential aged care practice, which contradicts intended objectives of ageing well and person-centeredness. For example, lack of privacy, adherence to uniform treatment and fixed schedules imposed by nursing staff and facility administrators make the care more mechanical and institutionalised (Kahn, 1999). There is little room for flexibility, in allowing resident preferences in care or in choice of day to day activities, another feature important for autonomy and person-centred care. That physical and social features of institutional settings are more or less incongruent with individual preferences has been reported widely (De Bellis, 2010; Kahana, Lovegreen, Kahana, & Kahana, 2003; Kane & Kane, 2001; Venturato, Kellett, & Windsor, 2007). Moving into a RACF adds on to the loss of independence that the older person is already suffering from and requires a great deal of adaptation and adjustment to an environment and lifestyle that is entirely different from that of one’s previous life (Marshall & Mackenzie, 2008).

Another vital factor in improving independence of older persons in RACFs is promotion of physical activity. From the perspective of care providers, provision and promotion of physical activity in RACFs have many challenges such as significant constraints in staffing and funding. These constraints contribute to other problems such as inadequate time for staff to incorporate physical activity into daily care or to provide individualised attention to residents, lack of staff or volunteers to transport residents to their activities and loss of physiotherapy, recreation, and occupational therapy staff. Another contributing factor was the increasing number of residents requiring high level care. Increased longevity and health care reforms such as ageing in place have resulted in greater admission of older persons with greater degree of dependence to RACFs. Another qualitative study explored the perspectives of nurses on the practice and political reform in long-term aged care in Australia (Venturato et al., 2007). The findings revealed conflict and a sense of tension between nurses’ traditional values roles and responsibilities and those supported by the reforms. There was a distancing of the nurses from providing direct nursing care to the residents as it was delegated to non-
nursing care workers and the nurses assumed more administrative and managerial roles. The literature above makes it clear that providing person-centred care and providing opportunities for health promotion activities for older persons is challenging from the perspective of administrators and that of care staff. Such constrained environmental conditions might lead to dissatisfaction for older residents who experience a loss of independence with admission to a residential aged care facility. A review by Kane and Kane (2001) on older persons’ preferences on long term care indicated that while aspects such as kindness, caring, compatibility, and responsiveness are valued, the residents also value control and choice on aspects of their daily lives to an extent that is possible in consideration of their functional limitations.

Engaging in physical activity is important for maintaining and improving the older person’s health and wellbeing. In the above section, I discussed the limited opportunities in RACFs for such activities and the related factors. In the following section, I discuss the different factors that are found as effective in motivating older adults to participate in exercise programmes. Engaging in a physical activity requires motivation, especially in a RACF environment which is alien to the older individual. This can also be related to the theories mentioned above.

2.10 Motivation for participation in exercise programmes

Motivation can be defined as the need, drive or desire to act in a certain way to achieve a certain goal (Resnick, 1996) or all the intrinsic processes and extrinsic factors that initiate and trigger actions (Masden, 1968; Roxendahl, 1987). Intrinsic motivation and goals for exercise may be feelings of well-being, enjoyment, pride, self-fulfilment, need of physical activity, or to feel independent and capable. Extrinsic motivation, for example, is reward, status, and appreciation or encouragement from others (Steers & Porter, 1991). An important factor in motivation is goal-oriented behaviour (Resnick, 1998). Factors which act as motivators for exercise among older people are, for example, health benefits (Cohen-Mansfield, S, & Guralnik, 2003; Conn, Tripp-Reimer, & Maas, 2003; O’Neill & Reid, 1991) enjoyment (Hirvensalo, Lampinen, & Rantanen,
1998; O'Brien Cousins, 2003) and social motives such as company and friends (Cohen-Mansfield et al., 2003; Hirvensalo et al., 1998; Midtgaaord, Rorth, Stelter, & Adamsen, 2006; O'Neill & Reid, 1991) or psychological benefits such as mental health, diversion and zest for life (Hirvensalo et al., 1998). The identification of goals is also important for the motivation needed to adhere to a physical training programme (Bandura, 1997; O'Brien Cousins, 2003; Resnick, Palmer, Jenkins, & Spellbring, 2000). Experienced instructors, support of staff, and suitable environment are important motivating factors, especially for older people in RACFs (Lindelof, Karlsson, & Lundman, 2012).

 Older people have stated several barriers for not exercising. Commonly reported barriers (subjective or objective) to exercise among older people include impaired health, lack of interest or motivation, fatigue, or discomfort or pain, fear of falling, and shortness of breath (Lees, Clarkr, Nigg, & Newman, 2005; McInnes, Askie, McInnes, & Askie, 2004). Other barriers are feeling too old, feeling no need to exercise or that one does not need exercise, lack of time, lack of knowledge, concerns about harm, or lack of company to share the exercise experience (Chen, 2010; Cohen-Mansfield et al., 2003). Other factors that could prevent an older person from participating in exercise include insecure physical environment, limited access to exercise facilities and a venue that is far away or difficult to reach for the older person (Cohen-Mansfield et al., 2003; Guerin, Mackintosh, & Fryer, 2008).

2.11 Self-efficacy

Self-efficacy is an individual’s belief of their own ability, despite potential barriers, to be able to organise and perform actions to achieve a specific goal. Self-efficacy is a concept within Albert Banduras’ Social Cognitive Theory (SCT), according to which, there is a mutual interaction between the individual, behaviour, and environmental events. Self-efficacy and outcome expectations are seen as the most important concepts of behavioural motivation (Bandura, 1977). Self-efficacy is a crucial factor in the
initiation and maintenance of goal-oriented behaviour and is affected by the actual performance of an activity, by vicarious experience or role models, by reliable verbal encouragement or other social influence, and by physiological or emotional condition (Bandura, 1977). The concept of self-efficacy has been applied on various behaviours, among others physical exercise. Self-efficacy has been shown to influence and be influenced by physical activity and has been identified as a determinant of exercise behaviour (Resnick et al., 2000) as well as a factor that can reduce functional limitations (McAuley, Konopack, Morris, et al., 2006), among older people. During an exercise period of one year, positive outcome realizations occurring between 0 - 6 months resulted in increased self-efficacy and exercise attendance between 7 – 12 months (Brassington, Atienza, Perczek, DiLorenzo, & King, 2002). Another study showed that physical health, self-efficacy, and outcome expectations directly influenced exercise behaviour and that age and mental health indirectly influenced exercise through self-efficacy and outcome expectations (McAuley, Konopack, Morris, et al., 2006).

In the above section, I discussed the literature on active ageing and the notion of wellness and the opportunities to active ageing for older people in RACFs. I then discuss how theorists explain older people’s adaptation to ageing and factors that motivate older people to participate in physical activity and exercise. In the following sections, I introduce Complementary medicine, an alternative approach to health, with specific focus on mind body interventions such as tai chi and yoga and their role in fall prevention and in improving health for older persons.

2.12 Complementary Medicine (CM)

The National Institute of Complementary Medicine (NICM) uses the term complementary medicine (CM) collectively referring to the following health service concepts: complementary medicine (medical and health care systems, therapies, and products that are not considered presently as conventional western medicine); alternative medicine (complementary medicine used as an alternative to conventional western medicine); traditional medicine (indigenous medicines and practices); and
integrative medicine (complementary medicine used together with conventional western medicine) (The National Institute of Complementary Medicine (NICM)). The term CM will be used to avoid confusion from the different nomenclature used by research reports and papers on non-conventional medicine approaches included in this thesis. CM is gaining popularity amongst people of all age groups in the western countries in recent decades (Harris, Cooper, Relton, & Thomas, 2012). Widespread use of CM consumption amongst older people is reported and is rising worldwide (Flaherty & Takahashi, 2004). Some of the reasons for people to seek complementary and alternative therapies include: health beliefs cultivated by personal experience and contemporary cultural practices, cost effectiveness, dissatisfaction with conventional medicine owing to decreased level of trust and confidence in treatment, and perceived lack of personalised and holistic care (McLaughlin, Lui, & Adams, 2012; Vincent & Furnham, 1996).

Increasing interests in CM research could be attributed to the evolving changes in global concepts of health, consumers’ health. The emphasis of optimal health in the global health agenda has transitioned since early 20th century from a ‘mere absence of disease’ to ‘complete physical, mental and social wellbeing’ (as defined by WHO in 1948) and to the recent focus on ‘the ability to adapt and self-manage’ in the face of social, physical and emotional challenges (Godlee, 2011). Recent trends of health care consumers indicate a shift in treatment approach from paternalism (practice of treatment without consideration of patient’s rights or responsibilities (Gallagher, 1998) to autonomy, desire for empowerment by participation in health care decisions, more responsibility for health and choice of health care models in alignment with individual’s health beliefs (Lindenmeyer, Jamie, Griffiths, & Legare, 2011).

Rapidly increasing older population, increased prevalence of chronic illness and multi-morbidity (Ornstein, Nietert, Jenkins, & Litvin, 2013), its consequences such as high mortality and reduced functional status add to the complexity of health care needs of older people. This makes provision of comprehensive holistic care that addresses physical, social and emotional needs challenging (Adams, Gatchel, & Gentry, 2001).
This situation necessitates the need for an alternative approach to conventional medicine, a complementary strategy that supports comprehensive and personalised care that would enhance quality of life in the ageing population, in addition to reducing health care costs (Willison & Andrews, 2004). The significance of CM use as potentially beneficial in maintenance of holistic health (Adams, Lui, & McLaughlin, 2009) has prompted the interests of both older consumers and health service providers.

The importance of CM in empowering older persons with autonomy in their care of chronic conditions, the benefits of integrating CM as a supplement therapy in RACFs is recognised in the recent decades (Eliopoulos, 1999; McLaughlin et al., 2012). Despite prevalence of use of CM by older adults (Adams, Sibbritt, & Young, 2008; Cheung, Wyman, & Halcon, 2007; Cuellar, Aycock, Cahill, & Ford, 2003; McLaughlin et al., 2012; Zhang, Xue, Lin, & Story, 2007) CM use by older people in RACFs is under-researched. Older persons in RACFs are faced with myriad of issues such as multi morbid conditions, frailty, loss of empowerment from dependence on activities of daily living and institutionalisation and social isolation. Complex and multi-domain health care needs and focus of care policies in RACFs towards holistic and person centred care highlight the necessity to investigate CM use in long-term care environments.

NICM lists four major domains of CM (The National Institute of Complementary Medicine (NICM)) such as:

- Biologically based practices (involve administration of natural medicines such as herbs, foods and supplements, as well as dietary and nutritional advice);
- Mind-body interventions (utilise techniques such as mindfulness, meditation to enhance the capacity of the mind to influence bodily function and vice versa);
- Manipulative and body based methods (includes structured exercises that involve manipulating of movements and postures to restore health); and
- Energy therapies (involves use of energy fields to manipulate the body).
It is to be noted that these domains are not strictly exclusive, as some of the CM approaches apply techniques that overlap between the domains. For example, the practice of yoga and tai chi is underpinned by mind body philosophy; however they are also considered a manipulative exercise. Tai chi and qi gong are also believed to be energy therapies.

2.12.1CM: Mind body interventions

Mind body interventions are techniques that are taught by trained practitioners (National center for complementary and alternative medicine (NCCAM)) that involve practice of skills that focus on interactions between mind and body to influence health (The Center for Mind-Body Medicine). The mind body approach to health is gaining recognition and popularity within modern society and associated fitness industry with the increasing need to address holistic health. Recent decades have witnessed a resurgence of holistic health research with focus on the power of mind to heal. Mind body interventions employ practice of ‘mindfulness’, a technique which bring a person’s focus to the internal and external experiences of the present moment (Baer, 2008). Recent surveys reveal use of mind body interventions for relaxation, treatment of chronic illness (Lee & Yeo, 2013), neuropsychiatric symptoms such as depression, anxiety, insomnia, headaches, memory deficits (Purohit et al., 2013; Wells, Phillips, Schachter, & McCarthy, 2010) attention deficits (Purohit et al., 2013), musculoskeletal and neurological conditions such as back pain with sciatica, migraines(Wells et al., 2010), severe sprains and asthma (Birdee, Wayne, Davis, Phillips, & Yeh, 2009). The influence of mental wellbeing on physical health and illness has been discussed widely in the literature (Brannon & Feist, 2009; Eysenck, 1995; Lenze et al., 2001). Depression has been identified as a leading cause of disability in both sexes worldwide (Mathers, Fat, & Boerma, 2008). In this context, mind body approaches such as yoga and tai chi, have been recognised as having potential to address multiple health needs, especially among older adults (Chen et al., 2010; Dechamps, Lafont, & Bourdel-Marchasson, 2007; McCaffrey & Fowler, 2003).
The mind body philosophy entails attainment of higher levels of embodiment through self-organisation and experience of wholeness (Mehling et al., 2011). Embodiment represents a state of being when an individual recruits all types of information processing (body and mind working in harmony) and directs focus on a particular aspect of oneself that is brought to attention at the time. Rosenfeld and Faircloth (2004) explain embodiment experience as a watchful and witnessing state of interceding where one places one’s body under one’s own surveillance.

In a study led by Mehling et al. (2011), the concept of body awareness in a variety of mind-body intervention such as yoga, tai chi, breath therapy, massage and Feldenkrais, the mind body practitioners agreed on a common and ultimate goal of the mind body practice as reaching towards a greater unity between body and self or higher level of embodiment. The process of attaining higher level of embodiment was said to involve experience of the following states of embodiment: lived body, where the practitioner is unaware of the body; objective body, where the body and self are experienced as disunited when in pain or with a loss of function; cultivated immediacy, an evolving state of embodiment where the practitioner begins to accept their body (with pain or loss of function) and redefine their experience of lived body; and subjective body state, where the body becomes integral and an equal part of self and a source of learning and meaning.

The state of unawareness of body described above is similar to ‘dispersive state of mind’ described by Hanh (2006), a philosopher who explores conscious awareness through Buddhist psychology. In this state, a person is unable to stop thinking, with numerous thoughts of past and future run uncontrolled. He suggests use of mindful breathing to end this state of dispersion and create a concentrated state of mind. This is also a technique that is used in yogic meditation to relax the body and mind (Gimbel, 1998; van der Riet, 2011). This state of relatively ‘empty’ mind sets a conducive environment to apply one’s mental energy and focus on a desired object: one’s body, goals of healing, wellness, happiness, depending on the intention of the individual. The same technique is also used to relax the mind and body in guided imagery and
visualisation, where the individual is encouraged to focus on positive thoughts. Guided imagery is defined as ‘any of various techniques (as a series of verbal suggestions) used to guide another person or oneself in imagining sensations and especially in visualizing an image in the mind to bring about a desired physical response ("Guided Imagery", 2014).

Prevalence and reported benefits of mindfulness based interventions have triggered investigations in neuroscience. In a controlled longitudinal study (Holzel et al., 2011) on a 8 week programme of mindfulness based stress reduction (MBSR) involving 16 healthy participants, structural changes in the brain (increases in gray matter concentration) in regions specific to learning, memory processing, emotion regulation, self-referential processing and perspective taking were noted. However, the results were not exclusive to mindfulness approach alone as the MBSR programme involved other features such as group interaction, stress education and gentle stretching exercises. Relearning the skill of ‘mindfulness’ can be significant for older persons in carrying out activities of daily living, especially considering the decreased attentional resources in advanced age (Springer et al., 2006). This is demonstrated in studies that tested older persons’ ability to deal with dual task situations, such as maintaining balance in an uneven surface and giving attention to postural tasks (Anand et al., 2003; Marsh & Geel, 2000).

2.13 Tai chi

Tai chi, also known as Tai chi chuan, Tai ji or Taijiquan, has its roots in the ancient chinese martial arts. It is also called ‘moving meditation’ (Fasko & Grueninger, 2001) as, in addition to body movement, tai chi also focuses on mindfulness and relaxation for physical, mental and spiritual cultivation. The philosophy on which tai chi is based is originally derived from Lao Tzu philosophy, which dates back to 575BC. Lao Tzu, who is also referred to a ‘Old sage’ or ‘Li Erh, was an ancient Chinese philosopher and founder of Taoism. The central doctrine of this theory advocates a simple, honest life without desire or selfish intentions and promotes ‘inner stillness’ to achieve longevity.
Tai chi incorporates the principles of Taoism, known as wu-wei, which refers to non-doing, doing without force, or doing without doing, with Buddhist principles of serenity (Lee, 1976). Although the philosophical origin of tai chi lies with Taoism, the art of tai chi unites three Chinese philosophical traditions: Confucianism, Taoism, and Buddhism, and reflects ethics and aesthetics as well as Chinese traditional medicine and cultural history (Alperson, 2008). Tai chi first appeared in China during the 11th and 12th centuries but its origin is still an often debated issue. The most commonly held position is that tai chi originated from the Wu-Tang Mountain where a Shaolin monk, called Zhang San-Feng, left his Buddhist monastery to learn from Taoist hermits. This resulted in the development of the martial art form of tai chi (Kurland, 1998). During the subsequent period, teaching tai chi was exclusively the domain of either Buddhist or Taoist monks until the 17th and 18th centuries when China was conquered by the invading Manchu (Wong, 1991). At this time laws preventing the ownership of weapons were passed by the reigning Manchu. This prompted the dissemination of tai chi from the monasteries to the people, and the use of tai chi as of a modified form of self-defence based on the strengthening of whole body systems.

The 108 movements in tai chi represent the yin and yang elements of the body and symbolize the harmonious balance between yin and yang thus leading the practitioner to optimal health. The yin represents worldly experiences such as passiveness or softness whereas the yang represents the opposite experiences such as activeness or hardness. This is portrayed in a yin-yang symbol which is a circle divided into two equal parts by a ‘S’ shaped line. The curved line represents the flow and integration of yin into yang and vice versa. The dark part of the circle has a white spot and the white part of the circle has a dark spot. This represents the harmony between yin and yang, where the existence of one depends on the other (Lee, 1976). This philosophy symbolises the harmonious integration of body and mind, which enables the flow of life energy, the ‘chi’. Tai chi is a meditative form of martial art that is based on principles of kinesiology: balance and body mechanics. The meditative attitude can be experienced in the flow or smooth transition from one form to the other. The mind body practice forms
the whole exercise, where the mind directs the physical action. This action stabilises the emotions while also exercising the body physically (Delza, 1996).

The mind body integration in the practice of tai chi refers to the conscious awareness or active state of mind that is continuously present throughout the exercise (Delza, 1996). Tai chi is designed in such a way that the practice requires one to focus on the body, the movement, the position of the body in space, while also being aware of the bodily sensations. Staying focussed under normal circumstances for a long period of time is difficult for any individual. However, the tai chi practitioner learns the skill of staying focussed throughout the duration of the exercise through practice. The wavering of mind, or interruptions to the alert state, when it occurs, does so only for a fleeting period of time. This happens during the repetitive actions, but one’s attention gets activated at the transition, when the practitioner progresses from one form to the next. The now alert mind continues to remain alert and ‘stay with the moment to moment action’ (Delza, 1996, p. 9). The performance of the tai chi exercise also involves a slow pace, which is one of its features that distinguish it from the rote exercises that are performed fast. The slowness and the variations in the slowness is a subjective experience where the practitioner develops awareness of the tension from the slow movements and gradually progresses to performing the slow movements with ease. It is usually estimated that a practitioner would take 20 to 25 minutes to perform the 108 forms. This slowness is found to challenge the balance mechanisms while also facilitating concentration of body position within the immediate environment (Wolf, Barnhart, Kutner, McNeely, Coogler, & Xu, 1996).

Various styles of tai chi emerged during the late 18th century, including the Chen, Yang, Sun and two forms of Wu styles (Wong, 1991). Each style has its own characteristics, differing in postures, forms, pace and the level of difficulty of performance. However, all styles emphasize movement coordination, relaxation and mindfulness. At present, there are many newer forms, some of which are considerably shorter than the 108 movements. These forms have been developed for either competition (Tang & Gu, 1963) or to meet the needs of people with a specific health
condition, such as diabetes and arthritis (Han et al., 2004; Yeh, Wang, Wayne, & Phillips, 2009). The Yang is the most popular form of tai chi due to its simplicity and practicability (Harling & Simpson, 2008). It requires constant knee flexion, wide stance width, and a steady slow speed, demanding strength and flexibility of lower leg muscles.

There has been increasing evidence of the physical and therapeutic effects of tai chi over the recent years with a positive influence on the following: functional balance and gait in older people (Lin, Hwang, Wang, Chang, & Wolf, 2006a); falls self-efficacy with reductions in fear of falling (Li, Fisher, Harmer, & McAuley, 2005); postural muscle strength (knee, ankle flexors and extensors) and reduction in fall risk in fall-prone older adults in residential care facilities (Choi, Moon, & Song, 2005a); Knee extensor muscle endurance, bone mineral density and decreased fear of falling during daily activities in older women with osteoarthritis (Song, Roberts, Eun-Ok Lee, & Bae, 2010) lower leg muscle strength and flexibility, cardiovascular endurance and psychosocial well-being (Wolf et al., 1996); psychological wellbeing including reduced stress, anxiety, depression, mood disturbance and increased self-esteem (Wang et al., 2010).

A qualitative study that utilized focus group discussions found that community dwelling senior tai chi practitioners with age ranging from 65 to 88 years and of all physical abilities found tai chi to be feasible and appealing (Beaudreau, 2006). A randomised controlled trial that used tai chi exercises showed positive results in perceived health status benefits, most notably in ambulation among transitionally frail older women (Greenspan, Wolf, Kelley, & O'Grady, 2007). A cross sectional study that recruited a convenient sample of 52 healthy older adults found both yoga and tai chi to be effective in improving balance performance (Hakim, Kotroba, Cours, Teel, & Leininger, 2010). A systematic review of longitudinal studies on tai chi published from January 2000 to 2007 found that older and transitionally frail older adults benefited from tai chi as a balance improvement exercise (Liu & Frank, 2010). It also found that the most
commonly used tai chi was the Yang style, duration of 12 weeks or longer, frequencies of twice a week or more and session lengths of at least 45 minutes.

While many researchers have noted the benefits of tai chi in robust older adults, some studies report that tai chi did not reduce the risk ratio of falling (Wolf et al., 2003) and that it is relatively ineffective in preventing falls in transitionally frail and frailer older adults (Busing, 2005). However, the direction of effect observed in most studies makes it plausible to consider tai chi as a clinically significant intervention in improving balance function in older adults. Improvement was noted in health related quality of life in nursing home residents after following tai chi and recommend inclusion of tai chi exercise for older persons in residential care facilities (Lee, Lee, & Woo, 2009a). It is also notable that tai chi is one of the fall prevention intervention programmes implemented nationwide for community dwelling older adults in New Zealand (Campbell AJ, 2010).

2.14 Yoga

Yoga means ‘Union’ with life in its entirety. It is derived from the classical Sanskrit root ‘Yuj’ that is similar in meaning to the English word ‘Yoke’ that implies “…an instrument which links or unites” (Mumford, 1979). The term yoga has multiple interpretations. The ancient scripture Bhagavad Gita defines yoga as ‘equanimity’. It means ‘sameness, or ‘evenness’ and includes ‘balance’ and ‘harmony’ (Feurstein 1998 pp 7). The traditional discipline of yoga has dominant spiritual connotations, the practice of which aims for detachment from worldliness, progressing through degrees of self-transcendence (Feuerstein, 1998).

The beneficial effects of yoga are believed to occur through asana (poses), pranayama (breath) and dhyana (meditation) and traditionally, yama (ethical behaviour), niyama (self-discipline), pratyahara (sense withdrawal), dharana (concentration) and samadhi (deep meditative awareness) (Evans et al., 2009). These are components of an eightfold path proposed by an ancient school of yoga, the classical system of Patanjali as steps to
achieve a higher level of integration of body and mind (Iyengar, 2002). The current conceptions of yoga in the western world is very different and far from the traditional meanings of yoga. In the western world, yoga is associated with physical exercise, breathing and meditation. However, yoga has a much wider concept in the traditional context. It is a discipline that encompasses a wide range of spiritual values, attitudes, and techniques that have been developed in India, dating back more than 5000 years, and is regarded as the root of ancient Indian civilisation (Feuerstein, 1998).

Yoga includes diverse bio-psychological practices associated with various cultures and spiritual traditions (Butera, 2006). Yoga philosophy deals with physical, mental and spiritual wellness. It holds a holistic perspective involving integration of mind and body, whereby physical and mental health is interdependent on one other (Butera, 2006). Yoga instruction may include physical practices, breathing exercises, relaxation and meditation practices (Butera, 2006). “Hatha Yoga” is one of the major ancient yoga systems and the most prevalent form of yoga currently practiced in western cultural settings (Ward, Stebbings, Cherkin, & Baxter, 2013). The Sanskrit word Hatha is a combination of ‘Ha’ (sun in Sanskrit) and ‘Tha’ (moon in Sanskrit) (Feuerstein, 1998). This refers to the combination of solar and lunar energy, which are two main forms of energy described in yoga philosophy. These energies were believed to flow in the human mind-body and govern life. Hatha Yoga practice was believed to bring these two energies into balance (Maheshwarananda, 2009).

‘Asana’ originally referred to maintenance of a pose used for prolonged meditation practice but was later developed within the framework of hatha yoga to refer to poses for building strength and suppleness and serving a range of therapeutic functions (Buhnemann, 2007; Feuerstein, 2000). Svatmarama explains that asana practice is the first step of hatha yoga as it builds physical strength, helps attain good health and assists in developing self-control (Svatmarama, 2002). Other traditional core yoga texts also view the asanas mainly as a foundation yogic practice intended to improve and maintain practitioners' well-being, flexibility, strength and vitality. In traditional yoga, asanas are intended to provide a good foundation for meditative practice by developing the ability
to remain seated for extended periods (Buhnemann, 2007). Yoga asanas can be classified as standing poses, sitting poses, twists, forward bends, back bends, arm balances, core strength postures, inversions, and restorative poses (Raub, 2002).

The act of regulating breath and energy during maintenance of asanas is called ‘pranayama’ (Iyengar, 2010). Yoga texts describe subtle energy channels called ‘nadi’ (tube or pipe in Sanskrit), through which the prana flows. The practice of pranayama is thought to enable better flow of vital energy and improved health (Iyengar, 2010). Pranayama is considered by traditional and contemporary yoga texts an important tool for improving health, preventing and curing diseases. It is also believed to help concentration by calming the mind as an essential foundation practice for higher spiritual practice (Feuerstein, 1998; Iyengar, 2010; Svatmarama, 2002).

‘Ahimsa’ or nonviolence is a principle of yoga that promotes ‘listening’ to one’s body and bodily sensations (Butera, 2006; Wang & Feinstein, 2011). This principle emphasises practicing yoga within limits of one’s ability and not harming the body. In other words, the yoga recommends the practitioners to avoid any movement or posture that causes pain. Pain or discomfort is thought of as ‘disharmony’ which is against the yoga principle of increasing harmony and balance within all aspects of one’s body and mind (Chidananda, 1991). Yoga instructors tailor the postures, meditation and breathing exercises to suit different individual’s needs. For older persons, practice of safety is emphasised by encouraging a harmonious practice, and avoiding pain and discomfort. Yoga techniques such as meditation, relaxed breathing and anxiety-reducing postures such as child’s pose (balasana) or mountain pose (tadasana) is recommended for reducing anxiety and pain (Wang & Feinstein, 2011).

The literature reports on different forms of yoga including: Hatha Yoga, Raja Yoga, Laya Yoga, Ashtanga Yoga, Sudharsan Kriya Yoga, Iyengar Yoga and Silver Yoga. Of these forms, the Iyengar Yoga is found to be particularly beneficial for patients with musculoskeletal conditions (Evans et al., 2009). Different forms of yoga have different cognitive behavioural, interpersonal and psychodynamic approaches (Bower, 2005) and
result in different physiological effects (Clay, Lloyd, Walker, Sharp, & Pankey, 2005; Hagins, Moore, & Rundle, 2007). Evans et al. (2009) illustrates this variation by contrasting Iyengar Yoga that focuses on postural alignment and awareness that leads to short and long term parasympathetic nervous system dominance as opposed to Ashtanga Yoga that focuses on fast moving yoga poses that lead to short term physiological arousal.

Yoga shares many of the physical and psychological benefits of exercise, in addition to specific effects not shared by regular exercise (Evans et al., 2009). Benefits pertaining to balance function as found in literature include: strengthening and relaxation of voluntary muscles that leads to control over the autonomic nervous system (Telles et al., 2004; Vahia, Vinekar, & Doongaji, 1966); improved strength (Greendale, McDivit, Carpenter, Seeger, & Mei-Hua, 2002; Haslock, Monro, Nagarathna, Nagendra, & Raguram, 1994); flexibility (Greendale et al., 2002) and range of motion, along with attention to alignment (DiBenedetto et al., 2005). Extension and flexion of muscles during yoga poses is associated with activation of antagonistic neuromuscular systems as well as tendon-organ feedback resulting in increased range of motion and relaxation (Riley, 2004). Yoga interventions for individuals with arthritis and other musculoskeletal conditions have found improvement in a range of physical outcomes, including pain, strength, joint tenderness, range of motion and disability (Evans et al., 2009). Slow breathing techniques used during yoga were associated with increased oxygen delivery to tissues (Spicuzza, Gabutti, Porta, Montano, & Bernardi, 2000).

Yoga is also found to positively impact on psychological aspects such as fear of falling and hence improve balance (Schmid, van Puymbroeck, & Koceja, 2010). An exploratory study found that the Iyengar Yoga programme may improve hip extension, increase stride length, and decrease anterior pelvic tilt all of which improve gait function in healthy elders (DiBenedetto et al., 2005). Krucoff, Carson, Peterson, Shipp, and Krucoff (2010) emphasize safety issues that ought to be considered when designing Yoga programmes for older adults. Studies on Yoga interventions for older adults show promising results in improving gait and balance and suggest that Yoga could be used
safely and effectively for prevention of falls in (Chen, 2008; Ross & Thomas, 2010; Schmid et al., 2010).

In this chapter I have presented the background literature for the present study and introduced to the reader yoga and tai chi, two complementary medicine approaches. I have briefed the origins, philosophies, health benefits of the interventions for the general older population. In the next chapter, I present a systematic and critical literature review on studies that have investigated yoga and tai chi in residential aged care settings with specific focus on balance, fall related measures, pain and quality of life.
Chapter 3 Evidence on the influence of yoga and tai chi on balance, pain and quality of life in older adults in RACFs: a critical review
3.1 **Introduction**

In the previous chapter I described literature relating to the background to the study. Here I discussed the concerns relating to an ageing society including the associated functional decline and multi morbidity. The notion of active ageing, wellness and healthy ageing were also noted along with related theories of ageing. I also provided an overview of residential aged care with a focus on the espoused philosophies and principles of care in this setting. I noted the characteristics of older people in this setting highlighting the concerns associated with frailty and the problem of falls in this group of older people. I noted the relationship between falls, balance and pain and the impact on quality of life. I also outlined motivation as a factor for consideration in older people when considering exercise. With exercise and wellbeing in mind I introduced the concept of complementary medicine with a particular focus on mind body interventions and yoga and tai chi as exercise interventions for the prevention of falls. This chapter provides a critical review of the available evidence on the use of tai chi and yoga interventions for frail older adults in residential care facilities (RACFs) and their influence on balance, falls, pain, and quality of life. This chapter was developed as a paper for publication to be submitted in the Journal of Advanced Nursing. In the following discussion I outline the aim of the review, the search methods used, the framework for the assessment of the literature, then present the critique of the literature and identify the gaps in evidence.

3.2 **Aim**

The aim of this review was to systematically and critically appraise the literature on the effectiveness of yoga and tai chi in improving balance, pain and quality of life for frail older adults in RACFs.
3.3 **Methods**

3.3.1 Literature Search

The search strategy is described using PRISMA guidelines (Moher, Liberati, Tetzlaff, & Altman, 2009) in Figure 3.1. Six databases were searched, including AMED, CINAHL, EMBASE, MEDLINE, PsycINFO and Web of Science in July 2013 without limitations upon the year of publication. Reference lists of recent reviews including Cochrane reviews were also searched to identify potential articles. Weekly database search alerts were reviewed for any additional articles until the end of the present study.
Records identified through database searching (n = 392)

Additional records identified through other sources (n = 5)

Records after duplicates removed (n = 166)

Records screened (n = 101)

Records excluded (n = 74)

Full-text articles assessed for eligibility (n = 27)

Full-text articles excluded, with reasons (n = 13)

Studies included (n = 11)
Publications (n = 14)
2 sets of publications found for 3 studies
The main key words were: older adults, residential care facilities, yoga, tai chi, qi gong, balance, fall, pain and quality of life. In addition, several other words that had similar meaning to keywords were used in several combinations. All the keywords used in the search are listed in Table 3.1. Several keywords that captured studies in ‘residential care settings’ were obtained from a recent Cochrane review (Crocker et al., 2013). Initially 392 articles were obtained. After removal of duplicates, searching for relevance by screening the title and abstract and further screening of full-text articles at text level, 14 publications were retrieved and included for the study.

Inclusion criteria were: English articles published in peer-reviewed journals that reported on an intervention study on tai chi or yoga in residential aged care settings; design: quantitative, qualitative or mixed method; yoga or tai chi as a stand-alone intervention; older adult participants equal or above 60 years of age, dependent on the RACF for nursing or personal care; at least one outcome related to balance, fall, pain, quality of life, feasibility or participants’ perspectives.

Articles were excluded when these were not original research articles, when the participants were not exclusively from a residential care population or when the full paper was not available. Where a pilot and a full scale study was available, only the full scale study was reviewed.

Table 3-1: Key words used in literature search

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<td>Hospitals, Veterans</td>
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<tr>
<td>5</td>
<td>Housing for the Elderly</td>
</tr>
<tr>
<td></td>
<td>Geriatric Nursing</td>
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<tr>
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</tr>
<tr>
<td>7</td>
<td>Nursing Care</td>
</tr>
<tr>
<td>8</td>
<td>Rehabilitation Nursing</td>
</tr>
<tr>
<td>9</td>
<td>Community Health Nursing</td>
</tr>
<tr>
<td>10</td>
<td>Hospitals, Convalescent</td>
</tr>
<tr>
<td>11</td>
<td>Rehabilitation Centers</td>
</tr>
<tr>
<td>12</td>
<td>Institutionalization</td>
</tr>
<tr>
<td>13</td>
<td>Group Homes</td>
</tr>
<tr>
<td>14</td>
<td>Assisted Living Facilities</td>
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<tr>
<td>15</td>
<td>Residential Facilities</td>
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<tr>
<td>16</td>
<td>Long-Term Care</td>
</tr>
<tr>
<td>17</td>
<td>Halfway Houses</td>
</tr>
<tr>
<td>18</td>
<td>((group or residential) adj home?).ti,ab.</td>
</tr>
<tr>
<td>19</td>
<td>((hous$ or residential or residence? or institution$ or facility or facilities) adj5 (elder* or geriatric* or seniors or older or aged)).mp.</td>
</tr>
<tr>
<td>20</td>
<td>((residential or long-term or longterm) adj5 (care or facility or facilities)).ti,ab.</td>
</tr>
<tr>
<td>21</td>
<td>((sheltered or retirement or residential or halfway or halfway) adj5 (hous$ or home? or accommodation)).ti,ab.</td>
</tr>
<tr>
<td>22</td>
<td>(life care cent$ or continuing care cent$ or extended care facility or extended care facilities).ti,ab.</td>
</tr>
</tbody>
</table>
23  ((care or convalescent) adj (home? or cent$ or facility or facilities)).ti,ab.

24  ((skilled or intermediate) adj2 (nursing facility or nursingfacilities)).ti,ab.

25  (healthcare adj2 (facility or facilities)).ti,ab.

26  assisted living.ti,ab.

27  (yoga or tai chi or qi gong or tai ji or ji quan or taiji or taijiquan).mp.

3.3.2 Quality assessment

The included articles were evaluated on their content and methodology. No qualitative study was found that was of relevance to the review objectives. The ‘Effective Public Health Practice Project (EPHPP)’ quality assessment tool for quantitative studies (National Collaborating Centre for Methods and Tools, 1998) was used for methodological evaluation of included studies. Each paper was rated as ‘strong’, ‘moderate’ or ‘weak’ based on the following criteria: selection bias, study design, confounders, blinding, data collection methods and withdrawals and dropouts. Two reviewers independently scored all relevant articles for quality. Differences in scoring were resolved by involving a third independent reviewer.

3.3.3 Data extraction and synthesis

The main focus of this review was to find available evidence on tai chi or yoga interventions were beneficial to frail older adults in RACFs, in terms of balance, fall, pain and quality of life. The included articles were evaluated on their content and methodology. Data was extracted from all the included articles, irrespective of their quality scores as only three papers were rated ‘strong’.

A narrative synthesis of extracted data included summarising the findings of the studies, considering their strengths and limitations, exploring the extent to which the studies
demonstrated that their interventions were of benefit to the participants and the feasibility of the intervention.

3.4 Results

The key findings of the 11 studies are reported in this section and summarised in 3.2 and 3.3.

3.4.1 Study design

This review included four randomised controlled trials (RCT) in five publications (results of a primary study published in two papers (Chen et al., 2010b; Chen et al., 2010), three quasi experimental studies with a control group, and three single group studies with pre-test and post-test design, and one single group study with assessments at multiple time points. No qualitative study that met review objectives was found.

3.4.2 Methodological quality of included studies

Table 3.2 outlines the results of the quality assessment outcomes of the 11 relevant studies. Global ratings of EPHPP indicated that two studies were strong, two moderate and the remaining seven weak. Nearly half (n=5) of the included studies scored ‘moderate’ and the rest ‘weak’ in selection bias. Reasons for this were lack of random selection of participants and inadequate reporting of the number of eligible participants. In most studies (n=8), information on blinding was either not provided, or the outcome assessors were not blinded to the participant’s allocation, or the participants were aware of the research question. Reliable and valid outcome measures were reported all studies. More than 50% of the participants completed the interventions in all studies.
Table 3-2: Quality Assessment Results of included studies (n=11)

<table>
<thead>
<tr>
<th>Author/Date</th>
<th>Selection Bias</th>
<th>Study Design</th>
<th>Confounders</th>
<th>Blinding</th>
<th>Data Collection Methods</th>
<th>Withdrawals/Dropouts</th>
<th>Global Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dechamps et al. (2010)</td>
<td>Moderate</td>
<td>Strong</td>
<td>Strong</td>
<td>Moderate</td>
<td>Strong</td>
<td>Strong</td>
<td>Strong</td>
</tr>
<tr>
<td>Choi, Moon, and Song (2005b)</td>
<td>Moderate</td>
<td>Strong</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Strong</td>
<td>Strong</td>
</tr>
<tr>
<td>Chen, Fu, Chan, and Tsang (2012)</td>
<td>Moderate</td>
<td>Strong</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Strong</td>
<td>Weak</td>
<td>Moderate</td>
</tr>
<tr>
<td>Lee, Lee, and Woo (2010)</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Strong</td>
<td>Weak</td>
<td>Strong</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Taboonpong, Puthsri, Kong In, and Saejew (2008)</td>
<td>Moderate</td>
<td>Weak</td>
<td>Strong</td>
<td>Weak</td>
<td>Strong</td>
<td>Moderate</td>
<td>Weak</td>
</tr>
<tr>
<td>Tsai, Chang, Beck, et al. (2009) and</td>
<td>Weak</td>
<td>Weak</td>
<td>Weak</td>
<td>Weak</td>
<td>Strong</td>
<td>Weak</td>
<td>Weak</td>
</tr>
<tr>
<td>Tsai, Beck, et al. (2009)</td>
<td></td>
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</tr>
<tr>
<td>Study</td>
<td>Rating 1</td>
<td>Rating 2</td>
<td>Rating 3</td>
<td>Rating 4</td>
<td>Rating 5</td>
<td>Rating 6</td>
<td>Rating 7</td>
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<tr>
<td>---------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Chen et al. (2008) and Chen, Li, et al. (2007)</td>
<td>Weak</td>
<td>Weak</td>
<td>Weak</td>
<td>Weak</td>
<td>Strong</td>
<td>Strong</td>
<td>Weak</td>
</tr>
<tr>
<td>Chen, Hsu, Chen, and Tseng (2007)</td>
<td>Weak</td>
<td>Weak</td>
<td>Weak</td>
<td>Weak</td>
<td>Strong</td>
<td>Moderate</td>
<td>Weak</td>
</tr>
<tr>
<td>Litchke, Hodges, and Reardon (2012)</td>
<td>Weak</td>
<td>Weak</td>
<td>Weak</td>
<td>Weak</td>
<td>Strong</td>
<td>Weak</td>
<td>Weak</td>
</tr>
<tr>
<td>Fan and Chen (2011b)</td>
<td>Weak</td>
<td>Moderate</td>
<td>Weak</td>
<td>Weak</td>
<td>Strong</td>
<td>Strong</td>
<td>Weak</td>
</tr>
</tbody>
</table>
3.4.3 Study setting

The studies included in the review were conducted in Taiwan (n=4), Hong Kong (n=2), Thailand (n=1), Korea (n=1), USA (n=2) and France (n=1). The settings of the studies were residential care facilities, nursing homes, veteran homes, assisted living homes and long-term care facilities.

3.4.4 Characteristics of participants

The characteristics of participants varied between studies. Five studies focussed on participants with specific characteristics such as impaired balance, visual impairment, diagnosis of dementia, sleep problems, self-report of osteo-arthritic pain (Chen et al., 2012; Choi et al., 2005b; Fan & Chen, 2011b; Litchke et al., 2012; Taboonpong et al., 2008; Tsai et al., 2009). In five other studies, the participants were cognitively intact, had mild to moderate dependency for activities of daily living and were able to walk without assistance (Chen et al., 2007; Chen et al., 2010; Chen et al., 2007; Chen et al., 2008; Lee et al., 2010). In only two studies, the inclusion criteria was more broad, enabling residents with light to moderate cognitive impairment to participate. They could get up alone or with technical assistance or human help and were able to understand basic motor commands.

Most sample populations were mixed gender groups, although predominantly female in six studies. One study reported on male residents in veteran homes in Taiwan (Chen et al., 2007; Chen et al., 2008). Sample size ranged from 27 to 175 with the exception of a pilot study that had 7 participants (Tsai et al., 2009).

3.4.5 Interventions

A synopsis of interventions is provided here. Details of the interventions and studies can be found in Tables 3.3 and 3.4.
Comparison Interventions and controls

While most studies featured either tai chi or yoga as the only experimental intervention, one study featured cognition action exercise as a parallel intervention in comparison to tai chi (Dechamps et al., 2010). This programme comprised mild to moderate intensity exercises, with more focus on lower body muscles. The cognition aspect involved using familiar movements, encouragement and helping to focus attention on the task, according to the participants’ verbal and cognitive capabilities. Seven studies had a control group with one that offered a music percussion activity as control (Chen et al., 2012) while the remaining control groups followed usual and routine non-exercise activities offered at the facility.

Tai chi

Eight studies tested tai chi interventions. Most studies used the yang style or sun style tai chi. Whilst Taboonpong et al. (2008) used 18 basic tai chi movements, Lee et al. (2010) did not specify any particular form of tai chi. The yang-style tai chi involved movements performed in a flowing manner with multi-directional weight shifting, coordinated body movements and emphasised body sensation. It was also simplified to suit older persons (Chen et al., 2012; Chen et al., 2007; Dechamps et al., 2010). The simplified tai chi exercise programme (STEP) was a modified yang style tai chi, had fewer leg movements, fewer knee bends and less complicated hand gestures (Chen et al., 2007; Chen et al., 2008). The sun style tai chi involved slow and continuous movements that were specifically designed for patients with arthritis (Choi et al., 2005b; Tsai et al., 2009).

In addition to tai chi, the interventions had other components such as warm up and cool down (Chen et al., 2007; Chen et al., 2008; Choi et al., 2005b; Lee et al., 2010; Tsai et al., 2009), music (Choi et al., 2005b; Taboonpong et al., 2008), deep breathing and muscular reinforcement exercises (Dechamps et al., 2010). Interventions were delivered by trained instructors who utilised demonstrations, video, visual cues and sometimes
physical guidance. Only two studies detailed features of tai chi modification to suit frail participants such as low intensity, non-strenuous movements, small groups (Chen et al., 2007) and gradual addition of a new form of movement according to ability (Tsai et al., 2009). The duration and frequency of tai chi programmes varied from 12 to 26 weeks, 22 to 90 minutes sessions with 2 to 4 sessions per week.

Yoga

Three studies tested yoga interventions. Litchke et al.’s study used Lakshmi Voelker chair yoga based on raja and hatha yoga. It included 32 seated yoga poses on average. It included three levels of flexibility achieved through poses and breathing exercises. Fan and Chen (2011b) and (Chen et al., 2010) utilised Silver yoga, a hatha yoga that comprised seven stretching poses. Abdominal breathing was emphasised in all phases (Litchke et al., 2012).

All the yoga interventions had supplementary components such as warm up and relaxation phases. Interventions were delivered by two or more certified instructors. All studies reported incorporating changes to interventions to suit the frail participants, with gradual progression of intensity. The duration and frequency of yoga programmes ranged from 10 to 24 weeks with 55 to 70 minutes sessions, twice to thrice a week.

3.4.6 Impact of tai chi and yoga on outcomes

The outcome measures for balance, fall, pain and quality of life were varied between studies. The balance measures were: Single leg stance test, Sensory organisation test, Step test and Berg Balance scale. Fall related measures included: fall incidence and fear of falling. Only one study measured pain. The bodily pain subscale of the Medical Outcomes Study short form (SF-36) was used. Quality of life had different labels: health related quality of life and general well-being. This outcome was measured by activities of daily living, neuropsychiatric inventory scores, state self-esteem, physical and mental components of health related quality of life, general well-being scale, physical and mental health status components of SF-36 questionnaire. In the following
section, findings of studies are grouped and presented under the different outcome measures used.

**Balance (Tai chi)**

**Single leg stance test**

Dechamps et al., 2010 (Dechamps et al., 2010) investigated in a RCT the effects of an adapted version of yang style tai chi and a cognition action programme on balance using ‘one leg stance’ test. This test is performed with eyes open and arms on the hips, where the participant must stand unassisted on one leg and is timed in seconds from the time one foot is flexed off the floor to the time when it touches the ground or the standing leg or an arm leaves the hips. Participants unable to perform the one-leg stand for at least 5 seconds are at increased risk for injurious fall (Jason, 2014).

While the balance scores did not improve significantly in both intervention groups, it deteriorated significantly in the control group. This study was scored ‘strong’ in the EPHPP evaluation. Choi et al. (2005b) compared Sun style tai chi with usual activities and measured balance by time standing on one leg with eyes open and eyes closed. The tai chi group showed significantly improved balance with their eyes open (P<0.01).

