Alexander Technique: an exploration of overcoming fear of falling in people aged 60 and over

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Abstract

This thesis comprises a mixed-methods study aimed at exploring whether an Alexander Technique intervention would enable participants aged 60 years and over to improve their balance and movement, thereby increasing balance confidence and reducing fear of falling. Frequency of delivery was explored for effect on the outcomes, experience and learning of the participants. Participants' feedback on Alexander Technique learning and the intervention encompassed: group learning; course content; and views on the usefulness of Alexander Technique in daily life.

Two groups of participants were recruited from Extra Care sheltered housing schemes (once-a-week intervention, *n*=13; twice-a-week intervention, *n*=16). Quantitative assessments of balance confidence (practical assessment) and fear of falling (operationalised as falls-related self-efficacy, self-report) were carried out twice before the intervention (control period); immediately post-intervention; and at four-weeks post-intervention. Qualitative data was obtained by focus groups and individual interviews. The intervention comprised eight sessions of Alexander Technique instruction provided by qualified Alexander teachers, delivered using explanation, demonstration and observation only.

Quantitative data (*n*=17) indicated an increase in balance confidence (significance inconclusive) and no change in fear of falling. Qualitative data provided evidence of increased activity levels commensurate with increased balance confidence. Fear of falling continued to be expressed, however, its effects appeared to be reduced, with implications for quality of life.

This research demonstrated that older adults were willing to embrace and apply Alexander Technique, perceived as relevant to their daily lives and continuing independence. Application of learning within and outside the course sessions enabled participants to bring about improvements in balance and movement to meet their individual needs. Group learning was enjoyed and confirmed as successful for this age group.

The study demonstrated that Alexander Technique is an appropriate intervention for older adults with fear of falling. Participants also recommended Alexander Technique learning for adults at a younger age.

[298 words]

Key Terms: Alexander Technique, fear of falling, balance confidence, older adults, older people, mixed-methods; pilot study

Table of Contents

Schedule of figures

Schedule of Tables

SCHEDULE OF APPENDICES

SCHEDULE OF APPENDICES Cont'd

Chapter 1 - Introduction and background to the study

1.1 Introduction

In this introductory chapter my personal and professional context as a history to this research study is given, along with an outline of the research aims. The study is set within the background of the problem of falls and fear of falling (FOF) in older adults and how these can compromise independence for the individual. Relevance to current policy is outlined, where supporting people to take individual responsibility for their health and remain independent in their own home into older age is increasingly advocated in National Health policy (NHS, 2019) and local Government policy (Shropshire Council, 2018; Staffordshire Council, 2018). A brief explanation of the relevance of