Two studies (Chen et al., 2007) and (Chen et al., 2008) examined the effect of a simplified tai chi exercise programme (STEP) on balance using single leg stance test. After 6 months of intervention, the balance scores improved but were not statistically significant (P=0.070). However, this study was limited by absence of a control group for comparison.

**Sensory organisation test (SOT)**

SOT helps to quantify an individual’s ability to maintain balance in a variety of complex sensory conditions (Tsang, Wong, Fu, & Hui-Chan, 2004). In an RCT
involving a cohort of visually impaired older persons, exposure to a modified 8-form Yang style tai chi \(^1\) over 16 weeks resulted in a significant increase in percentage change of the visual and vestibular ratio compared to the control group (Chen et al., 2012). However in this study, outcome measures were compared using percentage change from baseline that may have led to bias. This method does not correct for imbalance between groups at baseline and hence is statistically inefficient (Vickers, 2001).

*Step test*

Step test measures dynamic balance by assessing an individual’s ability to place one foot onto a 7.5 cm high step and then back down to the floor repeatedly as fast as possible for 15 seconds. The score is the number of steps completed in the 15-second period for each lower extremity (Mercer, Freburger, Chang, & Purser, 2009). In an investigation of the effects of low intensity tai chi that comprised 18 basic movements, the tai chi group had significantly greater improvement on the step test (p<0.05) than the control group that was offered usual activities (Taboonpong et al., 2008). However, this study did not account for clustering in the analysis.

*Balance (Yoga)*

*Single leg stance test*

Fan and Chen (2011b) found that Silver yoga exercises offered over 12 weeks significantly improved balance scores in single leg stance test (P<0.05). In contrast, in an RCT comparing Silver yoga delivered over 6 months with usual activities, the yoga group did not have any significant improvement in balance measured by single leg

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\(^1\) The Eight-Form tai chi is a simplified version of tai chi (Li, Fisher, Harmer, & Shirai, 2003) that that comprises eight forms that are easy to follow for older persons. It comprises a progressively difficult exercise starting with upper body motion and then involving whole body-limb coordination. It could be also done seated, reducing the demand on posture control.
stance test (Chen et al., 2010). Both these studies were cluster trials that did not adjust their analysis for the design.

**Berg Balance Scale (BBS)**

The BBS consists of 14 items that require a person to maintain or assume positions of varying difficulty. The ability to perform each task is graded from 0 to 4 with a total possible score of 56 (Berg, Wood-Dauphinee, Williams, & Maki, 1992). Litchke et al. (2012) studied Lakshmi Voelker chair yoga and found no statistically significant differences in Berg Balance scores measured pre and post intervention in the tai chi group. This study was limited by a small sample size and no control group for comparison.

**Falls**

Falls and related measures were reported in two studies (Chen et al., 2007; Choi et al., 2005b) that used tai chi and comprised: fall episodes and fear of falling.

A fall episode was defined as a sudden and unintentional change in position from an upright posture with or without loss of consciousness - that caused the person to land on the ground (Choi et al., 2005b). Information on fall episodes was obtained from participants and researcher’s observation during the study.

Choi et al. (2005b) measured fear of falling using fall avoidance efficacy scale of 1 to 10 based on the perceived confidence that the person would be able to avoid falling (Tinetti, Richman, & Powell, 1990). Participants’ rating of fear of falling on a scale of 0 to 10 reported in one study (Chen et al., 2007).

In a cluster RCT, Choi et al. (2005b) compared Sun-style tai chi and routine activities. The tai chi group had reduced number of falls compared to the control group during the intervention period, but this difference was not statistically significant. Fear of falling was significantly lower in the tai chi group than the control group (P<0.001). However, clustering was not taken into account in the analysis of this study. Two studies (Chen et
al., 2007) (Chen et al., 2007) tested a Yang style tai chi programme; however, there were no statistically significant differences in occurrence of falls or fear of falling.

**Pain**

Only one study examined pain (Tsai et al., 2009). This study investigated the effect of Sun style tai chi on pain using the bodily pain subscale of the Medical Outcomes Study short form SF-36. There were no significant differences in pain scores before and after the tai chi intervention. However, 3 out of 4 residents who participated in more than 21 sessions had clinically significant improvement in pain. Furthermore, Spearman’s rho correlation between the change in pain scores and the number of minutes attended was 0.78 (P<0.05) suggesting a strong, positive correlation. This study was limited by a small sample and absence of a control group for comparison.

**Quality of life**

Four studies assessed quality of life related measures and included health-related quality of life (HRQoL), components of HRQoL, general well-being scale scores, physical health status and social functioning components of SF-36.

Dechamps et al. (2010) assessed HRQoL through activities of daily living and neuropsychiatric scores. Taboonpong et al. (2008) used the General Well-Being Scale comprising 14 items that included anxiety, depression, happiness, self-control, vitality and general health, with scores ranging from 0-42. Two studies (Lee et al., 2010) and (Chen et al., 2007) assessed few components of HRQoL. The former reported significant improvement in the tai chi group in the composite effect of state-self-esteem, physical and mental components of HRQoL than in the control group. The latter (Chen et al., 2007) observed statistically significant improvement in physical health status and social functioning components in the tai chi group. But there was no usual care control group for comparison. Dechamps et al. (2010) and Taboonpong et al. (2008) were unable to demonstrate any effect of their programme on quality of life at the end of tai chi intervention.
3.5 Intervention compliance and Feasibility

Five studies reported a high attendance percentage, of over 75% in the intervention groups (Chen et al., 2010; Chen et al., 2008; Choi et al., 2005b; Fan & Chen, 2011b; Lee et al., 2010) with Fan and Chen (2011b) reporting highest attendance at 95%. Three studies did not report on attendance of participants (Chen et al., 2012; Litchke et al., 2012; Taboonpong et al., 2008).

On the whole, compliance of interventions varied between studies and appeared to be related to intensity of the intervention and level of dependence of participants. Three studies reported high intensity of interventions, ranging from 50 minutes to 1.5 hour sessions (Chen et al., 2012; Chen et al., 2007; Chen et al., 2008). Taboonpong et al. (2008) reported on 18 basic tai chi movements that were taught in 15 minutes. In this study, 4 out of 35 participants could not maintain the tai chi schedule.

Only one study reported on feasibility of the intervention (Tsai et al., 2009). In this study, only 8 out of 51 persons who were screened enrolled. Issues with participants’ dependence on staff and schedule of activities were noted to influence attendance. However, most participants reportedly enjoyed the tai chi practice.
<table>
<thead>
<tr>
<th>Study ID</th>
<th>Design and Participants</th>
<th>Intervention</th>
<th>Results/Outcomes</th>
<th>Comments/Limitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dechamps et al. (2010) France</td>
<td>RCT assessing the effects of an adapted tai chi programme (Intervention Group 1 (IG1)) and a cognition-action programme (Intervention Group 2 (IG2)) compared with usual care on health related quality of life in residential care settings. N=160 Older adults in an institution for more than 6 months, able to get up alone or with technical or human help and to be able to understand basic motor commands. Funding: None reported.</td>
<td>IG1: (n=51; mean age 83±8.6) Yang style tai chi adapted for older persons that emphasised body sensation, awareness of multidirectional weight shifting, body alignment and multi-segmental movement coordination. Deep breathing and muscular reinforcement exercises were integrated. Movement based approach; participants relied more on their learning 30 min x 4 pw for 6 months. IG2: (n=49; mean age 83.2±8.3) Cognition Action programme consisted of a 10 min warm up; lower limb movements, upper body exercises, stretching and resistance exercises performed seated; balance exercises.</td>
<td>Health related quality of life (Activities of daily living (ADL) and Neuropsychiatric inventory scores (NPI)); Balance (Timed up and go, one leg stance) ADL: No significant changes in both IGs whereas CG declined significantly after 6 months of intervention. At 12 months, the differences between IGs and CG were not significant (IG1 and CG: P=0.24; IG2 and CG: P=0.15) NPI: No difference between IG1 and CG (P=0.12); However, IG2 had a reduced total NPI score that was clinically significant at 6 months and at 12 months (P&lt;0.001) Balance (timed up and go, one leg stance) did not change significantly in IGS, but worsened significantly in CG.</td>
<td>Predominantly female participants Average attendance rate: 38.8% (IG1), 48.9% (IG2) 146/160 people completed 6-month assessments 135/160 people completed 12-month assessments Both interventions slowed down the decline in HRQoL The participants had high behavioural disturbances scores Participants in the IG1 were less disabled than those in the control group Given the multicentre site, there is no information on how consistency of the intervention was maintained. High likelihood of participants receiving unintended intervention and contaminating results The increased number of sessions</td>
</tr>
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</table>
performed standing, using chairs for support; The participants, all seated passed a light and medium size ball to the participants next to them, with their feet and arms at different heights; sessions ended with deep breathing and relaxation. 30-40 min x 2 pw for 6 months

Control group (CG): (n=60; mean age 80.9±10.1)
Usual care with no additional attention or exercise or cognitive behavioural training and long duration did not result in additional benefits.
There were no differences between IG1 and IG2 in the main outcomes.
Both interventions had many similar features such as light to moderate intensity exercises, challenge to balance, stretching and coordination, social stimulation and exercise repetitions.

<table>
<thead>
<tr>
<th>Choi et al. (2005b)</th>
<th>A cluster RCT to determine changes in physical fitness, fall avoidance efficacy and fall episodes of institutionalised older adults.</th>
<th>Intervention group (IG): (n=29; mean age 79.96±7.7)</th>
<th>Falls (incidence), fall avoidance efficacy (Falls efficacy scale), balance (time standing on one leg with eyes open and eyes closed)</th>
<th>Predominantly female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Korea</td>
<td>Sun style tai chi exercise programme consisted of 10 minutes warm-up, 20 minutes of 12 tai chi movements and 5 minutes of cooling-down exercise.</td>
<td>The IG showed significantly improved balance with their eyes open (P&lt;0.01). The IG had reduced number of falls than CG during the intervention period, but there were no statistically</td>
<td>Mean attendance rate was 80.3% for IG</td>
<td></td>
</tr>
<tr>
<td>STRONG</td>
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<td></td>
</tr>
<tr>
<td>N=68</td>
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</table>

Mean attendance rate was 80.3% for IG
59/68 participants completed the study.
Only participants who completed
Participants were ambulatory adults aged 60 years or over who had at least one of the following: (1) impaired gait (score <10 on the gait subscale (maximum 12) of the Performance Oriented Assessment of Mobility), (2) impaired balance (score <14 on the POAM balance subscale (maximum of 16)); (3) history of falling in the previous year; (4) postural hypotension, as indicated by a drop in systolic blood pressure of 20 mmHg from lying to standing; and (5) use of four or more prescription medications that may affect balance.

Funding: none reported

The warm up exercise comprised walking around with moving hands and greeting each other in the group, followed by exercises with two ranges of motion on each joint of the neck, shoulders, trunk, hip, knees and ankles. Programme was specifically designed for patients with arthritis that consisted of slow and continuous movements with a great deal of moving forward and backward. The 12 forms of the tai chi exercise involved bending of knees in wide steps. The cycle of 12 movements was repeated for 20 minutes while listening to traditional instrumental music. The cooling down exercise involved the stretching of arm and leg muscles and breathing exercises.

Intervention delivered by significant differences. The fear of falling reduced significantly in the IG than the CG (P<0.001)

Intervention were analysed for outcomes. Measures not reported for all participants initially included

At baseline, control group had better balance both with eyes open and eyes closed

Participants’ awareness of intervention assignment might have influenced their performance on post-test measures.

83
<table>
<thead>
<tr>
<th>Chen et al. (2012)</th>
<th>RCT to investigate the effects of Tai Chi on the balance control of older persons with visual impairment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hong Kong</td>
<td>N=40; visually impaired older persons form residential care homes</td>
</tr>
<tr>
<td>MODERATE</td>
<td>Participants were independent in walking,</td>
</tr>
<tr>
<td></td>
<td>a certified tai chi trainer. 35 minute sessions x 3 per week for 12 weeks.</td>
</tr>
<tr>
<td></td>
<td>CG: (n=30; mean age 78.73±6.9)</td>
</tr>
<tr>
<td></td>
<td>Maintained routine activities; did not participate in any regular exercise classes.</td>
</tr>
<tr>
<td></td>
<td>IG : (n=21; mean age 85.5 ± 6.9)</td>
</tr>
<tr>
<td></td>
<td>Modified 8-form Yang style tai chi that emphasised multi-directional weight shifting, head and trunk rotation and awareness of body alignment. Verbal cuing and physical guidance was also given. 1.5 hr x 3 pw for 16 wks.</td>
</tr>
<tr>
<td></td>
<td>Sensory organisation test (quantify individual's ability to maintain balance in a variety of complex sensory conditions)</td>
</tr>
<tr>
<td></td>
<td>IG had a significant increase in percentage change of the visual ratio compared to the CG (P= 0.006)</td>
</tr>
<tr>
<td></td>
<td>IG also had greater percentage improvement in the vestibular ratio than CG</td>
</tr>
<tr>
<td></td>
<td>23/40 completed the study.</td>
</tr>
<tr>
<td></td>
<td>Participants were independent in walking</td>
</tr>
<tr>
<td></td>
<td>Convenient sampling</td>
</tr>
<tr>
<td></td>
<td>Information on attendance not given</td>
</tr>
<tr>
<td>Lee et al. (2010)</td>
<td>Hong Kong</td>
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<tr>
<td>Study</td>
<td>Description</td>
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<tr>
<td>Taboonpong et al. (2008)</td>
<td>A quasi experimental study with a control group that investigated the effects of low intensity and short term tai chi programme on sleep quality general well-being and physical performance. N=50</td>
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<tr>
<td></td>
<td>IG1 : (n=38; age 60-69: 11; age 70-79: 11; age 80 and over: 3) Tai chi session comprised 7 minutes of warm up and 15 minutes of 18 basic tai chi movements. Video tape and music were also used. The sessions were offered from Monday to Friday, so the participants could choose any 3 convenient days to participate. 22minx3pw for 12 wks. Delivered by researcher trained in tai chi</td>
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<td></td>
<td>The environment, the independent characteristics of participants such as intact cognition and walking without assistance and other activities provided at the facility could have confounded the results.</td>
</tr>
<tr>
<td>tai chi or other exercises except stretching exercise, in the past month, had at least one of the following problems: shallow sleep, sleep less than 5 hours a night, awake more than twice at night, take more than 30 minutes to fall asleep, cannot go back to sleep when awake at night, wake up too early and not refreshed.</td>
<td>CG: (n=32; age 60-69: 7; age 70-79: 13; age 80 and over: 5)</td>
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</tr>
<tr>
<td>Funding: none reported</td>
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</table>

(Tsai e al., 2009) and (Tsai et al., 2009) (feasibility results) USA WEAK

A study using single group pre and post-test design to investigate effects of tai chi on osteoarthritic (OA) knee pain in older adults with cognitive impairment (CI).

The feasibility results of the study were discussed in 4445

N=7

IG: (n=7; mean age 83±6)

Sun style tai chi 12-form for arthritis included a warm-up, tai chi, and a cool-down period. The tai chi sessions started with 1-form of tai chi in the first session with gradual addition of a new form in each of the following sessions as participants made progress.

Pain (bodily pain subscale of the Medical Outcomes Study short form (SF-36), attendance, accuracy of performance, feasibility aspects

There were no significant differences in pain scores before and after the tai chi intervention (P=0.74).

Spearman’s rho correlation between the change in pain scores and the number of minutes attended was

The pilot study is underpowered to determine effectiveness of the intervention.

Older adults with moderate CI were able to perform the tai chi with similar or greater accuracy compared to older adults with mild CI. They also had improvements in pain that was clinically significant. However information on confounders such as participants’ illnesses and medication is not available.
Participants were residents from 4 long-term care facilities. Inclusion criteria were: 1) aged 60 years and older, 2) English speaking, 3) self-report of knee OA pain, 4) moderate to mild CI (Mini-mental status exam score 15-27), 6) physician’s permission to participate in tai chi, and 7) low activity levels defined as non-involvement in a regular exercise programme in the month before participation in the study.

Funding: none reported

Intervention delivered by a certified taichi instructor to small groups of 1-2 participants in each. Sessions lasted 20-40 minutes x 2 per week for 15 weeks.

0.78 (P<.05) suggesting a positive correlation.

Feasibility:
51 elders initially screened; 8 enrolled; 7 completed study

Reasons for exclusion: no pain, other illnesses, at risk of falls, low cognitive function making communication difficult, hearing problems, inability to walk, depression, refusal to participate, no consent from guardian/family

Chen et al. (2008) and Chen, Li, et al. (2007) Taiwan

Quasi experimental one group study with multiple time points to test the effects of a simplified tai chi exercise programme (STEP) on the physical health of older adults in long term care facilities

IG: (n=51; mean age 77.6± 4.5)

The STEP programme included a warm-up, tai chi movements and cool-down. STEP was a modified version yang style tai chi to suit older

Balance (single leg stance), hand grip strength, mental health(quality of sleep)

Participants’ hand grip strength (P=0.003) and mental health (quality of sleep P=0.003) improved significantly with improvements maintained throughout the end of

29/51 completed the study

Average attendance rate was 75.49%

The generalizability of the results are limited due to:
1. convenience sampling
<table>
<thead>
<tr>
<th>N=51</th>
<th>Male residents of two veteran homes. Inclusion criteria were: (1) aged 65 and over; (2) no previous training in any form of Tai Chi; (3) had lived in the facility for at least one month; (4) cognitively alert and had a score of at least eight on the Short Portable Mental Status Questionnaire (SPMSQ); (5) able to walk without assistance; and (6) had a Barthel Index (BI) score of 61 or higher. Funding: National Science Council, Taiwan</th>
<th>people, with fewer leg movements; fewer knee bends and less complicated hand gestures. Format: in groups of 15-20, prior to breakfast. Sessions were of 50 minute duration, with two 5 minute breaks in between. First 6 months, intervention conducted by instructor and the next 6 months, intervention was video-guided. Intervention delivered by two STEP certified instructors: One instructor demonstrated and lead the programme while another corrected positions of participants. 50 min x 3 pw for 6 months</th>
<th>the 12 months study. Balance scores at 6 months post intervention remained unchanged (pre intervention mean: 1.64; post intervention mean: 1.64), however improved over next 6 months (mean2.45), though statistically not significant (p=0.070).</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Chen et al., 2007)</td>
<td>A single group quasi-</td>
<td>IG: (n=28; mean age well-being outcome variables,</td>
<td>2. all participants being independent in activities of daily living 3. All participants were male 4. There is no information on blinding of outcome assessors.</td>
</tr>
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</table>

Convenience sampling and 59.21%
Taiwan

**WEAK**

Experimental study to examine the effects of tai chi on the physical and psychological well-being of older people in long-term care facilities

N=28

The inclusion criteria for the participants were: age 65 years and over; no previous Tai Chi practice experience; living in the facility for at least one month; familiar with Mandarin or Taiwanese; cognitively alert and able verbally to state their name, address and answer questions; absence of severe and acute cardiovascular, musculoskeletal or pulmonary illnesses. Participants had moderate level of dependency (Barthel index 85.75±3.26), requiring a helper or assistive devices to carry out daily activities.

Yang style tai chi, that was of low intensity and non-strenous for older adults was taught in two groups of 13 and 15 people. The movements were relaxed and in a flowing manner, with the erect trunk as the axis for all movements. It involved gradual shifting of weight from one foot to the other with smooth, coordinated body and ankle rotation, arm swing and leg extension.

Intervention delivered by a certified trainer; a RN licensed research assistant was present during all sessions to prevent possible harm from the intervention.

60 minute sessions x 2 per week for 6 months.

Including physical and mental health status (SF-36 questionnaire), quality of sleep, occurrence of falls and fear of falling.

There were statistically significant improvements in the social functioning (0.001) and physical health status (P=0.038) components of the SF-36 questionnaire. There were no statistically significant differences in occurrence of falls, fear of falling and quality of sleep.

Attendance rate

21/28 completed the study

Small sample size limit the generalizability of the results.

There is inadequate information on participants’ comprehension of the questionnaire; especially given that one third of participants had received no education.

Attrition details are not provided.
out ADL such as bathing, eating or toileting. They were able to stand alone without assistance to practice tai chi.

Funding: National Science Council, Taiwan
<table>
<thead>
<tr>
<th>Study ID</th>
<th>Design and Participants</th>
<th>Intervention</th>
<th>Results/Outcomes</th>
<th>Comments/Limitation</th>
</tr>
</thead>
</table>
| Litchke et al. (2012) | A study using pre-post design to examine the influence of chair yoga on balance, cognition, anxiety, depression and ADLs for persons with mild to severe stages of Alzheimer’s Disease (AD) N=27  
Participants were residents from two assisted living homes, with AD. They were divided into 3 groups based on scores obtained on Global Deterioration Scale: mild AD (level 4), moderate AD (level 5) and severe AD (level 6)  
Funding: none reported                                                                                      | IG: (n=27; age range 69-98)  
A Lakshmi Voelker chair yoga (LVCY) based on raja yoga and hatha yoga was used in this study. An average of 32 seated yoga poses were taught in 1-5 weeks; 8 seated poses were added in weeks 6-7, and 6 additional poses (standing and partnered) were added in weeks 8-10, for a total of 46 poses. Each pose was held for approximately one to two breaths, with a brief rest period after each of the following series of poses: warm-up, sun salutation, seven essential sitting movements, warrior, balance self-massage, seated spinal, and final relaxation. According to the LVCY teaching method, | balance (Berg Balance Scale), activities of daily living (ADL)  
There were no significant improvements in any outcome measures. However, improvement was noted in ADLs in the participants who had mild AD.                                                                 | Convenience sampling and small sample size limits generalizability of the results.  
19/27 completed study  
Predominantly female (n=15)  
House managers and caregivers were involved in communicating the residents and their families for participation, and for outcome measurements.  
Only participants who completed intervention were analysed for outcomes. Information on whether there were differences between participants who did not complete the study and the participants who completed the study is not provided. |
three levels of modification/flexibility were taught with the majority of poses to allow residents maximum engagement. The breathing style used throughout classes and during rest periods consisted of breathing in through the nose and exhaling through the mouth.

Intensity and duration of the programme was increased gradually from 30 minutes to 1 hour.

The sessions were delivered by the principal investigator who was also a certified LVCY teacher, a Level One Yoga Fit instructor, and a certified therapeutic recreation specialist. Participants used padded chairs with or without arms depending on their level of function.
### Fan and Chen (2011b) Taiwan

**WEAK**

A quasi-experimental, pre and post-test study with a control group to test the effects of yoga exercises on the physical and mental health of older people with dementia living in long-term care facilities.

N = 68

The inclusion criteria were: (1) aged 60 years and over; (2) diagnosed with dementia according to the definition in the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSMIV); (3) a Mini-Mental State Examination (MMSE) score of 18–23 (indicating IG: (n=33; mean age 78.73±6.9)

Silver yoga exercise with three phases: warm-up: 20 minutes, eight movements performed slowly and repeated 3-4 times to loosen the body structure, hatha yoga (20 minutes) that comprised seven gentle, stretching postures to increase range of motion and progressive muscle relaxation, considering the physical abilities and tolerance of elderly people, with each posture being held for 4-5 seconds and repeated 4 times, and 10 minutes relaxation with three activities to rest the body.

Balance(one-leg standing test, 6 meter walking speed test);
Mental health status: depression state (The Cornell Scale for Depression in Dementia) and problem behaviours (the Clifton Assessment Procedures for the Elderly Behaviour Rating Scale)

IG had significantly improved balance scores (P<0.05) and significant reduction in depression state (P<0.001) and problem behaviours (P<0.001) after 12 weeks of intervention.

59/68 completed the study

Average attendance rate was 95.46%

Convenience sampling and small sample size limits generalizability of the results.

59.3% participants were female. The average MMSE score was 18.75 ± 2.26, indicating mild dementia. The average Barthel Index score of the participants was 91.95 ± 8.46, indicating mild dependence in self-care activities, such as bathing, eating, or toileting.

There is no detail about how the consistency of the intervention was
| Chen, Chen, et al. (2010) And Chen, Fan, et al. (2010b) Taiwan WEAK | A cluster RCT to test the effects of a 6 month yoga exercise programme in decreasing depression, improving sleep quality and physical fitness (balance) in transitionally frail elders living in assisted living facilities. N=69 Inclusion criteria for participants included (a) transitional frail elders aged 65 years or older with a Barthel | IG: (n=38; mean age 78.73±6.9) Silver yoga exercise program included a 20 minute warm-up with eight postures; 20 minutes of hatha yoga that comprised seven gentle stretching postures and a 10 minute relaxation phase with three activities to rest. The sessions included a 5 minute break between the warm up and the hatha yoga. | Sleep quality (Pittsburgh Sleep Quality Index), depression state (Taiwanese Depression Questionnaire), balance (one leg stand test). After 6 months of performing yoga exercises, participants' overall sleep quality had significantly improved, whereas depression, sleep disturbances, and daytime dysfunction had decreased significantly (p < .05). There was no significant improvement in balance scores post intervention. Attendance rate averaged 80.83% 55/69 completed the study and were analysed for outcomes. Regular exercise habit seen in more than half of the participants might have confounded the results. All participants were cognitively intact; Average Barthel Index score was 99.55 indicating mild dependency in self-care. The demographic profile was significantly different in that nearly half of the CG participants smoked, whereas none of the IG maintained between the facilities. Clustering not accounted for in analysis, which may lead to overemphasis of the results. | mild dementia); (4) living in a long-term care facility for at least six months; and (5) have not participated in any kind of exercise sessions in the previous six months. Funding: none reported | Interventions were delivered by two certified instructors. Sessions of 55 minutes x 3 per week for 12 weeks. CG: (n=35; mean age 78.73±6.9) Usual activities |
index score of 91-99 (mildly functionally dependent), (b) no previous training in any forms of yoga, (c) ability to walk without assistance, and (d) cognitively intact as demonstrated by a Mini-Mental State Examination score of 24 or higher.

Funding: Social Affairs Bureau of Kaohsiung City Government, Taiwan.

The hatha yoga exercises were designed to increase range of motion and progressive muscle relaxation in older adults with special consideration for their physical abilities and tolerances. Abdominal breathing was emphasized in each phase.

Participants in IG were divided into groups of 12-13 people. Interventions were delivered by two certified silver yoga instructors.

Sessions were of 70 minutes duration x 3 per week for 6 months.

CG: (n=31; mean age 78.73±6.9)

Usual daily activities.

participants smoked.

Clustering not accounted for in analysis, which may have led to overemphasis of the results.

Mean values for balance measures not reported.
3.6 Discussion

This review was initiated based on the premise that whilst there is evidence that both tai chi and yoga improve balance, pain and quality of life in older adults who are healthy and independent in the community (2005; Hakim et al., 2010; Li et al., 2005; Lin, Hwang, Wang, Chang, & Wolf, 2006b; Wolf, Barnhart, Kutner, McNeely, Coogler, & Xu, 1996), little is known about whether similar benefits are seen in frail older adults in long-term residential care. The high risk of falls and its debilitating consequences in this population emphasise the importance of undertaking this investigation. The studies included in the review provide preliminary evidence that suggest yoga and tai chi interventions may be associated with improvements in balance, fall, pain and quality of life measures in older adults living in RACFs. Whilst frail older adults have been excluded from research for a range of reasons (Freret, Ricci, & Murphy, 2003; Hsu & Chen, 2005; Tsai et al., 2009), this review demonstrates emerging evidence relating to the use of tai chi and yoga amongst older adults that holds promise for those who live in RACFs.

The review accounts for studies on older people living in RACFs. More studies were conducted in Asia (Taiwan) than in Europe or the USA. There were none reported from Australia, New Zealand or United Kingdom. Vast differences were identified in the number of participants across the studies and the small sample sizes in some threaten the generalizability of their results (Chen et al., 2012; Chen et al., 2007; Litchke et al., 2012). On appraising the inclusion and exclusion criteria of the studies, discrepancies in the target population existed between the studies. In five studies, the inclusion criteria for participants included ability to walk without assistance and intact cognition (Chen et al., 2007; Chen et al., 2010; Chen et al., 2008; Lee et al., 2010; Taboonpong et al., 2008) suggesting relative independence of residents. In six other studies participants with impaired vision, gait, balance, mild to moderate cognitive impairment or with diagnosis of dementia were included indicating a higher level of dependence (Chen et al., 2012; Choi et al., 2005b; Fan & Chen, 2011b; Litchke et al., 2012; Tsai et al., 2009). There is a clear difference in resident characteristics between the included studies.
Methodologically, the overall quality of the included studies was low. Four studies were conducted without a control group (Chen et al., 2007; Chen et al., 2008; Litchke et al., 2012; Tsai et al., 2009). This poses a major problem for interpretation as observed changes may be due to the intervention or may just be a natural course of the ageing pathology. Of the seven studies with a control group design, only four studies used random assignment (Chen et al., 2012; Chen et al., 2010; Choi et al., 2005b; Dechamps et al., 2010). The poor quality of included studies limits the generalizability of the findings. Furthermore, different instruments were used to measure the different outcomes of interest, which compromised comparison between different studies.

No studies reported on adverse events. It is unclear if there was lack of reporting of adverse events or whether no actual adverse events occurred. This makes it difficult to determine whether the interventions are safe for frail older people. Furthermore, none of the studies examined long-term effects of the interventions. This makes it difficult to determine whether the benefits if any, resulting from short-term interventions of tai chi or yoga could be sustained. However, it appears that there is a high degree of intervention compliance demonstrated in all the included studies in spite of the dependent nature of the participants which suggests a level of motivation for these types of interventions.

Several gaps in evidence are identified in this review:

- Only one study assessed pain and four studies assessed quality of life. Studies that limit to physical parameters could limit the scope and outcomes of fall prevention interventions. Most studies included in this review did not measure social and psychological components which are important for the older persons. Looking beyond fall prevention may lead to effective ways of promoting health of older people (Ward-Griffin et al., 2004). Including broader determinants of health within fall prevention programmes could aid older people to cope with the physical, social and psychological challenges of older age (Bowling et al., 2003).
• There are no reports of qualitative studies. Qualitative studies are important, especially in health care intervention investigations, as they provide comprehensive understanding of various aspects such as design, process, conduct and outcome measures by optimising the implementation of the study, and facilitate interpretation of the study findings (O’Cathain, Thomas, Drabble, Rudolph, & Hewison, 2013). This is useful to care providers and health care practitioners, as irrespective of effectiveness of interventions, it may not be applicable if it is not perceived as suitable or feasible by care recipients. Qualitative studies that include perspectives of health care professionals and service providers are helpful to understand and address aspects that are vital to implementation of interventions. For example, in a facility with minimal resources, use of volunteers in providing information about the study could help in the recruitment of participants.

• The included studies did not provide details of modification of the yoga and tai chi interventions other than generic details such as intensity, duration and frequency. A clear description of the forms of yoga and tai chi would allow the intervention to be tested in another setting or for a larger population.

• There were no reported studies from RACF settings in Australia, New Zealand or UK. There is a lack of studies investigating yoga and tai chi for frail older adults in residential aged care settings. This is significant in the face of promising evidence for yoga and tai chi in the community dwelling older population and the urgent need for suitable intervention that addresses fall prevention and other health domains.

• All the studies in this review were conducted in residential aged care settings. However, only six studies reported their sample population as having moderate dependency for self-care as is evident by the described participant characteristics such as: impaired vision, gait, balance, mild to moderate cognitive impairment and diagnosis of dementia. The remaining studies (n=5) despite being conducted in a RACF setting, comprised a relatively independent sample of older people. This limits the generalizability of the findings to the general RACF population.
However the high degree of compliance demonstrated in most studies suggests that yoga and tai chi interventions could be implemented in RACF settings.

3.7 Conclusions

In this chapter, I presented a critical review on recent evidence on studies that investigated yoga and tai chi interventions in residential aged care settings and identified gaps in the literature. In the following chapter, I present the results of a randomised controlled trial that investigated the feasibility and influence of a 14 week modified yoga and tai chi programme in a residential aged care facility.
Chapter 4 Design and methods
4.1 Introduction

In the previous chapter I reviewed the relevant literature on the influence of yoga and tai chi on balance, pain and quality of life for older adults in RACFs.

In this chapter, I outline the research design, the rationale for selecting the methods, application of mixed method design to the study, methodological challenges in older person research, ethical considerations, staffing and reflections on the researcher’s position in the study. The design of the quantitative study (RCT) and the qualitative study are described in detail in the respective results chapters 5 and 6. The participatory and collaborative process involved in the mapping of suitable forms of yoga and tai chi for frail older residents of the RACF is described in detail in chapter 7. Recruitment of participants and the process, inclusion and exclusion criteria, interventions, outcome measures relevant to the RCT and statistical analysis is described in detail in chapter 5. Recruitment of participants to the focus group interviews and thematic analysis of data are discussed in chapter 6.

4.2 Aims, objectives and hypotheses of the study

As described in the introduction to this thesis, the main aims of the research were to implement, “map” and evaluate a 14 week programme of yoga and tai chi for frail older adults in a RACF.

The objectives were:

Objective 1:

To determine the feasibility of conducting a three arm RCT in a RACF with frail older people that tests the following hypotheses:

Hypothesis 1:
A 14 week modified yoga programme is more effective than usual RACF activity programme in improving balance function, quality of life, pain experience and in reducing number of falls in a RACF.

Hypothesis 2:

A 14 week modified tai chi programme is more effective than usual RACF activity programme in improving balance function, quality of life, pain experience and in reducing number of falls in a RACF.

Objective 2:

To explore the participant (the residents and staff) perspectives on whether the 14 week modified programme of tai chi and yoga was feasible and appropriate.

Objective 3:

To observe and map the implementation of modified approaches of yoga and tai chi with older people in a RACF.

The study used a concurrent mixed methods design, incorporating a Randomised Controlled Trial (RCT) and qualitative focus group interviews designed to explore the participant (the residents and staff) perspectives on whether the 14 week modified programme of tai chi and yoga was feasible and appropriate. RCTs are considered the gold standard for evaluating procedures (Kao et al., 2008). The qualitative arm of the study utilised FG interviews with the participants of the study and descriptive analysis based on the tenets of naturalistic inquiry (Lincoln & Guba, 1985). The qualitative findings were designed to complement the findings of the RCT by providing a broader perspective of the programme, thereby adding richness to the research (Creswell, 1997).

4.3 Mixed methods approach

Morse and Niehaus (2009, p. 9) define mixed methods design as “the use of two (or more) research methods in a single study, when one (or more) of the methods is not
complete in itself”. Mixed method approaches maximise the strengths and minimise the weaknesses of both quantitative and qualitative methods (Creswell, 2003; Johnson & Onwuegbuzie, 2004). The advantage of combining approaches has the potential to form greater and comprehensive understanding of the research problem and inferences that are more valid and credible (Greene & Caracelli, 2003).

4.4 Application of mixed methods design to the study

4.4.1 Rationale

The research objectives, outlined in the introduction to this thesis, were intended to provide a comprehensive understanding of the yoga and tai chi programme, its implementation and outcomes, thereby assisting with future programmes. The concurrent mixed methods design was the most suitable design to address the research objectives and to extend the scope, breadth and range of the enquiry (Rallis & Rossman, 2003). A study with simultaneous or concurrent mixed method design comprises quantitative and qualitative components that are conducted simultaneously (Morse, 2010).

The first research objective sought to determine the feasibility and effectiveness of yoga and tai chi interventions for frail and dependant older adults in RACFs. Investigation of feasibility was necessary as there was lack of evidence on a suitable programme of yoga and/ or tai chi for frail older population in residential care settings as suggested in Chapter 4. Mandelblatt, Weinstein, Russell, Marthe, and Panel on cost effectiveness in health and medicine (1997) describe effectiveness as the impact of a health intervention under ideal conditions. In this study, the research questions were: (a) Did participation in the yoga and tai chi programme have an effect on balance, pain and quality of life for the frail and dependent older adults in the RACF? This question was answered by statistical analysis of data gathered in the RCT. (b) Was it feasible to conduct a 14 week modified yoga and tai chi programme in a RACF? This question was answered by statistical analysis of data gathered in the RCT.
The second research objective was to explore the participants’ perspectives on whether the 14 week modified programme of yoga and tai chi was feasible and appropriate. To answer this question, a qualitative study was conducted as a supplementary component to the RCT. This study used qualitative focus groups, the findings of which were analysed using a qualitative descriptive thematic analysis. The qualitative study was intended to capture participants’ (residents and support staff) views, thereby adding depth to our understanding of the programme.

The third research objective was to observe and map the suitable approaches of yoga and tai chi for frail and dependent older people in the RACF. The related research question was: What are the approaches of yoga and tai chi that are suitable to the frail older people in the RACF? This question was answered using a qualitative participatory approach that involved input from all main stakeholders and video records of the entire tai chi and yoga sessions.

**Concurrent Embedded Strategy**

Numerous models have been described for combining methods (Creswell, Plano Clark, Gutmann, & Hanson, 2003). The present study used the ‘concurrent embedded strategy’ as described by Creswell and Plano Clark (2007) illustrated in figure 4-1. In this model, the qualitative methodology is located within an experimental design. This model was selected as it was well suited to the study’s purposes and setting. Consistent with Creswell and Plano Clark (2007) overall findings of the present study were based on interpretation of both the quantitative results and qualitative findings.
According to the concurrent embedded model, the RCT formed the core component and the embedded qualitative study augmented that core, adding insights and explanation to the findings of the core (Morse, 2003). Thus, the ‘theoretical drive’ of the overall research was deductive, and the method used was quantitative. However, in conducting the embedded study, the direction became inductive and the method used was qualitative. The process of observing and mapping of the suitable approaches of yoga and tai chi used with the older participants in the study, although embedded in the RCT, was designed in a way that involved continued refinement of the intervention throughout the study without influencing the measured outcomes of the RCT.

4.5 Data Collection

For this study, the data collections were essentially concurrent. Data for the RCT were gathered 6 months prior to the interventions, at specific points during the intervention
(week 1, week 7 and week 14), and 6 months after the intervention. The qualitative focus group interviews were conducted in the week following cessation of the exercise classes. The data for mapping the suitable yoga and tai chi programmes was collected throughout the study from the initial planning phase to the evaluation phase. This process is described in detail in Chapter 7.

4.6 **Integration of data**

The data generated from the RCT and qualitative focus groups were analysed separately and interpreted together (Tashakkori & Teddlie, 2003) at the end as shown in the figure 4-1. The final inferences are presented in Chapter 8 of this thesis.

4.7 **Overview of the study**

The study presented in this thesis investigated the processes and outcomes of yoga and tai chi interventions delivered in a RACF by experienced instructors. The modified approaches of yoga and tai chi intervention, an outcome of the study, resulted from a collaborative and participatory approach of main stakeholders. The modified yoga and tai chi programme was designed to be suitable for implementation in a residential care setting. A summary of the research framework is presented in Table 4-1.

**Table 4-1: An overview of the research framework**

<table>
<thead>
<tr>
<th>Components of quantitative data collection:</th>
</tr>
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<tbody>
<tr>
<td>1 Data on falls incidence 6 months prior to the intervention and 6 months after the intervention was collected for participants (Intervention and Control groups)</td>
</tr>
<tr>
<td>2 Participants randomised to yoga intervention group, tai chi intervention group and control group</td>
</tr>
<tr>
<td>3 Records of attendance at yoga and tai chi sessions (Intervention groups)</td>
</tr>
</tbody>
</table>
Participants’ balance measured immediate pre and post intervention (Intervention and Control groups) using Berg Balance Scale

Participants’ pain measured immediately pre and post intervention and mid intervention at week 7 using Verbal Descriptor Scale

Quality of life measured immediately pre and post intervention and mid-intervention at week 7 (Intervention and Control groups) using Dementia Quality of Life (DQoL) questionnaire

Components of qualitative data collection:

1. Post intervention semi-structured qualitative focus group interviews for participants of the yoga group, tai chi group and control group

Data analysis:

1. Quantitative data were analysed by descriptive statistics, Kruskal-Wallis one-way analysis of variance and a generalised estimating equation model

2. Qualitative data were interpreted using thematic analysis

Discussion and inferences:

Quantitative results and qualitative findings are discussed within respective chapters and also discussed jointly in the final section of the thesis. Significant factors identified by quantitative analysis were compared with themes that emerged from the interviews.

Priority: Quantitative

Sequence: Quantitative + qualitative concurrently

Integration: Research questions and primarily at inference stages
Strengths:

Mixed methods design allowed for a deeper and broader understanding of the exercise programme. A draft program of modified yoga and tai chi program for older adults in RACF was an outcome of the study. Practical contributions and directions for future research were identified.

Weakness:

Complexity of the design demanded more time and resources.

4.8 Study setting

The study was conducted at a residential aged care facility at Newcastle, New South Wales, Australia. The RACF was a 108 bedded facility offering low and high dependency residential care. The RACF was located in a tranquil surrounding and was equipped with facilities such as single private, double private and semi-private (or shared) rooms, private garden space, an in-house gymnasium, a dental clinic, a beauty salon, a chapel, a theatre room, various courtyards, library with computer access, lounge area with a pool table, barbeque and outdoor gardens. The yoga and tai chi interventions and focus group discussions were conducted in a large room that was well ventilated and lighted. The assessments (balance, pain and quality of life) were carried out in the participants’ rooms.

4.9 Methodological Challenges in conducting research for older persons in residential aged care settings.

The literature review in chapter 3 shows there is little evidence on research involving intervention studies for frail older people in residential aged care settings. Difficulty in conducting research involving frail older people is well documented (Freret et al., 2003;
Higgins et al., 2009; Higgins, Van Der Riet, Slater, & Peek, 2007; Hsu & Chen, 2005; Kehinde, Pope, & Amella, 2011; Ross et al., 2005; Tsai et al., 2009). The methodological challenges encountered in this study are very similar to those identified by the studies involving frail older people as listed previously.

Study criteria and design

In RACF1, there were not adequate number of residents who met the inclusion criteria, for example MMSE scores of above 24. Given the prevalence of dementia, depression and other disorders affecting memory and cognition (Australian Institute of Health and Welfare (AIHW), 2012b, 2013a; Caffrey et al., 2012), it was difficult to recruit participants who scored above 24, especially in the high care section of the RACF1. Accordingly the inclusion criteria were broadened in the second recruitment attempt (at RACF 2) where residents who were able to understand, follow and respond to simple instructions were included. Participants with severe cognitive disorders were excluded.

Many residents who volunteered to participate were not happy about the randomisation, as they preferred tai chi or yoga and not the control group. For future studies, with adequate resources, the control group participants could be offered their preferred intervention after the intervention period. Some participants felt 14 weeks was a long time for them to commit to and refused to participate. Blinding the participants was not possible as all participants came from the same facility.

Staff support

Due to heavy workload, shortage of staff and prioritisation of nursing routines, the nursing staff members were not available to support the programme; In my experience at the RACF1, this was evident during the group presentations that I conducted to explain about the study. Very few nursing staff attended as they could not take time away to attend the presentation. In RACF 2, this problem was effectively addressed, as the management identified the recreational activity officers as available for supporting the study. They organised the schedule of activities, to accommodate the research
interventions. Furthermore, lack of understanding of the research programme could have also contributed to the poor support of staff members. Demonstrations of the yoga and tai chi programmes during recruitment of support staff could have been useful. However, a demonstration of yoga was arranged in RACF1, however, this strategy failed to recruit adequate support.

**Fixed Schedules**

In RACF 1, among the residents who expressed interest in the study, many could not find time to participate as they were actively involved in various activities, in the community. Inviting them to allocate time for participating in a new programme, such as the tai chi and yoga was difficult. Several other residents were dependent on fixed schedules imposed by the RACF and the schedules would not accommodate a new programme.

**Older persons’ health**

Some participants were afraid that they could not keep up with the class and feared being embarrassed by other participants or staff members. They were reassured, they were encouraged to talk about their feelings, and this helped them. Encouragement and providing some time for them to clarify their doubts and fears about the programme provided the necessary assurance during practice. Experienced and competent instructors also played a vital role in addressing participants’ fear and safety concerns. This is also discussed in detail in chapter 6 section 6.3.5.

The tools that were used to assess the study outcomes were adapted considering the physical and cognitive limitations of the participants. The DEMQoL questionnaire was administered with considerations of the residents’ physical limitations. The questions were read slowly, in a clear voice and with clear pronunciation. I had a native English speaking staff member support me in this regard, in instances where the resident could not understand my pronunciation. Some questions were repeated and time allowed for their response. The items in the DEMQoL questionnaire were simple to understand for
all the participants. The participants did not have any problems with understanding or responding to the Verbal Descriptor Scale. However, for one resident, asking questions of pain brought back memories of a very painful experience in his past, that he became emotional. I did not continue administering the scale, but just sat with him, offering support, letting him know it was alright to express his emotions.

Perceptions of residents and staff

Some residents associated tai chi and yoga with specific religions or foreign culture and hence did not want to participate. Lack of knowledge of yoga and tai chi for some residents was demotivating to participate. Many residents remarked, “I am too old to do yoga”. There were some staff members who held similar opinions. Ageist attitude, prejudice about ability of the older person to participate (Higgins et al., 2007) could have prevented some staff from active involvement in the programme. In future studies, demonstrations of yoga and tai chi modified for older people that are video recorded could be shown during recruitment of staff and residents.

Staying connected with people

During recruitment, I spent 20-30h hours a week for 4 months, at the study site (RACF 2). This helped in the successful recruitment as it gained me acquaintances of many residents, administrators, care staff, activity officers, janitors and receptionists. Getting familiarised with these staff and residents helped me to establish a good rapport that was helpful in the recruitment. When the residents saw me frequently and interacting well with the staff and other people at the facility, they started communicating with me easily, involving me in their day to day activities. For example, one resident wanted me to help wrap gifts for her family during Christmas; another resident would want me to sit with her so she could talk about her past. I found the time spent in this manner was useful for me as a researcher, as I felt it easier to communicate, and did not feel alienated. The residents would also introduce me to their visiting friends and family and they were genuinely interested in our study and appreciated our efforts. Some
volunteers who were also interested helped with getting the participants to the venue on time.

4.10 **Ethical considerations**

Approval was obtained for this feasibility study from the Human Research Ethics Committee, University of Newcastle (approval number: H-2010-1164) and the ethics committee of the RACF, Newcastle, NSW that was involved in this study. The ethics approval letter is attached in the appendix 1.

**Consent**

There were eleven residents who had MMSE scores of below or equal to 24 amongst the participants of the present study. Amongst the study participants, two residents had the diagnosis of stroke, and another two with dementia. One participant suffered with depression. This suggests that some participants may have had loss of cognitive agility and good memory. However, it is important to note that MMSE is not sufficient to determine decision making capacity concerning participation in research (Fitten, Lusky, & Hamann, 1990; McKinnon, Cournos, & Stanley, 1989). Furthermore, if the sample was to be representative of the study population, it was important to include people with cognitive difficulties and it was unethical to do otherwise.

While the participants’ recorded MMSE scores were considered for baseline comparison; assessment of participants’ decision making capacity, ability to understand and respond, was carried out by considering cues as suggested by Harris and Dyson (2001) in their discussion paper on recruitment of frail older people to research. This included observing whether: the resident was able to concentrate on the researcher’s explanation by listening actively and responding appropriately; were there any signs of inconsistency or repetition in their answers; was the resident preoccupied; how they expressed their whether they understood or not; did they appreciate the importance of consenting and not consenting, did they understand a need for a decision and were they able to consider the risks and benefits of their choice.
If the residents were unable to understand the project, provisions were made to obtain proxy consent. However, in this study, all participants gave their own written consent. For studies that include participants with cognitive impairment, it is suggested to obtain proxy or relative consent after determining that the proxy or relative has the best interests of the resident (Harris & Dyson, 2001).

When it was clear that the resident has understood the explanation of the project, the resident was asked about their decision. In this study, there were no issues encountered by the residents in this regard. However, to aid in the residents’ decision making, the researcher was cautious not to make any statements that would have implied coercion. The resident was given time to think about their decision and to consult with friends and family. The researcher also explained that the consent was not in any way binding, and that they could always decide to discontinue from the study. Once the resident decided, they were thanked for their time and consideration, and were asked to sign the consent form. The researcher explained to them that the consent was a record that the study has been explained to them and that it was their decision to take part.

Information statements and consent forms were provide to the primary participants before random allocation. The recruitment process is described in detail in chapter 5. A copy of the information sheet and consent form for all primary and secondary participants of the study is attached (appendices 2 to 10).

Privacy and confidentiality

Confidentiality of the consent forms was ensured and the researcher was aware of the requirement for anonymity at all times. Each participant in the study was given a pseudonym or a code. The pseudonym or code was used consistently throughout the data analysis and reporting of the observations, interviews and journals. No identifying details of the participants were recorded. Pseudonyms that had no resemblance to the participants’ real names were used in the transcribed interviews and when reporting the outcomes of the inquiry.
All data collected is stored in a locked filing cabinet in the School of Nursing and Midwifery (SONM) and will remain stored in this manner for a period of fifteen years. Taped interviews and transcriptions will be stored in a locked filing cabinet in the SONM for the required period of 5 years. Only authorised personnel have access to the data, and include the team of researchers.

4.11 Staffing and researcher roles in the study

Student Physiotherapists who were trained to administer Berg Balance Scale were recruited to measure balance for all the participants at week 1 and week 14. Experienced and certified Tai chi and yoga instructors were recruited to implement the interventions. The support staff from the RACF also voluntarily provided support in the recruitment and implementation phase of the study. The research supervisors established connections with higher management of the RACFs through meetings, participated in the recruitment meetings, presentations and during data collection (video records). The student researcher recruited all participants to the study and undertook the majority of work for the study including: administration of tools to assess pain (Verbal Descriptor Scale) and quality of life (Dementia Quality of Life Questionnaire) for all participants at week 1, 7 and 14; video recording all tai chi and yoga sessions and maintaining a journal to enable mapping of suitable forms of yoga and tai chi that is presented in chapter 7; entering the quantitative data and transcribing the qualitative focus group interviews. To promote consistency, the student researcher undertook all embedded focus group interviews and was supported by the research supervisors. The entire research project was co-ordinated by the student researcher with guidance from the supervisors.

4.12 The researcher’s background and position

It is important to consider the background and potential influence of the researcher in the premise of qualitative research (Richards, 2005). In the present study, the researcher was a registered nurse, with 9 years’ experience in teaching and nursing practice. I
come from Sri Lanka and my 9 years’ experience in nursing was in India, Seychelles and Sri Lanka. My exposure in countries other than my home country and experience with older adults had equipped me with capability to adapt to the setting of the study in Australia. My background and experience had the potential to have both positive and negative influences on the study. My experience as a nurse helped me understand the issues that emerged from the course of the research and to communicate with the older participants. However, my background being a foreign country where English was not the first language could have led to assumptions about my understanding of the older people and could have influenced the expressions of their true experiences. Further, as a consequence of my background, I may have brought to the study some preconceptions that could have unconsciously influenced the way I approached the interviews, analysis and interpretation.

It is important for me as the researcher to be aware of my position, especially in the qualitative part of the research, as were my supervisors who monitored the objectivity of the research process. Throughout, I was aware of my actions and role in the study. As part of the reflexive process, I regularly questioned myself with regard to my understanding and the origins of my perspective. During the period of data collection and the focus group interviews, I was conscious of the need to gain the trust of the participants, and as such stated my position and adhered to the approved ethical requirements.

### 4.13 Conclusion

In this chapter I have presented and discussed the application of a mixed methods model to the present study (RCT and embedded qualitative study), focussing on elements common both to the RCT and the embedded study. The study setting and methodological challenges in conducting research with older adults in RACFs are described in detail. The chapter concludes with a discussion of the researcher’s background and position in the study. The methods and approach related specifically to
the RCT, the embedded study and the mapping of the suitable forms of tai chi and yoga are discussed in the following chapters 5, 6 and 7.
Chapter 5 Results: The influence of yoga and tai chi on balance and falls in a residential care setting – a randomised controlled trial.
5.1 Introduction

In the previous chapters 2 and 3, I have presented the context of the research setting for this study and critically reviewed the current literature on the influence of yoga and tai chi on balance, fall incidence, pain and quality of life amongst older adults in RACFs. The background literature discussed in chapter 1 identified a clear need to investigate suitable fall prevention exercise interventions for older adults in RACFs and emerging evidence for holistic interventions such as yoga and tai chi as holding potential to prevent falls by improving balance and fear of falling amongst older adults. In chapter 2, the review of the current literature on yoga and tai chi studies in residential aged care settings suggest that these interventions could have positive influence on balance, pain and quality of life for older adults in RACFs. However, there is no evidence on whether yoga and tai chi interventions could be safely implemented in RACFs in Australia. In this chapter, the results from assessments in a randomised cohort of older adults in a RACF are presented. I outline the following headings here. Firstly, I present the objectives of the study and the hypothesis statements that are followed by the predetermined feasibility criteria. In the Methods section, I describe the study design and setting, the detailed recruitment of participants, the process of randomization, the inclusion and exclusion criteria, the detailed descriptions of the interventions and control (usual care), the outcome measures, participants ‘demographic information and statistical analysis. I then present the results section that first describes the participant flow, the baseline characteristics of participants, compliance, adverse events and the effects on the primary and secondary outcomes. Finally I discuss the significant findings by comparing the outcomes in the context of current literature and identify the limitations and implications of the RCT.

The content of this chapter has been accepted for submission to the journal Contemporary Nurse.
5.2 **RCT Objectives and hypotheses**

The main objective was to determine the feasibility of conducting a three arm RCT in a RACF with frail older people that tests the following hypotheses:

Hypothesis 1: A 14 week modified yoga programme is more effective than usual RACF activity programme in improving balance function, quality of life, pain experience and in reducing number of falls in a RACF.

Hypothesis 2: A 14 week modified tai chi programme is more effective than usual RACF activity programme in improving balance function, quality of life, pain experience and in reducing number of falls in a RACF.

The predetermined feasibility criteria comprised: successful recruitment of 30 participants, 50% retention of participants until completion of study, 50% attendance of participants, and absence of serious adverse events requiring hospitalisation.

5.3 **Methods**

5.3.1 **Study design and setting**

This was a randomised controlled trial (RCT) conducted in a residential aged care facility in the Newcastle region, New South Wales, Australia. The RACF was a 108 bedded facility offering low and high dependency residential care. This feasibility study was approved by the Human Research Ethics Committee of University (HREC) of Newcastle and by the ethics committee of the RACF. All participants provided written informed consent.

Feasibility studies are used to approximate the main components of a study (Arain, Campbell, Cooper, & Lancaster, 2010). In the case of this study, the feasibility criteria for recruitment, retention and completion were based on the need to ensure an adequate number of participants for the intervention arms: yoga and tai chi, to test the outcome measures and to determine the suitability of yoga and tai chi with frail older people. The
absence of serious adverse events was essential in the light of the need to demonstrate safety.

The trial was registered with the *Australian New Zealand Clinical Trials Registry (ACTRN 12612000103864)*. Data collection took place from February 2011 to June 2012. This study is reported following recommended guidelines for reporting results of pilot investigations by Thabane et al. (2010) and the CONSORT guidelines for randomised trials of non-pharmacological treatment (Boutron et al., 2008).

5.3.2 Recruitment of study participants

Study recruitment took place over 4 months from May to August 2011.

Upon receipt of approval from the HREC, the management of the RACF was briefed on the purpose of the research, the proposed benefits of the research to frail older adults in the RACF and the nature and extent of support that was needed for the research to be carried out at their facility.

Step 1:

After receiving approval from the ethics committee of the RACF and subsequent expression of interest, the researchers met with the recreational activity officers (support staff) of the RACF who were the principal staff members coordinating activities for the residents of the facility. The nature of the research project and how we expected their assistance were explained.

Step 2:

Staff of the residential care facility created a list of residents who met the inclusion criteria set by the researchers (given below). This eligibility list enabled the support staff to make the initial approach to determine whether or not the residents (on the list) were interested in hearing about the study from the researchers. The researchers did not have any access to this list.
Step 3:

Upon receiving an expression of interest to hear about the study, the student researcher verbally explained the purpose of the study to the resident as per the information letter. The information letter was left with the resident along with a letter of consent.

Simultaneously, the researcher provided information statements and consent forms to the staff and the family members whose participation in the study was anticipated. The tai chi and yoga instructors were also formally recruited with information statements and consent forms.

Recruitment also involved notices in the facility, the facility’s newsletter, group presentations and individual meetings with staff and residents (when requested) at the RACF.

The residents, staff and family members were given a week to consider the invitation and encouraged to discuss the research programme with family, friends and staff before making a decision to consent.

The researcher followed up potential participants who did not post a response at the conclusion of the 1 week period. A letter of reminder was posted and a further week was allowed before removing the potential participant from the recruitment list.

Step 4:

A locked box, clearly labelled for the purpose of the study, was left at the reception of the residential care facility for the residents, family members and staff to drop their completed consent forms.

Step 5:

When letters of consent were received, the residents’ names were allocated with a number for the purpose of randomisation.
Randomization

Permuted block randomisation with a block size of 6 was generated using *Microsoft Office Excel*. After baseline assessments, participants were randomly allocated to tai chi, yoga or usual care groups by a researcher not involved in recruitment who prepared the randomised list in sealed envelopes that were given to the facility staff a day before the commencement of the interventions. The randomization resulted in each group having 11 participants.

Participants

**Eligibility criteria**

The inclusion criteria were: people aged 60 and over, ability to; stand with support, understand English, understand and follow simple instructions and demonstrations, and the absence of severe debilitating illness, severe cognitive, hearing and visual impairment as determined by the RACF staff.

**Interventions**

Sessions were scheduled in the morning and were conducted by experienced and certified tai chi and yoga instructors. Both instructors were female with over 20 years of teaching experience in their modalities. The tai chi instructor, a retired physiotherapist, is in her 60s and volunteers as a tai chi instructor in several RAC facilities in her local area. The yoga instructor, in her 50's, has a Bachelor of Health Science in Complementary Medicine and a Diploma of Yoga Teaching. She also has her own yoga school and is a naturopath.

The venue was a large, spacious, well lit, ventilated and air-conditioned room in the facility. Both tai chi and yoga programmes were designed by experts to suit the frail older participants, while progressing safely in complexity according to individual ability. For every session, there were at least two to four support staff members
(recreational activity officers) to assist the participants and to provide safety and support when needed. They stood or sat beside participants, providing light physical support to those who needed help and verbal prompting. The instructors explained and demonstrated the movements and postures, repeating instructions several times as necessary and at a pace suited for the participants. To facilitate better viewing, the participants were arranged in a semi-circle around the trainer. The instructors used techniques like providing clear, simple instructions, repeating demonstrations as necessary, mirroring movements (ie., instructor moving to her right when directing participants to move to the left), friendly approach, appreciation and maintained a good rapport throughout the entire intervention period.

The tai chi intervention

The tai chi intervention consisted of a 14-week programme of twice a week half-hour tai chi classes. Every session of the modified tai chi programme began with warm-up exercises of different joints and progressed through 18 individual tai chi and qigong movement patterns, with repetitions for each pattern, using imagery, breathing and posture control. The sessions concluded with the lotus ("The Australian academy of tai chi,")(description in detail provided in chapter 7 page) that consisted of flowing relaxed movements that tell a story and a flow pattern of walking. The movements were slow, controlled and circular using functional patterns and engageing the mind. The modifications incorporated performance according to individual capability and safe level of comfort. Every participant had a sturdy chair behind them to rest when necessary and a solid four-foot frame (a rollator with breaks on) in front to hold on for support. Imagery from nature was used to describe and enhance the movement (e.g., a flying dove spreading wings). A calm and soothing oriental music was used throughout the class. Throughout the programme good posture, natural breathing patterns, relaxation and balance were emphasised and focused to assist the participants.
The yoga intervention

The yoga intervention consisted of a 14-week programme of twice a week half-hour sessions. Every session commenced with awareness of breathing, slowing the breathing rate and warm up or preparatory movements. This was followed by modified traditional yoga exercises, (asanas), breathing (pranayama), synchronising movements with breathing and yoga nidra, a type of relaxation. In order to be suitable for the frail participants, more sitting activities, warm up and preparatory movements were included. The yoga asanas tadasana, urdhva hastasana, nitambasana, utkatasana, vrksasana, natarajasana, garudasana and virabhadrasana were performed while standing with two sturdy chairs, one behind the person (to rest whenever needed) and one in front to hold on at all times. The following asanas were performed seated: dandasana, marjariasana and matsyendrasana. All the above asanas are illustrated and described in chapter 7. The sessions concluded with pranayama and yoga nidra performed while the participants were seated comfortably, with the instructor guiding relaxation and mindful awareness of the body. A soothing music was played throughout the relaxation phase. The modified yoga programme was intended to improve mobility, fluidity of movement, strength of muscles especially to stabilise the joints of the ankle and knee, integration of left and right hemispheres of the brain and body awareness.

The usual care (control) group

Whilst the control group was not offered any other programme during the RCT the RACF encouraged all residents to access the Staying Active programme with biweekly half hour seated exercise sessions called the Physical culture, games and group activities like bingo, group reading and story-telling; a gym with bikes, pulleys and massage by trained staff; assisted and independent activities such as walking, gardening, etc. The participants of the RCT were not prevented from accessing their usual care programmes including the Staying Active programme. Two participants (tai chi=1; yoga=1) attended Physical culture during the intervention period.
Physical culture

Physical culture is a set of movements that are a fusion of dance styles and exercise that is choreographed with an upbeat, pop music by physiotherapists of ‘Bjelke-Petersen physical culture club’ that are designed for building aerobic fitness, muscle strength and tone, and increasing flexibility and coordination. This club conducts physical culture classes referred to as ‘BJP Physie’ through local clubs around Australia and in other countries. People of all age groups including children participate in this club and compete at local and internationally held competitions. In the RACF where the present study was conducted, a member of the above club was conducting physical culture classes for the residents on a voluntary basis. The classes involved physical culture movements performed seated with accompanying upbeat music. The class comprised joint exercises from shoulder to feet performed seated. Breathing exercises were also incorporated. A recreational activity officer joined the physical culture practitioner in demonstrating to the group of residents, who were encouraged to participate according to their ability. The classes concluded with a relaxation phase, where the residents were asked to imagine being in their favourite place, while listening to soft music (Bjelke-Petersen School of Physical Culture).

5.3.3 Outcome measures

The primary outcome measure of the main study was balance. The secondary outcome measures included fall incidence, pain and perceived quality of life.

Balance

Balance was measured using the Berg balance scale (Conradsson et al., 2007) by research assistants who were trained in the use of the tool and were blinded to participant allocation. Immediate pre and post intervention measurements were taken. The Berg balance scale is comprised of a series of 14 static and dynamic balance tasks each scored between 0-4 giving a summed score between 0-56 with a higher score indicating better balance. There is consistent evidence of the reliability and validity of
the Berg balance Scale for older population in residential care (Conradsson et al., 2007; Donoghue, Phyiotherapy Research and Older People (PROP) group, & Stokes, 2009).

Fall incidence

Falls were defined as “events that resulted in a person coming to rest inadvertently on the ground or floor or other lower level, excluding intentional change in position to rest in furniture, wall or other objects” (WHO, 2007). Fall incidence information was collected from the residents’ medical and nursing records maintained at the RACF. The data was collected for the period of six months pre-intervention, intervention period (14 weeks) and six months post intervention period.

Pain

Pain was measured using a verbal descriptor scale (VDS) immediately pre and post intervention and mid intervention at week 7. The VDS comprised words that describe pain of increasing intensity such as: no pain, mild pain, moderate pain, severe pain, very severe pain, and most intense pain imaginable (Jones et al., 2005). Participants were asked to select the word that best described their pain. Scores of 0 to 6 were assigned to each description of pain (Ware, Epps, Herr, & Packard, 2006). The reliability and validity of the VDS in older adults including older adults with mild cognitive impairment has been well established (Herr & Garand, 2001; Herr, Spratt, Mobily, & Richardson, 2004).

Quality of life

Perceived quality of life was measured using the Dementia quality of life (DEMQoL) questionnaire, a tool that is found suitable, reliable and valid for use in older adults with or without mild cognitive impairment (Moyle, Gracia, Murfield, G, & L, 2012). This tool was administered immediately pre- and post-intervention and mid-intervention at week 7. The questionnaire comprised 29 items that were rated on five point Likert scales that measured frequency (ranging from never to very often) or enjoyment.
(ranging from not at all to a lot). The mean scores of component items were used to derive scores for each subscale. Higher scores represented a better quality of life.

Data on pain and quality of life was collected by the student researcher who was also a registered nurse. However, she was not blinded to participant allocation because of the funding limitations associated with this study as a student project.

Demographics and health status

Demographic and health status data from residents’ records were obtained as part of the initial screening process for recruitment. This included: age in years, list of medications the participants were taking, and medical diagnoses recorded in the participants’ medical record. The records were used to further note occurrence of any adverse events during the intervention period.

5.3.4 Statistical analysis

Analyses were performed using the statistical software programme *Stata 11* (StataCorp, 2009). Statistical analysis included chi-square test for tests of association between two categorical variables and Kruskal-Wallis one-way analysis of variance to compare continuous variables across the three groups (ie. the two intervention groups and one control group). This was used instead of conventional analysis of variance (ANOVA) because of the small sample size and lack of normal distribution of data (McDonald, 2009). A generalised estimating equation (GEE) model was used to compare the performance of the three groups over the 14 week period. Here, the GEE model was preferred to repeated measures ANOVA, as the GEE model served as an extension of logistic regression models (Magin, Sibbritt, & Bailey, 2009). The extension component of the GEE model allowed for analysis of the data longitudinally, comparing the changes to the variables balance, falls, pain and quality of life over time. All participant data were analysed per protocol method.
Post-hoc power calculations

Post-hoc power calculations were conducted using a type I error probability of 0.05. For each outcome, the post-hoc power calculations were based on the mean change from week 1 to week 14. Across all outcomes, statistical power ranged from 5% to 40%, meaning that all analyses were under-powered to detect true difference – a typical situation for most pilot studies.

5.4 Results

Participant flow

Out of 108 residents in the aged care facility, 49 expressed interest in participating and were subsequently screened for participation in the study. Ten residents were found to be ineligible and six declined to participate before baseline measurements due to: ‘inconvenience’ (n=3) or ‘no reason given’ (n=3). Thirty three residents provided informed consent, completed baseline testing and were randomly assigned to each of the intervention groups (tai chi, yoga or usual care). The flow of participants through the study is represented in Figure 5.1.
Figure 5-1: Study Profile

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**Baseline characteristics**

A greater proportion of participants were female (72.7%) and the mean age was 83.8 (SD= 7.9) years with a range of 63-98. On average, the participants had 10 diagnosed medical conditions and had been prescribed between 4-22 medications. The median, range scores for the mini mental status examination scores (MMSE) were 27 (22-30). However, all participants could consent for themselves as verified by staff of the facility. Descriptive statistics are presented in Table 5-1. All groups were similar in the following characteristics: age, gender, cognitive status, number of medications and number of medical conditions. There were no significant differences between the groups at baseline for: balance, number of falls, pain or quality of life. None of the participants had current practice of tai chi or yoga although two participants from the yoga and tai chi groups recalled having practiced in the past tai chi and yoga respectively for a period of one to two years.
Table 5-1: Comparison of the control and intervention groups across a range of baseline characteristics

<table>
<thead>
<tr>
<th>Baseline Characteristics</th>
<th>Combined (n=33)</th>
<th>Tai Chi (n=11)</th>
<th>Yoga (n=11)</th>
<th>Control (n=11)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age mean (SD)</td>
<td>83.8 (8.0)</td>
<td>81.1 (8.0)</td>
<td>84.9 (6.7)</td>
<td>85.4 (9.1)</td>
<td>0.3046</td>
</tr>
<tr>
<td>Gender %female</td>
<td>72.7</td>
<td>72.7</td>
<td>90.9</td>
<td>54.5</td>
<td>0.1600</td>
</tr>
<tr>
<td>Mini Mental Score mean (SD)</td>
<td>25.9 (2.6)</td>
<td>25.7 (2.5)</td>
<td>27 (2.4)</td>
<td>25.2 (2.7)</td>
<td>0.2597</td>
</tr>
<tr>
<td>Number of co-morbidities mean (SD)</td>
<td>10.3 (4.6)</td>
<td>10.9 (5.6)</td>
<td>11.2 (4.5)</td>
<td>8.8 (3.4)</td>
<td>0.3712</td>
</tr>
<tr>
<td>Number of drugs consumed mean (SD)</td>
<td>13.1 (5.1)</td>
<td>14.6 (5.8)</td>
<td>12.7 (5.3)</td>
<td>12.1 (4.2)</td>
<td>0.5778</td>
</tr>
<tr>
<td>DEMQoL score at week 1 mean (SD)</td>
<td>92.3 (13.7)</td>
<td>89.7 (19.1)</td>
<td>93.9 (7.1)</td>
<td>93.5 (12.7)</td>
<td>0.8091</td>
</tr>
<tr>
<td>PAIN score at week 1 mean (SD)</td>
<td>1.8 (1.9)</td>
<td>1.2 (1.4)</td>
<td>2.5 (1.9)</td>
<td>1.7 (2.3)</td>
<td>0.2951</td>
</tr>
<tr>
<td>BBS score at week 1 mean (SD)</td>
<td>32.7 (13.9)</td>
<td>32.7 (17.4)</td>
<td>34 (16.3)</td>
<td>31.7 (9.0)</td>
<td>0.6792</td>
</tr>
<tr>
<td>Fall incidence mean (SD)</td>
<td>1.2 (2.5)</td>
<td>1.4 (2.5)</td>
<td>1.5 (3.6)</td>
<td>0.8 (1.3)</td>
<td>0.9932</td>
</tr>
</tbody>
</table>

*During 6 months pre-intervention
Recruitment and follow up

A total of 17 out of 22 (77.3%) people amongst the tai chi and yoga groups completed the intervention. The average attendance for the entire intervention period was greater for the tai chi group (78.2%) than the yoga group (76.3%). Five participants withdrew from the study during the intervention period (2 from the tai chi group and 3 from the yoga group) and three participants were lost to follow-up (1 from each group). The reasons for withdrawal in the tai chi group during intervention period were: feeling unwell (n=1) and concern about failing vision (n=1). Three yoga participants withdrew during the intervention due to loss of interest (n=1), exclusion for safety reasons (n=1) and no particular reason (n=1). Three participants (one from each group) died in the follow up period. Control group participants had access to usual care; the Staying active programme that included the physical culture and gym activities. As this was not monitored it is unknown how many control group members attended these.

Adverse events

One adverse event occurred during the study period. A participant of the yoga group experienced a fall during the session when he attempted to turn during a yoga posture. Although no injury was sustained, his participation in the study was ceased as it was revealed that he suffered from Ménière’s disease ("Committee on Hearing and Equilibrium guidelines for the diagnosis and evaluation of therapy in Meniere's disease," 1995).

Effects on primary outcome: balance

The yoga group was the only group to demonstrate an improvement in average Berg balance scores which improved from 34.0 to 42.8 post-intervention. In contrast, both the tai chi and control group showed a decline in balance measures immediately post-intervention, with a difference in average of -3.0 and -3.4 respectively (Table 5.2 and Figure 5-2). However, the difference in balance score between the groups was not statistically significant.
**Figure 5-2: Differences in Berg Balance Scale Scores week 1 to week 14**

*Effects on secondary outcomes: fall incidence, quality of life and pain*

There were no statistically significant differences between the three groups in the occurrence of falls. However, only the yoga group demonstrated a slight decrease in fall incidence from 11 in the pre-intervention period to 9 in the post intervention period. While pre- and post-intervention mean fall incidents remained similar for the tai chi group, they rose from 0.8 to 2.6 for the control group. All three groups had lower mean fall incidents during the 14 week intervention period, with the tai chi group having no fall incidents (Table 5.2 and Figure 5-3).
Figure 5-3: Difference in fall incidence week 1 to week 14

Figure 5-4: Difference in Verbal Descriptor Scale scores week 1 to week 14
Though not statistically significant, perceived quality of life improved solely for the tai chi group from an average of 89.7 at baseline to 96.6 at week 14, whereas it remained almost the same for the yoga group (93.9 at baseline and 94.0 at week 14) and reduced by 2.4 for the control group (Figure 5-5). Of the three groups, only the yoga group experienced a (non-statistically significant) reduction in average pain scores (from 2.5 to 2.1). Both the tai chi and control groups had an increased pain score average post intervention (Table 2 and Figure 5-4).

The GEE models indicated no statistically significant differences in any of the outcome measures between the three groups. However, note that post-hoc power calculations revealed that the study had ≤32% statistical power to detect differences between the control group and intervention groups for all four outcomes measures.
Table 5-2: Comparison of the control and intervention groups across a range of outcome measures

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Tai Chi group</th>
<th>Yoga group</th>
<th>Control group</th>
<th>p - value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Mean (SD)</td>
<td>n</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>BBS score (week 1)</td>
<td>10</td>
<td>32.7 (17.4)</td>
<td>8</td>
<td>34.0 (16.3)</td>
</tr>
<tr>
<td>BBS score (week 14)</td>
<td>8</td>
<td>27.8 (22.0)</td>
<td>5</td>
<td>42.8 (6.7)</td>
</tr>
<tr>
<td>Difference in BBS scores (week 14 - week 1)</td>
<td>8</td>
<td>-3.0 (11.6)</td>
<td>5</td>
<td>3.2 (3.6)</td>
</tr>
<tr>
<td>DEMQoL score (week 1)</td>
<td>11</td>
<td>89.7 (19.1)</td>
<td>10</td>
<td>93.9 (7.0)</td>
</tr>
<tr>
<td>DEMQoL score (week 7)</td>
<td>9</td>
<td>93.9 (9.2 )</td>
<td>8</td>
<td>94.0 (4.1)</td>
</tr>
<tr>
<td>DEMQoL score (week 14)</td>
<td>9</td>
<td>96.6 (10.9)</td>
<td>8</td>
<td>94.0 (8.9)</td>
</tr>
<tr>
<td>Difference in DEMQoL scores (week 7 - week 1)</td>
<td>9</td>
<td>4.2 (15.0)</td>
<td>8</td>
<td>0.0 (4.6)</td>
</tr>
<tr>
<td>Difference in DEMQoL scores (week 14 - week 1)</td>
<td>9</td>
<td>6.9 (18.0)</td>
<td>8</td>
<td>0.0 (6.5)</td>
</tr>
<tr>
<td>Difference in DEMQoL scores (week 14 - week 7)</td>
<td>9</td>
<td>2.7 (9.2 )</td>
<td>8</td>
<td>0.0 (7.1)</td>
</tr>
<tr>
<td>PAIN score (week 1)</td>
<td>11</td>
<td>1.2 (1.4)</td>
<td>10</td>
<td>2.5 (1.9)</td>
</tr>
<tr>
<td>PAIN score (week 7)</td>
<td>9</td>
<td>1.7 (1.6)</td>
<td>8</td>
<td>2.4 (1.6)</td>
</tr>
<tr>
<td>PAIN score (week 14)</td>
<td>9</td>
<td>1.4 (1.7)</td>
<td>8</td>
<td>2.1 (1.6)</td>
</tr>
<tr>
<td>Difference in PAIN scores (week 7 - week 1)</td>
<td>9</td>
<td>0.4 (1.0)</td>
<td>8</td>
<td>-0.4 (2.8)</td>
</tr>
<tr>
<td>Difference in PAIN scores (week 14 - week 1)</td>
<td>9</td>
<td>0.2 (1.1)</td>
<td>8</td>
<td>-0.6 (3.1)</td>
</tr>
<tr>
<td>Difference in PAIN scores (week 14 - week 7)</td>
<td>9</td>
<td>-0.2 (1.1)</td>
<td>8</td>
<td>-0.3 (2.3)</td>
</tr>
<tr>
<td>Fall incidence: during 6 months pre-intervention</td>
<td>11</td>
<td>1.4 (2.5)</td>
<td>11</td>
<td>1.5 (3.6)</td>
</tr>
<tr>
<td>Fall incidence: during 14 weeks intervention</td>
<td>9</td>
<td>0 (0)</td>
<td>9</td>
<td>0.7 (0.9)</td>
</tr>
<tr>
<td>Fall incidence: during 6 months post-intervention</td>
<td>9</td>
<td>1.6 (3.2)</td>
<td>8</td>
<td>0.8 (1.0)</td>
</tr>
<tr>
<td>Difference in fall incidence</td>
<td>9</td>
<td>-1.7 (2.7)</td>
<td>9</td>
<td>0.2 (1.2)</td>
</tr>
<tr>
<td>post-intervention - intervention</td>
<td>9</td>
<td>-0.1 (2.1)</td>
<td>8</td>
<td>0.3 (0.9)</td>
</tr>
<tr>
<td>post-intervention - intervention</td>
<td>9</td>
<td>1.6 (3.2)</td>
<td>8</td>
<td>0.1 (1.6)</td>
</tr>
<tr>
<td>Outcomes</td>
<td>Tai Chi group</td>
<td>Yoga group</td>
<td>Control group</td>
<td>p - value</td>
</tr>
<tr>
<td>-----------------</td>
<td>---------------</td>
<td>------------</td>
<td>---------------</td>
<td>-----------</td>
</tr>
<tr>
<td>n Mean (SD)</td>
<td>n Mean (SD)</td>
<td>n Mean (SD)</td>
<td>p-value</td>
<td></td>
</tr>
</tbody>
</table>

*p-value obtained from generalized estimating equation (GEE) model*
5.5 Discussion

This study represents the first ever examination into whether a modified tai chi or yoga programme could be safely implemented in a residential care setting. In this study, the feasibility of conducting a RCT that compared modified programmes of yoga and tai chi in residential care settings was demonstrated. All the feasibility criteria set out were met: 33 participants were recruited, more than 50% of participants of the yoga and tai chi intervention groups had an attendance of ≥70%, and 28 participants completed the trial. There were no serious adverse events associated with participation in the tai chi and yoga programmes. The participants’ demographics are comparable with the older adult population in RACFs in Australia (Australian Bureau of Statistics (ABS), 2012; Australian Institute of Health and Welfare (AIHW), 2012b).

Although not conclusive, our findings suggest that tai chi and yoga may be associated with improvement in balance, pain and quality of life in frail older people. Improvement in balance has been reported in previous studies that used yoga for relatively robust older adults living in the community (Chen & Tseng, 2008; Oken et al., 2006; Schmid et al., 2010; Zettergren et al., 2011). The favourable effect of yoga intervention on balance is hypothesized to be mediated by the slow stretching postures that increase muscle strength and endurance (Fan & Chen, 2011a), improving flexibility (Schmid et al., 2010) and gait function (DiBenedetto et al., 2005). Two quasi experimental studies that involved transitionally frail older adults in long term care facilities in Taiwan (Chen et al., 2010a; Fan & Chen, 2011a) found similar results with silver yoga exercises. Although the participants in these two studies were described as transitionally frail, they were able to assume challenging positions such as kneeling, squatting, supine and prone on the floor. In contrast, the participants of this study had mean BBS of 32.7(SD=13.9), which was substantially lower than the published normative values for similarly aged community dwelling adults (males: 53, females 50) (Steffen, Hacker, & Mollinger, 2002).

Randomised controlled trials that employed tai chi as the intervention have reported significant improvement in balance function, reduced fear of falling and fall risk in older adults who were in reasonably good health and community dwelling (Taylor-
Piliae et al., 2010; Voukelatos, Cumming, Lord, & Rissel, 2007). Similar results were reported by two studies where the older participants had high risk of falls (Taylor et al., 2012; Tousignant et al., 2012). In contrast, the tai chi and control groups in our study experienced a decline in balance. This outcome could be due to the frail and dependant nature of the participants or the lack of challenge to balance as the tai chi participants spent less time collectively, performing standing exercises than the yoga participants. This association has been reported in recent systematic reviews (Cameron et al., 2010; Howe Tracey et al., 2011). The low Berg balance scores of our participants place them in a high falls risk classification whereby a score of ≤ 40 has been associated with an almost 100% fall risk (Shumway-Cook, Baldwin, Polissar, & Gruber, 1997). The results for balance and falls are congruous in that only the yoga group experienced a decrease in fall incidents and concomitant increase in berg balance scores. This finding supports previously reported association between berg balance scores and falls (Chiu, Au-Yeungg, & Lo, 2003). It could be argued that the change scores demonstrated in the yoga participants may constitute clinically valuable change. A recent systematic review (Downes, Marquez, & Chiarelli, 2013) suggests that if an individual experiences a change of between 3 and 7 points one can be 95% confident that there has been a real change in balance. Given the improvement in average score of 3.2 points following 14 weeks of yoga, this positive finding warrants further investigation.

Our analysis revealed that the pain scores measured by VDS improved in the yoga group although not statistically significant. However, the improvement of 0.6 points measured by VDS is considered to be a clinically significant difference (Edelen & Saliba, 2010; Kendrick & Strout, 2005). This is an important finding considering the high prevalence (80%) and frequency of pain that could further exacerbate frailty in institutionalised older adults who suffer multiple ailments and co-morbidities (Jakobsson, Klevsgård, Westergren, & Hallberg, 2003; Malec, Knoebel, & Shega, 2012). A recent systematic review reported effectiveness of yoga in significantly reducing pain over control interventions like therapeutic exercises, touch and manipulation, relaxing yoga, self-care, standard care or no intervention in nine out of 10
RCTs (Posadzki, Ernst, Terry, & Lee, 2011). The mindfulness approach of yoga is hypothesised to affect hyper vigilance and emotional reactivity aspects of chronic pain by shifting the person’s attention away from painful stimuli while increasing awareness of the body (Hassed, 2013).

The tai chi group had improved DEMQoL scores post intervention, this finding being consistent with previous studies (Chyu et al., 2010; Lee, Lee, & Woo, 2009b). The yoga group had similar scores pre- and post-intervention, while the control group not only had no improvement, but had scores lower than pre-intervention. Perceived quality of life scores could be influenced by factors other than the interventions themselves, such as: social inclusion, enjoying participation in group activity, distraction, novelty of the activity, a purposeful feeling (something to look forward to), promotion of positive attitude, self-efficacy, etc.

We found that consistent support of the management and staff of the facility was instrumental in conducting the study. The frail nature of residents, their high level of dependency and the shortage of nursing staff added to the challenge of introducing a novel intervention for the purpose of testing its suitability in a trial such as ours. Presence of additional volunteers and staff enabled safe conduct of the programmes. Frequent visits and volunteering at the facility helped the researcher to develop a good rapport with the residents. Researchers who measured outcomes had to reschedule visits several times due to unavailability of participants owing to illness, visits to doctors and other appointments.

Both the tai chi and yoga groups had more than 75% average attendance, in spite of the frail and dependent nature of the participants. Enthusiasm in participation was observed in most participants. Some participants (n=5) who initially discontinued participation due to health and personal reasons (hospitalisation, death of a family member) willingly continued to attend the tai chi and yoga sessions after returning to the residential facility.
There are several limitations to this study that necessitate discussion. The primary aim of this study was to assess the feasibility of conducting a randomised controlled trial comparing tai chi and yoga as fall prevention interventions in residential care settings. The small sample size and under-powered nature of the study renders the findings as preliminary and incapable of making definitive conclusions on effectiveness and safety of the interventions tai chi and yoga. Further, 36.4% of participants had MMSE score of \( \leq 25 \), indicating possible mild cognitive impairment (Vertesi et al., 2001). Therefore, we cannot comment on the ability of residents with moderate and severe cognitive impairment safely participating in these interventions. Measures of physical activity of the three groups were not precise. The RACF had provisions such as gym, massage, physical culture, a biweekly exercise activity and gardening activities. Participants of all groups had access to all these activities during the intervention period. Hence, potential confounding by differences in physical activity between intervention and control groups could not be adequately controlled. Blinding was impossible for the participants who were from the same facility and for the trainers who delivered the interventions. The researcher who measured outcomes pain and quality of life was also not blinded to treatment allocation of the participants. This could have been a potential source of bias.

5.6 Conclusion

The findings of the study suggest it is possible to safely implement modified yoga and tai chi in a residential care setting and evaluate this using RCT design. They also show that yoga and tai chi may be important in the prevention of falls in older people. They show positive changes to balance, pain and quality of life and a high level of interest through attendance amongst the older participants. The results support offering tai chi and yoga to older people who are frail and dependent with physical and cognitive limitations.
There are several implications for nursing and practice arising from this study. A cost benefit analysis is recommended; as it is evident from the present study that successful implementation of the yoga and tai chi programme is dependent on resources; support staff and experienced instructors. Nurses and service providers need to be aware that safety was possible only when safety considerations involving the environment, resources and modifications were made. Whilst that yoga and tai chi are viable alternatives to the usual suite of activities offered to people in residential care settings, as with any new initiative, it is essential to have the support of management staff, nurses and carers. For these activities they needed dedicated time, space and support. Frail older people need assistance to mobilise and attend the sessions. For safety there needed to be a large room with; warmth, quiet, privacy, space for movement, appropriate chairs and distance between chairs, and physical supports such as walking frames and a small number of dedicated staff. The care staff needed to be open to the idea of yoga and tai chi, flexible, empathetic and willing to facilitate attendance of older people to sessions on time. The staff members’ attitude and knowledge about the yoga and tai chi programmes as well as their resources, interest, and commitment to mobilising the residents were important adjuncts to this trial.

The high level of interest for yoga and tai chi amongst the older participants needs to be explored. What were the perceptions and experiences of the older participants? What other supported activities might be possible? For example, might table tennis, ping pong, indoor golf and bowls be viable alternatives to usual care? How might these compare with interactive games offered in the form a Wiis? The management and nursing staff of RACFs need to be open to exploring possibilities for new and innovative alternatives with older people, in particular those that might help to prevent falls, enhance social contact, and promote health and wellbeing. In addition, they need to explore ways of breaking down barriers such as care routines, and perceptions about physical ability, frailty and the limitations of cognition.

Finally, an attempt to replicate these findings must be performed in a large randomised multi centred controlled clinical trial to assess the external validity of these results. We
remain optimistic that modified tai chi and yoga programmes may constitute an important CM approach to fall prevention in residential care settings.

In the following chapter I answer the question on appropriateness of the yoga and tai chi interventions from the perspectives of the participants of the study and staff members. I also explore their perceptions and experience of the modified approaches of yoga and tai chi.
Chapter 6 Results: The perceptions and experiences of resident and staff participants of yoga and tai chi interventions in a RACF: Qualitative interviews
6.1 Introduction

In the previous chapter I presented the results of the quantitative inquiry on whether a 14-week modified yoga and tai chi programme was feasible for frail and dependant older adults in RACFs.

In the following chapter I first describe the study design and the methodology of the qualitative embedded study, then describe the participants and their recruitment and then present the findings of the analysis of focus group (FG) interviews with the older participants from the yoga and tai chi groups and the FGs with staff who supported the participants during the sessions.

The review of the relevant literature pointed out the scarcity of evidence to determine feasibility of tai chi and yoga interventions in the RACF settings, and no study reported undertaking a qualitative inquiry to explore the appropriateness of these interventions.

The literature review identified only 11 studies that investigated tai chi (n=8) and yoga interventions (n=3) in RACF settings with focus on outcomes related to fall prevention. None of these studies used a qualitative approach. Qualitative intervention studies are essential as they inform on practical aspects of intervention implementation such as feasibility and acceptability of interventions (Patton, 2002).

As noted in chapter 4, focus group (FGs) interviews were to explore the participants’ perspectives and experiences of the modified yoga and tai chi programmes. In addition, I was interested in the feasibility and appropriateness of the programmes for the participants and the staff. In determining the feasibility of the yoga and tai chi, I wanted to explore the application of moves and or positions relating to yoga and tai chi that were doable, practical and appropriate for the participants in the light of their health and functional status. In order to determine appropriateness of a programme, understanding of the perspectives of main stakeholders is essential (Sanmartin, Murphy, Choptain, Conner-Spady, McLare, et al., 2008). I was also interested in the perceptions and experiences of the participants.
In presenting this part of the study, I have harmonised the inputs from the two main stakeholders; the residents and the staff of the RACF. The findings of the FGs and the related discussion are presented in this chapter.

6.2 Methods

6.2.1 Study design

As noted previously in Chapter 4, this feasibility study used a mixed methods design which incorporated a RCT of yoga and tai chi with frail older people in a RACF, FG interviews with the older participants and the staff who supported them during the sessions and mapping of suitable forms of yoga and tai chi for frail and dependent older adults in RACF. The outcomes of the mapping process of the yoga and tai chi, will be presented in the following chapter (7).

This part of the study used a qualitative descriptive approach that draws from the general tenets of naturalistic inquiry (Creswell, 1997). Naturalistic inquiry is an approach to inquiry that can be used to explore human experience holistically and acknowledges existence of multiple constructed realities of individuals that are inseparable from the world in which they are experienced, bound by time and context (Lincoln & Guba, 1985; Patton, 2002). Naturalistic inquiry is appropriate to answer this part of study because it allowed inquiry to be carried out based on the realities and viewpoints of those under study in the context in which they occur (Lincoln & Guba, 1985; Patton, 2002). It also enabled holistic understanding of the feasibility and appropriateness of interventions from the perspective of participants of the intervention groups and the staff. In this study, FG interviews were used to address the aims: To explore the participants’ (the residents and staff) experience and perspectives of a 14 week modified programme of tai chi and yoga and the feasibility and appropriateness of these programmes.
As noted in chapter 4 this study was approved by the Human Research Ethics Committee of University of Newcastle and by the ethics committee of the RACF. All participants had provided informed consent for the FG interviews.

6.2.2 Focus groups

Focus groups were used to explore the perspectives and experiences of the resident and staff participants relating to the modified yoga and tai chi programmes with attention to the feasibility and appropriateness of these programmes. The FGs not only provided a way to understand the residents and staff’s experiences, but they also enabled the observation of the interactions between participants, providing additional insights (Stewart & Shamdasani, 1990). The nature of interaction of the group allowed participants to comment and build on to the emerging issues (Acocella, 2012) which helped to obtain a comprehensive picture from their diverse perceptions and experiences of the yoga and tai chi. The use of FGs also allowed information to be gathered efficiently in a short period of time without exhausting the frail older participants (Krueger, 1988).

At the end of the 14 week interventions, participants of the yoga and tai chi groups who had provided written consent to attend a FG interview were invited to participate in the FGs. Staff who participated in the programme and management staff members were also invited. The FGs were conducted at the end of the 14 week intervention programme, during week 15 as it was important to capture perceptions whilst the experiences of the yoga and tai chi sessions were still recent and fresh in their minds. One FG was held with each of the groups. The FGs were conducted in the morning at 9.30 in a spacious hall in the RACF that was well ventilated and lighted and had minimal noise interruptions. The focus group interviews were audio recorded on a digital pen (echo smart pen, Livescribe Inc, 7677 Oakport St, 12th Floor, Oakland, CA 94621) and written notes and responses were documented by myself as the focus group facilitator. The focus group interviews were also moderated by my research supervisors, who aided by contributing questions, facilitated note taking and recording. The presence
of two moderators allowed one researcher to offer assistance to residents when needed while the other continued engaging the participants in the discussion. The focus group interviews ranged between 60 to 90 minutes. The participants’ nutritional and hydration needs were met during the focus group meetings with refreshments such as tea, juice and biscuits provided.

Sixteen participants from the yoga (n=8 residents) and tai chi (n=8 residents) groups and three staff members who participated in the programme as support persons were able to attend the FG interviews. As noted previously in chapter 5, the staff members’ involvement during the yoga and tai chi sessions included standing or sitting beside the older participants, providing light physical support to those who needed help and verbal prompting. They also helped in overall implementation of the programme by coordinating the resident activity schedule to accommodate the yoga and tai chi interventions. For example, they helped the older participants by assisting them with dressing and toileting so that they could attend the scheduled yoga and tai chi sessions on time by and they reminded them as often as necessary. A description of the staff participants is outlined in Table 6-2. Consistent with the ethical principles described in chapter 4, participants have been given a pseudonym in order to protect their identity. The FG questions were guided by the research aim: ‘to explore the participants’ (the residents and staff) experience and perspectives in relation to the 14 week modified programme of tai chi and yoga and the feasibility and appropriateness’ and are presented in figure 6.1

The focus groups commenced with introductions by all group members followed by a reminder of the purpose of the focus group interview and the need for confidentiality within the group. The researcher then stated the questions to the group, ensuring that everyone had heard and understood the questions clearly and had an opportunity to respond. The questions progressed from broad topics to specifics, depending on the participants’ responses. For example, when the researcher asked the residents about their experience practicing yoga, the residents said they had a rewarding experience. The researcher prompted further elaboration by asking about what specific aspects of
the intervention had they found rewarding and in what ways they found it rewarding. All participants were encouraged to speak freely about their perceptions and experience. Often, the questions were repeated gently to ensure understanding and prompts were provided for the older persons to take the lead and respond. Prompts sometimes included the researcher talking about what she thought was happening, and then this thread was picked up by one of the group members and elaborated. The researcher also welcomed any further topics the participants wished to discuss. Most resident informants were able to relate the questions to the specific intervention period and to describe their experiences.

Figure 6-1 Interview Question Guide

1. What were your perceptions about yoga and tai chi before starting the classes? How did you feel about these approaches?
2. What was your opinion of the notion of yoga/ tai chi before this study?
3. Now that you have completed the yoga/tai chi classes, can you tell me about your experience/perceptions when practicing yoga/ tai chi?
4. What were your perceptions/experiences/feelings in the first few weeks after starting Yoga/ Tai Chi?
5. Would you like to share with us any concerns you have had about the classes?
6. How do you feel now that the classes have ended?

6.2.3 Description of Participants

The characteristics of the resident participants are presented in Table 6-1. There were 16 resident participants’ whose ages ranged from 66-92 years. All resident participants had at least one long term condition: musculoskeletal, cardiovascular and/or respiratory disease. Except for 5 of the residents, Catherine, Gabrielle, Betty, Jean, and Christine (pseudonyms) the remaining resident participants used a mobility aid such as a walker.
As noted in chapter 5, all of the resident participants had their balance assessed as part of the RCT. Notably all of them had poor balance according to the Berg Balance Scale (Berg et al., 1992) with scores ranging from 3 to 38. Four participants had a high fall risk indicated by BBS score of 20 and less, whilst the remaining participants had medium fall risk (BBS scores of 21-40) (Conradsson et al., 2007). Two resident participants had MMSE scores of 22 and 23 indicating possible mild cognitive impairment (Folstein, Folstein, & McHugh, 1975). Thirteen of the 16 resident participants reported having participated in exercise or regular physical activity in their past, although more than five to ten years ago. All the residents had access to a Physical Culture programme that is described in chapter 5. The remainder of the resident participants reported not having participated in regular exercise or physical activity in the last 10 years. However, the participants of both yoga and tai chi groups had access to the facility gym and to the biweekly physical culture sessions (described in Chapter 5). One participant from the yoga group and the tai chi group attended the Physical Culture programme during the intervention period. Their attendance at the exercise programme and at the gym was not monitored. Three staff members who participated as support persons in the yoga and tai chi interventions also participated in the staff focus group (Table 6.2).

Consent from the resident participants was reconfirmed verbally from time to time throughout the study in consideration of their vulnerability (National Health and Medical Research Council, Australian Research Council, & Australian Vice-Chancellor's Committee, 2007). Ongoing consent was also needed in the light of the MMSE scores that indicated possible mild cognitive impairment amongst some of the participants. Participants were reminded that they had the opportunity to withdraw their participation from the focus group at any time they wished and that they need not give any reason.
Table 6-1: Overall characteristics of resident participants (n=16)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in years, median (range)</td>
<td>86 (66-92)</td>
</tr>
<tr>
<td>Mini Mental Status Examination, (0-30)*, median (range)</td>
<td>27 (22-30)</td>
</tr>
<tr>
<td>Berg Balance Scale (0-56)* pre intervention, median (range)</td>
<td>35 (0**-52)</td>
</tr>
<tr>
<td>Post intervention, median (range)</td>
<td>37 (0**-55)</td>
</tr>
<tr>
<td>Previous participation in regular physical activity***, n</td>
<td>13</td>
</tr>
<tr>
<td>Osteoarthritis, n</td>
<td>8</td>
</tr>
<tr>
<td>Heart disease, n</td>
<td>8</td>
</tr>
<tr>
<td>Diagnosed dementia, n</td>
<td>2</td>
</tr>
<tr>
<td>Previous stroke, n</td>
<td>6</td>
</tr>
<tr>
<td>Number of medications n, median (range)</td>
<td>13 (5-22)</td>
</tr>
</tbody>
</table>

* A higher score indicates better status; **Score 0 given to residents who were not tested due to refusal, fear of falling or deemed unsafe by staff; *** Physical activity undertaken more than 10 years ago as reported by the participants; n= number of participants

Table 6-2: Description of participants-staff

<table>
<thead>
<tr>
<th>Pseudonym</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nancy</td>
<td>Recreational activities officer</td>
</tr>
<tr>
<td>Josephine</td>
<td>Recreational activities officer</td>
</tr>
<tr>
<td>Anne</td>
<td>Recreational activities officer</td>
</tr>
</tbody>
</table>

6.2.4 Analysis

As noted above, the focus group discussions were recorded and later transcribed verbatim. Transcription of the interviews was performed by the student researcher using
Livescribe software (Livescribe Inc, 7677 Oakport St, 12th Floor, Oakland, CA 94621). The interview transcripts were reviewed and verified against the audio file as they were completed. The interview transcripts were analysed thematically (Braun & Clarke, 2006), guided by a qualitative descriptive approach.

The analysis was undertaken by two researchers individually with discussion taking place to clarify emerging themes. Initially, all of the transcripts were reread several times to become familiarised with the data. A line-by-line analysis of the transcripts in Microsoft Word was performed manually, highlighting significant statements and noting initial codes and researcher notes in the margin. This type of coding reduces researchers’ influence on the data and helps to retain the meaning implied by the participants in the original context of the focus groups (Charmaz, 2008). Codes that emerged were compared and contrasted with each other, and collated to form potential themes. As analysis proceeded, additional codes emerged that refined the themes, generating clear definitions for each theme.

For the most part, the analysis took an inductive, exploratory approach addressing the research objective that was to explore the experiences and perspectives of participants. This allowed a rich description of participant experiences and perceptions around the main topic. Many of the participants expressed their feelings about their long-term residence in the RACF that affected the way they experienced yoga and tai chi. I have also summarised specific feedback from participants on safety and feasibility of interventions.

6.3 Results and discussion

The following themes emerged from the data: ‘yoga and tai chi: a breath of fresh air’, ‘yoga, tai chi and companionship’, ‘a sense of purpose’ and ‘you got to keep moving’. The theme ‘yoga and tai chi: a breath of fresh air’ with eight sub themes, captures the participants’ perceptions and experience of the modified yoga and tai chi programme. ‘Yoga, tai chi and companionship’ and ‘a sense of purpose’, capture the experiences of
doing group exercise activities. The theme ‘you got to keep moving’ portrayed the older residents’ commitment to being active despite their age related limitations.

Many subthemes identified here were consistent with literature on other group exercise interventions (Galik, Resnick, & Pretzer-Aboff, 2009; Guerin et al., 2008; Phillips & Flesner, 2013). However, the prominent theme illustrated in section 7.3.1 reflected appreciation of the uniqueness of the mind-body approach of yoga and tai chi.

‘You got to keep moving’ reflected the participants’ attitude on physical activity and exercise. Despite the limitations posed by their advanced age and life in the RACF, the frail older adults had potential for growth and development towards wellness. This finding supports previously reported research on coping strategies of older people in the face of advanced age and frailty (Fisher & Gosselink, 2008; Shearer, Fleury, Ward, & O’Brien, 2012). Participants’ perceived benefits from participation enhanced their self-efficacy and was empowering. Empowerment and enhanced self-efficacy are associated with wellness and healthy ageing. The participants unanimously appreciated their perceived psychosocial benefits that resulted from socialisation during the participation in the yoga and tai chi programme. It presented with opportunities to promote relatedness, a recognised construct of wellness concept.

6.3.1 Yoga and Tai Chi: like a breath of fresh air

Largely, the participants felt that both tai chi and yoga were novel approaches to exercise and activity sessions in residential care and different from all other physical activities that they were using at the facility. Yoga and tai chi were like ‘a breath of fresh air’ [S0214-19] Anne (staff): Whilst these words were from a staff member, that yoga and tai chi were like “fresh air” resonated for the residents as well. The idea of “fresh air” is an image that brings to mind something that is new, different, diversifying and exciting, refreshing and challenging.

It's like nothing you have done before

[Y1127] Catherine (resident, Yoga group)
**Novel, new and exciting:**

Many participants expressed their need for an activity that was different to those that were available at the RACF.

I [am] looking forward to doing something different … [refers to tai chi]

[T0219] Frances (resident, Tai Chi (TC) group)

Here, it is necessary to consider the fact that there were limited opportunities for physical activity and socialisation at the RACF as described previously in chapter 5. Furthermore, the activities that were available did not cater to all of their needs. For example, ‘Bingo’ and group reading were activities perceived by some resident participants as not stimulating or appropriate. As Frances said:

I don’t like going to Bingo… It’s not my type…

[T0343] Frances (resident, TC group)

The in house gym activities described previously in chapter 5 were appreciated by the older participants, however; they did not provide the ability to socialise as with group activity. Whilst the group seated exercise programme, ‘Physical Culture’ (described in chapter 5) was offered on a biweekly basis the modified yoga and tai chi was considered different from these other activities as they offered other components that addressed their physical, psychological, social and emotional needs. As Gabrielle noted:

The yoga is for the body and the mind .. so .. if you go to the yoga classes, you are getting a lesson or rehabilitation,.. contact with other people, and.. visibly, you are helping your body.

[Y0932-33] Gabrielle (resident, Yoga group)

Staff member Anne compared the currently available activities for the residents with the yoga and tai chi programme and noted that the differences were welcome and refreshing.
It was like breathing fresh air, this is something really nice to introduce not only staff but to residents as well, it took us away from our normal ideas of activities as well, and I think it comes down to positively embracing this as something new, rather than just having a creeping tunnel vision, and having one particular path ... you know its lateral thinking, it's a new idea and its wonderful…

\[S0214-19\] Anne (staff)

The staff felt very positive about the programme from the beginning and expected that it would be welcomed by the residents.

I think it was a great concept... to give the residents a very new activity

\[S0114-17\] Anne (staff)

Amongst the resident participants, there was unanimity in their preference for doing an activity that was new to them. The idea of challenge it brought to them was enjoyable. It gave them opportunity to learn new skills that they found rewarding.

I think the challenge does you good… it’s like nothing you have done before.

\[Y1127\] Catherine (resident, Yoga group)

[Everyone nods saying] ‘yes’…

Catherine and Gabrielle, yoga participants, used the metaphor “pioneers" in reference to themselves as being the first group of people to start this culture of practicing tai chi or yoga. Here, trying an unfamiliar exercise was adventurous for them as they were exploring unchartered territories. As Catherine said with excitement:

Think of the pioneers … if they can do what they did, surely we can do.

\[Y1216\] Catherine (resident, Yoga group)

We are all pioneers in one way.

\[Y1217\] Gabrielle (resident, Yoga group)
The participants appreciated the distinguishing nature of mind-body interventions such as yoga, tai chi from other physical activities and exercises.

… it's not what people consider as exercise... it was a different concept of exercise…

[S0303-05] Josephine (staff)

The exercises are the same thing over and over but tai chi is different...

[T0541] Frances (resident, TC group)

In the smoothness, there is rhythm, flow and mindfulness

One feature that was seen as common to both yoga and tai chi by all participants was the slow, deliberate manner in which the yoga postures and tai chi movements were performed. The postures in yoga utilised a combined action of stretching postures, deep breathing and body awareness.

It [tai chi] is slower movement [than physical culture]

[T0549] Bernadette (resident, TC group)

Slow body movements, the stretching felt good.

[Y0836-52] Daphne (resident, Yoga group)

The participants felt the slow dynamics that is integral to the changing postures and movements associated with yoga. They relished the smooth, continuous, flowing movements which helped them to relax. As Gabrielle explains:

Yoga calms. Physical culture is resonant. Yoga was very flowing...compared to physical culture...that the exercises flowed, the yoga does flow.

[Y0233-36] Gabrielle (resident, Yoga group)

Staff member Josephine had a similar opinion on tai chi.
They [participants] found that this [tai chi] was very beautiful and flowing, and very graceful.

[SO305-06] Josephine (staff)

Staff Josephine commented that the tai chi movements when performed slowly, with mindful awareness, eventually involved all the muscles and could help maintain equilibrium and steadiness for the frail residents.

Here [in tai chi] you are controlling your breathing, you are controlling your movements, and your stretching of muscles and that's done slow, and they are deliberate I suppose, and the way you learn to put your foot down on the ground, its deliberate.

[S0616-23] Josephine (staff)

The resident participants felt that the soft oriental music that was played throughout the yoga and tai chi sessions also complimented the gentleness of the exercises. The breathing exercises also helped them relax.

The gentleness of movements and the music is important... In the smoothness, there's a rhythm. It is that slowness of the rhythm which is important... in our breathing... and it also helps in the rhythmic flow of thought

[Y0639-42] Ellen (resident, Yoga group)

The Staff felt the tai chi movements were more graceful than yoga. They thought of yoga as a “postural exercise” with control and less emphasis on flow. This appreciation of difference could be attributed to the different approaches that the yoga and tai chi instructors used in instruction. In yoga, the instructor guided them through a series of postures and the instructions were specific to the parts of the body involved in the posture. However, in tai chi the sequences had a story line with each posture relating to a scene in nature. The staff believed the use of a storyline made tai chi entertaining as an exercise for the residents.

I felt the residents enjoyed tai chi the most, I found that it was more of a story line, and
you could get more involved in it, the movement, a bit more graceful… yoga was more of posture control.  

[S0420-21] Nancy (staff)

Staff Anne felt that the slowness of the movements and the active engagement of mind and body stimulated the residents’ cognition, as they had to focus more on the movement and on their body.

…you think also, with it being slower and deliberate, helps with their cognition, because they have to actually think about it, in a more slower way rather than the faster ones (exercises) where its more reactional [react] rather than thinking that I have to stretch my foot back, stretch my toe up, .. How do you go about that… with cognition… it helps cognitively… as they have to think harder about each movement.

[S0624-28] Anne (staff)

Bernadette, a tai chi participant said she experienced a shift in awareness from being on an ‘auto-pilot mode’ to being able to notice bodily sensations and associated thoughts and feelings, as they occurred. Focusing her attention to sensory stimuli and being proprioceptive (aware of one’s body in relation to the environment) in activities such as sitting, standing and stepping helped her move around safely. She felt this made a big difference. This finding is significant in the face of evidence that suggests decreased proprioception and compromised gait in older adults (Goble, Coxon, Wenderoth, Van Impe, & Swinnen, 2009; Ribeiro & Oliveira, 2011; Sudarsky, 2001).

It made me more conscious too, When I am walking, just walking with my walker, the heel and toe, I didn't know whether I was walking correctly, but now, I am more aware , I am standing straight, and also being more careful, getting into chairs and things.

[T0736-43] Bernadette (resident, TC group)

So [about] getting into chairs; how did you sit in a chair earlier?

Researcher

I did it somehow, but I wasn’t as conscious of it. It was a bit hit or miss something. But I
take care now... I am more aware of my body and cautious when I change positions.

[T0736-43] Bernadette (resident, TC group)

“With gentle action, it doesn’t take so much out of you...you feel better afterwards too.”

The participants expressed that the features such as the slowness, gentleness and not having to physically exert while doing the yoga and tai chi was very different to their experience doing the other physical activities offered at the facility. Yoga and tai chi exercises were done at a slower pace, that was tolerable and within the ability of the participants. It allowed them time to adjust to changes in movement. It did not require as much physical challenge and they felt it was safer to engage with. In contrast, the fast paced exercise extended them physically at times.

Tai chi is not as severe as some of the others...it’s not such a strain...does not take a lot out of you… It is slower movement.

[T0546-47] Jean (resident, TC group)

Well, I liked the slowness of it, that sort of thing, with faster exercises; I wouldn’t be able to keep up…

[Y0601-06] Daphne (resident, Yoga group)

I did go to the physical culture, [but] it was my breathing problem and I could not keep up, it was just stressful.

[Y0424-31] Catherine (resident, Yoga group)
However, one participant preferred a combination of both the slow and fast paced exercises. She was not sure whether she would get benefits of exercise by doing slow and smooth actions such as in yoga; however, she also felt fast paced exercise such as physical culture, could result in pain or cause harm.

The flow [in yoga] is the smooth action...but whether your muscles get a lot out of smoother actions, I couldn't tell, but then again, if you jerk with physical culture, you can have trouble... but I would like just the combination of the two... It's just my opinion...

[Y0240-43] Gabrielle (resident, Yoga group)

The ‘gentleness’ of the tai chi movements appeared as though it didn’t require exertion, making them feel better and had a lasting effect. Not pushing hard and doing the exercise slowly was beneficial.

You weren’t pushed ... not pushing your body hard...you were doing it gently...I guess you get more out of it that way...whereas when you do something hard, you feel your body is being torn...being frightened, having fear... but with gentle action, it doesn’t take so much out of you...you feel better afterwards too...and it lasts throughout the day.

[T0708-11] Jean (resident, TC group)

The tai chi offers a lot of benefits as you do a lot of stretching, muscle stretching and its slow... you know the stretching, without putting an added strain on their body...
Whereas I think the exercise group (refers to the ‘Physical culture’ group) can be quite strenuous at times

[S0616-23] Josephine (staff)

While the approaches of yoga and tai chi that were different from that of physical culture was perceived positively by many participants, one resident felt she was not doing any exercise, as she felt no exertion from doing tai chi.

There was nothing physical...we just moved hands... and that sort of thing...didn’t have to lie on the floor or anything like that...that’s all...
“You move your whole body”

The participants felt that yoga and tai chi involved a whole body work out when compared with physical culture, where they did all exercises seated.

(In tai chi), you move your whole body...

Although some participants talked about feeling that all their muscles were used, and exercised; they didn’t realise it during the session as the movements were slow and deliberate. They “felt worked out” after the session.

I could certainly feel the straining in my calf, in my legs… I feel it has done me a lot of good… The exercise in tai chi is so gentle, you don’t realise… that you are using all your muscles… it takes in everything, your hands, arms, shoulders, your torso, your legs, your feet, and you really realise when the session is finished, that you’ve used all of those muscles.

I also would mention… after completing the sessions, I found that a lot of the muscles had some feeling… that… it was a tiredness as opposed to terrible over exhaustion… and I found that very comforting.

“It feels like your body is alive still”

Throughout the focus groups, the participants expressed their embodied experiences such as enhanced body awareness, increased energy and vitality and feeling relaxed. Rosenfeld and Faircloth (2004) explain embodiment is experienced as a watchful and
witnessing state of interceding where one places one’s body under one’s own surveillance. One resident explains her embodied experience through the use of a metaphor that her ‘body is alive’. As she said;

It feels like your body is alive still ...well, that's comforting. You can still do things, no matter how old you are. That type of thing that you can still carry out these things...it helps... you don’t feel like you are a vegetable… you've proved something to yourself ... that you can do it…

[TO2, 07] Jean (resident, TC group)

Here she compared her ‘new’ experience of vitality, increased energy and enhanced awareness of bodily sensations against her past feelings of incapacity and helplessness. The mindfulness based practice helped participants to become consciously aware of their body. This knowledge was empowering and promoted self-worth. When the participants found that they were able to perform the exercises by participating, they were surprised at this new found knowledge. They felt good about it. It encouraged them to continue participation. It made them forget their limitations and reinforced self-competence and self-efficacy.

But at the time I did the Yoga, I didn't think I could do it …

[Y1123] Elsie (resident, Yoga group)

… to be able to stand and do some of those exercises was very very good. I didn’t know that I could do that.

[T0146-47] Bernadette (resident, TC group)

“I feel very confident…I stand by myself...I don’t get afraid of falling anymore…”

The tai chi participants reported embodied experiences of improved balance, reduced fear of falling, improved confidence in walking, sitting and performing standing
exercises. The slow, deliberate movements and postures gave them a sense of security. Because the residents felt safe and secure, they could perform their exercise with more confidence.

Bernadette developed confidence in her ability to stand and balance. Knowing that there was support close by in the form of chairs was reassuring for her. She appeared to feel rewarded by the ability to stand independently with confidence.

Well, my main problem is my balance and fear of falling and I think that's improved greatly. Normally, I don't like to stand without holding on to something, and to be able to stand and do some of those exercises was very good... I didn't know that I could do that... I still couldn't take a full credit though. I still make a mistake and stumble and... have a bit of a fall..., but I feel more confident now

[T0145-T0203] Bernadette (resident, TC group)

I haven't been able to walk... I had a hip operation on one side and I have smashed my femur in a fall; so, I haven't been able to walk normally for a long time... but now I find it improving all the time... I think it's due to the tai chi... It's given me confidence. She (tai chi Instructor) showed me how to sit .. that made a big difference ... yes, I feel very confident ... I stand by myself... I don't get afraid of falling anymore...

[T0752-T0803] Miriam (resident, TC group)

Another participant said that after attending some sessions, she found that she stood for longer periods and that she felt good about it.

I know that every time we had to stand to do the exercises, I found I was able to stand for longer period each time, at first I thought I'd like to sit down very quickly, but afterwards I find I have been standing for long... I thought that was good...

[T0512-14] Bernadette (resident, TC group)

One resident said her pain improved after the tai chi programme.

In the beginning, I had the hip pain, where the fracture was... and there my knee
bothers me a bit. It comes, its nasty and it goes... so, I've sort of... I live with it... I expect it... accept it... earlier, the pain lasted for a longer period of time, usually I get these bouts during the night, and now I get it, but it doesn't last long. It's just not as severe, as awful.

[T0832-42] Bernadette (resident, TC group)

Staff had similar reports of participants having benefited from improved balance, confidence and pain.

Many residents have benefited from the tai chi, for example, Bernadette, she says she has got reduced hip pain and has got more confidence when she is walking in her room.  

[S0616-23] Josephine (staff)

I think the most notable one would be Daphne, I think she is more self-assured, getting around, I just think she feels more confident, I mean... She's just getting in and out of places, walking around, seems a little more confident than she used to be.

[S0632-34] Anne (staff)

Miriam is another person who is showing signs of confidence... A lot of them are stable in their getting around, I mean in their posture and their whole demeanour. I think these exercises also take their mind away from their pain, distracting them.

[S0704] Anne (staff)

Some said they slept better after attending the tai chi session.

...Earlier, I could only sleep for 1.5 to 2 hours and now I am getting more sleep hours like 3-4 ... I am sleeping better after Tai chi... I am getting more hours of sleep.

[T0821-28] Bernadette (resident, TC group)
However, a resident participant in the yoga group was disappointed in not having experienced an improvement in her balance. However, she said she was willing to try again.

I thought yoga would give me a sense of calmness and would help me with my balance, which is my problem and I don’t think it’s improved at all …

[Y0205-07] Elsie (resident, Yoga group)

“I could often see the rhythm moving, the rivers flowing, the trees moving in the breeze, the gentleness of it...”

Most participants said they liked the flow of the exercises, deep breathing, the music and the instructor’s gentle tone and voice. The presence of the instructor was viewed as important in creating this relaxing atmosphere. The yoga group appreciated the relaxation phase of the programme, where the instructor used guided imagery.

yoga was quite relaxing and peaceful…lovely, lovely… I did like the peacefulness of it … she [the instructor] was very calming and very nice… that part [contemplation phase] was very nice. I liked the smoothness and the flow and a lot of that had got to do with the voice … Its gentle with rhythm, quiet….

[Y03] Edith (resident, Yoga group)

The breathing exercises felt very good…

[Y0644] Daphne (resident, Yoga group)

My perception of Yoga, the deep breathing... I put myself to sleep with deep breathing... [refers to the yoga nidra, the relaxation phase at the end of every yoga session]

[Y06] Ellen (resident, Yoga group)
Guided imagery (GI) during the relaxation phase of yoga stimulated positive thoughts by encouraging visualisation of a pleasant memory. In GI, images of sensory quality that are derived from a person’s experience are prompted by an instructor to achieve a therapeutic effect (Lewandowski & Jacobson, 2013).

Quite often, in that contemplation section (yoga nidra), I could often see the rhythm moving, the rivers flowing, the trees moving in the breeze, the gentleness of it.

[Catherine (resident, Yoga group)]

Catherine, a yoga participant explained that her mind was restless, with a number of thoughts rushing through her mind that were distressing and unsettling. With the yoga practice, she felt herself relaxing, her mind was more settled and practicing served as a welcome distraction from all her stressful thoughts.

I did find it comforting in the way it has been done…..and also I find as I walk… I find that I am doing the shoulders, to try and loosen up all the tension and I think it is worthwhile… the way it is done slow, is quite good… I think it is right for me, and I didn’t want to miss any session …I do really think that it has benefitted me… and given me a lot of thought to mind… to settle… to settle my mind …with all the problems that I have… well, mainly, in my mind… because I am very stressed, and I think I would take anything that helps me.. It helped me feel calm.

[Baarts and Pedersen (2009), in their research on CM users, report that mindfulness training helps practitioners to gain control over their mind and body and to relax.]

Elsie had a similar experience. She felt less anxious and more relaxed. Feeling calm and relaxed, she was able to continue her participation in yoga and did not feel exhausted anymore.

At first, I felt very tired, first few weeks, and I have sort of calmed down, I’m feeling calm. I didn’t feel tired anymore…
“Worthwhile”

All the participants appreciated the yoga and tai chi programme as worthwhile and rewarding. They felt motivated to participate because of the feeling of safety and newfound knowledge that they were able to do the exercises. This gave them confidence and made them look forward to the next session.

I am glad you came and asked me... I think it's been very good [and] very rewarding. I think it is worthwhile. I do.  

[Catherine (resident, Yoga group)]

…the majority enjoyed and looked forward to attend the classes

[Nancy (staff)]

Staff mentioned one resident who would get disappointed on days when he could not attend tai chi

…I did see he really enjoyed the sessions, and he looked forward to them, and the days when staff was not available to get him ready, he was very disappointed.

[Josephine (staff)]

The Staff expected that the residents would benefit from the modified approaches of yoga and tai chi, as it allowed them to exercise according to their ability. The modifications helped to set realistic goals for the residents and motivated them to participate.

It was motivation for the aged people, and to see it being modified for them, to their abilities, has been very worthwhile, because they were able to do what was in their range of abilities, and that's the reward.  

[Anne (staff)]
They also felt they would want to try any exercise that would improve balance, and would enable them to be active.

I thought it was a very worthwhile study... balance is very important for the elderly person... falls are caused through a loss of balance, and I think, anything we can do to improve that... is worthwhile. [S0108-10] Josephine (staff)

All participants said they enjoyed participating in the yoga and tai chi programmes. That tai chi was enjoyable because of its entertaining nature were often mentioned. This could be credited to the tai chi instructor’s use of humour throughout her sessions, the vivid visualisations of nature encouraged through guided imagery and the story line in every sequence of tai chi qi- gong movements. Enjoyment of experience is an important motivational factor reported in research involving other exercise activities for exercise participation (Mickelborough, van der Linden, Tallis, & Ennos, 2004).

It was very entertaining and I enjoyed doing it... (others agree to it. Harvey also keeps agreeing by nodding) She told some lovely stories... I thoroughly enjoyed it... and I am going to keep on coming [to tai chi classes that were to be continually conducted by staff]

[T06, 13] Miriam (resident, TC group)

I think the yoga was very good, it makes you happy... it makes you active... we enjoyed it...

[Y1406] Catherine (resident, Yoga group)

6.3.2 Yoga, Tai chi and Companionship

Transition from a life of independent living in one’s own home to a residential care facility can be very difficult. Increased risk of social isolation for older people in RACFs has been well documented (Buckley & McCarthy, 2009). Residents experience a loss of associations, relationships and connections that they have built over their life time and are faced with a situation, where they have to initiate new friendships in order to develop a sense of ‘belongingness’ (Barredo & Dudley, 2008). This finding is similar to the observation that is presented in a qualitative study involving older people in long term care facilities in a theme titled, ‘waiting, activity and grieving loss of
personhood’ (Coughlan & Ward, 2007). Gabrielle, a resident in the yoga group was articulate in expressing her perceived loss, her feeling of loneliness and the need for friendly conversations and social connections. Her expression was reflective of participants who had a need to experience belongingness in their life in the RACF by establishing social connections.

It’s a big step (coming into residential care)... you could have [access to], a bowling club, and all that. You leave all that and come here… familiarity is the thing.. Age comes.. your friends aren’t there…they’ve departed. So,…. you are here to live and make the most of it. And with the little bit of effort on your part, and the other person’s part, … I don’t mean hugging or kissing or all of that… but just talk! .. I think that it is something that absolutely is necessary … Too many hide themselves in their rooms...

[Y10, 7] Gabrielle (resident, Yoga group)

While some struggled to come to terms with their situation, there were some who accepted and tried to adapt to their new environment.

In the end, with the conditions like we have got, you can hide yourself away

[Y0611-14] Gabrielle (resident, Yoga group)

The interventions created opportunities for the participants to socialise, encouraging them to form new friendships and relationships amongst people who shared many common problems. Being in a group activity enabled them to contribute and care for each other.

Participants welcomed the opportunity to socialize as a group which they did not, otherwise, do often. They preferred meeting people they hadn't met previously and having a mixed group, with men and women. Usually, they had very little chance of meeting other residents except the ones they would sit with at the dinner table. Other than being visited occasionally by friends and family, they had special occasions at the facility, where most residents would gather for tea. The yoga or the tai chi programme was seen as a rare socialising opportunity which they appreciated and enjoyed.
When you do group work, you have got the companionship… and the feelings of the ones with you… it’s much better… has been my attitude… that you must make use of, with people… when you join here, you are given a table… you are allocated tables, to sit at for breakfast and meals… but… this (yoga) is bringing you together as a group……. But there are times when you need company…… It’s good to get out of the four walls…

[Y06,07] Gabrielle (resident, Yoga group)

In the 14 weeks of yoga or tai chi programme, the participants had developed friendly society, where they cared for one another, made their contributions and felt relaxed to voice their opinions. One resident expressed her feeling of liberation, away from the confines of ‘four walls’.

I like my room sometimes… It’s good to just be there sometimes… and think your own thoughts… but other times, I think ‘Ellen, get out of this place... Go and see if there’s anyone out there”. You’ll just talk… that helps me…

Its company… Away from those four walls…

[Y07] Ellen (resident, Yoga group)

The instructors and staff also played a vital role, by being sensitive to the individual's needs and at the same time promoting socialization in the group. The participants supported each other in the group, by getting to the venue as a group, having friendly conversation and encouraging each other during the sessions.

…I think the companionship, the common care, the way you get the instructor understanding each individual, makes a big difference.

[T0940-41] Jean (resident, TC group)

6.3.3 A sense of purpose

The individual’s need for maintaining a sense of self through identifying personal
values, autonomy, purpose and social connectedness, if not supported, results in social isolation that is detrimental to the sense of self-worth and well-being (Ryff, 1995). Values are desirable trans situational goals, varying in importance, that serve as guiding principles in the life of a person or other social entity (Schwartz, 1994).

The participants felt that the yoga and tai chi programme promoted a sense of self-worth, as they planned their day, looking forward to the next yoga or tai chi session.

…you know... waiting for the day of tai chi... Glad to get up there and...I enjoyed it very much.  

[T0217-18] Frances (resident, TC group)

Staff members Anne emphasises the importance to the older residents of being valued and having a sense of purpose every day;

… [to be busy, to have a purpose] that's very important here, they [the residents] need a reason to get up every day, to be valued and just helps their wellbeing all over… because otherwise, they get bored, they get lonely, there’s not much that happens in their life like it used to be…

[S03,04] Anne (staff)

The participants also had a sense of achievement and control. They could choose whether to participate or not, and to decide on their level of participation. The programme delivery in groups promoted socialisation, where participants enjoyed being in their group, where they looked after each other, and had opportunities to contribute and feel valued. On the whole, it promoted their sense of well-being. Staff member Anne sums up the importance of activities that are meaningful to a person’s self-identity:

As far as the exercises are concerned, they get a sense of belonging, planning for the day, and having a reason to do something, you know, rather than ‘oh, there’s nothing on today’. They get a sense of purpose… I think it’s meaningful in that way… there’s something to look forward to, something that they can commit to, have the opportunity
to have the ability to know they can decide to go, so it empowers them a bit to have some control, and then when they come [to the sessions] they get the benefit of what goes with the exercise, you know, they go away, and they talk about it… So socially as well, there’s a lot of benefits, from just the exercise to the complete... whole person… their sense of wellbeing.

[S03, 04] Anne (staff)

6.3.4 “You got to keep moving”

There was general consensus amongst residents that there is a need to keep physically active in order to stay healthy. Some participants believed in maintaining their activities and in always trying their best to stay active. They acknowledged that they did not have access to their preferred choice of activities that they had engaged in before they came into the RACF and when they were younger. They felt that even though their bodies had let them down physically they had to make the most of what was available to them. As Jean said:

It's [referring to exercise] beneficial to everybody, no matter how old they are... if they can still keep the body flexible, movable. For longer period... I mean, it keeps them alive...

[T0937-38] Jean (resident, TC group)

Catherine was living with Cancer and had suffered many remissions. She had heard of yoga earlier in her life and she believed it would help her relax. She had told me on several occasions that all she needed was to have peace and that she was willing to try anything available for it. She said with reference to yoga:

On some days, I get in very black moods, and I have trouble swallowing and all the problems with the vocal cords.. It's not easy when I can't eat… and I had so many cancer operations.. I just feel that I have just got to do things to the best ….to try and carry on...

[Y0438-40] Catherine (resident, Yoga group)
Daphne, expressed her desire to keep moving and “doing”, to remain functional to the extent that she can be. Daphne had suffered a stroke and had lost function of her right hand, and had problems communicating through speech.

I didn’t know whether I improved…or not, you know… what I mean…you can’t do a lot about it you know, there are numerous advantages [if you exercise], if you don’t use it, you’d lose it… I used to do lot of exercises… when I was quite younger.. [unclear]… it wouldn’t be that sort of thing anymore… you got to keep moving.. just keep moving…

[Y0601-06] Daphne (resident, Yoga group)

We keep trying to do what we can … this is the only time you could do it… you just try and do it.

[Y09,10] Daphne (resident, Yoga group)

Some participants would take up any opportunity that they thought would help them regain their health. Their determination motivated them to participate. Here a staff participant comments:

I look at Daphne and I look at her determination... and she has spoken couple of times about not giving up, and this about her whole demeanour of getting around and doing things, not giving in, this has really made a difference to her, I mean just look at her determination...

[S0404-10] Anne (staff)

She [Daphne] thinks that, ‘I am not going to let you take over, I am not giving up, I won’t’ [with reference to her disability post stroke]  

[S0411-12] Josephine (staff)

The participants expressed the need to have a variety of physical activities that they could choose from. Although the participants were divided in their preference of physical activity such as yoga, tai chi or physical culture, it was clear that they felt they needed more physical activities and also relaxation activities such as meditation.

More music and meditation would be nice.

[Y1012-13] Ellen (resident, Yoga group)
6.3.5 Participants’ perspectives on feasibility

The perspectives of resident participants and staff on the feasibility and appropriateness of the interventions focused on aspects such as: instruction, intensity, scheduling, duration, venue, seating arrangements and support of staff were also explored as noted previously.

Instruction

There were many aspects to the instruction of yoga and tai chi that were important to the participants in this study. They included clear communication, individualised approach, compassionate understanding, respecting the participants’ wishes, acknowledgement of the participants’ ability and encouragement. Techniques such as guided imagery in both yoga and tai chi helped the participants engage in the movements and postures. In particular, the tai chi instructor’s story approach and humour was entertaining. The yoga trainer’s gentle tone and guidance towards improving body awareness was considered beneficial.

The instructors’ experience of practicing and teaching tai chi and yoga for older adults for many years was essential to understand and cater to the learning needs of older adults in RACFs. Both instructors had over 20 years of teaching experience as mentioned in chapter 5. The tai chi instructor had also practiced physiotherapy and had over 9 years of experience teaching older people in residential care facilities. Extensive experience, knowledge on ageing, compassionate understanding and acceptance of individuals’ ability have been previously reported as desirable qualities of instructor’s and promoting positive experiences in older adults (Atkinson & Permuth-Levine, 2009; Chen, Chen, Wang, & Huang, 2005).

Communication

The instructors’ approach in communicating with the participants and in conducting the sessions was noted and appreciated by both staff and resident participants. The staff
remarked on the way the instructors “reached out” and “communicated” with the residents, making each participant feel important. The instructors attended to the participants individually to help them to achieve some benefit from the poses being demonstrated. By attending to the each participant individually they helped them to feel important. Both instructors also used encouraging words and showed appreciation of the participants’ efforts frequently. As one staff member said:

The ladies that did the groups [instructors], they reached out to each and every resident so well, especially the Tai Chi instructor, The Yoga instructor got better with time, just the way they interact and engage with people… making them feel important as individuals… it was remarkable..! [S0220-23] Josephine (staff)

I enjoyed the company...and the teacher. [T0119] Dorothy (resident, TC group)

I’d like to pass on a special thanks to the instructor… [she was] very good at it [teaching tai chi]… [She was] very kind and understanding of each one, helped each one, she was very good, the type of care, very understanding, very good… [T0227-29] Jean (resident, TC group)

The tai chi instructor was appreciated by all participants of the group for her compassionate understanding of the individual residents’ feelings by being considerate of their wishes and ability to perform a movement and spending time to enquire about how each participant felt from time to time.

…the instructor understanding each individual… makes a big difference. [T0940-41] Jean (resident, TC group)

The yoga instructor was appreciated by all the yoga participants for her approach in demonstrating the yoga postures and sequences.

the instructor, she had an excellent way of performing her instructions. [Y0525-29] Catherine (resident, Yoga group)
All the yoga participants said that they enjoyed her gentle, smooth and rhythmic tone of voice and it helped them to relax.

…she was very calming and very nice…that part was very nice

[Y0305-08] Edith (resident, Yoga group)

The instructions were clear, descriptive and delivered at a pace that suited the group.

I liked the smoothness and the flow and a lot of that had got to do with the voice … Its gentle with rhythm, quiet….

[Y0338-43] Ellen (resident, Yoga group)

Guided imagery

Both yoga and tai chi instructors used guided imagery and visualisation. However, in the tai chi sessions, guided imagery continued throughout the session in all the sequences that had a ‘story line’, whereas in the yoga sessions, it was used mainly during the contemplation phase. Guided imagery (GI) is defined as a series of verbal suggestions used to guide another person or oneself in imagining sensations and especially in visualizing an image in the mind to bring about a desired physical response (Merriam-Webster Online).

The tai chi sequences comprised stories involving nature and the sequences used in the programme are described in detail in chapter 8. The tai chi instructor used guided imagery and visualisation throughout her demonstration. For example, the tai chi instructor, in a sequence of movements, would say, “dig in to the earth, smell the rich earth and then toss it out”. She involved every participant in the visual scenes that she created like, “let’s go to Jean’s garden today… it’s beautiful here.” The use of GI during tai chi encouraged visualisation of scenes of nature and tapped into the participants’ senses. This was used to engage participation.
The yoga instructor used guided imagery during some of the poses. For example, while demonstrating the ‘Mountain pose’, she would say, “Stand tall… imagine balancing a book on your head”. While instructing on the ‘Tree pose’, she would say “feel your roots go down into the earth, feel your steady trunk, a strong beautiful tree”. While performing the ‘warrior pose’, she would say “feel ready to meet your challenges and fears with an open heart…”

_Humour, fun and laughter_

The participants felt that tai chi was entertaining, especially when they remembered the stories that helped in visualisation and the humour that made them laugh. The tai chi instructors’ use of humour in addition to guided imagery was considered entertaining and fun. Enjoyment and entertainment facilitate helps motivate participation in the activity and aid in developing positive coping strategies (Duay & Bryan, 2006).

It was very entertaining and I enjoyed doing it… (others agree to it…Harvey also agrees by nodding)..She (referring to the instructor) told some lovely stories…

_ [T0650-51] Miriam (resident, TC group)_

_Body awareness_

Both tai chi and yoga instructors invited participants to consider the spatial, temporal and sensory awareness of their bodies in space and time.

She showed me how to sit… that made a big difference

_ [T0803] Miriam (resident, TC group)_

The yoga instructor encouraged mindful awareness during the shoulder rolling exercise, “Loosen your (left or right) shoulder, be mindfully aware… feel the shoulder as you are doing it” She also guided their thoughts that in turn helped achieve the pose or movement. For
example, she would say, “Stand tall, think proud and open your chest… feel your breath flowing…”

The tai chi instructor encouraged the participants to reflect on how they felt during the pose or movement. She helped the participants to focus upon, feel and sense the part or parts of the body engaged and involved in movement and the exercise. For example, the tai chi instructor would say;

“Lift the left foot and stretch it out…and lower it down slowly, placing it carefully on the ground. And if you like, you can put your hands on the knee, and feel the muscle tightening.”

She would add, “so you have muscles there…” for humour.

Facility staff Involvement

Involvement of staff of the RACF and their support is instrumental in implementation of any programme. In this study, support from staff was significant in influencing participation of residents in the yoga and tai chi interventions. Positive relationships between residents and staff of the facility are important in the light of the dependence of residents on staff for their physical and psychosocial needs (Coughlan & Ward, 2007). Coordination, team work, flexibility, and effective communication have been identified as important aspects of staff support to motivate older adults’ participation in exercise activities (Galik et al., 2009). When the research team approached this facility, the management and staff were interested in the programme and showed enthusiasm and support. In this study, the involvement of all RACF staff started from their introduction to the modified yoga and tai chi programme, seeking their support during recruitment and, once consent had been obtained from participants, their continued support by helping the residents to get ready on time, and reminding and encouraging the residents’ participation throughout the 14 weeks of the study. Three staff members who were designated as recreational activity officers at the RACF were actively involved in supporting the residents when they participated in the yoga and tai chi programmes. These staff members had the support of other RACF staff members at all levels, from
management to care staff. Staff attitude towards the yoga and tai chi programme, their perceived importance, allowing room for flexibility, effective communication and coordination were amongst the aspects that were highlighted in the focus group discussion.

All the staff agreed that involvement of the staff members was very important in implementing this programme.

I think as soon as you came and spoke to us about [the programme], we were all very positive and this was something we really wanted to do, to happen here.

[S0119-20] Josephine (staff)

However, there were some disruptions that occurred during the implementation of the tai chi and yoga programmes. For example, on a day when there was an emergency, the participants arrived late for their yoga session. After the session commenced, a registered nurse (RN) interrupted the session in order to administer medications to a one of the participants. Sadly, the RN expressed her dissatisfaction openly. When I asked about this matter in the focus group, Staff Nancy remarked:

I think that negativity [of the RN] wasn’t really about the programme [yoga/tai chi], it was how they felt about what their part was going to be, how they are going to get the residents ready, their routines, I think that was the negative part rather than what we were actually trying to achieve. There were some staff in the beginning [who were] asking about it [the yoga/tai chi programme]. They were interested in what was happening, I think any negativity was really about how they were going to cope with it themselves, you know because, I think, they work to routines, but we were flexible in our roles, so I think that put a bit of pressure on them in that way.

[S0127-33] Nancy (staff)

Rescheduling care routines to accommodate the yoga and tai chi programmes meant that the support staff (recreational activity officers) had to communicate and coordinate with nursing staff who worked different shifts and the team leaders to ensure that the
participants were able to attend the programme at the designated times. This process was very challenging when external agency nurses were hired during nursing staff shortages which were common. Often, the external agency staff could not be informed about schedule changes or about the need for participant residents to be assisted to the yoga or tai chi session in adequate time. This meant that some residents missed out because they could not get assistance to attend and this led to some disappointment as one staff member said with regard to Owen:

… I did see he [Owen] really enjoyed the sessions, and he looked forward to […] the days when staff were not available to get him ready, he was very disappointed.

[S0417-18] Josephine (staff)

Owen was dependent on staff to assist him with his morning care and could not attend the tai chi sessions on days when the nursing staff members were running late with their routines or not available.

Nursing and care staff were generally interested in the programmes. They observed the need for flexibility and planning ahead as key attributes to implementing the programme.

We are very flexible in welcoming new ideas, new concepts when you arrived with this programme. [S0214-19] Anne (staff)

We were flexible with our schedules, I think if you need to go to a facility, then you need to have life style staff [recreational activity officers] who are flexible, we do change or shift programmes around, we actually cancelled some bus outings, which didn’t seem
to affect the residents in any way, as we felt that this was more important. We also knew this was for 14 weeks, and that this would have to be in a controlled environment, and we were willing to be flexible for that. So, if you are going to go to another facility, they would have to be willing, flexible and plan ahead.

[S0208-13] Josephine (staff)

The staff members recommended meetings prior to commencement of the programme that involved nursing staff who could talk to yoga and tai chi instructors, clarify any issues and witness demonstrations. They felt this would help them understand the importance of the programme and would help get their support.

The RACF staff in this study, the recreational activity officers Nancy, Josephine and Anne played an important role in encouraging participants to attend the yoga and tai chi sessions. They often reminded the residents of benefits of the programme and offered constant encouragement. These were some of the approaches that the staff used to motivate residents. This was especially effective with resident participants who had memory problems.

you know Dorothy, she didn't want to come every time, you know, we had to [encourage] her, and tell about how graceful it is and stuff like that, and about the enjoyment you get there, she did actually enjoy once she attended the classes. If we just approached and said, ‘Tai chi is on, are you coming?’ she would say ‘no’. Every time, we had to talk about the benefits... so it’s all in your approach.

[S0309-13] Nancy (staff)
Scheduling and duration

Scheduling of the modified yoga and tai chi programme required several alterations to an already existing compact time table of planned activities. Analysis of the FGs also revealed that altering an existing schedule might affect consistency of the routines and influence residents’ participation in the programme as the individuals differed in the values they placed on different activities. A morning schedule, starting at 10 AM, after breakfast that allowed time for residents who were dependant on others for their morning care needs such as toileting and mouth care, was considered suitable.

Time wise, I think it was too early, at 9.30, may be 10.00 would have been right, I think this in hindsight.. If the sessions started at 10.00, some of the participants who were late or who needed help to get ready would have attended. But we didn’t see that in the beginning...

[S0524-27] Josephine (staff)

Duration of half an hour for the yoga and tai chi sessions was considered appropriate by both staff and resident participants. Any period longer than this might have been “exhausting” and “intolerable” for the frail older residents.

It was adequate because by the time, if it went any long, some of them weren’t well up to it, doing it, because it’s too much… we are not young people any more…

[T0407-T0506] Jean (resident, TC group)

I would prefer it to be an hour rather than half an hour... It started and it’s all finished ...

[T0413-47] Owen (resident, TC group)

I think one hour will be too much…

[Y10-] Gabrielle (resident, Yoga group)

I can't stand for too long...

[Y1138] Ellen (resident, Yoga group)

I think it could have been longer… may be three quarters of an hour.
The staff members were unanimous in their opinion that half hour duration was sufficient and that any longer would not have been tolerated by this group of frail residents.

I think more than half hour would be difficult for them to concentrate, they may fall asleep. For some people it may be taxing them physically, and for others, it may be problem of concentration, I think half an hour is long enough. I think that they had the benefit of an hours session in half an hour... because if you see some of them, were struggling, or getting exhausted.

However, some residents wanted the yoga and tai chi programme to continue beyond the 14 weeks.

All the participants, the residents and staff, preferred the programmes to continue beyond the trial period of 14 weeks.

… a few of them have said they’ll miss it [the yoga and tai chi sessions]... some feel that 14 weeks is too quick for them…

…and also they don’t want to lose any advantages they have gained.

Inclusion of a new programme to an existing schedule needed adjustments and changes to other programmes, such as, bus outings, ‘Bingo, and other social group activities that
were already in place. The RACF staff members had to prioritise and decide on programmes that could be delayed or cancelled in light of available options to reschedule. This impacted one resident’s participation in the programme. Staff member Nancy referred to a resident who withdrew from the tai chi programme because she did not want to miss her hair dresser’s appointment.

… some residents have their routines [like] hair dresser’s appointment. It’s more important for them… Like for one resident, even when the hair dresser assured her that she would attend to her after the yoga or tai chi, she still was not happy;

[S0603-05] Nancy (staff)

Getting all the resident participants in time to the sessions was challenging on every day of the programme, and especially on Mondays when both interventions were scheduled, due to limited staff availability. This affected participants who were dependent on staff support for getting ready for the yoga/tai chi classes. However, the staff felt they managed to successfully get most participants to attend the sessions throughout the 14 week programme.

We coped a lot better, on the Mondays than I anticipated that we would, We cancelled some bus outings, and we changed our bingo from morning to the afternoon, and we found out that it (referring to ‘bingo’) actually worked better in the afternoon and is going to remain that way.

[S0530-32] Josephine (staff)

Staff remarked that the participants of the intervention groups did not complain about the cancellation of bus outings. However, whether participants of the control group and other residents were affected by this change of schedule is not clear.

Venue and seating arrangements

The venue was important in creating a relaxed ambience. The staff considered a controlled environment to be safe and practical; however, the residents preferred an
outdoor environment under suitable weather conditions. A semi-circle seating arrangement that allowed a good view of the instructor’s demonstration and safety enhancing props and chairs were considered essential.

The sessions were conducted in a large open hall in the facility, that was controlled for ventilation and lighting. However, the room was not sound proof which meant that noise from traffic on a busy road and the noise from the adjacent kitchen often infiltrated the venue. However, the resident participants did not report noise as disrupting in following the instructions. On the other hand, it was the only room that was spacious enough to accommodate the groups, and convenient for the staff to help move the participants for their lunch. The RACF staff members however, ensured the venue was always set up and free of interruptions during the sessions. Large notices were strategically placed signalling the sessions were in progress.

The resident participants preferred an outdoor and a greener venue on a day when the weather was suitable. However, considering the safety of the residents, staff participants preferred a venue that was controlled in terms of lighting, ventilation and accessibility.

You know when I first heard of yoga, I thought it would be wonderful, if we did it outdoors… that was my immediate thought, a beautiful and pleasant situation…

[Y1310-14] Ellen (resident, Yoga group)

If the day was nice…

[Y1318] Catherine (resident, Yoga group)

If it wasn’t too cold… or too hot

[Y1320] Elsie (resident, Yoga group)

Importantly outside, you’ve got the weather to consider…

[Y1332] Gabrielle (resident, Yoga group)

The staff felt that it was important to have a controlled and sheltered environment for residents’ safety.
No, that [outdoor venue] wouldn’t be suitable for the residents, it would be cold or hot, or windy. It would be better to have a controlled and sheltered environment that is safe, I think outdoor it will not be possible.  

Provision of a safe space added to the participants’ feelings of safety and security. Sturdy chairs were placed behind every participant so they could rest, allowing them to sit at any time during the exercises. In the tai chi sessions, many of the participants had their own walker in front of them at all times. Some also had assistance and support from staff or volunteers. The yoga participants had a sturdy chair in front of them. They used this as a support when doing standing exercises. The presence of the walker and the chair provided a sense of safety when participating. In addition, those doing yoga were also supported by staff and or volunteers at times.

I haven’t had one [a fall] since I’ve been here, but during the last session, my legs sort of gave away. And I was glad that I had a chair behind me so I could sit immediately.

All participants were seated in a semi-circle, facing the instructor. This enabled the instructor to support the individuals, by helping them with the postures and movements as needed. The participants also had an unobstructed view of the instructors and the performance of their moves. Participants who had some difficulties in hearing and vision were seated near the instructor.

However, for one participant, the staff felt that the unfamiliar environment of the venue could have affected his participation, especially in doing the standing exercises.

[Owen] He might have felt that he couldn’t get up as it was a different environment, whereas in the gym he had the bars for support, or he could have not wanted to get up in front of people, for the fear of failing, you know, or he felt that it was not safe enough for him to stand.
6.4 Discussion

The findings of the focus group interviews with 16 residents and three support staff members were presented in this chapter. The focus group interviews were designed to examine the appropriateness of the modified yoga and tai chi programme by exploring the residents’ expectations of physical activity, their perceptions of the modified yoga and tai chi programmes and their perceived benefits from participation.

In the following section, I highlight and discuss the aspects of the yoga and tai chi programme that were brought up in the findings as appealing to the participants. I then discuss the participants’ psychosocial needs such as autonomy, competence and relatedness that were identified from the findings, motivational factors and finally the strengths and limitations of the study.

6.4.1 Sense of safety

The themes “With gentle action, it doesn’t take so much out of you… you feel better afterwards too” and “You move your whole body” explained the perceived physical exertion that the participants experienced in performing the yoga and tai chi exercises. The mild to moderate intensity and the slow and controlled nature of the exercises were emphasised as having contributed to a sense of safety while performing the exercises. Both tai chi and yoga were delivered in a way that required minimal physical exertion in the initial sessions and gradually progressed to increased intensity. This was evidenced by the participants’ ability to do more standing exercises in later sessions. It is understandable to expect frail older adults to be attracted to lower intensity or moderate exercise in preference to strenuous exercise. The older person has less fear about injury or death while participating in an exercise that is perceived as reasonably safe (O'Brien Cousins, 2000).

Both instructors emphasised to participants that they assume positions and or engage with the movements and exercises at their own pace and within the limits of their ability/disability. Frequently the participants were reminded by the instructors to feel
free to stop whenever they wanted and to rest. Sitting and standing exercises were
alternated in both programmes. This helped them to exercise and engage with the
movements at their pace. The support staff members were also ready at all times during
the session to assist the participants in change of positions whenever needed. The
participants expressed that being able to stop doing the exercise without feeling
embarrassed about it was important.

If I wanted to stop I could always ... [do so] you do what you can

[Y11-] Gabrielle (resident, Yoga group)

When gradually increasing the complexity of the exercise, the instructors assessed the
participants’ ability and decided whether or not to proceed based on the participants’
feedback and performance. For example, the tai chi instructor found that the participants
had difficulty in focusing on both leg and arm movements; so she decided to encourage
focus on leg movements separately and the arm movements were done while seated.

6.4.2 Mindfulness

Enhancing body awareness and mindfulness are key elements of mind body
interventions such as yoga and tai chi and through this process, practitioners aim for a
greater unity between body and self (Mehling et al., 2011). The participants’ experience
of yoga or tai chi was associated with embodied experiences of enhanced body
awareness, renewed vitality, enhanced self-efficacy, relaxed mind and body and
happiness. These forms of emotional embodiment are related to wellness, a subjectively
embodied experience incorporating bodily harmony and balance (Duay & Bryan, 2006).
The active engagement of mind and body stimulated the participants to focus
specifically on their bodily sensations during the postures and movements. They
attributed the conscious awareness of their body in the environment to the slow and
deliberate movements and the instructor’s guidance. In both the yoga and tai chi
programme, this referred to the instructor’s verbal encouragement to pay attention to
their bodily sensations. For the participants, learning to be mindfully aware during change of positions and movement was a renewed skill.

6.4.3 Building self-efficacy

The interventions offered the participants an opportunity to rediscover their bodies; their potential to do exercises. The present study did not actively measure self-efficacy. However, several programme components (modification of exercise to suit ability, progressive increase of complexity, functional nature of the exercise) could be related Bandura’s (1977) self-efficacy strategies and the qualitative findings suggest that the yoga and tai chi programmes built self-efficacy. It was interesting to note that residents who did not believe in their ability to do exercise were surprised when they were able to participate and became better and confident with subsequent sessions of yoga or tai chi. Participants’ confidence, abilities and expectations were reinforced by their performance in the tai chi or yoga programme. The participants’ responses also reflected their self-efficacy from perceived physical improvements such as balance, confidence, posture and enhanced body awareness. Perceived improvements in balance and enhanced body awareness during change of postures and mobility improved their functional capacity and served as positive reinforcement. This finding is consistent with the theory of self-efficacy that posits that self-efficacy expectations can be influenced by experience to attain a desired outcome (Bandura, 1977). Self-efficacy is one’s belief in one’s own ability to complete tasks and reach goals. Influencing self-efficacy expectations could promote exercise behaviour and adherence to continued physical activity (Booth, Owen, Bauman, Clavisi, & Leslie, 2000). Participants’ perceived benefits from participation enhanced their self-efficacy and was empowering. Empowerment is a process whereby an individual’s self-efficacy is enhanced and where the individual possesses skills, resources, opportunity, and authority to change a situation (Adolfsson, Walker-Engstrom, Smide, & Wikblad, 2007; Shearer et al., 2012). Empowerment and enhanced self-efficacy are associated with wellness and healthy ageing.
6.4.4 Guided imagery

Guided imagery and visualisation that was used in both yoga and tai chi helped the participants to relax. Guided imagery and visualisation have been reported to have therapeutic use, especially in treating pain and promoting relaxation (Chen & Francis, 2010). Guided imagery is also reported to be associated with motivation to exercise amongst adults (Duncan, Hall, Wilson, & Rodgers, 2012; Kalicinski & Lobinger Babett, 2013). Imagery in exercise is said to influence motivation by facilitating efficacy beliefs (Munroe-Chandler & Gammage, 2005).

6.4.5 Social connectedness

Participation in the yoga and tai chi programme gave the residents an opportunity to belong and to connect with other people who had similar life experiences. This finding is significant in light of social isolation that is an important deterrent to quality of life for older persons in RACFs (Buckley & Mccarthy, 2009; Hacihasanoğlu, Yıldırım, & Karakurt, 2012). Despite the RACF service objectives to offer a home like atmosphere for the older person, it still does not compare to ‘home’ as the older person faces many threats to self-identity like loss of loved ones, loss of independence and limited opportunities to exercise their preferences in terms of day to day living. New friendships that happened through the yoga and tai chi programme helped older residents to feel belonged.

6.4.6 Meaningful activity

The theme ‘a sense of purpose’ portrayed the meaningfulness of the interventions to the older residents. Having a sense of purpose and meaning through activities that provided an opportunity to carry out actions that aligned with the residents’ values. People develop personal values through activities that had a meaning to them in their past(Hermans, 1987). For example, during the yoga and tai chi programme, the residents helped their peers to get to the venue, contributed suggestions to the instructor and encouraged fellow residents during the intervention. In the RACF environment,
even if they were unable to do the things that they used to do in their past, they could identify new activities that aligned with their values. Participants’ opinions of yoga and tai chi as ‘graceful’ and ‘beautiful’ also meant they were more appropriate to them than other fast paced exercises. A recent review on interventions to enhance quality of life of older people in residential care noted that there were few ‘meaningful leisure’ activities despite evidence in favour of enhanced quality of life (Van Malderen, Mets, & Gorus, 2013). Meaningful activities are those activities that are liked and/or those that give a sense of purpose. A recent study that examined the ‘active ageing’ concept in residential care setting identified the importance of providing older people with activities that are meaningful to them to enhance their sense of autonomy and quality of life (Van Malderen, Mets, De Vriendt, & Gorus, 2013).

6.4.7 Attitude towards physical activity

The perspectives of participants of this study emphasized psychological and behavioural adaptations to life changes and disabilities. The expectations of physical activity of the study participants were not to seek freedom from or avoid physical disability, but to make most of the available resources in aiming towards wellness. Their expectation was to actively engage in life, to have autonomy and to seek challenges from novel pursuits. Most participants in this study had a positive attitude towards physical activity and exercise, and had a strong desire to stay active and achieve improvements in physical and functional capacity. The will to improve and restore functional ability has been reported in other qualitative studies that explored perceptions of older adults in RACFs (Lindelof et al., 2012; Oberg et al., 2014). The importance of remaining engaged with life and positive attitude is associated with self-growth and successful ageing (Reichstadt, Sengupta, Depp, Palinkas, & Jeste, 2010). This positive behaviour in older adults can be understood by relating to two theories: Parse’s humanbecoming theory and continuity theory by Atchley. According to Parse’s humanbecoming theory (Parse, 1998), humans are seen as unique individuals, who when presented with new ways of becoming, are able to choose ways to be with situations and circumstances that arise throughout life. For the participants of this study, life in the RACF and the yoga and tai
chi programmes presented with opportunities to new ways of becoming, to aim towards personal goals such as better mobility and independence. However, despite new ways of becoming presented as opportunities, the choice that the individual makes might depend on the individual’s past experiences. According to the continuity theory, older people continue to hold their beliefs and lifestyles, unique to their personality, through their past, present and future, to cope with changes inevitable to the ageing process (Atchley, 1989). Amongst the focus group participants, 13 residents had physically active lifestyles in their past. This could have made it possible for them to continue to have a positive attitude toward physical activity, and motivated their participation.

6.4.8 Need for variety and novelty

The participants expressed need for an activity that was different from what they were doing can be comprehended, given the heavily routinized schedule of activities in the RACF. Institutional modelling of RACFs bears the disadvantage of offering service that is less flexible and mechanised due to limited resources (Kane & Kane, 2001). Yoga and tai chi interventions were viewed as novel interventions and doing an activity that was new to them was challenging and welcome. It gave them opportunity to learn new skills. In a qualitative study that interviewed community dwelling older adults that aimed to examine attributes of successful ageing, trying new things that were of personal interest, and learning new skills, that was fun and enjoyable was perceived as important for successful ageing (Reichstadt et al., 2010).

Frail older adults who are dependent for care have perceptions of incompetence or feelings of reduced self-determination, which are factors known to affect motivation (Vallerand, O'Connor, & Hamel, 1995). However, contrary to this belief, the qualitative findings in this thesis point out to the potential in frail older residents for active involvement in physical activity programmes. The findings contributed to knowledge on motivating factors that are prominent in this group of older people. This is important, as understanding factors that regulate behaviours is helpful to initiate interventions to promote healthy behaviours.
6.4.9 Autonomy, competence and relatedness

The findings of this study may help support self-determination theory (Deci & Ryan, 2000) whereby motivation is driven by autonomy, competence, and relatedness. The residents who participated in the tai chi or yoga programme experienced a degree of autonomy, as it gave the participants opportunities to exercise control over their preference to participate, degree of participation and in contributing to the respective yoga or tai chi groups. Autonomy is experienced when a person has control over his own behaviour (Deci & Ryan, 2000). The instructors encouraged autonomy, in their approach, by encouraging the residents to practice within the range of their perceived bodily ability. The participants could always stop when they wanted and could decide on the level of their participation. Residents said it was important for them to not feel embarrassed when they were unable to keep up with the other members of the group. It also gave them opportunities to contribute to the group by offering support to other members of the group.

Continued participation led to greater perceived competence and enhanced their confidence. Many participants were pleasantly surprised in their new knowledge that they were able to participate in yoga or tai chi to an extent that they had thought was impossible. This had a positive influence on their exercise expectations and a strong will to improve. This is evident in the expression of a resident who believed in the future in spite of her terminal illness (section 7.3.4). This is contrary to the disengagement theory that suggests that older adults withdraw from personal relationships and do not actively engage in social roles and activities as they age (Cumming & Henry, 1961).

It is evident from the findings discussed under section 7.3.2 that the modified yoga and tai chi programme provided an opportunity to meet their needs of relatedness, by promoting socialisation, a sense of belonging and camaraderie with the members of the group. Everyone enjoyed the social company, practicing the yoga and tai chi in a group.
The instructors also were important in promoting this socialisation and in making it an entertaining and enjoyable experience.

6.4.10 Incentives, barriers and facilitators

Several incentives, barriers and facilitators were identified as having influenced residents’ participation in this study. These findings are consistent with research in other exercise activity programmes in community and residential care settings (Lindelof et al., 2012; Phillips & Flesner, 2013; Yu & Swartwood, 2012).

The incentives for the resident participants were their positive attitude towards physical activity; perceived benefits from participation such as improved balance, pain, fear of falling, confidence, enjoyment, peace and calm; and will to improve. Participants of the tai chi groups said they enjoyed and appreciated the use of humour by the instructor. The use of humour has been associated with motivating older adults with cognitive impairment in RACFs to participate in exercise activities (Galik et al., 2009). Enjoyment, which is an intrinsic motivator from participating in an activity, is well documented as a strong motivator for older adults to participate in exercise activity programmes (Kirkland, Karlin, Stellino, & Pulos, 2011). A study that examined relations between motivational factors in older adults 55 years and above, found significant differences between exercisers and non-exercisers in intrinsic motivation, suggesting that exercise enjoyment is particularly effective motivational factor for older adults (Kirkland et al., 2011). Perceived benefits of socialising in the group and appealing feature of the programme such as enjoyment, peace and calm were motivating. We noted that even the residents who did not feel well or those who had recently returned to the RACF after a period of hospitalisation, wanted to continue participating. They said they enjoyed the exercise and the company. For another resident, participation in the yoga was confrontational and brought her limitations to the foreground of her attention. Daphne, who attended all the 28 yoga sessions, told us in the FG that she suffered with her emotions, as she was reminded of her disability and
that it was unfair for her, as she was a physically active person in the past. However, she
told us that she kept continuing attending the yoga because; she did not want to give up.

The barriers to participation were negative attitude, lack of confidence and failing health
and ailments. Negative attitude and a low self-efficacy were evident when some
residents did not participate as they felt yoga or tai chi was not appropriate for their age.
Failing health was a barrier for some residents. The residents reported having
fluctuating feeling of wellness. There were some days when they did not feel fit to
attend the session. Participants, who were dependent on staff for getting ready in the
morning, were unable to make it to the sessions on days when there were short staffing
problems. Some residents reported negative experiences, such as pain, discomfort and
exhaustion. Disappointments with perceived absence of improvement could affect
continued involvement in physical activity programmes. For example, there was a yoga
participant who was disappointed in not having experienced an improvement in her
balance.

I thought yoga would give me a sense of calmness and would help me with my
balance, which is my problem and I don’t think it’s improved at all …

[Y0205-07] Elsie (resident, Yoga group)

Facilitating factors were: support from the yoga and tai chi instructors, support from the
facility staff and the residents’ need for an exercise activity that was different from
other activities offered at the RACF. The participants emphasised the support they
received from the instructors and reported that the staff were motivating. Similar
findings have been reported by other research studies on encouraging exercise activities
among older adults (Atkinson & Permuth-Levine, 2009; Galik et al., 2009; Phillips &
Flesner, 2013).

6.4.11 Strengths and limitations

The qualitative focus group interviews in this study were used as an adjunct to the RCT
in determining the feasibility and appropriateness of the modified yoga and tai chi
programme in a RACF. Although these focus groups yielded valuable information, there are some limitations that deserve attention. Participants’ views that are presented in the focus groups may not be reflective of their personal stance in the matter, but rather a collective opinion of the group. This may be because participants may have altered their opinions according to their perception of what was expected of them (Vicsek, 2007). Another limitation is that the researcher’s prompts in the discussion could have ‘led’ the participants to their statements and prevented them from expressing their own ideas. It is also worth noting that during the FGs, some participants were not as articulate as others on some matters.

Despite our invitation to the care staff, management and family members of participants, no one could attend the focus groups, except the three support staff members. This limited the scope of the focus groups, as we could not hear about their views on the appropriateness of the interventions.

Another limitation is that the subthemes were not mutually exclusive. This could be attributed to the complexity of individuals’ experiences. It was not always possible to separate intertwined experiences from each other. For example, the subtheme ‘active engagement of body and mind’ is reflected in most other subthemes.

The researchers did not request validation of responses from respondents after the focus groups as it was intended to preserve each participant’s reality at the time (Sandelowski, 1993). However, to ensure accuracy of interpretation, clarifications of responses were sought when necessary during the FGs. Descriptive validity was ensured by comparing notes between the two researchers involved in data collection and arriving at an agreement on the data captured. In addressing trustworthiness, I have presented quotations from the focus group interviews to enable the reader to evaluate my interpretation.

Finally, the findings cannot be generalised to all residents in the RACF in general. However, it is to be noted that the focus groups in this study were not intended for generalization but rather for gaining a richer understanding of participants’ experience.
of the yoga and tai chi programme and the factors that motivated their participation. An advantage here is that these results can be useful in other contexts after recontextualisation.

6.5 Conclusion

Analysis of the qualitative data reveals that both yoga and tai chi provide an opportunity for the older persons to experience enhanced quality of life through interaction of physical, mental, emotional and intellectual wellness domains. The findings indicate that mind body interventions such as yoga and tai chi are appropriate for frail and dependent older people in residential care settings, when modifications are made considering individual residents’ ability, motivation and preference. Aspects of the interventions such as entertainment, mild to moderate intensity and support of instructors and staff served as motivators to participate. Support of instructors, staff and family add to a conducive environment in encouraging participation. As the first study to investigate feasibility of a modified yoga and tai chi programme in a residential care setting, it represents a point for future research in investigating the effectiveness of yoga and tai chi through large quantitative and qualitative trials.

In this chapter, I have presented the design and process of the embedded qualitative component of the study and discussed my interpretation of the findings with related literature. In the following chapter, I present the mapping of the forms of yoga and tai chi that was found suitable to the frail older participants of this study.
Chapter 7 Results: Mapping of yoga and tai chi for older adults in residential care
7.1 Introduction

In the previous chapter, the resident and staff participants’ perspectives and experience of the modified yoga and tai chi were presented. In this chapter I present the results of the observation and mapping of the modified yoga and tai chi used in the RCT described previously in chapter 6. As the literature review in Chapter 3 highlighted, there was little evidence on what constitutes a suitable programme of yoga and tai chi for older adults in residential care settings. It was with this in mind that the study design included this important step. In this chapter, I present the methods and approaches used in the mapping of the modified yoga and tai chi programmes.

As stated previously in the introduction to this thesis the objective of this part of the study was to observe and map the implementation of modified approaches of yoga and tai chi with older people in a RACF.

7.2 Method

This part of the study incorporated observation and mapping of the yoga and tai chi poses. In order to achieve this I used observations in conjunction and collaboration with the stakeholders. To this end, this part of the study was also informed by the principles of participatory research, whereby all stakeholders contributed to the process. The participatory model allows for ordinary people to generate knowledge (Park, 2006). In this method of inquiry, the ‘power’ of research is shared between the researchers and the stakeholders (Cornwall & Jewkes, 1995). The knowledge generated in this study was ‘the forms of yoga and tai chi’ that were deemed appropriate for the older residents in a RACF. The notion of ‘appropriateness’ is subjective. To make a decision on the form of intervention that is suitable to the older residents, it is important to know what they think about the aspects of the intervention as practically possible for them. John Øvretveit (2002, p. 7) explains the importance of understanding different people’s perceptions to evaluate a health programme. He says, “What people think is the outcome is an outcome”. The input from the people involved in this project included the
instructors, the resident participants, the support staff and the management staff of the RACF was crucial to the formation of knowledge on ‘appropriate form of yoga and tai chi’ as they had the first-hand experience of the interventions.

The methods used in this part of the study included:

1. Consultation during the design phase of the yoga and tai chi programme with the stakeholders
2. Planning for each session
3. Feedback from resident participants and support staff regarding modifications needed
4. Video recording each of the yoga and tai chi intervention sessions.
5. A reflective journal kept by the student researcher and the instructors maintained throughout the implementation phase.

This study was approved by the Human Research Ethics Committee of University of Newcastle and by the ethics committee of the RACF. All participants provided written informed consent as described previously in chapter x.

7.2.1 Design Phase

In the design phase of the RCT described in chapter 5, a panel of experts and stakeholders comprising the yoga and tai chi instructors, researchers involved in the study and management staff from the RACF was involved. The yoga and tai chi instructors were certified to instruct the respective practice and had over 20 years’ experience in training older people. The tai chi instructor was also a trained physiotherapist and had instructed tai chi in residential care settings for over five years. The yoga instructor has instructed yoga for mixed groups comprising older adults in the community over a period of 10 years. The team of researchers comprised a student researcher who is a professional registered nurse and three research supervisors who, combined, had extensive experience in older person research and complementary and alternative medicine. The management and support staff from the RACF were experienced in management of care for older persons in residential care settings.
The yoga and tai chi instructors developed a plan of the poses and movement sequence to be used and the modified versions of yoga and tai chi to suit frail and dependent older people in RACFs. That the programme was offered over a 14 week period and conducted twice per week for 30 minutes provided a reference point for the poses selected for use. The other stakeholders contributed further to by suggesting recommendations to be considered in light of the older persons’ level of dependency. For example, the staff of the RACF suggested the yoga sessions to commence with seated exercises in order for the frail residents to not get exhausted. All the stakeholders communicated through email.

7.2.2 Implementation phase

Each instructor followed a pre prepared plan of poses to be used. All resident participants were offered support from a member of RACF staff and all were encouraged to invited family along for support.

Throughout the 14 week implementation phase, all stakeholders were invited to inform the modifications to the yoga and the tai chi programmes to ensure a safe delivery. The instructors modified the delivery of the planned tai chi and yoga sessions as needed by assessing the resident participants responses based on their performance and verbal feedback and suggestions. For example, the resident participants told the instructors how long they felt they could stand during the sessions. The support staff members from the RACF who were present at the yoga and tai chi sessions also contributed to providing feedback on the modifications needed to the programme. The support staff also noted any comments suggestions that they received from the resident participants and brought this to the attention of the yoga and tai chi instructors. For example, they stated that the residents were having difficulty in noting the leg, foot and ankle movements as the instructor was performing the demonstrations behind a chair. The instructors made changes as needed. All of the yoga and tai chi intervention sessions were also video recorded. The student researcher and the instructors also maintained a reflective journal throughout the implementation phase.
7.2.3 Evaluation phase

In the evaluation phase, the instructors, the student researcher and the research supervisors had face to face discussions and email exchanges using the data (journal entries and video records) to evaluate the poses and movements that best suited the resident participants and prepared a report. The evaluation was an ongoing process from the outset. It included stakeholders’ judgements about the worth of each and every aspect of the yoga and tai chi interventions. The approach of yoga and tai chi used for healthy older adults were compared with the approach that was documented in video records and the reflective journal entries.

7.3 Modified yoga programme

The yoga programme included half an hour of hatha yoga, described with modifications as detailed below. Hatha yoga is a ‘body mind’ practice where mindful awareness is encouraged (Swami Muktibodhananda, 1985).

Traditionally, a hatha yoga class, usually about one and a half hours, consists of a warm up including; asanas (poses/postures); pranayama (breathing practices); meditation and relaxation. The yoga nidra, or relaxation with mindful awareness, is usually done in supine position. The warm up and asanas take the whole body through a range of movements including forward bends; back bends; side stretches; twists; inversions utilising a variety of positions such as standing, sitting, kneeling, prone and supine. Usually the class is practised in bare feet. Some movements are dynamic (flowing) others are static (held). Slow ‘diaphragmatic’ or ‘belly’ breathing is utilised and some movements are performed in rhythm with the breath.

The main modifications to the traditional hatha yoga involved considering safety factors that would affect the older residents in the RACF. The participants wore comfortable, supportive shoes and were aided by at least two support staff. Many older participants were unable to, or had difficulty getting on and off the floor. Accordingly, the participants either sat on a chair or stood holding onto a sturdy chair. Each participant
had two chairs (one to sit on and one placed in front for support). The support chair was used to hold onto while doing standing asanas (always with at least one hand holding the support chair). The sitting chair was used to sit on for some of the warm up and modified asanas; to rest if required, for pranayama (breathing) and for yoga nidra; relaxation with mindful awareness.

In order to avoid ‘automatic’ mode, there was some variety and novelty in the sessions. The yoga programme consisted of 20 minutes of warm up, preparatory movements and the modified asanas (see pictures below). Unlike in a traditional class, the whole body was not moved through full range of movement. Rather the sessions focused on preventing falls and safety.

Both dynamic movements and static poses were included. Over the 14 weeks there was a progression from easier variations of the modified asanas to harder variations with a lot of preparatory movements. For example, at the beginning of the programme more time was spent sitting and less time standing. Standing time was gradually lengthened. Participants were able to sit down when they needed to rest. Some of the movements could be practised while either sitting or standing. Throughout the sessions, the participants were instructed to slightly draw in their lower abdomen to activate their core muscles. Each session finished with 10 minutes of pranayama and yoga nidra.

Modified Asanas

The following pictures show two yoga practitioners who attend regular yoga classes demonstrating the asanas used in the study. The traditional variation is on the left and the modified variation is on the right side of the image. Permission to copy and communicate these pictures has been granted by the yoga instructor. This can be seen in appendix 17. This programme is designed to be taught by trained yoga teachers.
MOUNTAIN (TADASANA)

UPWARD SALUTE (URDHVA HASTASANA)
SIDE STRETCH (NITAMBASANA)

CHAIR (UTKATASANA)
TREE (VRKSASANA)

DANCER (NATARAJASANA)
EAGLE (GARUDASANA)

WARRIOR 2 (VIRABHADRASANA 2)
STAFF (DANDASANA)

CAT (MARJARIASANA) contraindicated with hypertension
SITTING TWIST (MATSYENDRASANA)

See appendix 14 for excerpts of the modified hatha yoga instructions plan for 28 sessions carried out in 14 weeks.

7.4 Modified tai chi programme

This study used a half hour tai chi programme that is described in detail in the following sections. As described in chapter 2 there are a variety of Tai Chi styles followed by different schools available in the community. The Tai Chi patterns require constant shifts in weight bearing and directional changes combined with coordinated arm movements requiring time and practice to achieve. Since all participants of the tai chi programme were frail and had physical limitations, a recognized style of Tai Chi was not introduced. Repetition of movements, also referred as Qi gong, were chosen and modified as chair based exercises, focusing on the ability and function of residents. Qi
gong refers to training of the mind and body to direct the flow of energy (Qi) within the body (Tai Chi Australia).

Safety was given prime consideration while also attempts were made to engage the participants and make the programme enjoyable. The residents remained in control of their own level of participation and worked within their own comfort zones. They were encouraged to “listen to their bodies”. Support staff members were invited to be present and to inform the instructor of any individual needs of the participants.

The programme was designed to focus on the functional abilities of the participants. The participants were encouraged to perform difficult movement sequences which were gradually introduced (see appendix 15) while also reminding them to perform within their level of capability. Most movements could be performed in standing using the support of a walking frame or chair. Extra time was usually needed to adjust or change postures.

In the beginning the residents remained seated to gain confidence and to understand how to move slowly with control while maintaining correct posture. The tai chi sessions progressed from gradually increasing repetitions for endurance, increasing standing time and introducing more complex movements. The gradual addition of new movements and increase in complexity throughout the 14 week tai chi programme is described in appendix 15. A soft oriental music was played throughout the sessions to enhance the experience.

A theme was chosen for each week to assist the residents in understanding how the movements could help them to maintain or improve their abilities. Each movement was demonstrated before the residents joined in. Guidance continued as the movement was repeated several times with the participants. In community based classes it is traditional to explain benefits of Qigong through Chinese philosophy. However, in this study the instructor used personalized stories, and kept descriptions relevant to the residents’ experiences in order to make the classes more engaging and encourage participation and
interest. This approach was based on the instructors previous experience working with older people in RACFs.

In the following sections, the modified tai chi programme used in the study is described in detail. In every session, the tai chi programme included the following sequence:

1. Checking posture,
2. Greeting/salutation,
3. A selection of warm up exercises including balance exercises,
4. A selection of Shibashi, Golden treasure or Mind Power Qigong,
5. Selected sequences of Lotus, Wild goose, energisers and finishing salutation.

The components of the tai chi programme are as follows:

1. Shibashi: a group of 18 individual qi gong exercises that are designed to balance the energy (qi) throughout the body (Khor, 1994)
2. Golden treasure: a dynamic qi gong exercise having both characteristics of qi gong and strengthening exercises (Tai Chi Australia)
3. Mind power qi gong: qi gong exercises that involve descriptive imagery to produce stronger muscle contractions and movements
4. Lotus: a sequence of movements that involve exercise for the mind and body and deep diaphragmatic breathing(Khor, 1999)
5. Wild goose: an advanced form of tai chi movement that imitates wild goose’s shape and activities and requires flexibility, leg strength and balance (Everyday Tai Chi) and
6. Energisers: brief exercises to increase energy.

Shibashi, Lotus and the Wild Goose sequences are illustrated below with photographs that feature two tai chi instructors in order to contrast the modified Tai chi. The tai chi instructor gave consent for their photographs to be used in this thesis.
7.4.1 Movements selected for the Tai chi programme

Shibashi

**Raising the arms.** Feet shoulder width apart with arms by sides but not touching body. Raise the hands in front with palms facing downwards to shoulder height or to the height which is comfortable. Slightly bend elbows and lower arms to starting position.

**Opening the Chest.** From the same starting position raise the hands to shoulder height, then turn palms to face each other and take them out to the sides.

**Separating the Clouds.** From same starting position, cross the hands in front with fingers pointing upwards. Lift to face height or above head depending on the ability of the person, then separate and returned to sides.
**Rolling the Arms in Horse-riding stance.** Stand or sit with feet wider apart if comfortable and hands in front at waist height, palms upwards and with knees slightly bent if standing. Allow left hand with palm upwards to move back by turning torso slightly to left, bring left hand up in front of shoulder with palm forward and push out in front of shoulder, while turning torso to the front. Turn palm up and repeat with right hand.

MODIFICATION: In a community class this would be flowing and continuous, but residents manage better with one side at a time.

![Shibashi-Rolling the arms in horse-riding stance](image)

**Supporting a Ball in Front of the Shoulders.** Feet shoulder width apart. Take left hand with palm turned upwards across the body and to be in front of the right shoulder as the torso turns to the right.

MODIFICATION: In community classes the left heel is lifted to gain further rotation. This can be used later as a progression. Turn the hand over with palm downwards and take back to starting position (while the raised heel is lowered). This is repeated with the right hand.
**Gazing at the Moon.** Feet shoulder width apart. Hands hold an imaginary moon from the sides and positioned on the lap. Turn to the left taking hands up and out to the left, bring down and take moon across to the right and return.

**Turning the waist and Pushing with the Palm.** Shoulder width apart. Bring left hand up centre line to chest height with palm facing right. Push palm across to right turning torso to right, pressing right hand with palm down towards the floor. Relax both arms and left hand turns upwards and is brought back to left side. Repeat with opposite hand.

MODIFICATION: If this proves too difficult to coordinate, the pressing down of opposite hand is omitted. Added control and balance is required to transfer weight and stand on one leg while other leg moves forward or to side. Bending
and straightening knees strengthens legs and is important for ability to move from sitting to standing and return.

Cloud Hands in a Horse-riding Stance. Feet wider than shoulder width apart. Lift left hand with palm facing inwards to face height with right hand palm down by hip. Turn torso to left and hands move to left. Change position of hands so right is in front of face and left at hip height. Turn torso to right and then reverse hands turning to left again.

MODIFICATION: The width of stance and height of hand may need to be adjusted for comfort. At first in Aged Care the movement in the top hand with the trunk rotation is taught. For some coordinating the lower hand is too difficult and therefore can be omitted.
**Scooping the Sea and Looking at the Horizon.** With left bow stance and weight back on right foot, shift weight forward onto left foot in front as the hands are scooped down to cross at wrists. Weight is then shifted to right back leg again as the hands are lifted and separate as they are come to sides again. At the same time raise the toes of the front foot. Repeat, reversing leg position.

MODIFICATIONS: In a community class the bow stance is achieved by stepping to a corner. When seated or using the support of a frame or chair, stepping straight forward is recommended, as the spine and pelvis remain in alignment. The movement is taught in sitting and can be progressed to standing if they have confidence, leg strength and balance. Raising the front toes on the weight shift to the back foot as in a Community class is omitted when standing until advanced classes.

**Pushing the Waves.** The foot and leg work is the same as previous movement. Bring both hands to chest height separated with palms facing outwards. Transfer eight to front foot and bring hands down and push them forward. Transfer weight back and allow hands to return to starting position. Reverse leg position and repeat.

MODIFICATIONS: In a community class the bow stance is achieved by stepping to a corner. When seated or using the support of a frame or chair, stepping straight forward is recommended, as the spine and pelvis remain in alignment. The movement is taught in sitting and can be progressed to standing if they have confidence, leg strength and balance. Raising the front toes on the weight shift to the back foot as in a Community class is omitted when standing until advanced classes.
The Flying Dove Spreads its Wings. The foot and leg work is the same. Take arms out to side with hands facing forward. Bring arm across and in front of chest with space between hands as body moves forward and take arms out to side as body moves back. Repeat with opposite bow stance.

MODIFICATION: In a Community Class the back heel is raised when moving body forward and front toes are raised when taking body backwards. Raising heels and toes is omitted in Aged Care classes due to balance and coordination difficulties.

Punching in a Horse-riding Stance. Stand or sit with feet as widely apart as comfortable. Bring hands besides hips with palms facing upwards and make fists.
Lift left fist up, turn knuckles upwards and punch forward glaring at fist. Relax arm and allow hand to turn over returning to starting position. Repeat with right fist.

**Balancing the Chi to a Close.** Stand or sit with feet shoulder width apart. Turn palms outwards and raise to chin height with palms upwards, turn palms over and press down, separate and return to sides.

**Peacock Unfolds Tail.** Stand or sit with feet shoulder width apart and hands in front of thighs. Lift hands to face level, circle arms with palms turned outwards back to starting position. **MODIFICATION:** The hands can be taken higher as a progression if range and B.P. allow.

**Small Heavenly Roll.** Stand or sit with feet shoulder width apart and palms together with fingers downwards. Bring the hands up through the centre line, turn at heart level so fingers point upwards, and continue in a circle out and down to starting position. **MODIFICATION:** The circle may need to be smaller for comfort and to keep palms together.

**Fisherman Casts Net.** Stand or sit with feet as wide apart as comfortable. If standing bend knees slightly. Turn to right and bring hands facing outwards to right with left at shoulder height and right at waist height. Turn to left allowing arms to move across. Reverse position of arms so that right is at shoulder level and left at waist height and turn back to the right. **MODIFICATION:** Hands may need to be positioned lower for.
comfort and if it is too difficult to coordinate both hands, the resident can focus on the top hand only.

**Embrace the Morning Sun.** Stand or sit with feet shoulder width apart and bring arms out to sides and up. Turn hands over and lower with palms facing downwards and fingers pointing towards each other. Draw hands apart and repeat several times.

**Zen.** Standing or sitting with feet shoulder width or half shoulder width apart. Bring right hand in for ladies and place just below navel, covering with left hand. Reverse hand position for men. Be aware of slow deep breathing. **MODIFICATION:** It is safe to close the eyes in sitting Zen but only if the resident wishes to do so. The eyes are not closed while in standing.

**Golden Treasures**

This set of exercises involves internal stretching.

**Heavenly Lift.** Sit with feet half a shoulder width apart, fingers interlocked, palms facing upwards. Lift hands upward through centre line, rotate outwards at heart height and push forwards. Hands can be taken higher depending on medical conditions. This is an internal vertical stretch.

**MODIFICATION:** In a C.B. Class the hands are turned upwards and stretched upwards above head. In A.C. Class the stretch is in a comfortable range from chest to head height and taken forwards. From Week 3, the participants were encouraged to widen the distance between their legs in standing from narrow to shoulder width.

**Note:** This was the only Golden treasure selected in this programme.
Mind Power Qigong

This set involves descriptive imagery to encourage recruitment of muscle fibres to produce stronger muscle contractions and movements.

Sit with feet shoulder width apart and parallel and arms by sides on outside of chair arms.

**Push boat across wave.** Both palms parallel to floor with fingertips forwards. Visualize pushing the hands downwards and forward guiding and pushing the boats forward and then pulling back to beside hips to return.

**Push the Iron Balls.** The hands are rotated so finger tips point outwards. Pressure is downwards and outwards visualizing pushing heavy iron balls across the floor and then pulling back to beside hips.

**Black Bear Lifts the Rock.** Feet are positioned in horse-riding stance adjusted to individual comfort. Visualize scooping hands under a rock, lift rock to chest height then move hands so rock can be pushed up and forward letting weight go as arms follow through. Movement is repeated several times visualizing lifting an increasingly heavier rock.

*The Lotus*

The Lotus uses continuous changes in the pattern of arm movements which result in the need for subtle postural changes to maintain centre of gravity. These movements are also gentle stretches. The breathing pattern changes with long slow breaths and some
slightly faster automatically. The visualisation can engage the five senses as the story is
told of sights and sounds of nature in a garden setting.

The Lotus can be performed in standing or sitting and takes over 3 minutes to complete.
Starting position: Feet half shoulder width apart, upright posture with arms relaxed by
sides and knees slightly bent if standing. From Week 3, the participants were
encouraged to widen the distance between their legs in standing from narrow to
shoulder width.

**Raising arms** as the sun rises (Figures 7.1a to 7.1g). Push up through feet and
stretch up through the spine while lifting the arms with palms down to shoulder (or
comfortable) height keeping shoulders relaxed. Lower the elbows bringing hands
down and turning palms upwards and bring in to body so little fingers trace around
the rib cage out to the sides (relaxing down).

MODIFICATION: In a community class the hands sweep around the back brushing
over the kidneys with back of hands. This can be used in later classes when standing
and if the resident has suitable shoulder range. Usually Lotus is performed in standing
and full stretch is encouraged. In RACF classes, this range of movement is not expected
and the Lotus can still be effective in limited ranges. When seated, it is difficult to
sweep the hands behind the back so tracing the rib cage from centre out to sides is
accepted.
Figure 7.1c

Figure 7.1d

Figure 7.1e

Figure 7.1f

Figure 7.1g
**Turtle treads water** (Figures 8.2a to 8.2k). Lift arms out sideways, turn palms to face the front (while stretching up) and move the arms in to cross in front of body, turn palms outwards again and take them out sideways and then lower down to the sides (relaxing down).
Snow rabbit digs the earth (Figures 8.3a to 8.3g). Cross arms at wrists below navel with left hand on top and lift together to face height with palms facing outwards, lower as palms turn inwards, lift and allow to separate. Turn palms upwards as arms are lowered to sides.
**Fair Maiden Scoops Water** (Figures 8.4a to 8.4h). Cup palms and lift up and forward to shoulder height, turn fingers towards each other and separate them. Draw arms out sideways with palms up and lift hands and bring to head height (stretching up).
Raindrops Fall on Lotus (Figures 8.5a to 8.5c). Form fists and pull down so hands behind but not touching ears, continue circling to below and in front of ears but not touching, release fists (relaxing down).
Lotus Flower Opens (Figures 8.6a to 8.6f). Push open palm upwards (stretching up) and turn palms outwards arcing arms out and down towards sides (relaxing down).

MODIFICATION: In community classes the participant rises onto balls of feet while stretching arms above head. In aged care the resident does not lift heels and stretches only as far as is safe and comfortable.
**Face the wind** (Figures 8.7a to 8.7j). Scoop left hand up centre line into prayer position facing right at heart height. Stretch up and turn to right as hand is pushed across body to the right. Right hand is pressed down with palm facing floor at hip level. Relax the movement and allow the left palm to turn upwards and lower to side.

MODIFICATION: The movement requires skill and coordination. Some residents, particularly those who have suffered cerebral vascular accidents, find it difficult to take a limb across the centre line to the opposite side. For most coordinating pushing one hand across and the other down may be too difficult and for these it is acceptable to concentrate on the movement of the left hand only.

The same movement is repeated scooping with the right hand.

Figure 8.7a    Figure 8.7b

Figure 8.7c    Figure 8.7d
Lift the branches to the sky. Place left hand in right palm and lift up through the centre to just above heart.

Figure 8.8

Press the roots into the earth (Figures 8.9a to 8.9d). Turn palms over and press down so hands are at hip level, bringing torso slightly forward at hips.

MODIFICATION: In a community class in standing the torso is taken further forward so that hands are at knee level. In a RACF class when done in sitting, the trunk can be taken forward [nose over toes], but if this is being done in standing the resident maintains an upright posture and does not bend forward.

Figure 8.9a       Figure 8.9b
**Gather** the fruits of the earth (Figure 8.10). Scoop right hand clockwise and left anticlockwise at hip level.

**MODIFICATION:** In a community class this is done with knees bent and torso forward so scooping is at knee level.

**White crane spreads wings to dry** (Figures 8.11a to 8.11j). Move torso back into upright position. Take left hand with fingers pointing upwards through centre line and flatten hand with palm facing upwards above left shoulder before pushing hand upwards within comfortable range, while pressing right hand down beside right hip. Relax, stretch and lower left hand. Repeat with opposite arm movements.
Snow rabbit ploughs the earth (Figures 8.12a to 8.12g). Cross at wrists with right hand on top and repeat sequence described in snow rabbit digs earth.
To finish, lift and lower arms as the sun sets (8.13a to 8.13g)

Lift hands with palms facing upwards to shoulder height while elongating spine, turn palms over allow elbows to bend lowering hands to sides relaxing down.
The Wild Goose

The Wild Goose is an advanced exercise requiring flexibility, leg strength and balance. It is performed in many different ways and sequences. In the following, the movements that have been adapted to be chair based are outlined. Usually a movement is repeated 3-5 times. In this sequence there are 3 repetitions for bilateral movements and 2 for each side if unilateral. MODIFICATION: In a Community Class deep knee flexion and directional change is used. The range of knee flexion in standing expected in an Aged Care Class is restricted for safety due to loss of strength and muscle control. However, this limited range of knee bending can still help improve balance and assist in stability. The arm movements in the Wild Goose involve patterns which assist awareness of proprioception and neuromuscular control.

**Preparation.** Begin in sitting with good posture with feet shoulder width apart. Raise arms (palms down) to shoulder height and lower slowly. Hands are relaxed in front of thighs with fingers slightly curved with space between and more space between fingers and thumb – representing the end of the goose’s wings.

**The wild goose awakens and begins to stir.** Keeping shoulders relaxed, bring hands slightly forward, up, out and return completing a small circle. Repeat with a slightly larger circle. Complete with a third larger circle. If possible, each time the breath in and out becomes a little deeper.
The wild goose opens the wings to the sky. Lift the arms up and out. Look up with eyes. Bring arms in and down to in front of abdomen.

The wild goose listens alertly. Lift heels and bring hands up and then forward with palms facing at heart height. Bring hands down towards hips.

The goose cleans and preens the feathers. Drop heels and lift hands up and behind head. Bring hands down to front of neck trace down and out along rib cage and down along outside of thighs to knees. Lift both heels again, then drop them as the hands flick up and forward.
The wild goose searches for mate. Lift and place left foot forward onto little toe and adjoining part of foot. Bring left hand up in front with palm facing inwards. Look at palm and follow as hand is moved out to left. Lower hand and bring foot back in. Repeat movement with right arm and leg. Change and repeat again with left arm and leg. Repeat again with right.

The wild goose displays for mate. Turn body to left and bring right hand up just in front of forehead with palm turned to forehead and lower left hand to behind back (near sacrum) with palm facing outwards. Return arms to sides and turn to face front again. Turn body to right and change arms to left up and right down. Lower the arms to the side and turn to face the front again.
The wild goose scoops water and splashes it over body. Bring left thumb and finger tips together and bend elbow to touch left shoulder. Release fingers and lower arm to side. Repeat with right arm.

The wild goose builds its nest. Lift both arms up to shoulder height then lower them down. Repeat twice, making three times in all.
The wild goose takes off across the lake. Begin fluttering the hands and circle arms forward, up, out, and down; three times, continuing fluttering throughout. As arms come forward and up, take body forward. As arms come down, move body back in chair.

The wild goose leads the flock. Move arms up and out to side to head height and bring down again to sides; do this three times.
The wild goose descends through the trees. Begin fluttering again and move hands in front in a figure of eight, moving between waist and shoulder height.

The wild goose lands by the lake and searches for food, parting the reeds. Cross at wrists come forward with body and take hands downwards, separate and take out wards, back in again crossing at wrists and lifting. This sequence is done three times.
The wild goose returns to the nest and settles for the night. Begin fluttering again and circle both arms out, up and down the centre. Repeat with less fluttering. On the third time, there is no fluttering as the goose glides in to land. Cross right arm across chest, then left arm. Close eyes and lower arms. Open eyes.

**Energisers**

The programme ends with this set for cool downs. Move feet to shoulder width apart and check posture.

**Butterfly.** Cross arms in front of chest with palms facing body. Arc hands downwards and outwards to shoulder height and return. Repeat three times.

**Cutting the Flowers.** As the arms arc down and cross in front, continue moving up in front of face, separate and turn palms to front and continue to sweep arms out and down. Repeat once more.

**Gathering the Flowers.** Reverse direction of movement. Repeat.

Repeat two butterflies and close off by bringing the feet together and bringing hands out to side palms upwards, turn palms over and bring in to press down onto lap.

**Warm up**

The warm up exercises were done at the beginning of every session.
**Wrist rolls.** Lift arms forward to a comfortable position in front of lower part of chest with palms facing down and elbows slightly bent. Circle both wrists in one direction and then in opposite direction.

*MODIFICATION:* The residents remain seated

**Shoulder rolls.** Shoulder blades are lifted then taken back, down and forwards several times and then rolled in the reverse direction. Both shoulders can be moved together, one at a time or alternating left shoulder then right.

*MODIFICATION:* This exercise can be a difficult concept for many as the scapulae tend to be rotated forward from prolonged sitting with poor posture. At first the exercise may need to be broken into component parts of scapula elevation, depression, retraction and protraction.

**Finger curls and straightening.** Lift arms as in a] turn palms up, curl fingers to make a fist, bring thumb over turn hand over and slowly straighten fingers[Golden Glove]. Fingers can also be flicked open and closed as an alternative [Humming Bird].

*MODIFICATION:* In community classes the grip is performed with palms facing down. This grip is common in R.A.C.F. when using walking frames so is changed to palm up for variation. Palm up produces a stronger grip in a functional position for receiving and holding an object like a tablet or piece of fruit.

**Trunk Rotation:** Cross arms across chest with left fingers resting on right shoulder and right fingers on left. Turn whole trunk to the left, return to centre and turn to right and back to centre.

*MODIFICATION:* The placement of the hands allows the spine to rotate more freely than if arms are by side. It is a more protective exercise for older people with compromised spines than more vigorous ones used in community classes.
Ankle circling. Lift left foot and circle ankle in one direction and then opposite way before placing foot back on floor. Repeat with right foot.

MODIFICATION: This is performed in sitting rather than balancing on one leg in standing as in traditional classes.

Tai Chi jogging. Lift left heel pressing ball of foot onto floor, lower heel and lift right heel. This can be performed slowly visualising an uphill slope or a little faster on a downhill slope.

MODIFICATION: The balance is not challenged in sitting as it is in standing in a traditional class.

Knee Extension (in sitting). Lift one knee and extend foot forward to place heel on floor in front; lift foot and return. Repeat with the other leg.

Forward flexion of trunk at hips (in sitting). Lift both hands up in front with palms facing downwards to shoulder height. Continue looking ahead and bring arms and body forward to as far as nose over toes. Return to upright position and roll shoulders back.

Calf and Hamstring Stretch (in sitting). Raise one foot to straighten at knee, pull foot back, hold, release foot and slowly lower the leg. Repeat with other leg.

‘Bubbling well’ (in sitting). ‘Bubbling well’ point or ‘Yongquan’ refers to the spot on the pad of the foot, at the head of the instep, behind the toes. This point is significant in tai chi as during shifting weight, 70% of the weight of each foot must be positioned over the ‘bubbling well’ point.

Lift heel keeping ball of foot and toes on floor, press across toes and ball of foot in one direction then reverse and repeat with other foot.
**Balance exercises**

The balance exercises were performed in standing with support. The feet are moved apart to shoulder width.

**Transfer weight** (from one leg back to centre and then to other leg)

MODIFICATION: Support of a chair or walking frame is used. The resident can allow the weight bearing knee to bend slightly and then extend as weight is shifted and opposite knee flexes. In a traditional class deeper bending of the knees is required. If seated, the weight is shifted from one buttock and foot to the other.

**Rotating pelvis** (in one direction and reverse imagining drawing a circle with the tail bone).

MODIFICATION: If residents remain seated, they can visualize sitting on a clock face and move around the numbers in both directions.

**Forward and backwards weight transfers.** Bow stance with back foot at 45 degrees and opposite foot in front and pointing straight ahead, shift weight from back leg to front leg and back again. Change position of feet and repeat.

**Knee Flexion.** Feet comfortably apart; weight evenly distributed, breathe out and lower gently bending at knees, then push up through feet to lift body and straighten knees but do not lock knees

**Knee extension.** Lift one leg, extend at knee and place heel on floor, lift foot to return. **Side step.** Lift one foot and take out to side, place on floor, lift and return. **Lifting and dropping heels.** While holding on to the walking frame, lift the heels of both feet and then drop back.
7.5 Conclusion

In this chapter I have described the process of mapping of modification to yoga and tai that was used for this study and presented the details of the modified versions, illustrated by pictures.

The modified approaches of yoga and tai chi that resulted from contributions of the main stake holders were presented in this chapter. The knowledge and experience of training older adults in the community (for the yoga instructor) and in RACFs (for the tai chi instructor) helped the instructors design an initial draft programme that was modified to suit the residents of the RACF. The input from the residents and staff members of the RACF involved in the study helped the yoga and tai chi instructors to apply further modifications during the respective sessions. The journals maintained by myself as a facilitator, the yoga and tai chi instructors and the video records aided the discussions between the researchers and the instructors in mapping a final modified programme of yoga and tai chi. While this programme could be utilised in residential care settings, it should be noted that aspects such as the individual participants’ level of mobility, comprehension could vary. While it is important that trained and experienced instructors of tai chi and yoga deliver the interventions, delivery of interventions also require a supportive environment including support personnel who could assist the participants as needed.

The following chapter concludes this thesis with the interpretation of findings from both the quantitative and embedded qualitative components of this study discusses the practical implications, limitations and makes recommendations for future research.
Chapter 8  Discussion, conclusions and future directions
8.1 Introduction

In the previous chapters, I reviewed, synthesised and integrated a wide range of literature and provided the conceptual and methodological aspects of the present research. I presented, analysed and interpreted the quantitative and qualitative findings in chapters 5 and 6. In this chapter, I draw together the quantitative and qualitative aspects, to provide a summation of the whole study and address the research questions. I also discuss the main practical contributions, the study limitations and provide suggestions for future research.

The aim of this study was to develop, implement and test a 14-week programme of yoga and tai chi for frail older adults in a RACF. It addressed two main questions: ‘is it feasible to conduct a RCT that tests a 14 week modified programme of yoga and tai chi in residential care settings?’ and ‘is the 14 week modified programme of yoga and tai chi considered appropriate and suitable by frail older participants and staff?’ An additional study aim was to ‘map the suitable forms of the yoga and tai chi for frail older adults in the RACF’.

8.2 Summary of the findings

The present research makes an important contribution to the literature. It does this by being the first RCT with an embedded qualitative study to examine a 14-week tai chi and yoga programme implemented in an Australian residential care facility. The mixed method design was appropriate in addressing the aim and research questions because it led to a comprehensive understanding of the feasibility and appropriateness of the yoga and tai chi intervention for older adults in residential aged care setting. The methods used in this study also resulted in the development of a comprehensive pictorial and explanatory map of suitable forms of yoga and tai chi for use with frail and dependent older adults in RACFs.

The RCT demonstrated that a 14-week modified yoga and tai chi programme was feasible in a residential aged care setting, and provided evidence that yoga and tai chi
may be associated with improvement in balance, pain and quality of life. These findings support growing evidence that CM interventions such as yoga and tai chi could reduce fall risk factors and also have holistic benefits.

The qualitative findings demonstrated that practicing yoga and tai chi led to perceived improvements in multiple wellness domains. This suggests that these interventions provide opportunities for frail and dependent older residents to experience enhanced quality of life and active ageing. The qualitative findings also revealed important insights concerning what was most valued by the participants and the factors that motivated their participation in the programme. In particular, it identified lack of suitable physical activity and social isolation as key issues to be addressed in order to improve quality of life. Attributes of the yoga and tai chi programme such as the instruction, group exercise, aspects such as mindfulness, slow movements and guided imagery were highlighted as significant in motivating participation and improving confidence.

8.3 Preventing falls in RACFs

A majority of older people (67%) who reside in non-private dwellings live in residential aged care facilities (Australian Bureau of Statistics (ABS), 2013). Living in a RACF combined with age related functional decline and multimorbidity makes the older adults in this setting most vulnerable to falls and related consequences. Increased risk of falls adds to the burden of the already complex and challenging tasks involved in adapting to life in RACF. The RACF setting offers limited opportunities and biopsychosocio resources to cope effectively with the ageing process (De Bellis, 2010; Kane & Kane, 2001; Marshall & Mackenzie, 2008). Hence, research is needed to reduce fall risks and also to determine interventions that address multiple wellness domains and empower the frail older persons to cope with the challenges of ageing.

The importance of exercise interventions is recognised globally as an array of hope in this situation, especially in improving balance, mobility and improving older person’s
ability to carry out activities of daily living. There have been increased interests in investigating exercise interventions for fall prevention and many studies involve older adults in the community. Amongst exercise interventions, yoga and tai chi, two CM modalities that employ a holistic mind-body approach have emerged as promising in improving not only balance and mobility but also as having positive effects on pain and quality of life for older adults. Whilst the use of yoga and tai chi is relatively unexplored in RACF population in Australia as indicated by the literature review the findings of this study demonstrate their feasibility in this setting. Furthermore, whilst there are three published studies (RCTs)(Chen et al., 2012; Choi et al., 2005b; Dechamps et al., 2010) on tai chi and one study (RCT) (Chen et al., 2010) on yoga that provide some insights none of these studies provide specific guidance in terms of the implementation and suitability of yoga and tai chi in residential care settings with frail older people. The qualitative findings address this gap by not only establishing the appropriateness of the yoga and tai chi interventions, but also by mapping forms of yoga and tai chi that are suitable for the frail older adults in RACF settings.

### 8.4 Feasibility

The research question of whether the 14-week modified programmes of yoga and tai chi are feasible and appropriate for frail older adults in residential care settings was determined by a RCT and qualitative interviews. Clinical research recommends using a broad approach that involves clinical, patient and societal perspectives as essential for determining appropriateness of an intervention(Sanmartin, Murphy, Choptain, Conner-Spady, McLaren, et al., 2008). The AIHW Metadata online registry defines the term ‘appropriate’ as ‘care, intervention or action provided is relevant to the client’s needs and based on established standards'(Metadata Online Registry(METeOR)). In this study, the appropriateness of the interventions was determined by including the perspectives of the participants and support staff who facilitated implementation in the RACF. This was achieved by using qualitative focus group interviews.
Both quantitative and qualitative approaches determined that the modified yoga and tai chi programmes are feasible in the RACF. The quantitative indicators of feasibility were as follows: recruitment of 33 participants, high attendance (≥70%) and completion rates (28/33). There were no serious adverse events associated with participation in the tai chi and yoga programmes. However a yoga participant had a near fall during the first yoga session. This occurred when he attempted to turn to a side, holding on to chairs in front of and behind him. The participant had a medical diagnosis of Meniere’s disease which may cause dizziness on movement of the head. Whilst the participant was reminded by the researcher and the Yoga trainer, before the session started, not to perform any turning movements of the head that may cause him to lose balance, the participant turned his head without thinking about his situation. It should be noted that, despite his condition and advice to do otherwise, the participant was very keen to take part in the study. When the participant presented to the Yoga group he was reminded of the risks associated with taking part with respect to his condition. It is recommended that diagnosis of Meniere’s disease be noted as an exclusion criterion for future studies.

Poor health is identified as a barrier to participation in physical activity (Cohen-Mansfield et al., 2003; Thurston & Green, 2004). Although the definition of poor health is debatable, the demographic characteristics of the participants in the present study indicate relatively poor health (comorbidities mean: 10.3; number of drugs consumed mean: 13.1; Berg Balance score ≤ 40). The relatively good rates of compliance despite the health status of the participants suggest that specific programme attributes could have facilitated adherence. This is shown by the following findings: > 75% of tai chi and yoga participants completed the intervention and average attendance of >75% was recorded in both intervention groups.

The qualitative findings also explained the possible reasons for high retention of participants. Safety was a fundamental requirement in determining feasibility of the interventions in considering the high risks of fall and related injuries in the frail older residents. Compromised balance function and fear of falling can limit participation in physical activity (Curcio, Gomez, & Reyes-Ortiz, 2009). Safety was addressed in this
study by providing a safe physical environment with the use of dedicated support people, chairs, and walkers and by incorporating modifications to the interventions as described in the previous chapter 7.

Environmental conditions such as indoor lighting, acoustics, ventilation and thermal environment contribute to safe and comfortable environment in long term care facilities (Wong, Skitmore, Buys, & Wang, 2014). This is especially concerning older residents with dementia who can get confused with less optimal environmental conditions (Steinfeld, 2002; van Hoof, Kort, Hensen, Duijnstee, & Rutten, 2010) and older residents with compromised balance function (Akyol, 2007). A safe physical environment was made possible by choosing a venue with adequate lighting and ventilation, a half-hour session scheduled after morning care and breakfast, provision of sturdy chairs for support and by presence of at least two staff to support the residents when needed. In this study, participants expressed feeling safe by the presence of sturdy chairs and their walkers on brake, while practicing the exercises. Other environmental aspects included reducing noise, limiting intrusions and reducing traffic of people’s movement at the venue to minimise sensory demand on the participants and to help them focus on the instructions during the sessions.

In particular, the participants reported feeling safe while practicing tai chi and yoga. They felt this was due to the slow, deliberate and controlled manner of performing the movements and postures and the instructors’ guidance. Feeling safe is not easy for older persons who have compromised balance issues and it is especially challenging for people who have suffered a fall. The participants in the study practiced caution, in order to avoid a fall, while attempting to move and while participating in the yoga and tai chi. Practicing the tai chi and yoga slowly and steadily, they were comforted with a sense of safety, that allowed them to gradually move forward, and participate with more intensity. Furthermore, in doing the exercises slowly, they knew what the next sequence or pose would be, and this enabled them to relax and continue participation. Coordinated movements and postures in yoga and tai chi, with mindful awareness on maintaining balance and stability contributed to the feeling of safety. Some participants
said they were ‘more aware’ of their body and ‘more conscious’ [T0736-43] Bernadette (resident, TC group) in relation to changing positions such as sitting, standing and using correct posture while walking. The feeling of safety with improved position sense encouraged them to perform their exercise with more confidence.

8.5 **Primary and secondary outcomes**

The results of the RCT indicated improved Berg Balance Scale scores (BBS) for the yoga participants, when in comparison, the BBS scores of participants in the tai chi and the control groups declined. However, interestingly, qualitative findings indicated participants of both yoga and tai chi groups believed their physical function had improved; they noted changes in balance, posture, and change of positions. They were more confident and not as fearful of falling and they had a greater sense of proprioception as noted above. All of this meant that they believed they had increased functional abilities and this was of benefit to them. These paradoxical outcomes (quantitative vs qualitative) demonstrate the fact that humans are indivisible, unpredictable and ever-changing in support the humanbecoming theory (Rizzo Parse, 2007). These positive findings are also consistent with other tai chi and yoga studies conducted in residential aged care settings (Chen et al., 2012; Chen et al., 2007; Chen et al., 2008; Choi et al., 2005b; Fan & Chen, 2011b; Taboonpong et al., 2008), although participants in those studies included people with severe cognitive impairments.

There were no statistically significant differences between the three groups in the incidence of falls. Fall data is helpful to assess for adverse events, so this data could be used in future meta-analysis. Results showed a positive trend for the yoga and tai chi groups when compared with the control group, as while the yoga group had a slight reduction in falls in the post intervention period and the tai chi group did not have any difference, the control group mean fall incidence rose from 0.8 to 2.6. These results point to the need for a further, larger study, with the power to detect change in falls. Importantly, no major injuries were related to the programme, only minor musculoskeletal discomfort, indicating that the yoga and tai chi interventions were safe.
for the frail older residents. The minor musculoskeletal discomfort also suggests that the participants have had benefits of exercise by working their muscles that haven’t been exercised for some time.

Although balance-training is increasingly being recognised as vital in fall prevention programmes for community dwelling older adults, there is a lack of clear recommendation on the type of exercise suitable for older people in residential care settings. This is evident from findings of two recent reviews. A Cochrane review conducted in 2011 that examined effectiveness of fall prevention interventions in RACFS that included 94 studies could not make recommendations on suitable types of exercises (Howe Tracey et al., 2011). However, further insight was added by a more recent Cochrane review that studied physical rehabilitation for older people in long term care facilities that included 67 studies, and concluded that physical rehabilitation for residents in RACFs may be effective and reduce disability with few adverse events (Crocker et al., 2013). This finding is supported by a study that employed high intensity functional exercise programme among people in residential care setting who were dependent in activities of daily living (Lindelof et al., 2012). Participants in this study appreciated the high intensity exercise as beneficial in overcoming bodily limitations and to achieve vitality and improved quality of life (Lindelof et al., 2012). The present study adds to this evidence by demonstrating that CM interventions such as yoga and tai chi can be safely implemented in RACFs.

This study also showed clinically significant improvements in pain scores in the yoga group. The qualitative findings showed reports of reduced pain by a participant in the tai chi group. All participants agreed they did not experience any pain during the practice of yoga and tai chi except minor aches and discomfort that made them feel as if they had had a “work out”. They said they felt good about it. Both practices of yoga and tai chi encourage ‘awareness of self’ and paying attention to bodily sensations. This approach is said to reduce pain and discomfort as the individual learns caution in not doing a movement or posture that causes pain (Wang & Feinstein, 2011). In the present study, both tai chi and yoga instructors used this approach, whereby they frequently
reminded the participants to perform the yoga and tai chi exercises within their level of comfort and not to strain. The residents stated this motivated them to participate. The residents’ responses also highlighted the contrasting features of tai chi, and yoga against fast paced exercise in relation to fear of self-harm. One resident noted that she felt ‘torn’ and afraid of hurting herself when performing the fast paced exercise which was part of the physical culture programme offered in the study RACF. Fear of harm is noted as one of the main barriers for older adults to engage in physical activity (Lees et al., 2005). There is limited evidence on effects of yoga and tai chi on pain in older adults in RACF settings. A study that investigated Sun style tai chi in this setting reported residents (n=3) who participated in more than 21 sessions had clinically significant improvement in pain (Tsai et al., 2009). However, this study was under powered to determine effectiveness of the intervention with a small sample size (n=7) and no control group for comparison.

Components of successful ageing and quality of life (QoL) for older adults are identified as good physical, mental and social function, together with autonomy (Centers for Disease Control and Prevention (CDC), 2013; World Health Organization, 1995). Fall prevention interventions, in particular exercise interventions have been shown to influence many aspects of a person’s life and positively affect QoL. However, research is required to determine the type of fall prevention interventions that effect QoL. To address this gap in the literature, the present study looked at the effect of tai chi and yoga on QoL. The results of the RCT in the present study found improved DEMQoL scores from an average of 89.7 at base line to 96.6 at week 14 in the tai chi group. This finding supports two previous tai chi studies that reported improvements in components of QoL measures such as composite effect of state self-esteem, physical, mental and social components of HRQoL (Chen et al., 2007; Lee et al., 2010). The yoga group did not have a difference in DEMQoL scores in the post intervention assessment. However, the control group had reduced DEMQoL scores by 2.4 post intervention.
Qualitative findings from the present study suggest that the programme positively impacted physical function, social function and mental health domains of participants’ quality of life. Several themes identified in this study are consistent with a recent qualitative investigation on active ageing determinants in RACF settings (Van Malderen, et al., 2013). The participants had a positive attitude towards physical activity. This is further elaborated in section 8.9 of this chapter. Contrary to general belief, learning new things continues to be important. This was evident with the participants’ enthusiasm about participating in yoga and tai chi: a resident of the yoga group described learning a new skill was a challenge and that the challenge was motivating to participate.

Van Malderen, Mets, De Vriendt, et al. (2013) described in their qualitative study, two ‘active ageing determinants’ for older people in residential aged care settings: to participate in an activity that gives the older person an opportunity to feel useful and availability of opportunities to participate at individual, organisational and societal levels. In the present study, the participants of the yoga and tai chi groups felt attending the programme gave them a sense of purpose, a break from the routines of the RACF, over which they did not have control most of the time. The participants had the opportunity to be actively involved in the yoga and the tai chi programme: in giving feed back to the instructors on what they could and not do, offering their suggestions, to socialise, to help their fellow peers and to feel a sense of belongingness in the group.

The findings of this study were consistent with literature on other group exercise interventions (Guerin et al., 2008; Phillips & Flesner, 2013). The participants unanimously appreciated their perceived psychosocial benefits that resulted from socialisation during the participation in the yoga and tai chi programme. The activities promoted relatedness, a recognised construct of wellness.
8.6 **Yoga, tai chi and ageing well**

The qualitative findings of the present study corresponded with the physical, mental, emotional and intellectual wellness domains that are recognised as determinants of active ageing (International council on active aging (ICAA)). Each of these five wellness domains interacted in a way that contributed to the older participants’ perceived wellness and also served as motivation to participate in physical activity. Despite the limitations posed by their advanced age and life in the RACF, the frail older adults had potential for growth and development towards wellness. This finding supports previously reported research on coping strategies of older people in the face of advanced age and frailty (Fisher & Gosselink, 2008; Shearer et al., 2012).

The policies on ageing well that are adapted by world countries have a common message: to provide opportunities for the older person to engage in activities that are meaningful and promote their wellbeing. The yoga and tai chi programme provided the participants with a sense of purpose. This was discussed in section 6.3.3 (Chapter 6). Life in RACF poses many changes to the older persons’ life and the older person realises needs to promote self-worth arise in the changed life situation: the need to seek new friendships, to be accepted and respected by other residents, to find purpose for each day in a heavily routine-oriented set up and to identify aspects in the changed situation that align with one’s personal values. The findings of the present study suggest that interventions such as yoga and tai chi could create an environment to develop the older person’s wellbeing.

This also is in alignment with attributes of wellness proposed by McMahon and Fleury (2012) such as: connecting with others, to belong and to feel empowered. The interventions created opportunities for the participants to socialise, encouraging them to form new friendships and relationships amongst people who shared many common problems. Being in a group activity, it enabled them to contribute and care for each other. Being in a group of people who shared common experiences such as age, living in a RACF, their experience of co-morbidities and common purpose for participating in
the yoga and tai chi programmes, created an empathetic atmosphere. These similarities among group members could have helped the participants achieve a sense of self-worth and well-being. The interventions offered them an opportunity to rediscover their potential ability to perform exercises. Recognition of the older person’s strengths helped to reinforce their self-efficacy that empowered them to move toward health and wellness (Rotegard, Moore, Fagermoen, & Ruland, 2010).

The participants of both yoga and tai chi groups reported experiencing improved balance, confidence and decreased fear of falling. Perceived benefits helped the residents move towards their personal goal, for example to move better with confidence and without fear. This can be interpreted from Parse’s humanbecoming perspective, in which individuals are unique and are seen as taking up ‘new ways of life’ with different situations that arise throughout life (Parse, 1998). Despite limitations in movement and other functions, participants had the potential to aim towards a personal health goal, such as better mobility.

Older residents can be helped with promotion of wellness through their self-identity by providing opportunities to uphold and continue their personal values such as participation in maintaining health, concern for loved ones, meaningful work (contributing to the group) and having fun (entertainment, socialisation, distraction from concerns) (Fleury, 1996). The residents were able to socialise, offer friendship, companionship that was reciprocated from other members of the group and the trainer. Through the interactions between the members that continued throughout the tai chi and yoga classes and that extended even beyond to other times, when they spent talking about their experience, practicing yoga or tai chi, the participants were doing things that were similar to those that they did when they were independent adults, such as contributing by offering help, encouraging each other, and enjoying a social company. There was also a display of matured understanding and acceptance of the individual differences of the group members, who had different functional limitations. No one was judging the other, nor was judged by others, there was a cordial atmosphere, in which the participant was able to grow and develop and foster wellness.
8.7 Suitable approaches: yoga and tai chi

Modifying exercises to the needs of individuals are associated with higher levels of adherence (Imayama et al., 2013). The findings of the present study indicate that tailoring the exercises boosted adherence. The modifications to the interventions involved tailoring the intensity of the yoga and tai chi programmes to suit the individual’s ability and a careful choice of yoga postures and tai chi sequences as illustrated in chapter 7. Modifying the yoga and tai chi programmes made the exercises simple for the residents to follow, and at the same time, by gradually increasing the complexity, it also served as a challenge to maintain their interest and produce improvement.

Most participants noted that the tai chi and yoga exercises were physically possible and that they were surprised at this finding. Progressions of the yoga and tai chi programmes in complexity also motivated participation. When the participants found they attained their goals, they were motivated to further try complex forms and continued participation. Both tai chi and yoga aimed to improve the residents’ functional capacity such as walking, changing postures (sit to stand) and reaching out to objects, to mention a few. When the participants experienced improvements in functional tasks, this motivated them to continue attending sessions.

The programmes also provided opportunities for self-competition. Tailoring and progressions permitted self-competition. Participants, when they were able to perform at a certain level, they further challenged themselves by progressing to a higher level of difficulty. For example, in both yoga and tai chi classes, the participants increased their standing time towards the latter sessions of the programme. Furthermore, performing the exercises also provided for opportunities for comparison with others. While it may have motivated some participants, some might have had a contrary effect. This was evident when a participant dropped out of the tai chi programme as she felt she could not keep up with the rest of the group. Despite the instructors reassuring her, she still
did not want to continue practice. However, she also reported failing vision as the reason for not continuing participation.

8.8 **Motivation: physical activity**

Frail older adults who are dependent for care have perceptions of incompetence or feelings of reduced self-determination, which are factors known to affect motivation (Vallerand et al., 1995). However, contrary to this belief, the qualitative findings in this thesis point to the potential in frail older residents for active involvement in physical activity programmes. The findings contributed to knowledge on motivating factors that are prominent in this group of older people. This is important, as understanding factors that regulate behaviours is helpful to initiate interventions to promote healthy behaviours.

The findings of this study supports self-determination theory (Deci & Ryan, 2000) that is used to predict exercise behaviour. According to self-determination theory, motivation is driven when three basic psychological needs are met: autonomy, competence and relatedness. The modified yoga and tai chi programme aided the participants in satisfying their basic psychological needs such as autonomy, competence and relatedness. The residents who participated in the tai chi or yoga programme experienced a degree of autonomy, as it gave the participants opportunities to exercise control over their preference to participate, degree of participation and in contributing to the respective yoga or tai chi groups. Autonomy is experienced when a person has control over his own behaviour (Deci & Ryan, 2000). The instructors encouraged autonomy in their approach by encouraging the residents to practice within the range of their perceived bodily ability. The participants could always stop when they wanted and could decide on the level of their participation. Residents said it was important for them to not feel embarrassed when they were unable to keep up with the other members of the group. It also gave them opportunities to contribute to the group by offering support to other members of the group.
Continued participation led to greater perceived competence and enhanced their self-efficacy. Many participants were pleasantly surprised in their new knowledge that they were able to participate in yoga or tai chi to an extent that they had thought was impossible. This had a positive influence on their exercise expectations and a strong will to improve. This is evident in the expression of a resident who believed in the future in spite of her terminal illness (section 7.5.2). This is contrary to the disengagement theory that suggests that older adults withdraw from personal relationships and do not actively engage in social roles and activities as they age (Cumming & Henry, 1961).

It is evident from the findings discussed under section 7.5.5 that the modified yoga and tai chi programme provided an opportunity to meet their needs of relatedness, by promoting socialisation, a sense of belonging and camaraderie with the members of the group. There was a unanimous expression that everyone enjoyed the social company, practicing the yoga and tai chi in a group. The instructors also were important in promoting this socialisation and in making it an entertaining and enjoyable experience.

Several other motivational factors were also identified: incentives, barriers and facilitators as having influenced residents’ participation in this study. These findings are consistent with research in other exercise activity programmes in community and residential care settings (Lindelof et al., 2012; Phillips & Flesner, 2013; Yu & Swartwood, 2012).

The incentive for the resident participants was their positive attitude towards physical activity; perceived benefits from participation such as improved balance, pain, fear of falling, confidence, self-efficacy, enjoyment, peace and calm; and will to improve. Positive attitude towards physical activity is discussed in detail in section 7.5.2. Perceptions of enjoyment of the tai chi and yoga were mainly attributed to the mind body approach, the instructors’ use of humour and enjoyment of company. The use of humour has been associated with motivating older adults with cognitive impairment in RACFs to participate in exercise activities (Galik et al., 2009). Enjoyment, which is an
intrinsic motivator for participating in an activity, is well documented as a strong motivator for older adults to participate in exercise activity programmes (Kirkland et al., 2011). A study that examined relations between motivational factors in older adults 55 years and above, found significant differences between exercisers and non-exercisers in intrinsic motivation, suggesting that exercise enjoyment is particularly effective motivational factor for older adults (Kirkland et al., 2011). A perceived benefit of socialising in the group and appealing features of the programme such as enjoyment, peace and calm were motivating. I noted that even the residents who did not feel well or those who had recently returned to the RACF after a period of hospitalisation, wanted to continue participating. They said they enjoyed the exercise and the company. For another resident, participation in the yoga was confrontational and brought her limitations to the foreground of her attention. Daphne, who attended all the 28 yoga sessions, told us in the FG that she suffered with her emotions, as she was reminded of her disability and that it was unfair for her, as she was a physically active person in the past. However, she told us that she kept continuing attending the yoga because; she did not want to give up.

The barriers to participate were negative attitude, low self-confidence and failing health and ailments. Negative attitude and a low self-confidence were evident when some residents did not participate as they felt yoga or tai chi was not appropriate for their age. Failing health was a barrier for some residents. The residents reported having fluctuating feeling of wellness. There were some days when they did not feel fit to attend the session. Participants, who were dependent on staff for getting ready in the morning, were unable to make it to the sessions on days when there were short staffing problems. Some residents reported negative experiences, such as pain, discomfort and exhaustion. Disappointments with perceived absence of improvement could affect continued involvement in physical activity programmes. For example, there was a yoga participant who was disappointed in not having experienced an improvement in her balance. Elsie’s BBS scores had improved only by 2 points with the pre-intervention
score being 38. A difference of at least 8 points is required for minimum detection of change (Berg et al., 1992; Donoghue et al., 2009).

I thought yoga would give me a sense of calmness and would help me with my balance, which is my problem and I don’t think it’s improved at all.

[Y0205-07] Elsie (resident, Yoga group)

Facilitating factors were: support from the yoga and tai chi instructors, support from the facility staff and the residents’ need for an exercise activity that was different from other activities offered at the RACF. This has been discussed in chapter 6 in section 6.3.5. The participants emphasised the support they received from the instructors and reported that the staff were motivating. Similar findings have been reported by other research studies on encouraging exercise activities among older adults (Atkinson & Permuth-Levine, 2009; Galik et al., 2009; Phillips & Flesner, 2013).

8.9 **Attitude: physical activity**

The perspectives of participants of this study had emphasised psychological and behavioural adaptations to life changes and disabilities. The expectations of physical activity of the study participants were not to seek freedom from or avoid physical disability, but to make most of the available resources in aiming towards wellness. Their expectation was to actively engage in life, to have autonomy and to seek challenges from novel pursuits.

Most participants in this study had a positive attitude towards physical activity and exercise, and had a strong desire to stay active and achieve improvements in physical and functional capacity. The will to improve and restore functional ability has been reported in other qualitative studies that explored perceptions of older adults in RACFs.
(Lindelof et al., 2012; Oberg et al., 2014). The importance of remaining engaged with
life and positive attitude is associated with self-growth and successful ageing
(Reichstadt et al., 2010). This positive behaviour in older adults can be understood by
relating to two theories: Parse’s humanbecoming theory and continuity theory by
Atchley (1989). Parse’s humanbecoming theory (Parse, 1998), posits that individuals
choose different ways to live with in any given circumstance. For the participants of
this study, life in the RACF and the yoga and tai chi programmes presented with
opportunities to new ways of living life, to aim towards personal goals such as better
mobility and independence. However, the choice that the individual makes in every
situation might depend on the individual’s past experiences. According to the continuity
theory, older people continue to hold their beliefs and lifestyles, unique to their
personality, through their past, present and future, to cope with changes inevitable to the
ageing process (Atchley, 1989). Amongst the focus group participants, thirteen had
physically active lifestyles in their past. Previous positive experience with physical
activity could have influenced a positive attitude toward physical activity, and
motivated their participation.

The participants expressed need for an activity that was different from what they were
doing can be comprehended, given the heavily routinized schedule of activities in the
RACF. Institutional modelling of RACFs bears the disadvantage of offering service that
is less flexible and mechanised due to limited resources (Kane & Kane, 2001). Yoga
and tai chi interventions were viewed as novel interventions and doing an activity that
was new to them was challenging and welcome. It gave them opportunity to learn new
skills. In a qualitative study that interviewed community dwelling older adults that
aimed to examine attributes of successful ageing, trying new things that were of
personal interest, and learning new skills, that was fun and enjoyable was perceived as
important for successful ageing (Reichstadt et al., 2010). Thurston and Green (2004)
emphasise the need for exercise interventions to focus on participant satisfaction and
enjoyment through development of new skills and relationships instead of on motivation
and behaviour change. They stipulate the former approach would lead to adherence to the exercise intervention (Thurston & Green, 2004).

8.10 **Methodological considerations**

8.10.1 **Mixed method design**

Investigating the 14-week modified yoga and tai chi programmes using different approaches and methods allowed the effects, applicability and participation to be seen from different perspectives. The combination of quantitative and qualitative studies examining effects and experiences among individuals and between groups, provided a comprehensive picture. Using the mixed method design helped gain insight into a multidimensional reality (Polit & Beck, 2004). The findings in this thesis indicate that responses from focus group interviews provided additional information about the interventions and their effects that the assessment tools fail to capture. Self-reported measures and performance based tests are distinct but complement one another (Guralnik et al., 1994; Stretton, Latham, Carter, Lee, & Anderson, 2006). The qualitative interviews allowed the participants to describe their most important experiences in their own words. This added more in-depth information to the interventions. This illustrates that the quantitative and qualitative findings complemented each other. The free narration by the informants revealed their emphasis on aspects of the programmes such as the importance of instruction, group activity, perceived improvements in daily function and how they perceived the interventions.

8.10.2 **Features of the RCT**

This study has features of a high quality study (Stanley, 2007) such as concealed randomisation and a wide inclusion criteria. The use of wide inclusion criteria could help generalise findings to older people in RACFs in the country. To control for threats to internal validity, after baseline assessment, an off-site researcher used a concealed randomisation procedure (described in Chapter 5) to randomly allocate residents to the intervention and control groups. The similarity of the groups at baseline for all
demographic and health status variables demonstrated effective randomisation. However it was impossible to blind the participants and the assessors, as only one facility was involved in the study. Financial constraints prevented from recruiting more assessors, in order to establish effective blinding. Another major limitation was difficulty to clearly mark the characteristics of the control group and ethical considerations that prevented prescribing activities to the participants in the intervention groups. For example, it was not possible to restrict participants from the yoga or tai chi group from attending other exercise facilities, like the in house gym and physical culture sessions that were offered at the facility. Hence, it is not possible to ascribe the effects and responses to the interventions. The other limitations were small sample size and a low effect size. However, according to the randomisation procedure, the participants had agreed to participate in some kind of activity, so the groups did not comprise exclusively of motivated and interested individuals.

8.10.3 Outcome measures and data collection

The external validity of the study was limited because of the exclusion of people who had severe cognitive impairment or inability to understand instructions. This was because it was important for the participants to follow simple instructions, they had to be aware of what was going on, and they need to have recall ability to participate in DEMQoL tests and attend focus group interviews. However, we included some participants who had diagnosis of Dementia if they satisfied the above criteria. The lowest MMSE score recorded for resident participants of the focus groups was 22 (mild or no cognitive impairment (Whelan, Oleszek, Macdonald, & Gaughran, 2009). The tools used in the study to measure outcomes balance (BBS), quality of life (DEMqoAGEINGL questionnaire), and pain (VDS) were all well validated to be used for older adults. However, falls incidence was recorded with the help of information entered in the residents’ medical records maintained at the facility. The fall incidence monitoring was not supervised due to lack of resources and this might have been a threat to external validity. Problem of under reporting of falls has been reported previously (Kehinde et al., 2011). During data collection, resident participants were not
always available at the facility due to reasons such as medical or ophthalmology appointment, visiting family member and friends, hospitalisation, fear of falling, refusal to be assessed and care staff advising that the resident cannot perform the test. This was especially seen in assessment of balance by assessors who were trained physiotherapy students. Despite repeated visits by the assessors, four participants could not be assessed post intervention for balance.

8.10.4 Rigour

In addressing the rigour of the qualitative study, quotations from the focus group interviews are presented, to make it possible for the reader to evaluate the interpretations. In addition, my supervisors and I reflected as a group on and discussed the classification of codes, categories, sub-themes and the theme for all the interviews and changes were incorporated until a consensus was reached. The team members (my supervisors and I) coming from different specialisations (general nursing, older person nursing, complementary and alternative medicine) brought different perspectives to the analysis through having different frames of interpretation. Contextual analysis allows for transferability of the findings to other contexts after re-contextualisation. The theories described in this chapter have not been used to guide the focus group interviews. They emerged as interesting data from the analysis and I was able to interpret and understand the findings by relating to them. These theories are introduced in Chapter 1 (Background) to make the context comprehensible for the reader.

8.10.5 Mapping

The video records of the yoga and tai chi programmes during the RCT, journal entries by the researcher and the instructors aided in mapping the most suitable forms of yoga and tai chi for this group of frail older residents. As the characteristics of participants of the present study are comparable to that of the general RACF population in Australia (Australian Institute of Health and Welfare (AIHW), 2007, 2012b), this information
could be helpful in designing a larger study involving older people in RACF settings and in consideration of programme aspects such as feasibility, duration, frequency, mode of delivery, intensity of the programme, how the interventions were implemented, and how to progress the complexity of the interventions.

8.10.6 Gaining access for the study

It is important for staff of the RACF to understand the research project to facilitate the research and to foster and establish a relationship between the researchers and the facility staff at the pre-intervention phase (Freret et al., 2003; Hsu & Chen, 2005; Johl & Renganathan, 2010). In establishing this, the researchers conducted several meetings with the directors and the staff members, first to explain about the project and then to discuss the logistics. The staff members expressed their desire to improve the physical ability of the residents. However, the first recruitment attempt in another RACF in the local area in which the study was conducted was not successful as there were inadequate number (n=15) of residents who volunteered to participate. Subsequent recruitment at another RACF was successful with an adequate sample for testing feasibility (n ≥ 30).

The management and staff actively collaborated with the researcher in the recruiting process and in the implementation of the interventions. The staff members were enthusiastic about trying out a novel intervention that was promising for older adults. This helped the researcher maintain a working relation with the staff members (recreational activity officers). It was also important for me to be self-reflective and deal with anxiety related to working in a foreign country and culture. My working knowledge of English and being a nurse with good communication skills were helpful. At the same time, the staff members were welcoming and friendly. The cordial atmosphere at the facility left no room for ‘power’ conflicts (Toraiwa, 2009) between the researcher and staff members in implementing the research.
The management provided access to the researcher to visit the facility as often as possible. This opportunity helped me as a researcher to develop a rapport with the older people in the facility. I spent around 20 to 30 hours per week during the recruitment period. Spending time at the facility helped me establish a good rapport with residents and staff of the facility. This enabled collaboration and a positive atmosphere at the facility.

8.10.7 Recruitment:

Successful recruitment was dependent on several strategies that were discussed in chapter 4. Some of the strategies are listed below:

- Continued presence of the researcher at the facility and good rapport was helpful, as the residents were able to freely ask questions and express any concerns they had.

- Encouragement to seek clarification and more information and allowing some time to allow participants to ask questions provided was helpful.

- Use of several recruitment methods such as: frequent reminders, staff involvement, flyers, newsletters, conferences and individual meetings.

- Broadening the inclusion criteria to maximise number of participants

- Flexible schedules

- Demonstration of the interventions to staff and residents before commencing the study

8.11 Ethical considerations

Performing yoga and tai chi interventions for frail, older people with multiple diagnoses, pain or depressive symptoms necessitated consideration of possible risks or discomfort. This was dealt with having trained and experienced RACF staff available at the venue during the intervention sessions. Experienced nurses were available at the facility to attend to any participant during the sessions if and when necessary. The
instructors also made necessary modifications to the programme to suit the frail older persons based on their knowledge, experience, observation of the participants and incorporating suggestions from the participants and support staff members. Adverse events and discomfort reported by participants were noted in a daily journal.

Including people with dementia and cognitive impairment was important for the study, since they are in need of exercise and to maintain or improve physical function but are often excluded from other intervention studies (Cubit, 2010). Performing the interventions with residents who were diagnosed with dementia raises special concerns from an ethical perspective. These residents might have been limited in their awareness of what was going on and their ability to communicate and give their informed consent. However, older people with cognitive limitations could still be able to indicate a meaningful choice; therefore seeking assent and respecting their dissent would allow the individual to participate in research (Black, Rabins, Sugarman, & Karlawish, 2010).

The least MMSE score recorded for the participants in this study was 20, indicating their ability to understand instructions and offer informed consent. Furthermore, the participants’ ability to make decisions for themselves were assessed as described in chapter 4. In this study, all participants, or their relatives when needed because of cognitive impairment, gave their informed written consent.

The research aim to determine whether yoga and tai chi interventions were suitable for use among frail older people with possible mild cognitive impairment also addressed the issue of whether it is ethically justifiable, that is, whether the benefits from performing tai chi and yoga are greater than the risks and discomfort. Since this information could not be obtained only from physical measures, the participants’ perceptions and experiences of the experience was explored in the embedded qualitative component of the study.

The participants were guaranteed that they would not be individually identifiable in the presentation of the results. They were also informed that it was possible to withdraw from participating in the study without stating a reason, and with no affect to their care.
situation. This study was approved by the Human Research Ethics Committee of University of Newcastle and by the ethics committee of the RACF.

8.12 Clinical implications

The findings in this thesis show that the 14-week modified yoga and tai chi programme could be safely implemented for frail and dependent older people in a RACF. It was a viable way of exercising for older people with different degrees of physical and cognitive impairment and with several comorbidities. This is significant because this group of older people is understudied. The study also demonstrated that holistic approach of yoga and tai chi provided a wellness experience for the participants and opportunities to grow and age successfully, despite their physical limitations. In addition, the perceived benefits of the modified yoga and tai chi programmes also served as motivators to continued participation. There are large benefits to be gained for both society and the individual if physical decline from (lack of physical activity) can be reduced and if the consequences from impaired balance, proprioception and gait ability as evidenced in falls and fractures could be minimised.

The results are of considerable value to health care professionals and service providers involved in the care of frail older and dependent people. The results of this thesis support offering tai chi and yoga to older people who are frail and dependent with physical and cognitive limitations. Although in this study the interventions were delivered safely, it was possible only when safety considerations involving environment, resources and modifications were implemented. Hence, it is important to consider barriers, discomfort and adverse reactions to guide successful implementation of a similar programme. Noting adverse events and constantly evaluating factors affecting their performance and participation is essential to make modification to the programme, avoid barriers and discomfort, and utilize the motives and resources of each individual. Advantages of group training as well as individualisation of the programme require consideration in implementing similar programmes to groups of people with different levels of physical and cognitive ability.
This thesis contributes knowledge about how to plan and perform a yoga and tai chi intervention that is applicable in residential aged care settings. The detailed mapping of the modifications of the interventions (Chapter 7) is expected to enable physical activity providers in a residential care setting to adapt and implement the programme. The programme is easy to perform and individualise and there is no need for specific facilities or expensive equipment. However, guidance and supervision of trained yoga and tai chi practitioners would be necessary in initiating such programmes, which could then be led by RACF staff members who are adequately trained and knowledgeable about the residents’ capabilities and physical function. Future implementation of the yoga or tai chi programme could be facilitated by more actively involving the RACF staff in the training.

8.13 Future Directions

The results of the RCT in chapter 5 indicate that it is possible to safely implement a 14-week modified yoga and tai chi programme in residential age care settings and test through a randomised controlled trial. The results are promising in suggesting that yoga and/or tai chi has positive effects on balance, pain and quality of life. However, these results are that of a small scale RCT. An attempt to replicate these findings must be performed in a large randomised multi centred controlled clinical trial to assess the external validity of these results. The data from this thesis (quantitative and qualitative findings) can be directly used to design such a trial, in terms of its conduct and sample size calculation.

The findings in this thesis show high attendance, compliance and motivation among the participants. Nevertheless, future interventions that are aimed at increasing motivation and attendance are required to influence exercise behaviour in older people with physical or cognitive impairment. It would also be interesting to evaluate the effect of yoga and tai chi programmes on subjective wellbeing and motivation in a larger mixed method study.
No economic analysis was conducted during the feasibility study presented in chapter 5. A future study that estimates a cost benefit analysis is recommended; as it is evident from the present study that successful implementation of the yoga and tai chi programme is dependent on resources, mainly support staff and experienced instructors. The staff members’ attitude and knowledge about the yoga and tai chi programmes as well as their resources, interest, and commitment to activating the residents are other interesting issues for future studies. This could be achieved with programmes on educating and training staff members in RACFs with the aim of increasing their knowledge on physical activity for older people, and motivational factors.

8.14 Conclusion

The prevention of falls among older persons in residential care facilities is a national health promotion priority. Falls are a particular problem in RACFs due to the increased age related vulnerability of older people and limited opportunities to physical activity and exercise. This also implies limited opportunities for the older person to experience quality of life and successful ageing. Research is needed to determine holistic fall prevention interventions and their applicability in this setting. Balance training programmes have been found to be effective as fall prevention interventions in community dwelling older adults. Among them, yoga and tai chi interventions are becoming popular as holistic fall prevention interventions. There has been no RCT with embedded qualitative study that has investigated yoga and tai chi programmes with the aim of preventing falling among frail and dependent older adults in RACFs.

This thesis has contributed to our understanding of the problems faced by older adults in RACFs, has explained the barriers and facilitators to participation in physical activity, successfully tested a modified programme of yoga and tai chi as a holistic fall prevention programme, its potential in providing opportunity for the frail and dependent older person to age well and mapped the forms of yoga and tai chi suitable for this population.
References


Department of Communities. (2012). *Western Australian Senior wellbeing indicators 2012 (version 2), Summary*. Perth, Western Australia: Government of Western Australia.


Donoghue, D., Phyiotherapy Research and Older People (PROP) group, & Stokes, E. K. (2009). How much change is true change? The minimum detectable change of the berg balance


Hakim, R. M., Kotroba, E., Cours, J., Teel, S., & Leininger, P. M. (2010). A cross-sectional study of balance-related measures with older adults who participated in tai chi, yoga, or


Lindenmeyer, A., Jamie, K., Griffiths, F. E., & Legare, F. (2011). "They're made in factories and not by witches on the allotment": Midlife women's approaches to complementary and alternative therapies. *Health care for women international, 32*(12), 1046-1067.


Mandelblatt, J. S., Weinstein, M. C., Russell, L. B., Marthe, R. G., & Panel on cost
effectiveness in health and medicine. (1997). Assessing the effectiveness of health
interventions for cost-effectiveness analysis. The Journal of General Internal Medicine,
12(9), 551-558.


control. Gait & Posture, 12(2), 105-113. doi: http://dx.doi.org/10.1016/S0966-
6362(00)00074-6

admitted residents to hostel accommodation in Australia. Australian Occupational


and Social Sciences, 61(5), P270-277.

McAuley, E., Konopack, J. F., Motl, R. W., Morris, K. S., Doerksen, S. E., & Rosengren, K. R.
and self-efficacy. Annals of Behavioural Medicine, 31(1), 99-103. doi:
10.1207/s15324796abm3101_14

Holistic Nursing Practice, 110-116.


Series A, Biological Sciences and Medical Sciences, 55(11), M658-666.

Philosophy, 4(3), 179-188.

nursing. Journal of Advanced Nursing, 56(5), 472-479. doi: 10.1111/j.1365-
2648.2006.04042.x

Publishing.


StataCorp. (2009). Stata Statistical Software (Release 11) [Computer software]. College Station, TX: StataCorp LP.


The Center for Mind-Body Medicine. what is mind-body medicine? [http://cmbm.org/about/what-is-mind-body-medicine/](http://cmbm.org/about/what-is-mind-body-medicine/)


Appendix 1

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Information Statement for participants

Preventing falls in older people in residential care settings: Improving balance through Tai Chi and Yoga

Dear Madam/Sir

This letter is an invitation for you to participate in the research project mentioned above which is being conducted by Padmapriya Saravanakumar, a PhD student from the School of Nursing and Midwifery, Faculty of Health, University of Newcastle. The supervisors for the above project are Professor Isabel Higgins, Associate Professor David Sibbritt and Associate Professor Pamela Van Der Riet. Ms. Jodie Marquez is a physiotherapist and a co-researcher.
Why is the research being done?

Accidental falls among older people are a major public health concern. It has been found that most accidental falls are due to poor balance and mobility. Several studies have found that Yoga and Tai Chi are effective in promoting balance and preventing falls. Yoga is a well recognised mind and body therapy that promotes physical, mental and spiritual wellbeing. It is a combination of breathing exercises, physical postures, and meditation. Research findings suggest that yoga programmes tailored to older people may be effective in preventing age-related changes to balance and mobility. Tai Chi is a system of slow meditative physical exercise designed for relaxation, balance and health. Recent studies also show that Tai Chi is effective in improving balance, muscle strength, range of movement, flexibility and falls prevention.

Our research aims to:
1. Find whether it is possible to conduct Yoga and Tai Chi programmes in residential care settings.
2. Identify the best forms of Tai Chi and Yoga for the elderly with different levels of balance.
3. Determine whether it is possible to find changes in balance, pain experience, quality of life and number of falls in older residents who follow the Yoga/Tai Chi programmes compared to those who receive usual care.

What would you be asked to do?

Participation in this study would involve you being randomly assigned to one of the following: a) Tai Chi exercise programme, b) Yoga exercise programme or c) usual activities programme routinely conducted at the facility. Random selection means that you will have an equal chance of being in one of the above programmes.

Activities for all participants, regardless of which group you are assigned to will include:
1. Having your balance assessed by a student physiotherapist 3 times in a 14 week period: in the 1st week, 7th week and the 14th week. These assessments will take up to 30 minutes on each occasion and will involve evaluating your balance on a scale which uses everyday tasks, such as standing and turning, and is commonly used in older people.
2. Being asked about any pain you experience 3 times in a 14 week period: in the 1st week, 7th week and the 14th week. These assessments will take up to 5 minutes each and will involve you rating your level of pain.

3. Completing a quality of life questionnaire 3 times in a 14 week period: in the 1st week, 7th week and the 14th week. This questionnaire has 29 questions. If necessary, the student researcher will help you with the questionnaire by asking the questions and completing the form with you. If you are unable to respond to the questionnaire, your family member will be invited to respond to another questionnaire that is designed for them to respond on your behalf. This questionnaire has 31 questions.

4. Allowing, the research student to examine your medical records held by the residential care facility in order to document medical history, health conditions, medications and if any falls have been recorded in the following period: from 6 months before the study and up to 6 months after the study.

5. Agreeing to attend a group meeting where discussions will be audio recorded for transcription and analysis later. The purpose of this meeting is for you (if you wish) to share your experiences and views of the Yoga/Tai Chi/Usual activities programme. The group meeting will be held at the end of the 14 week programme and will take up to 40-50 minutes of your time.

If you are allocated to the Tai Chi or Yoga group, participation will also involve:

6. Attending Yoga or Tai Chi classes provided by professional trainers in 2 one hour sessions per week for 14 weeks. The programme will be tailored to suit your level of mobility, balance and capacity to understand instructions. During these sessions staff of the residential care facility will be in close attendance to ensure your safety. You may also want a family member or friend to stay by your side to offer support during the exercises.

7. Agreeing to be video recorded whilst doing the Tai Chi or Yoga so that the researchers can review and describe the exercises that proved to be helpful for everyone.

What choice do you have?
Your participation in this research project is entirely voluntary, and if you chose not to participate in this research it will not affect any services provided by the Residential Care Setting.

Are there any risks or benefits of participating?
If you are allocated to the ‘Usual activities’ programme, there are no additional risks or benefits other than what you are already exposed to at the residential care facility.

The following applies only if you are allocated to the Tai Chi or Yoga programme: There may be a very small risk of a fall, emotional disturbance (this may occur should you become concerned about not being able to do a movement or hold a position) or some minor discomforts (largely due to using muscles that have not previously been used for some time) during the Tai Chi or Yoga sessions. In order to reduce these risks you will be provided with continuous monitoring and support by the care staff during and after the sessions. Furthermore, you will be encouraged to express any concern while participating in the program. Every concern will be addressed by the staff. The expected benefits of participating in the classes include an improvement in your balance which would result in prevention of falls, improved overall comfort and sense of well-being.

**How will your privacy be protected?**

**Audio records:**

No identifying details will be recorded. Pseudonyms (false names) will be used for transcribed interviews and when reporting the findings of the study.

**Video records** *(This applies only if you are allocated to the Tai Chi or Yoga programme)*:

The video image of your face will be pixelated (this is where the video is edited so that the face becomes blurred) to preserve anonymity. The pixilation will take place after the data analysis of the study is complete.

**Focus group interviews:**

You, family members and staff within the focus group interviews will be told of the importance of confidentiality within the group and that the content of group conversations should not be shared with anyone outside of the group, although it is recognised that this confidentiality cannot be enforced. Consent to participate in the focus group interviews is also an agreement to confidentiality within the group.

**Data obtained from assessment of balance, pain, quality of life and medical records**

All information pertaining to you will be confidential and your name is not mentioned in any reports of this study.
Safekeeping of records:

All information will be kept in a locked filing cabinet in the researcher’s office at the university and will only be used for the purposes of this study. Only the researchers will have access to this information. At any time during the time of the study you may request to have access to the recordings and/or transcripts of the conversations that we have to change or edit as you wish. The results will be marked as edited. Information collected for the study will be retained for 5 years at the University of Newcastle and then destroyed.

How will the information collected be used?

This information will be used to prepare a short report that will be sent to you and all participants and the Residential Care Setting for this study. The results of this study will be used to initiate a similar research on a larger scale to determine the usefulness of Yoga/Tai Chi programmes for older residents. The findings will be reported in the form of a thesis or book for examination as part of the student’s PhD studies at the University of Newcastle. Findings will also be made available through publications in peer reviewed journals and disseminated through conference presentations.

What are your rights?

If you decide to participate in this research, your rights are protected as follows:

1. You have the right to ask questions of the researcher.
2. You have the right to refuse to participate in this study and your refusal will not affect the service you receive from the Residential Care Setting
3. You have the right to refuse to answer any question, should you choose, and no reason needs to be given.
4. In the event of being allocated to either the Tai chi or Yoga programme, you have the right to refuse to be video recorded and no reason needs to be given.
5. You reserve the right to withdraw from the study at any time. You do not need to give a reason and it will have no effect on the service offered.

What do you need to do to participate?
If you wish to participate in the study, please sign the consent form, place it in the self-addressed and sealable envelope and drop it into the locked box provided at the reception of the residential aged care facility. The student researcher will collect the forms from the box.

**Further information**

If you would like further information please do not hesitate to contact the researchers on the phone numbers given below.

**Yours sincerely,**

<table>
<thead>
<tr>
<th>Padmapriya Saravanakumar</th>
<th>Professor Isabel Higgins</th>
</tr>
</thead>
<tbody>
<tr>
<td>PhD student</td>
<td>School of Nursing and Midwifery</td>
</tr>
<tr>
<td>School of Nursing and Midwifery</td>
<td>University of Newcastle</td>
</tr>
<tr>
<td>Faculty of Health</td>
<td>University Drive</td>
</tr>
<tr>
<td>University of Newcastle</td>
<td>Callaghan, 2308</td>
</tr>
<tr>
<td>Mobile:</td>
<td>Tel: 49216144</td>
</tr>
</tbody>
</table>

**Complaints about this research**

This project has been approved by the University’s Human Research Ethics Committee, Approval No:…………………………….

Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher, or, if an independent person is preferred, to the Human Research Ethics Office, The Chancellery, The University of Newcastle, University Drive, Callaghan NSW 2308, Australia, telephone (02) 49216333, email [Human-Ethics@newcastle.edu.au](mailto:Human-Ethics@newcastle.edu.au).
Appendix 2

Padmapriya Saravanakumar (PhD candidate)
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Fax: 4921 6301
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Professors Isabel Higgins & Pamela Van der Riet
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Associate Professor David Sibbritt
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Ms. Jodie Marquez
Lecturer in Physiotherapy
School of Health Sciences
University of Newcastle
TEL:+612 49212041
E-mail: Jodie.Marquez@newcastle.edu.au

Information Statement for guardians of participants

Preventing falls in older people in residential care settings: Improving balance through Tai Chi and Yoga

Dear Madam/Sir

This letter is an invitation for your family member to participate in the research project mentioned above which is being conducted by Padmapriya Saravanakumar, a PhD student from the School of Nursing and Midwifery, Faculty of Health, University of Newcastle. The supervisors for the above project are Professor Isabel Higgins,
Associate Professor David Sibritt and Associate Professor Pamela Van Der Riet. Ms. Jodie Marquez is a physiotherapist and a co-researcher.

**Why is the research being done?**

Accidental falls among older people are a major public health concern. It has been found that most accidental falls are due to poor balance and mobility. Several studies have found that Yoga and Tai Chi are effective in promoting balance and preventing falls. Yoga is a well recognised mind and body therapy that promotes physical, mental and spiritual wellbeing. It is a combination of breathing exercises, physical postures, and meditation. Research findings suggest that yoga programmes tailored to older people may be effective in preventing age-related changes to balance and mobility. Tai Chi is a system of slow meditative physical exercise designed for relaxation, balance and health. Recent studies also show that Tai Chi is effective in improving balance, muscle strength, range of movement, flexibility and falls prevention.

Our research aims to:

4. Find whether it is possible to conduct Yoga and Tai Chi programmes in residential care settings.
5. Identify the best forms of Tai Chi and Yoga for the elderly with different levels of balance.
6. Determine whether it is possible to find changes in balance, pain experience, quality of life and number of falls in older residents who follow the Yoga/Tai Chi programmes compared to those who receive usual care.

**What would your family member be asked to do?**

Participation in this study would involve your family member being randomly assigned to one of the following: a) Tai Chi exercise programme, b) Yoga exercise programme or c) usual activities programme routinely conducted at the facility. Random selection means that your family member will have an equal chance of being in one of the above programmes.

Activities for all participants, regardless of which group your family member, are assigned to will include:
8. Having your family member’s balance assessed by a student physiotherapist 3 times in a 14 week period: in the 1st week, 7th week and the 14th week. These assessments will take up to 30 minutes on each occasion and will involve evaluating your balance on a scale which uses everyday tasks, such as standing and turning, and is commonly used in older people.

9. Your family member being asked about any pain experienced 3 times in a 14 week period: in the 1st week, 7th week and the 14th week. These assessments will take up to 5 minutes each and will involve your family member rating his/her level of pain.

10. Your family member completing a quality of life questionnaire 3 times in a 14 week period: in the 1st week, 7th week and the 14th week. This questionnaire has 29 questions. If necessary, the student researcher will help your family member with the questionnaire by asking the questions and completing the form with him/her. If your family member is unable to respond to the questionnaire, you will be invited to respond to another questionnaire that is designed for you to respond on your behalf. This questionnaire has 31 questions.

11. Allowing the research student to examine your family member’s medical records held by the residential care facility in order to document medical history, health conditions, medications and if any falls have been recorded in the following period: from 6 months before the study and up to 6 months after the study.

12. Agreeing to attend a group meeting where discussions will be audio recorded for transcription and analysis later. The purpose of this meeting is for you (if you wish) to share your experiences and views of the Yoga/Tai Chi/Usual activities programme. The group meeting will be held at the end of the 14 week programme and will take up to 40 -50 minutes of your time.

If your family member is allocated to the Tai Chi or Yoga group, participation will also involve:

13. Your family member attending Yoga or Tai Chi classes provided by professional trainers in 2 one hour sessions per week for 14 weeks. The programme will be tailored to suit your family member’s level of mobility, balance and capacity to understand instructions. During these sessions staff of the residential care facility will be in close attendance to ensure safety. You may also want to stay by your family member’s side to offer support during the exercises.

14. Agreeing to your family member being video recorded whilst doing the Tai Chi or Yoga so that the researchers can review and describe the exercises that proved to be helpful for everyone.
What choice does your family member have?

Your family member’s participation in this research project is entirely voluntary, and if he/she chooses not to participate in this research it will not affect any services provided by the Residential Care Setting.

Are there any risks or benefits of participating for your family member?

If your family member is allocated to the ‘Usual activities’ programme, there are no additional risks or benefits other than what he/she is already exposed to at the residential care facility. The following applies only if your family member is allocated to the Tai Chi or Yoga programme: There may be a very small risk of a fall, emotional disturbance (this may occur should your family member become concerned about not being able to do a movement or hold a position) or some minor discomforts (largely due to using muscles that have not previously been used for some time) during the Tai Chi or Yoga sessions. In order to reduce these risks your family member will be provided with continuous monitoring and support by the care staff during and after the sessions. Furthermore, your family member will be encouraged to express any concern while participating in the programme. Every concern will be addressed by the staff. The expected benefits of participating in the classes include an improvement in your family member’s balance which would result in prevention of falls, improved overall comfort and sense of well being.

How will your family member’s privacy be protected?

Audio records:

No identifying details will be recorded. Pseudonyms (false names) will be used for transcribed interviews and when reporting the findings of the study.

Video records (This applies only if your family member is allocated to the Tai Chi or Yoga programme):

The video image of your family member’s face will be pixelated (this is where the video is edited so that the face becomes blurred) to preserve anonymity. The pixilation will take place after the data analysis of the study is complete.

Focus group interviews:

You, your family member and staff within the focus group interviews will be told of the importance of confidentiality within the group and that the content of group
conversations should not be shared with anyone outside of the group, although it is recognised that this confidentiality cannot be enforced. Consent to participate in the focus group interviews is also an agreement to confidentiality within the group.

**Data obtained from assessment of balance, pain, quality of life and medical records**

All information pertaining to your family member will be confidential and your family member’s name will not be mentioned in any reports of this study.

**Safekeeping of records:**

All information will be kept in a locked filing cabinet in the researcher’s office at the university and will only be used for the purposes of this study. Only the researchers will have access to this information. At any time during the time of the study your family member may request to have access to the recordings and/or transcripts of the conversations that we have to change or edit as he/ she wishes. The results will be marked as edited. Information collected for the study will be retained for 5 years at the University of Newcastle and then destroyed.

**How will the information collected be used?**

This information will be used to prepare a short report that will be sent to you, your family member and all participants and the Residential Care Setting for this study. The results of this study will be used to initiate a similar research on a larger scale to determine the usefulness of Yoga/ Tai Chi programmes for older residents. The findings will be reported in the form of a thesis or book for examination as part of the student’s PhD studies at the University of Newcastle. Findings will also be made available through publications in peer reviewed journals and disseminated through conference presentations.

**What are your family member’s rights?**

If your family member decides to participate in this research, his/ her rights are protected as follows:

6. Your family member has the right to ask questions of the researcher.
7. Your family member has the right to refuse to participate in this study and his/her refusal will not affect the service he/she receives from the Residential Care Setting.

8. Your family member has the right to refuse to answer any question, should he/she choose, and no reason needs to be given.

9. In the event your family member gets allocated to either the Tai Chi or the Yoga group, he/she has the right to refuse to be video recorded and no reason needs to be given.

10. Your family member reserves the right to withdraw from the study at any time. He/She does not need to give a reason and it will have no effect on the service offered.

**What does your family member need to do to participate?**

If your family member wishes to participate in the study, he/she is requested to sign the consent form, place it in the self addressed and sealable envelope and drop it into the locked box provided at the reception of the residential aged care facility. The student researcher will collect the forms from the box.

**Further information**

If you would like further information please do not hesitate to contact the researchers on the phone numbers given below.

**Yours sincerely,**

Padmapriya Saravanakumar  
PhD student  
School of Nursing and Midwifery  
Faculty of Health  
University of Newcastle  
Mobile:  

Professor Isabel Higgins  
School of Nursing and Midwifery  
University Drive  
Callaghan, 2308  
Tel: 49216144

**Complaints about this research**

This project has been approved by the University’s Human Research Ethics Committee, Approval No:..........................
Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher, or, if an independent person is preferred, to the Human Research Ethics Office, The Chancellery, The University of Newcastle, University Drive, Callaghan NSW 2308, Australia, telephone (02) 49216333, email Human-Ethics@newcastle.edu.au.
Information Statement for Staff of the Residential Care Facility who participate in the study

Preventing falls in older people in residential care settings: Improving balance through Tai Chi and Yoga

Dear Madam/ Sir

This letter is an invitation for you to participate in the research project mentioned above which is being conducted by Padmapriya Saravanakumar, a PhD student from the School of Nursing and Midwifery, Faculty of Health, University of Newcastle. The supervisors for the above project are Professor Isabel Higgins, Associate Professor...
David Sibritt and Associate Professor Pamela Van Der Riet. Ms. Jodie Marquez is a physiotherapist and a co-researcher.

**Why is the research being done?**

Accidental falls among older people are a major public health concern. It has been found that most accidental falls are due to poor balance and mobility. Several studies have found that Yoga and Tai Chi are effective in promoting balance and preventing falls. Yoga is a well recognised mind and body therapy that promotes physical, mental and spiritual wellbeing. It is a combination of breathing exercises, physical postures, and meditation. Research findings suggest that yoga programmes tailored to older people may be effective in preventing age-related changes to balance and mobility. Tai Chi is a system of slow meditative physical exercise designed for relaxation, balance and health. Recent studies also show that Tai Chi is effective in improving balance, muscle strength, range of movement, flexibility and falls prevention.

Our research aims to:
7. Find whether it is possible to conduct Yoga and Tai Chi programmes in residential care settings.
8. Identify the best forms of Tai Chi and Yoga for the elderly with different levels of balance.
9. Determine whether it is possible to find changes in balance, pain experience, quality of life and number of falls in older residents who follow the Yoga/Tai Chi programmes compared to those who receive usual care.

**What would you be asked to do?**

Participation in this study involves:

1. Supporting the residents who would be participating in Yoga/ Tai Chi sessions. This would involve you standing or sitting beside them and offering light physical support and verbal prompting.
2. Participating in a focus group discussion that will be held at the end of the 14 weeks of the Yoga/ Tai Chi programme to provide your feedback about the sessions. The discussions will be audio recorded and transcribed for analysis later.
3. As the Yoga/Tai Chi sessions will be video recorded, it is anticipated that your image is likely to be captured.

**How much time will it take?**

The Yoga/Tai Chi sessions will be conducted as one hour sessions twice a week for 14 consecutive weeks. Your support to residents would be required during these sessions.

**What are the risks and benefits of participating?**

There are no risks and benefits of participating.

**How will your privacy be protected?**

*Audio records and transcriptions:*
No identifying details of any of the participants will be recorded. Pseudonyms (false names) will be used for transcribed interviews and when reporting the findings of the study.

*Video records:*
The faces of all participants will be pixelated (this is where the video is edited so that the face becomes blurred) to preserve anonymity. The pixilation would be done after the data analysis is complete.

*Focus group interviews:*
Participants, family members and staff within the focus group interviews will be told of the importance of confidentiality within the group and that the content of group conversations should not be shared with anyone outside of the group, although it is recognised that this confidentiality cannot be enforced. Consent to participate in the focus group interviews is also an agreement to confidentiality within the group.

*Safekeeping of records:*
All information obtained from you will be kept confidential. Your name will be replaced with a pseudonym. All information will be kept in a locked filing cabinet in the researcher’s office at the university and will only be used for the purposes of this study. Only the researchers will have access to this information. Data will be retained for at least 5 years at the University of Newcastle, after which it will be destroyed.
How will the information collected be used?

This information will be used to prepare a short report that will be sent to all participants and the Residential Care Setting. The results of this study will be used to initiate a similar research on a larger scale to determine the usefulness of Yoga/Tai Chi programmes for older residents. The findings will be reported in the form of a thesis or book for examination as part of the student’s PhD studies at the University of Newcastle. Findings will also be made available through publications in peer reviewed journals and disseminated through conference presentations.

What are your rights?

If you decide to participate in this research, your rights are protected as follows:

11. You have the right to ask questions of the researcher
12. You have the right to refuse to participate in this study
13. You have the right to refuse to answer any question, should you chose, and no reason needs to be given.
14. Your decision to participate or not to participate in the study will not affect in any way your employment relationship.

What do you need to do to participate?

If you wish to participate in the study, please sign the consent form and drop it in to the locked box provided at the reception of the residential aged care facility. The student researcher will collect the forms from the box.

Further information

If you would like further information please do not hesitate to contact the researchers on the phone numbers given below.
Yours sincerely,

Padmapriya Saravanakumar  
PhD student  
School of Nursing and Midwifery  
Faculty of Health  
University of Newcastle  
Mobile:

Professor Isabel Higgins  
School of Nursing and Midwifery  
University of Newcastle  
University drive  
Callaghan, 2308  
Tel: 49216144

Complaints about this research

This project has been approved by the University’s Human Research Ethics Committee, Approval No:…………………………….

Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher, or, if an independent person is preferred, to the Human Research Ethics Office, The Chancellery, The University of Newcastle, University Drive, Callaghan NSW 2308, Australia, telephone ( 02) 49216333, email Human-Ethics@newcastle.edu.au.
Appendix 4

Information Statement for Tai Chi and Yoga

Instructors

Preventing falls in older people in residential care settings: Improving balance through Tai Chi and Yoga

Dear Madam/Sir

This letter is an invitation for you to participate in the research project mentioned above which is being conducted by Padmapriya Saravanakumar, a PhD student from the School of Nursing and Midwifery, Faculty of Health, University of Newcastle. The supervisors for the above project are Professor Isabel Higgins, Associate Professor
David Sibritt and Associate Professor Pamela Van Der Riet. Ms. Jodie Marquez is a physiotherapist and a co-researcher.

Why is the research being done?

Accidental falls among the elderly are a major public health concern that incurs a heavy expense to the health care system internationally and in Australia. It has been found that most accidental falls are due to poor balance and mobility.

Several studies have found that Yoga and Tai Chi are effective in promoting balance and thereby preventing falls.

Yoga is a well recognised mind and body therapy that promotes physical, psychological and spiritual wellbeing. It is a combination of breathing exercises (Pranayama), physical postures (asanas), and meditation. Global research findings suggest that yoga programmes tailored to older people may be an effective means of preventing age-related changes to balance and mobility.

Tai Chi is a system of slow meditative physical exercise designed for relaxation, balance and health. Recent studies show that Tai Chi is effective in improving balance, muscle strength, range of movement, flexibility and falls prevention.

Our research aims to:

10. Find whether it is possible to conduct Yoga and Tai Chi programmes in residential care settings.
11. Identify the best forms of Tai Chi and Yoga for the elderly with different levels of balance.
12. Determine whether it is possible to find changes in balance, pain experience, quality of life and number of falls in older residents who follow the Yoga/Tai Chi programmes compared to those who receive usual care.

What would you be asked to do?

1. You are invited to conduct the Yoga/Tai Chi programme in 2, one hour sessions for a period of 14 weeks for older residents of the residential care setting. The
residents will have varying levels of balance abilities but all will be able to stand with hand support.

2. During the programme, you are invited to record your observations in a reflective journal to help the researcher determine the most feasible and useful Yoga/Tai Chi exercises for the participants.

3. The Tai Chi and Yoga sessions will be video recorded. It is likely that your image will be captured while you conduct the sessions. The faces will be pixelated (blurred) during video editing after the data analysis is complete.

**How much time will it take?**

The Yoga/ Tai Chi sessions will be conducted as one hour sessions twice a week for 14 consecutive weeks.

**What are the risks and benefits of participating?**

There are no anticipated risks in participating. The benefits will include expanding our knowledge of the usefulness of Yoga/ Tai Chi in older persons.

**How will your privacy be protected?**

**Video records:**
The faces of all participants will be pixelated (this is where the video is edited so that the face becomes blurred) to preserve anonymity. The pixilation would be done after the data analysis is complete.

**Safekeeping of records:**

All information obtained from you will be kept confidential. Your name will be replaced with a pseudonym. All information will be kept in a locked filing cabinet in the researcher’s office at the university and will only be used for the purposes of this study. Only the researchers will have access to this information. Information collected for the study will be retained for at least 5 years at the University of Newcastle, after which it will be destroyed.

**How will the information collected be used?**
The information collected from your reflective journals and from other sources will aid the researcher to map the feasible and helpful movements and or exercises in Tai Chi and Yoga for older people.
The results of this pilot study will be used to initiate a similar study of larger scale to determine the usefulness of the Yoga/Tai Chi programmes for older residents. The findings will be reported in the form of a thesis or book for examination as part of the student’s PhD studies at the University of Newcastle. Findings will also be made available through publications in peer reviewed journals and disseminated through conference presentations.

**What do you need to do to participate?**

If you wish to participate in the study as a Yoga/Tai Chi trainer, you are invited to return the signed consent form and place it in the self addressed and sealable envelope for return to the student researcher via the post.

**Further information**

If you would like further information please do not hesitate to contact the researchers on the phone numbers given below.

**Yours sincerely,**

Padmapriya Saravanakumar  
PhD student  
School of Nursing and Midwifery  
Faculty of Health  
University of Newcastle  
Mobile:  

Professor Isabel Higgins  
School of Nursing and Midwifery  
University of Newcastle  
University drive  
Callaghan, 2308  
Tel: 49216144
Complaints about this research

This project has been approved by the University’s Human Research Ethics Committee, Approval No:…………………………….

Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher, or, if an independent person is preferred, to the Human Research Ethics Office, The Chanceller, The University of Newcastle, University Drive, Callaghan NSW 2308, Australia, telephone ( 02) 49216333, email Human-Ethics@newcastle.edu.au.
Appendix 5

Consent form for resident participants of the research project:

Preventing falls in older people in residential care settings: Improving balance through Tai Chi and Yoga

Date: 11th January 2011

I agree [or, I agree for my relative] to participate in the above research project and give my consent freely.

I understand that the project will be conducted as described in the Information Statement, a copy of which I have retained.
I understand I [or my relative] can withdraw from the project at any time and do not have to give any reason for withdrawing.

I consent to:

- Being assessed for balance by a physiotherapy student 3 times in a 14 week period: in the 1st week, 7th week and the 14th week.
- Being assessed for pain by the student researcher 3 times in a 14 week period: in the 1st week, 7th week and the 14th week.
- Completing a quality of life questionnaire 3 times in a 14 week period: in the 1st week, 7th week and the 14th week.
- Allowing the student researcher to access my medical records held at the residential care facility in order to obtain information on my medical history, health and history of falls (in the following period: from 6 months before the programme and up to 6 months after the programme).
- Attending a group meeting at the end of the 14 weeks.
- Being audio recorded during the group meeting at the end of the 14 weeks.
- If I am allocated to the Tai Chi or the Yoga group, I agree:
  - To attend 2 one hour sessions of either of the above allocated group for consecutive 14 weeks and
  - To being video recorded while participating in the above sessions.

I understand that my personal information will remain confidential to the researchers.

I have had the opportunity to have questions answered to my satisfaction.

Printed Name……………………………………………………………………………………………………………………………………………………………………………………………………
Signature……………………………………………………………………………………………………………………………………………………………………………………………………
Date……………………………………………………………………………………………………………………………………………………………………………………………………
Witnessed by:

Name..............................................................................................................

Signature.................................................................Date..............

(Please use this section if you are representing the participant in making informed consent)

In signing this form at the direction of............................................................

I confirm that he/she has read, or had read to them, the contents of the Information Statement and Consent Form and has made an informed choice to participate.

Printed Name.............................................................................................

Signature...............................................................................................

Date.................................................................................................
Appendix 6

Consent form for participants’ family members:

Preventing falls in older people in residential care settings: Improving balance through Tai Chi and Yoga

Date: 11th January 2011

I agree to participate in the above research project and give my consent freely.

I understand that the project will be conducted as described in the Information Statement, a copy of which I have retained.
I understand I can withdraw from the project at any time and do not have to give any reason for withdrawing.

I consent to:

- Attending 2 one hour sessions of Yoga/ Tai Chi per week for 14 consecutive weeks as a support person for my family member who may need assistance.
- Being video recorded while participating in the Yoga/ Tai Chi sessions.
- Attending a focus group meeting at the end of the 14 week Yoga/ Tai Chi programme.
- Being audio recorded during the focus group meeting at the end of the 14 week Yoga/ Tai Chi programme.

I understand that my personal information will remain confidential to the researchers.

I have had the opportunity to have questions answered to my satisfaction.

Printed Name………………………………………………………………………………

Signature………………………………………………………………………………

Date………………………………………………………………………………
Appendix 7

Consent form for support persons of the research project:

Preventing falls in older people in residential care settings: Improving balance through Tai Chi and Yoga

Date: 11th January 2011

I agree to participate in the above research project and give my consent freely.

I understand that the project will be conducted as described in the Information Statement, a copy of which I have retained.

I understand I can withdraw from the project at any time and do not have to give any reason for withdrawing.

I consent to:
• Attending 2 one hour sessions of Yoga/ Tai Chi per week for consecutive 14 weeks as a support person for the residents who need help.

• Being video recorded while participating in the Yoga/ Tai Chi sessions.

• Attending a focus group meeting at the end of the 14 week Yoga/ Tai Chi programme.

• Being audio recorded during the focus group meeting at the end of the 14 week Yoga/ Tai Chi programme.

I understand that my personal information will remain confidential to the researchers.

I have had the opportunity to have questions answered to my satisfaction.

Printed Name……………………………………………………………………………………………………………………………..

Signature………………………………………………………………………………………………………………………………

Date……………………………………………………………………………………………………………………………………
Appendix 8

Consent form for tai chi instructor of the research project:

Preventing falls in older people in residential care settings: improving balance through Tai Chi and Yoga

Date: 11th January 2011

I agree to participate in the above research project and give my consent freely.

I understand that the project will be conducted as described in the Information Statement, a copy of which I have retained.

I understand I can withdraw from the project at any time and do not have to give any reason for withdrawing.
I consent to:

- Conducting 2 one hour sessions of Tai Chi per week for 14 consecutive weeks.
- Maintaining a journal on the Tai Chi sessions conducted.
- Being video recorded while conducting the Tai Chi sessions.

I understand that my personal information will remain confidential to the researchers.

I have had the opportunity to have questions answered to my satisfaction.

Printed Name……………………………………………………………………………………………………

Signature……………………………………………………………………………………………………

Date……………………………………………………………………………………………………
Consent form for the yoga instructor of the research project:

Preventing falls in older people in residential care settings: improving balance through Tai Chi and Yoga

Date: 11th January 2011

I agree to participate in the above research project and give my consent freely.

I understand that the project will be conducted as described in the Information Statement, a copy of which I have retained.

I understand I can withdraw from the project at any time and do not have to give any reason for withdrawing.
I consent to:

- Conducting 2 two one hour sessions of Yoga per week for 14 consecutive weeks.
- Maintaining a journal on the Yoga sessions conducted.
- Being video recorded while conducting the Yoga sessions.

I understand that my personal information will remain confidential to the researchers.

I have had the opportunity to have questions answered to my satisfaction.

Printed Name………………………………………………………………………………………………………

Signature………………………………………………………………………………………………………

Date………………………………………………………………………………………………………
Appendix 10

Medical Records Data Collection Form for the Research Project:

Preventing falls in older people in residential care settings: improving balance through Tai Chi and Yoga

Primary Participant ID:…………………………………………………

Age:…………………………….yrs                 Sex:  male/ female

Provisional medical diagnosis:……………………………………………………………………………………………………………………………..

Any co morbidities affecting balance and gait:

Eye:…………………………………………………………………………………………..

ENT ( ear/ nose/ throat):………………………………………………………………

NS (Nervous system):…………………………………………………………

CVS (cardio vascular system):………………………………………………

MS (Musculo skeletal system):……………………………………………


Cognition………………………………………………………………………………

Pain……………………………………………………………………………………

Medications currently prescribed:…………………………………………………

No. of falls (in the period: 6 months before the Yoga/Tai Chi programme and up to 6 months after the programme)

In a period of 6 months before the programme:…………………………………

During the 14 week programme:…………………………………………………

In a period of 6 months after the programme:…………………………………...
Appendix 11

Berg Balance Scale

Description:
14-item scale designed to measure balance of the older adult in a clinical setting.

Equipment needed: Ruler, 2 standard chairs (one with arm rests, one without)
Footstool or step, Stopwatch or wristwatch, 15 ft walkway

Completion:
- Time: 15-20 minutes
- Scoring: A five-point ordinal scale, ranging from 0-4. “0” indicates the lowest level of function and “4” the highest level of function. Score the LOWEST performance.
- Total Score = 56

Interpretation:
- 41-56 = low fall risk
- 21-40 = medium fall risk
- 0-20 = high fall risk

Criterion Validity:
“Authors support a cut off score of 45/56 for independent safe ambulation”.

Riddle and Stratford, 1999, examined 45/56 cutoff validity and concluded:
- Sensitivity = 64% (Correctly predicts fallers)
- Specificity = 90% (Correctly predicts non-fallers)
- Riddle and Stratford encouraged a lower cut off score of 40/56 to assess fall risk

Comments: Potential ceiling effect with higher level patients. Scale does not include gait items

Minimal Detectable Change:
“A change of 4 points is needed to be 95% confident that true change has occurred if a patient scores within 45-56 initially, 5 points if they score within 35-44, 7 points if they score within 25-34 and, finally, 5 points if their initial score is within 0-24 on the Berg Balance Scale.”


Norms:
### Berg Balance Scale

Name: ___________________________ Date: ____________

Location: _________________________ Rater: __________________

<table>
<thead>
<tr>
<th>ITEM DESCRIPTION</th>
<th>SCORE (0-4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sitting to standing</td>
<td></td>
</tr>
<tr>
<td>Standing unsupported</td>
<td></td>
</tr>
<tr>
<td>Sitting unsupported</td>
<td></td>
</tr>
<tr>
<td>Standing to sitting</td>
<td></td>
</tr>
<tr>
<td>Transfers</td>
<td></td>
</tr>
<tr>
<td>Standing with eyes closed</td>
<td></td>
</tr>
<tr>
<td>Standing with feet together</td>
<td></td>
</tr>
<tr>
<td>Reaching forward with outstretched arm</td>
<td></td>
</tr>
<tr>
<td>Retrieving object from floor</td>
<td></td>
</tr>
<tr>
<td>Turning to look behind</td>
<td></td>
</tr>
<tr>
<td>Turning 360 degrees</td>
<td></td>
</tr>
<tr>
<td>Placing alternate foot on stool</td>
<td></td>
</tr>
<tr>
<td>Standing with one foot in front</td>
<td></td>
</tr>
<tr>
<td>Standing on one foot</td>
<td></td>
</tr>
</tbody>
</table>

**Total**  

---

**Table 4. Berg Balance Scale Scores: Means, Standard Deviations, and Confidence Intervals by Age, Gender, and Use of Assistive Device**

<table>
<thead>
<tr>
<th>Age (y)</th>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>60-69</td>
<td>Male</td>
<td>1</td>
<td>51.0</td>
<td>---</td>
<td>35.3 – 66.7</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>5</td>
<td>54.6</td>
<td>0.5</td>
<td>47.6 – 61.6</td>
</tr>
<tr>
<td></td>
<td>Overall</td>
<td>6</td>
<td>54.0</td>
<td>1.5</td>
<td>52.4 – 55.6</td>
</tr>
<tr>
<td>70-79</td>
<td>Male</td>
<td>9</td>
<td>53.9</td>
<td>1.5</td>
<td>48.7 – 59.1</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>10</td>
<td>51.6</td>
<td>2.6</td>
<td>46.6 – 56.6</td>
</tr>
<tr>
<td></td>
<td>Overall</td>
<td>19</td>
<td>52.7</td>
<td>2.4</td>
<td>51.5 – 53.8</td>
</tr>
<tr>
<td>80-89</td>
<td>Male</td>
<td>10</td>
<td>41.8</td>
<td>12.2</td>
<td>36.8 – 46.8</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>24</td>
<td>42.1</td>
<td>8.0</td>
<td>38.9 – 45.3</td>
</tr>
<tr>
<td></td>
<td>No Device</td>
<td>24</td>
<td>46.3</td>
<td>8.2</td>
<td>42.1 – 50.5</td>
</tr>
<tr>
<td></td>
<td>Device</td>
<td>10</td>
<td>31.7</td>
<td>10.0</td>
<td>28.3 – 35.1</td>
</tr>
<tr>
<td></td>
<td>Overall</td>
<td>34</td>
<td>42.0</td>
<td>9.2</td>
<td>38.8 – 45.3</td>
</tr>
<tr>
<td>90-101</td>
<td>Male</td>
<td>2</td>
<td>40.0</td>
<td>1.4</td>
<td>38.9 – 51.1</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>15</td>
<td>36.9</td>
<td>9.7</td>
<td>32.8 – 40.9</td>
</tr>
<tr>
<td></td>
<td>No Device</td>
<td>7</td>
<td>45</td>
<td>4.2</td>
<td>40.9 – 49.1</td>
</tr>
<tr>
<td></td>
<td>Device</td>
<td>10</td>
<td>31.8</td>
<td>7.6</td>
<td>28.4 – 35.2</td>
</tr>
<tr>
<td></td>
<td>Overall</td>
<td>17</td>
<td>37.2</td>
<td>9.1</td>
<td>32.5 – 41.9</td>
</tr>
</tbody>
</table>
GENERAL INSTRUCTIONS
Please document each task and/or give instructions as written. When scoring, please record the lowest response category that applies for each item.

In most items, the subject is asked to maintain a given position for a specific time. Progressively more points are deducted if:

- the time or distance requirements are not met
- the subject’s performance warrants supervision
- the subject touches an external support or receives assistance from the examiner

Subject should understand that they must maintain their balance while attempting the tasks. The choices of which leg to stand on or how far to reach are left to the subject. Poor judgment will adversely influence the performance and the scoring.

Equipment required for testing is a stopwatch or watch with a second hand, and a ruler or other indicator of 2, 5, and 10 inches. Chairs used during testing should be a reasonable height. Either a step or a stool of average step height may be used for item #12.
**Berg Balance Scale**

**SITTING TO STANDING**
**INSTRUCTIONS:** Please stand up. Try not to use your hand for support.

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>able to stand without using hands and stabilize independently</td>
</tr>
<tr>
<td>3</td>
<td>able to stand independently using hands</td>
</tr>
<tr>
<td>2</td>
<td>able to stand using hands after several tries</td>
</tr>
<tr>
<td>1</td>
<td>needs minimal aid to stand or stabilize</td>
</tr>
<tr>
<td>0</td>
<td>needs moderate or maximal assist to stand</td>
</tr>
</tbody>
</table>

**STANDING UNSUPPORTED**
**INSTRUCTIONS:** Please stand for two minutes without holding on.

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>able to stand safely for 2 minutes</td>
</tr>
<tr>
<td>3</td>
<td>able to sit 2 minutes under supervision</td>
</tr>
<tr>
<td>2</td>
<td>able to sit 30 seconds</td>
</tr>
<tr>
<td>1</td>
<td>able to sit 10 seconds</td>
</tr>
<tr>
<td>0</td>
<td>unable to sit without support 10 seconds</td>
</tr>
</tbody>
</table>

If a subject is able to stand 2 minutes unsupported, score full points for sitting unsupported. Proceed to item #4.

**SITTING WITH BACK UNSUPPORTED BUT FEET SUPPORTED ON FLOOR OR ON A STOOL**
**INSTRUCTIONS:** Please sit with arms folded for 2 minutes.

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>able to sit safely and securely for 2 minutes</td>
</tr>
<tr>
<td>3</td>
<td>able to sit 2 minutes under supervision</td>
</tr>
<tr>
<td>2</td>
<td>able to sit 30 seconds</td>
</tr>
<tr>
<td>1</td>
<td>able to sit 10 seconds</td>
</tr>
<tr>
<td>0</td>
<td>unable to sit without support 10 seconds</td>
</tr>
</tbody>
</table>

**STANDING TO SITTING**
**INSTRUCTIONS:** Please sit down.

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>sits safely with minimal use of hands</td>
</tr>
<tr>
<td>3</td>
<td>controls descent by using hands</td>
</tr>
<tr>
<td>2</td>
<td>uses back of legs against chair to control descent</td>
</tr>
<tr>
<td>1</td>
<td>sits independently but has uncontrolled descent</td>
</tr>
<tr>
<td>0</td>
<td>needs assist to sit</td>
</tr>
</tbody>
</table>

**TRANSFERS**
**INSTRUCTIONS:** Arrange chair(s) for pivot transfer. Ask subject to transfer one way toward a seat with armrests and one way toward a seat without armrests. You may use two chairs (one with and one without armrests) or a bed and a chair.

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>able to transfer safely with minor use of hands</td>
</tr>
<tr>
<td>3</td>
<td>able to transfer safely definite need of hands</td>
</tr>
<tr>
<td>2</td>
<td>able to transfer with verbal cuing and/or supervision</td>
</tr>
<tr>
<td>1</td>
<td>needs one person to assist</td>
</tr>
<tr>
<td>0</td>
<td>needs two people to assist or supervise to be safe</td>
</tr>
</tbody>
</table>

**STANDING UNSUPPORTED WITH EYES CLOSED**
**INSTRUCTIONS:** Please close your eyes and stand still for 10 seconds.

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>able to stand 10 seconds safely</td>
</tr>
<tr>
<td>3</td>
<td>able to stand 10 seconds with supervision</td>
</tr>
<tr>
<td>2</td>
<td>able to stand 3 seconds</td>
</tr>
<tr>
<td>1</td>
<td>unable to keep eyes closed 3 seconds but stays safely</td>
</tr>
<tr>
<td>0</td>
<td>needs help to keep from falling</td>
</tr>
</tbody>
</table>

**STANDING UNSUPPORTED WITH FEET TOGETHER**
**INSTRUCTIONS:** Place your feet together and stand without holding on.

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>able to place feet together independently and stand 1 minute safely</td>
</tr>
<tr>
<td>3</td>
<td>able to place feet together independently and stand 1 minute with supervision</td>
</tr>
<tr>
<td>2</td>
<td>able to place feet together independently but unable to hold for 30 seconds</td>
</tr>
<tr>
<td>1</td>
<td>needs help to attain position but able to stand 15 seconds feet together</td>
</tr>
<tr>
<td>0</td>
<td>needs help to attain position and unable to hold for 15 seconds</td>
</tr>
</tbody>
</table>

373
**Berg Balance Scale** continued…..

REACHING FORWARD WITH OUTSTRETCHED ARM WHILE STANDING
INSTRUCTIONS: Lift arm to 90 degrees. Stretch out your fingers and reach forward as far as you can. (Examiner places a ruler at the end of fingertips when arm is at 90 degrees. Fingers should not touch the ruler while reaching forward. The recorded measure is the distance forward that the fingers reach while the subject is in the most forward lean position. When possible, ask subject to use both arms when reaching to avoid rotation of the trunk.)

( ) 4 can reach forward confidently 25 cm (10 inches)
( ) 3 can reach forward 12 cm (5 inches)
( ) 2 can reach forward 5 cm (2 inches)
( ) 1 reaches forward but needs supervision
( ) 0 loses balance while trying/requires external support

PICK UP OBJECT FROM THE FLOOR FROM A STANDING POSITION
INSTRUCTIONS: Pick up the shoe/slipper, which is place in front of your feet.

( ) 4 able to pick up slipper safely and easily
( ) 3 able to pick up slipper but needs supervision
( ) 2 unable to pick up but reaches 2-5 cm (1-2 inches) from slipper and keeps balance independently
( ) 1 unable to pick up and needs supervision while trying
( ) 0 unable to try/needs assist to keep from losing balance or falling

TURNING TO LOOK BEHIND OVER LEFT AND RIGHT SHOULDERS WHILE STANDING
INSTRUCTIONS: Turn to look directly behind you over toward the left shoulder. Repeat to the right. Examiner may pick an object to look at directly behind the subject to encourage a better twist turn.

( ) 4 looks behind from both sides and weight shifts well
( ) 3 looks behind one side only other side shows less weight shift
( ) 2 turns sideways only but maintains balance independently
( ) 1 needs supervision when turning
( ) 0 needs assistance to keep from losing balance or falling

TURN 360 DEGREES
INSTRUCTIONS: Turn completely around in a full circle. Pause. Then turn a full circle in the other direction.

( ) 4 able to turn 360 degrees safely in 4 seconds or less
( ) 3 able to turn 360 degrees safely one side only 4 seconds or less
( ) 2 able to turn 360 degrees safely but slowly
( ) 1 needs close supervision or verbal cuing
( ) 0 needs assistance while turning

PLACE ALTERNATE FOOT ON STEP OR STOOL WHILE STANDING UNSUPPORTED
INSTRUCTIONS: Place each foot alternately on the step/stool. Continue until each foot has touch the step/stool four times.

( ) 4 able to stand independently and safely and complete 8 steps in 20 seconds
( ) 3 able to stand independently and complete 8 steps in > 20 seconds
( ) 2 able to complete 4 steps without aid with supervision
( ) 1 able to complete > 2 steps needs minimal assist
( ) 0 needs assistance to keep from falling/unable to try

STANDING UNSUPPORTED ONE FOOT IN FRONT
INSTRUCTIONS: (DEMONSTRATE TO SUBJECT) Place one foot directly in front of the other. If you feel that you cannot place your foot directly in front, try to step far enough ahead that the heel of your forward foot is ahead of the toes of the other foot. (To score 3 points, the length of the step should exceed the length of the other foot and the width of the stance should approximate the subject’s normal stride width.)

( ) 4 able to place foot tandem independently and hold 30 seconds
( ) 3 able to place foot ahead independently and hold 30 seconds
( ) 2 able to take small step independently and hold 30 seconds
( ) 1 needs help to step but can hold 15 seconds
( ) 0 loses balance while stepping or standing

STANDING ON ONE LEG
INSTRUCTIONS: Stand on one leg as long as you can without holding on.

( ) 4 able to lift leg independently and hold > 10 seconds
( ) 3 able to lift leg independently and hold 5-10 seconds
( ) 2 able to lift leg independently and hold ≥ 3 seconds
( ) 1 tries to lift leg unable to hold 3 seconds but remains standing independently.
( ) 0 unable to try of needs assist to prevent fall

( ) TOTAL SCORE (Maximum = 56)
Appendix 12

Verbal Descriptor Scale

Instructions: This tool is for more articulate patients, who can use verbal terms to express the level of their pain. Have patients place a check mark next to the phrase that best describes the current intensity of their pain.

Scoring: Keep a record of the corresponding number that the patients mark on this tool. A response of "No Pain" is given a value of zero, whereas a response of "The Most Intense Pain Imaginable" is given a value of six. Compute a mean score by summing the values reported at each assessment and dividing by the number of assessments. You may also simply track either the values or the descriptors themselves over time.

Sources:
Verbal Descriptor Scale

Patient's Name: _________________________________ Date: ________

Instructions: Please place a check mark next to the phrase that best describes the current level of your pain.

_____ The Most Intense Pain Imaginable
_____ Extreme Pain
_____ Severe Pain
_____ Moderate Pain
_____ Mild Pain
_____ Slight Pain
_____ No Pain
Appendix 13

Dementia Quality of Life Questionnaire (DEMQoL)
DEMQOL (version 4)

Instructions: Read each of the following questions (in bold) verbatim and show the respondent the response card.

I would like to ask you about your life. There are no right or wrong answers. Just give the answer that best describes how you have felt in the last week. Don't worry if some questions appear not to apply to you. We have to ask the same questions of everybody.

Before we start we'll do a practice question; that's one that doesn't count. (Show the response card and ask respondent to say or point to the answer) In the last week, how much have you enjoyed watching television?

a lot       quite a bit       a little       not at all

Follow up with a prompt question: Why is that? or Tell me a bit more about that.
For all of the questions I'm going to ask you, I want you to think about the last week.

First I'm going to ask about your feelings. In the last week, have you felt........

1. cheerful? **
   □ a lot □ quite a bit □ a little □ not at all
2. worried or anxious?
   □ a lot □ quite a bit □ a little □ not at all
3. that you are enjoying life? **
   □ a lot □ quite a bit □ a little □ not at all
4. frustrated?
   □ a lot □ quite a bit □ a little □ not at all
5. confident? **
   □ a lot □ quite a bit □ a little □ not at all
6. full of energy? **
   □ a lot □ quite a bit □ a little □ not at all
7. sad?
   □ a lot □ quite a bit □ a little □ not at all
8. lonely?
   □ a lot □ quite a bit □ a little □ not at all
9. distressed?
   □ a lot □ quite a bit □ a little □ not at all
10. lively? **
    □ a lot □ quite a bit □ a little □ not at all
11. irritable?
    □ a lot □ quite a bit □ a little □ not at all
12. fed-up?
    □ a lot □ quite a bit □ a little □ not at all
13. that there are things that you wanted to do but couldn’t?
    □ a lot □ quite a bit □ a little □ not at all

Next, I’m going to ask you about your memory. In the last week, how worried have you been about........

14. forgetting things that happened recently?
    □ a lot □ quite a bit □ a little □ not at all
15. forgetting who people are?
    □ a lot □ quite a bit □ a little □ not at all
16. forgetting what day it is?
    □ a lot □ quite a bit □ a little □ not at all

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17 your thoughts being muddled?  □ a lot  □ quite a bit  □ a little  □ not at all
18 difficulty making decisions?  □ a lot  □ quite a bit  □ a little  □ not at all
19 poor concentration?  □ a lot  □ quite a bit  □ a little  □ not at all

Now I’m going to ask you about your everyday life. In the last week, how worried have you been about...........

20 not having enough company?  □ a lot  □ quite a bit  □ a little  □ not at all
21 how you get on with people close to you?  □ a lot  □ quite a bit  □ a little  □ not at all
22 getting the affection that you want?  □ a lot  □ quite a bit  □ a little  □ not at all
23 people not listening to you?  □ a lot  □ quite a bit  □ a little  □ not at all
24 making yourself understood?  □ a lot  □ quite a bit  □ a little  □ not at all
25 getting help when you need it?  □ a lot  □ quite a bit  □ a little  □ not at all
26 getting to the toilet in time?  □ a lot  □ quite a bit  □ a little  □ not at all
27 how you feel in yourself?  □ a lot  □ quite a bit  □ a little  □ not at all
28 your health overall?  □ a lot  □ quite a bit  □ a little  □ not at all

We’ve already talked about lots of things: your feelings, memory and everyday life. Thinking about all of these things in the last week, how would you rate...........

29 your quality of life overall? **  □ very good  □ good  □ fair  □ poor

** Items that need to be reversed before scoring

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Appendix 14

Excerpts of the modified hatha yoga instructions

ALL  28 SESSIONS (2 sessions per week)

Mindful awareness of the present moment, body and breath.

SESSION 1 & 2

SITTING:

Sit tall: awareness of breathing-even in and out breaths; slowing breathing rate

Warm up:

-shrug shoulders up & down x 3 times

-lift one arm forward & up; lower arm down x 3 times

Repeat to other side

-lift one arm forward and up; lean to right; hold for 3 breaths x 3times

Repeat to other side

Sitting (spinal) twist/Matsyendrasana modification

-turn upper body & neck to the right; take right arm back to the right- hold for 3 breaths

Repeat to other side

-neck stretch: drop chin to chest and hold for 3 breaths

-right fingers on right shoulder: circle arm 3x each way; repeat to other side

-lift one arm out in front with palm up: bend & straighten lower arm x 3 times; circle from wrist x 3 times each way

Repeat with the other arm.
-lift one arm out in front palms down: bend & straighten fingers-alternating thumb in & out x 6 times

Repeat with other arm & hand.

-lift right lower leg: point and flex foot x 3 times

Repeat with other foot

-lift right lower leg: rotate ankle x 3 times each way

**Stand (holding chair in front)**

**Mountain/Tadasana:** stand tall, looking straight ahead (imagine balancing a book on head)

**Preparation for balances**

- up and down on toes x 3 times; hold up for 3 breaths

- transfer weight from one leg to the other x 6 times

- stand on one leg take heel towards buttock x 3 times

Repeat to other side

- take one leg out to side and bring back in (abduction & adduction) x 3 times

Repeat with other leg

**Tree/Vrksasana modification**

- weight on right leg; turn out from left hip and place left heel on inner right ankle

Hold for 3 breaths

Repeat with other leg
Chair/Utkatasana modification (every participant had two chairs; one behind and one in front)

-legs together: take buttocks back and tilt trunk forward as if sitting down on chair x 3 times

-sit back on chair and then stand again x 3 times

Finish sitting on chair

Sitting on chair

-Elbows by sides; forearms parallel to floor- take forearms out to sides and back in x 3 times

-Hands in prayer position, bringing elbows towards each other; open hands into a flower like the lotus x 3 times

Staff/Dandasana modification

While seated, imagine your spine as a staff, rooted firmly in the earth

-straighten (leg extension) and bend right leg (leg flexion) x 3 times

Repeat with other leg

Cat/Marjariasana modification

-lean forward taking hands to shins or ankles; drop head down (contraindication: hypertension); curl up back slowly x 3 times

(While curling back, do it slowly in order to avoid dizziness)

PRANAYAMA

-slow & deeper breathing; in for 3 counts and out for 3 counts (1 minute)

YOGA NIDRA (ROTATION OF AWARENESS AROUND THE BODY)
SESSION 3 & 4

SITTING:

Sit tall: awareness of breathing-even in and out breath; breathe in for 3 counts out for 3 counts; slowing breathing rate

Warm up

- Shrug shoulders up & down x 3 times
- turn head to right and then to left x 3 times
- drop chin to chest x 3 times
- lateral neck stretch: drop right ear towards right shoulder then left ear towards left shoulder x 3 times each side
- upper arms & elbows by side of trunk and forearms parallel to floor- take forearms away from each other x 3 times
- hands in prayer position; take hands to open lotus flower position x 3 times

Stand (holding chair in front)

Mountain/Tadasana: stand tall (imagine balancing a book on head)

Preparation for balances

- lift one arm forward & up x 3 times; repeat to other side
- side stretch: lift one arm overhead and lean to side x 3 times each side
- twist to the right taking right arm back; hold for 3 breaths; repeat to other side
- transfer weight from one leg to the other x6
- up and down on toes x 3 times; then hold up for 3 breaths

- lift one foot; point and flex foot x 3 times; repeat with other foot

**Chair/Utkatasana modification**

- legs together: take buttocks back and tilt trunk forward as if sitting down on chair x 3 times then hold ‘chair’ for 3 breaths.

**Tree/Vrksasana modification**

- weight on right leg; turn out from left hip, place left heel on inner right ankle and take one arm overhead; hold for 3 breaths

Repeat with other leg

*(SIT IF NECESSARY)*

- right fingertips on right shoulder; circle arm & shoulder each way x 3 times; repeat with left arm

- one arm outstretched in front:
  - flex and extend wrist x 3 times; repeat with left wrist
  - rotate hand one way then the other x 3 times; repeat with left hand
  - stretch and bend right fingers and thumbs, alternating thumbs in and out x 3 times; repeat with left hand

**PRANAYAMA**

- slow & deeper breathing: even in and out breaths (1 minute)

- alternate nostril breathing/nadi shodhan: imagine air flowing in left nostril and out the right nostril, then in the right nostril and out the left nostril (1 minute)
YOGA NIDRA (ROTATION OF AWARENESS AROUND THE BODY)

-with oriental music

SESSION 5 & 6

SITTING:

Sit tall: awareness of breathing—even in and out breath; breathe in for 3 counts out for 3 counts; slowing breathing rate.

Warm up

-Shrug shoulders up & down x 3 times

-turn head to right and then to left x 3 times

-drop chin to chest x 3 times

-lateral neck stretch: drop right ear towards right shoulder then left ear towards left shoulder x 3 times each side

-upper arms & elbows by side of trunk and forearms parallel to floor—take forearms away from each other x 3 times

-hands in prayer position; take hands to open lotus flower position x 3 times

Cat/Marjariasana modification (not with hypertension)

-lean forward taking hands to shins or ankles; drop head down; curl up x 3 times

Stand (holding chair in front)

Mountain/Tadasana: stand tall (imagine balancing a book on head)

-lift one arm forward and up x 3 times; repeat to other side

-side stretch: lift one arm overhead and lean to side x 3 times each side
- twist to the right taking right arm back; hold for 3 breaths; repeat to other side

- transfer weight from one leg to the other x6

- up and down on toes x 3 times; then hold up for 3 breaths

- lift one foot; point and flex foot x 3 times; repeat with other foot

- lift one foot; rotate from ankle x 3 times; repeat with other foot

- turn whole body to the right (hold chair with left hand); abducted & adducted right leg out to side; turn to left and repeat to other side x 3 times

**Chair/Utkatasana modification**

- legs together: take buttocks back and tilt trunk forward as if sitting down on chair x 3 times

  and then hold ‘chair’ for 3 breaths.

**Tree/Vrksasana modification**

- weight on right leg; turn out from left hip, place left heel on inner right ankle and

  take one arm overhead; hold for 3 breaths

Repeat with other leg

**(SIT IF NECESSARY)**

- arm outstretched in front:

  - rotate hand one way then the other x 3 times each way; repeat with left hand

  - stretch and bend right fingers and thumbs, alternating thumbs in and out x 3 times; repeat with left hand
PRANAYAMA

-alternate nostril breathing/nadi shodhan: imagine air flowing in left nostril and out the right nostril then in the right nostril and out the left nostril (1 minute)

YOGA NIDRA (ROTATION OF AWARENESS AROUND THE BODY)

-with oriental music

SESSIONS 7 & 8

SITTING:

Sit tall (if comfortable, sitting on edge of chair with no back support): awareness of breath-even in and out breaths; breathe in for 3 counts out for 3 counts; slowing breathing rate.

Warm up

-Shrug shoulders up & down x 3 times

-upper arms & elbows by side of trunk and forearms parallel to floor- take forearms away from each other x 3 times

-hands in prayer position; take hands to open lotus flower position x 3 times

-turn head to right and then to left x 3 times each side

-lateral neck stretch: drop right ear towards right shoulder then left ear towards left shoulder x 3 times each side

-eagle arms: cross one arm across the other; wiggle right fingers then left fingers; repeat to other side

-lift both arms forward & up x 3 times

Stand (holding chair in front)
**Mountain/Tadasana:** stand tall (imagine balancing a book on head)

- lift one arm in front & overhead x 3 times; repeat to other side

- side stretch: lift one arm overhead and lean to side x 3 times each side

- twist to the right taking right arm back; hold for 3 breaths; repeat to other side

- right fingertips on right shoulder; circle arm & shoulder each way x 3 times; repeat with left arm

- arm outstretched in front:
  - rotate hand one way then the other x 3 times; repeat with left hand
  - stretch and bend right fingers and thumbs, alternating thumbs in and out x 3 times; repeat with left hand

- up and down on toes x 3 times; then hold up for 3 breaths

**Chair/Utkatasana modification**

- legs together: take buttocks back and tilt trunk forward as if sitting down on chair x 3 times

  and then hold ‘chair’ for 3 breaths.

**Tree/Vrksasana modification**

- weight on right leg; turn out from left hip, place left heel on inner right ankle and take one arm overhead; hold for 3 breaths

  Repeat with other leg

- turn whole body to right (hold chair with left hand); abduct & adduct right leg out to side; turn to left and repeat to other side x 3 times
-lift one foot and rotate from ankle x 3 times each way; repeat on other leg

**SITTING**

**PRANAYAMA**

-calming breaths; out breath 2x longer than in breath eg breath in for 3 counts and breath out for 6 counts

**KIRTAN MEDITATION**

-palms up turned; take tips of index fingers to touch tips of thumbs, say ‘sa’; release; take tips of middle fingers to touch tips of thumbs, say ‘ta’; release ; take tips of ring fingers to touch tips of thumbs, say ‘na’; release; take tips of little fingers to touch tips of thumbs say ‘ma’; release; repeat 5 times

**YOGA NIDRA (ROTATION OF AWARENESS AROUND THE BODY)**

-with oriental music

**SESSIONS 9 & 10**

**SITTING:**

Sit tall (if comfortable, sitting on edge of chair with no back support): awareness of breath-even in and out breaths; breathe in for 3 counts out for 3 counts; slowing breathing rate.

Warm up

- Shrug shoulders up & down x 3 times

- upper arms & elbows by side of trunk and forearms parallel to floor- take forearms away from each other x 3 times

- hands in prayer position; take hands to open lotus flower position x 3 times
- turn head to right and then to left x 3 times each side

- lateral neck stretch: drop right ear towards right shoulder then left ear towards left shoulder x 3 times each side

- eagle arms: cross one arm across the other; wiggle right fingers then left fingers; repeat to other side

- lift both arms forward & up x 3 times

**Stand (holding chair in front)**

**Mountain/Tadasana:** stand tall (imagine balancing a book on head)

- lift one arm in front & overhead x 3 times; repeat to other side

- side stretch: lift one arm overhead and lean to side x 3 times each side

- twist to the right taking right arm back; hold for 3 breaths; repeat to other side

- right fingertips on right shoulder; circle arm & shoulder each way x 3 times; repeat with left arm

- arm outstretched in front:
  
  - rotate hand one way then the other x 3 times; repeat with left hand

  - stretch and bend right fingers and thumbs, alternating thumbs in and out x 3 times; repeat with left hand

  - flex and extend wrist x 3 times; repeat with left wrist

- up and down on toes x 3 times; then hold up for 3 breaths

**Chair/Utkatasana modification**

- legs together: take buttocks back and tilt trunk forward as if sitting down on chair x 3 times
and then hold ‘chair’ for 3 breaths.

**Tree/Vrksasana modification**

-weight on right leg; turn out from left hip, place left heel on inner right ankle

and

take one arm overhead; hold for 3 breaths

Repeat with other leg

-transfer weight from one foot to the other lifting foot x6

-lift one foot, point and flex foot x 3 times; repeat with other foot

-lift one foot and rotate from ankle x 3 times each way; repeat on other leg

-turn whole body to right (hold chair with left hand); abduct & adduct right leg

out to side; turn to left and repeat to other side x 3 times

**SITTING**

**PRANAYAMA**

-calming breaths; out breath 2x longer than in breath eg breath in for 3 counts

and breath out for 6 counts

**KIRTAN MEDITATION**

-palms up turned; take tips of index fingers to touch tips of thumbs, say ‘sa’; release; take tips of middle fingers to touch tips of thumbs, say ‘ta’; release; take tips of ring fingers to touch tips of thumbs, say ‘na’; release; take tips of little fingers to touch tips of thumbs say ‘ma’; release; repeat 5 times

**YOGA NIDRA (ROTATION OF AWARENESS AROUND THE BODY)**

-with oriental music
SESSIONS 11 & 12

SITTING:

Sit tall (if comfortable, sitting on edge of chair with no back support): awareness of breath—even in and out breaths; breathe in for 3 counts out for 3 counts; slowing breathing rate.

Warm up

- Shrug shoulders up & down x 3 times

- upper arms & elbows by side of trunk and forearms parallel to floor—take forearms away from each other x 3 times

- turn head to right and then to left x 3 times each side

- hands in prayer position; take hands to open lotus flower position x 3 times

- eagle arms: cross one arm across the other; wiggle right fingers then left fingers; repeat to other side

- lift both arms forward & up x 3 times

Cat/Marjariasana modification (not with hypertension)

- lean forward taking hands to shins or ankles; drop head down; curl up x 3 times

Stand (holding chair in front)

Mountain/Tadasana: stand tall (imagine balancing a book on head)

- lift one arm in front & overhead x 3 times; repeat to other side

- side stretch: lift one arm overhead and lean to side x 3 times each side

- twist to the right taking right arm back; hold for 3 breaths; repeat to other side
-right fingertips on right shoulder; circle arm & shoulder each way x 3 times; repeat with left arm

-up and down on toes x 3 times; then hold up for 5 breaths

**Chair/Utkatasana modification**

-legs together: take buttocks back and tilt trunk forward as if sitting down on chair x 3 times

and then hold ‘chair’ for 5 breaths.

**Tree/Vrksasana modification**

-weight on right leg; turn out from left hip, place left heel on inner right ankle and take one arm overhead; hold for 5 breaths

Repeat with other leg

-lift one foot, point and flex foot x 5 times; repeat with other foot

-lift one foot and rotate from ankle x 3 times each way; repeat on other leg

-turn whole body to right (hold chair with left hand); abduct & adduct right leg out to side; turn to left and repeat to other side x 3 times

-arm outstretched in front:

-rotate hand one way then the other x 3 times each way; repeat with left hand

-stretch and bend right fingers and thumbs, alternating thumbs in and out x 3 times; repeat with left hand

**SITTING**

**PRANAYAMA**
-alternate nostril breathing/nadi shodhan: imagine air flowing in left nostril and out the right nostril then in the right nostril and out the left nostril (1 minute)

**KIRTAN MEDITATION**

-palms up turned; take tips of index fingers to touch tips of thumbs, say ‘sa’; release; take tips of middle fingers to touch tips of thumbs, say ‘ta’; release; take tips of ring fingers to touch tips of thumbs, say ‘na’; release; take tips of little fingers to touch tips of thumbs say ‘ma’; release; repeat 5 times

**YOGA NIDRA (ROTATION OF AWARENESS AROUND THE BODY)**

-with oriental music

**SESSIONS 13 & 14**

**SITTING:**

Sit tall (if comfortable, sitting on edge of chair with no back support): awareness of breath-even in and out breaths; breathe in for 3 counts out for 3 counts; slowing breathing rate.

Warm up

- Shrug shoulders up & down x 3 times

- Hands in prayer position; take hands to open lotus flower position x 3 times

- Eagle arms: cross one arm across the other; wiggle right fingers then left fingers; repeat to other side

- Lift both arms forward & up x 3 times

**Staff/Dandasana modification**

- Straighten & bend right leg x 3 times
-with right leg straightened point & flex right foot x 3 times

Repeat with other leg

**Stand (holding chair in front)**

**Mountain/Tadasana:** stand tall (imagine balancing a book on head)

- lift one arm in front & overhead x 3 times; repeat to other side
- side stretch: lift one arm overhead and lean to side x 3 times each side
- twist to the right taking right arm back; hold for 3 breaths; repeat to other side
- up and down on toes x 3 times; then hold up for 5 breaths
- hula; circle pelvis one way then the other x 3 times

- right fingertips on right shoulder; circle arm & shoulder each way x 3 times; repeat with left arm
- arm outstretched in front:
  - rotate hand one way then the other x 3 times each way; repeat with left hand
  - stretch and bend right fingers and thumbs, alternating thumbs in and out x 3 times; repeat with left hand

**Chair/Utkatasana modification**

- legs together: take buttocks back and tilt trunk forward as if sitting down on chair x 3 times

and then hold ‘chair’ for 5 breaths.

**Tree/Vrksasana modification**
- weight on right leg; turn out from left hip, place left heel on inner right ankle and take one arm overhead; hold for 5 breaths
Repeat with other leg
- lift one foot, point and flex foot x5; repeat with other foot
- lift one foot and rotate from ankle x5 each way; repeat on other leg

Dancer/Natarajasana modification
In this pose, look straight ahead
- bend left knee & take left heel towards right buttock x 3 times
Repeat with other leg

SITTING

PRANAYAMA
- alternate nostril breathing/nadi shodhan: imagine air flowing in left nostril and out the right nostril then in the right nostril and out the left nostril (1 minute)

KIRTAN MEDITATION
- palms up turned; take tips of index fingers to touch tips of thumbs, say ‘sa’; release; take tips of middle fingers to touch tips of thumbs, say ‘ta’; release; take tips of ring fingers to touch tips of thumbs, say ‘na’; release; take tips of little fingers to touch tips of thumbs say ‘ma’; release; repeat 5 times

YOGA NIDRA (ROTATION OF AWARENESS AROUND THE BODY)
- with oriental music

SESSIONS 15 & 16
**SITTING:**

Sit tall (if comfortable sitting on edge of chair with no back support): awareness of breath—even in and out breaths; breathe in for 3 counts out for 3 counts; slowing breathing rate.

Warm up

- Shrug shoulders up & down x 3 times
- Upper arms & elbows by side of trunk and forearms parallel to floor—take forearms away from each other x 3 times
- Turn head to right and then to left x 3 times each side
- Eagle arms: cross one arm across the other; wiggle right fingers then left fingers; repeat to other side
- Lift both arms forward & up x 3 times

**Staff/Dandasana modification**

- Straighten & bend right leg x 3 times
  - With right leg straightened point & flex right foot x 3 times

Repeat with other leg

**Stand (holding chair in front)**

**Mountain/Tadasana:** stand tall (imagine balancing a book on head)

- Lift one arm in front & overhead x 3 times; repeat to other side
- Side stretch: lift one arm overhead and lean to side x 3 times each side
- Twist to the right taking right arm back; hold for 3 breaths; repeat to other side
- Up and down on toes x 3 times; then hold up for 5 breaths
-hula; circle pelvis one way then the other x 3 times

-right fingertips on right shoulder; circle arm & shoulder each way x 3 times; repeat with left arm

-arm outstretched in front:

-rotate hand one way then the other x 3 times; repeat with left hand

-stretch and bend right fingers and thumbs alternating thumbs in and out x 3 times; repeat with left hand

**Chair/Utkatasana modification**

-legs together: take buttocks back and tilt trunk forward as if sitting down on chair x 3 times

and then hold ‘chair’ for 5 breaths.

**Tree/Vrksasana modification**

-weight on right leg; turn out from left hip, place left heel on inner right ankle and take one arm overhead; hold for 5 breaths

Repeat with other leg

-lift one foot, point and flex foot x5; repeat with other foot

- lift one foot and rotate from ankle x5 each way; repeat on other leg

-turn whole body to right (hold chair with left hand); abduct & adduct right leg out to side; turn to left and repeat to other side x 3 times

**Dancer/Natarajasana modification**

-bend left knee & take left heel towards right buttock x 3 times
Repeat with other leg

**SITTING**

**PRANAYAMA**

-alternate nostril breathing/nadi shodhan: imagine air flowing in left nostril and out the right nostril then in the right nostril and out the left nostril (1 minute)

**KIRTAN MEDITATION**

-palms up turned; take tips of index fingers to touch tips of thumbs, say ‘sa’; release; take tips of middle fingers to touch tips of thumbs, say ‘ta’; release; take tips of ring fingers to touch tips of thumbs, say ‘na’; release; take tips of little fingers to touch tips of thumbs say ‘ma’; release; repeat 5 times

**YOGA NIDRA (ROTATION OF AWARENESS AROUND THE BODY)**

-with oriental music

**SESSIONS 17 & 18**

**SITTING:**

Sit tall (if comfortable sitting on edge of chair with no back support): awareness of breath-even in and out breaths; breathe in for 3 counts out for 3 counts; slowing breathing rate.

Warm up

- Shrug shoulders up & down x 3 times

- upper arms & elbows by side of trunk and forearms parallel to floor- take forearms away from each other x 3 times

- hands in prayer position; take hands to open lotus flower position x 3 times
- eagle arms: cross one arm across the other; wiggle right fingers then left fingers; repeat to other side
- lift both arms forward & up x 3 times

**Staff/Dandasana modification**
- straighten & bend right leg x 3 times
  - with right leg straightened point & flex right foot x 3 times

Repeat with other leg

**Cat/Marjariasana modification (not with hypertension)**
- lean forward taking hands to shins or ankles; drop head down; curl up x 3 times

**Stand (holding chair in front)**

**Mountain/Tadasana:** stand tall (imagine balancing a book on head)
- lift one arm in front & overhead x 3 times; repeat to other side
- side stretch: lift one arm overhead and lean to side x 3 times each side
- twist to the right taking right arm back; hold for 3 breaths; repeat to other side
- up and down on toes x 3 times; then hold up for 5 breaths
- right fingertips on right shoulder; circle arm & shoulder each way x 3 times; repeat with left arm
- arm outstretched in front:
  - rotate hand one way then the other x 3 times; repeat with left hand
  - stretch and bend right fingers and thumbs, alternating thumbs in and out x 3 times; repeat with left hand
Chair/Utkatasana modification

-legs together: take buttocks back and tilt trunk forward as if sitting down on chair x 3 times

and then hold ‘chair’ for 5 breaths.

Tree/Vrksasana modification

-weight on right leg; turn out from left hip, place left heel on inner right ankle and

take one arm overhead; hold for 5 breaths

Repeat with other leg

-lift one foot; point and flex foot x5; repeat with other foot

-lift one foot and rotate from ankle x5 each way; repeat on other leg

Dancer/Natarajasana modification

-bend left knee & take left heel towards right buttock X 3 TIMES

Repeat on other leg

- turn whole body to right (hold chair with left hand); abduct & adduct right leg out to side; turn to left and repeat to other side x 3 times

Warrior 2/Virabhadrasana 2 modification

-legs apart; turn right leg to the right and slightly turn left foot to the right; lunge to the right; bend and straighten right leg x 3 times

Repeat to the other side
PRANAYAMA

-calming breaths; out breath 2x longer than in breath eg breath in for 3 counts
and breath out for 6 counts

KIRTAN MEDITATION

-palms up turned; take tips of index fingers to touch tips of thumbs, say ‘sa’;
release; take tips of middle fingers to touch tips of thumbs, say ‘ta’; release ; take tips of
ring fingers to touch tips of thumbs, say ‘na’; release; take tips of little fingers to touch
tips of thumbs say ‘ma’; release; repeat 5 times

YOGA NIDRA (ROTATION OF AWARENESS AROUND THE BODY)

-with oriental music

SESSIONS 19, 20, 21 & 22

SITTING:

Sit tall (if comfortable sitting on edge of chair with no back support): awareness of
breath-even in and out breaths; breathe in for 3 counts out for 3 counts; slowing
breathing rate.

Warm up

-Shrug shoulders up & down x 3 times

-upper arms & elbows by side of trunk and forearms parallel to floor- take
forearms away from each other x 3 times

-hands from prayer to reverse prayer position x 3 times

-fingers to diamond shape

-take right hand to left shoulder with in breath; release on out breath; take left
hand to right shoulder on in breath; release x6
-lift both arms forward & up x 3 times

**Staff/Dandasana modification**

- straighten & bend right leg x 3 times
  - with right leg straightened point & flex right foot x 3 times

Repeat with other leg

**Cat/Marjariasana modification (not with hypertension)**

- lean forward taking hands to shins or ankles; drop head down; curl up x 3 times

**Stand (holding chair in front)**

**Mountain/Tadasana:** stand tall (imagine balancing a book on head)

- lift one arm in front & overhead x 3 times; repeat to other side
- side stretch: lift one arm overhead and lean to side x 3 times each side
- twist to the right taking right arm back; hold for 3 breaths; repeat to other side
- up and down on toes x 3 times; then hold up for 5 breaths
- right fingertips on right shoulder; circle arm & shoulder each way x 3 times; repeat with left arm
- arm outstretched in front:
  - rotate hand one way then the other x 3 times; repeat with left hand
  - stretch and bend right fingers and thumbs, alternating thumbs in and out x 3 times; repeat with left hand

**Chair/Utkatasana modification**
- legs together: take buttocks back and tilt trunk forward as if sitting down on chair x 3 times

and then hold ‘chair’ for 5 breaths.

**Tree/Vrksasana modification**

- weight on right leg; turn out from left hip, place left heel on inner right ankle and take one arm overhead; hold for 5 breaths

Repeat with other leg

- lift one foot, point and flex foot x5; repeat with other foot

- lift one foot and rotate from ankle x5 each way; repeat on other leg

- bend right knee & take right heel towards right buttock X 3 TIMES

- turn whole body to right (hold chair with left hand); abduct & adduct right leg out to side; turn to left and repeat to other side x 3 times

**Warrior 2/Virabhadrasana 2 modification**

- legs apart; turn right leg to the right and slightly turn left foot to the right; lunge to the right; hold for 3 breaths

Repeat to the other side

### SITTING

### PRANAYAMA

- calming breaths; out breath 2x longer than in breath eg breath in for 3 counts and breath out for 6 counts

### KIRTAN MEDITATION

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406
-palms up turned; take tips of index fingers to touch tips of thumbs, say ‘sa’; release; take tips of middle fingers to touch tips of thumbs, say ‘ta’; release; take tips of ring fingers to touch tips of thumbs, say ‘na’; release; take tips of little fingers to touch tips of thumbs say ‘ma’; release; repeat 5 times

**YOGA NIDRA (ROTATION OF AWARENESS AROUND THE BODY)**

- with oriental music

**SESSIONS 23, 24, 25, 26, 27 & 28**

**SITTING:**

Sit tall (if comfortable sitting on edge of chair with no back support): awareness of breath—**even in and out breaths; breathe in for 3 counts out for 3 counts; slowing breathing rate.**

Warm up

- shrug shoulders up & down x 3 times

- hand sequence: hands in prayer to lotus flower to reverse prayer to triangle shape to prayer x 3 times

- lift both arms forward & up x 3 times

**Staff/Dandasana modification**

- straighten right leg and lift left arm overhead; release; straighten left leg and lift right arm overhead x 6

**Cat/Marjariasana modification (not with hypertension)**

- lean forward taking hands to shins or ankles; drop head down; curl up x 3 times

**Stand (holding chair in front)**

**Mountain/Tadasana:** stand tall (imagine balancing a book on head)
-lift one arm in front & overhead x 3 times; repeat to other side

-side stretch: lift one arm overhead and lean to side x 3 times each side

-twist to the right taking right arm back; hold for 3 breaths; repeat to other side

-up and down on toes x 3 times; then hold up for 5 breaths

-arm outstretched in front:
  -rotate hand one way then the other x 3 times; repeat with left hand
  -stretch and bend right fingers and thumbs alternating thumbs in and out x 3 times; repeat with left hand

**Chair/Utkatasana modification**

-legs together: take buttocks back and tilt trunk forward as if sitting down on chair x 3 times

and then hold ‘chair’ for 5 breaths.

**Tree/Vrksasana modification**

-weight on right leg; turn out from left hip, place left heel on inner right ankle and take one arm overhead; hold for 5 breaths

Repeat with other leg

-lift one foot, point and flex foot x 5 times; repeat with other foot

-lift one foot and rotate from ankle x 3 times each way; repeat on other leg

-bend right knee & take right heel towards right buttock x 3 times

-turn whole body to right (hold chair with right hand); abduct & adduct left leg out to side; turn to left and repeat to other side x 3 times
Warrior 2/Virabhadrasana 2 modification

-legs apart; turn right leg to the right and slightly turn left foot to the right; lunge to the right; hold for 3 breaths

Repeat to the other side

Dancer/Natarajasana modification

-bend left knee & take left heel towards right buttock and lift right arm in front to shoulder height; hold for 3 breaths

Repeat to other side

-right fingertips on right shoulder circle arm & shoulder one way then the other; repeat with left arm x 3 times

Eagle/Garudasana modification

-stand on right leg with right knee slightly bent; cross left leg over right and place left foot on floor on lateral side of right foot; hold for 3 breaths

Repeat on other leg

SITTING

PRANAYAMA

-calming breaths; out breath 2x longer than in breath eg breath in for 3 counts and breath out for 6 counts

KIRTAN MEDITATION

Kirtan meditation is a chant exercise originating from Kundalini yoga that involves chanting and using finger poses (mudras) (Dowdle). It reduces stress levels, increases focus and concentration of the mind.
- palms up turned; take tips of index fingers to touch tips of thumbs, say ‘sa’;
release; take tips of middle fingers to touch tips of thumbs, say ‘ta’; release ; take tips of ring fingers to touch tips of thumbs, say ‘na’; release; take tips of little fingers to touch tips of thumbs say ‘ma’; release; repeat 5 times

**YOGA NIDRA (ROTATION OF AWARENESS AROUND THE BODY)**

-with oriental music

The yoga nidra and visualisation instructions are as follows:

If it feels ok gently close your eyes; Feel your body touching the chair and the floor

Take your awareness to:

Right: hand, thumb, index finger, middle finger, ring finger, little finger, palm of hand, back of hand, wrist, forearm, elbow, upper arm, armpit, whole arm, side of trunk, hip, thigh, knee, shin, ankle, top of foot, heel, ball of foot, big toe, second toe, third toe, fourth toe, little toe, all toes, whole foot, whole leg.

Left: hand, thumb, index finger, middle finger, ring finger, little finger, palm of hand, back of hand, wrist, forearm, elbow, upper arm, armpit, whole arm, side of trunk, hip, thigh, knee, shin, ankle, top of foot, heel, ball of foot, big toe, second toe, third toe, fourth toe, little toe, all toes, whole foot, whole leg.

Right buttock, Left buttock, spine, Right shoulder blade, Left shoulder blade, whole back, top of shoulders, neck, scalp, Right ear, Left ear, forehead, Right temple, Left temple, Right eyebrow, Left eyebrow, eyebrow centre, Right eye, Left eye, both eyes, Right cheek, Left cheek, nose, lips, chin, face, whole head, throat, Right collar bone, Left collar bone, chest and abdomen

Awareness of whole body
Visualisation

Imagine yourself in a pleasant place… perhaps somewhere you have been or create a place in your mind…….

Imagine you are there now, imagine the colours, sounds, textures………

Imagine yourself relaxed, calm and content…..

Bring awareness back to your body and feel body touching the chair and the floor, listen to the sounds around you.

Open your eyes when ready.
### Appendix 15

**Introduction of new movements and complexity in the 14 week tai chi programme (28 sessions)**

Table 1: Gradual introduction of new movements and complexity in tai chi programme

<table>
<thead>
<tr>
<th>Week.Session</th>
<th>Theme</th>
<th>New introductions</th>
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| 1.1          | Posture     | Warm up: wrist rolls, shoulder rolls, finger curls and straightening, trunk rotation, ankle circling and tai chi jogging.  
Balance: Transfer weight between legs, rotating pelvis  
Shibashi: raising the arms, opening the chest, separating the clouds, pushing the waves  
Lotus: (in sitting) sequence 1 to 4  
Energisers: (in sitting) butterflies, cut the flowers, gather the flowers  
Closing salutation |
| 1.2          | Posture     | Warm up: knee extension  
Shibashi: holding a ball in front of the shoulder, gazing at the moon, embrace the morning sun |
| 2.1          | Leg strength| Warm up: (in sitting) forward flexion of trunk at hips, Calf and hamstring stretch, Bubbling well  
Balance: Forward and backward weight transfers, knee flexion  
Shibashi: (in sitting) scooping the sea and looking at the horizon, flying dove spreads its wings  
Lotus: (in standing) sequence 1 to 6 |
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| **2.2** | Leg strength | Balance: Knee extension, Side step  
Shibashi: (in sitting) Turn waist to push palm  
Lotus: (in standing) sequence 1 to 7 |
| **3.1** | Balance and Stability | Golden Treasure: Heavenly lift  
Shibashi: Punching in horse riding stance  
Lotus: (in standing) sequence 1 to 9 |
| **3.2** | Balance and Stability | Shibashi: (in standing) raising the arms, opening the chest, separating the clouds  
Lotus: (in standing) sequence 1 to 11  
The participants were encouraged to widen the distance between their legs in standing from narrow to shoulder width while performing Lotus, Heavenly lift and Shibashi to challenge balance and stability. |
| **4.1** | Coordinating breath and movement | Lotus: (in standing) sequence 1 to 13 |
| **4.2** | Coordinating breath and movement | Shibashi: Fisherman casts the net  
Lotus (in standing and repeated in sitting) sequence 1 to 13 |
| **5.1** | Using the five senses | Shibashi: Rolling the arms in horse riding stance, Cloud hands.  
Lotus: the descriptions in the Lotus are changed to emphasize the sense of sight, hearing, taste, smell and feeling in the visualisation |
| **5.2** | Using the five senses | Shibashi: Balancing the chi to close, Zen |
| **6.1** | Balance and Stability: Proprioception | Shibashi: Small heavenly roll  
Wild Goose: Wild Goose awakes and begins to stir. |
<p>| <strong>6.2</strong> | Balance and Stability | Wild goose: Wild goose returns and settles for |</p>
<table>
<thead>
<tr>
<th>Section</th>
<th>Topic</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1</td>
<td>Relaxation</td>
<td>Peacock unfolds tail</td>
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<tr>
<td>7.2</td>
<td>Relaxation</td>
<td>Relaxation as an important principle was emphasised in Tai chi classes.</td>
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<td></td>
<td></td>
<td>The residents were encouraged to perform the slower rhythmic movements</td>
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<td></td>
<td></td>
<td>with slower and deeper breathing. Learning to relax the shoulders helps</td>
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<td></td>
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<td>relaxation during and after the classes.</td>
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<td>8.1 and 8.2</td>
<td>Flexibility and Strength</td>
<td>Mind Power Qigong: Black bear lifts the rock</td>
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<td></td>
<td></td>
<td>Mind power Qigong requires imagery to visualize the strength of the</td>
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<td></td>
<td></td>
<td>movement. With each repetition residents were encouraged to imagine</td>
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<td></td>
<td></td>
<td>lifting a heavier rock needing more power to achieve this. It builds</td>
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<td></td>
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<td>on the awareness of a firm base with placement of feet.</td>
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<td>9.1 and 9.2</td>
<td>Focus and concentration</td>
<td>Mind power Qigong: Push boat across the wave (forward and backward),</td>
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<td></td>
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<td>Push the iron balls (out to sides)</td>
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<td>In these exercises the movement is through only a small range and</td>
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<td></td>
<td></td>
<td>focus is required to imagine moving heavy objects, recruiting more</td>
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<td>muscle fibres. It can feel quite tiring so repetitions are limited to</td>
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<td>2 or 3.</td>
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<td>10.1 and 10.2</td>
<td>Posture, breathing and</td>
<td>The Wild Goose: The wild goose opens wings to the sunlight</td>
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<td></td>
<td>relaxation</td>
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<tr>
<td>11.1</td>
<td>Balance, Stability and leg strength</td>
<td>Balance: (in standing) Lifting and dropping heels</td>
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<td></td>
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<td>Wild Goose: Wild goose looks alertly</td>
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<tr>
<td>11.2</td>
<td>leg strength</td>
<td>Wild Goose: Wild goose cleans and preens its feathers.</td>
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<tr>
<td>12.1</td>
<td>Strength and flexibility with relaxation</td>
<td>Wild Goose: Wild goose searches and displays for a mate</td>
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<tr>
<td>12.2</td>
<td>Strength and flexibility with</td>
<td>Wild goose: Wild goose builds a nest</td>
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<td>relaxation</td>
<td>As confidence is gained relaxation occurs which allows more fluid movements with improved flexibility. The increased time spent in standing strengthens lower limbs.</td>
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| 13.1 | **Endurance, focus and visualisation**  
Wild Goose: Wild goose splashes water over body.  
Wild Goose: Wild goose takes off across the lake and leads the flock  

The increased number of repetitions in Shibashi builds endurance along with the continuous flowing arm movements of the Lotus and Wild Goose. Using the imagery and visualising the story assists focus. |
| 14.1 and 14.2 | **Health and happiness**  
No new movements were introduced. Residents were encouraged to share their experience with comments, questions and laughter. |
Appendix 16

HREC Ethics Approval Letter
HUMAN RESEARCH ETHICS COMMITTEE

Response Required

To Chief Investigator or Project Supervisor: Professor Isabel Higgins
Co-Investigators / Research Students: Doctor Pamela Van Der Riet
Associate Professor David Sibbritt
Mrs Padmapriya Saravanan Kumar
Mrs Jodie Marquez

Re Protocol: Preventing falls in older people in residential care settings: improving balance through Tai Chi and Yoga

Date: 07-Dec-2010
Reference No: H-2010-1164

Thank you for your Response to Conditional Approval (minor amendments) submission to the Human Research Ethics Committee (HREC) seeking approval in relation to the above protocol.

Your submission was considered under Expedited review by the Ethics Administrator on 07-Dec-2010.

The status of your submission is Conditional Approval (minor amendments). Before it can be considered further, you are asked to provide a response to the matters listed below.

Before preparing your response, please note:
- Do NOT resubmit your application form itself unless you are specifically requested to do so.
- Please highlight any amendments to the documents and update the version number and date.
- Where the research is the project of a student, ensure that the response is submitted to the HREC by the project supervisor.
- The research must not commence until you receive written confirmation of full approval.

Matters to be addressed:

It would appear from the response submitted on 26 November 2010 that the researchers have decided to amend the recruitment documents so that there is now only one Information Statement, which will cover recruitment for all three arms of the project (Tai Chi, Yoga and control). This will allow for randomisation to occur post-recruitment.

While this is acceptable, the documents revised 25/11/10 require some minor amendments to be clearer in their presentation (particularly when taking into account the resident participants).

The Senior Human Research Ethics Officer has made suggested amendments to the Information Statement for Participants using track changes. A copy of this revised document will be emailed separately to the Project Supervisor and Student Researcher. If the researchers accept the suggested amendments, they should also be applied to the Information Statement for Guardians of Participants, with both documents submitted in your response.

Application Expiry:
Your application will remain valid for six (6) months from the date of the above decision. If you do not respond within that time the application will be cancelled and you will need to submit a new application if you wish to pursue the research.
Professor Alison Ferguson  
Chair, Human Research Ethics Committee  

For communications and enquiries:  
Human Research Ethics Administration  

Research Services  
Research Office  
The University of Newcastle  
Callaghan NSW 2308  
T +61 2 492 18969  
F +61 2 492 17164  
Human-Ethics@newcastle.edu.au
Re: seeking copyright permission to use yoga photographs in PhD thesis

karen <karennic@idl.net.au>

Wed 18/06/2014 10:40 AM

To Padmapriya Saravanakumar <padmapriya.saravanakumar@uon.edu.au>:

To Priya
Yes I give you permission to use the below mentioned photographs
Regards Karen Nicoll

On 17/06/2014 6:45 PM, Padmapriya Saravanakumar wrote:

Dear Karen,

I am contacting you to seek written permission to copy and communicate the following material within the electronic version of my PhD thesis:

Photographs (in colour) of the following yoga demonstrations that illustrate modifications for older participants in the residential aged care facility used in the study: Tadasana, Urdhva Hastasana, Niitambasana, Utkatasana, Vrisasana, Natarajasana, Garudasana, Virabhadrassana, Dandasana, Marjariasana and Matsyendrasana

If you are not the rights holder for this material I would be grateful if you would advise me who to contact.
The thesis will be made available on the internet via the University of Newcastle's online digital repository

http://ogma.newcastle.edu.au:8080/vital/access/manager/Repository

| NOVA. The University of Newcastle's Digital Repository

NOVA - University of Newcastle Research Online

Read more...


Thank you,

Yours sincerely,

Padmapriya Saravanakumar
Candidate for PhD
School of Nursing and Midwifery
Faculty of Health
University of Newcastle
NSW 2308

https://podb1035.outlook.com/owa/web/resource?cid=AAMiAGK1OGHwMTA2LjExOTM1MDU3NgC1ODU4LWJLU1YTM1MDU3M...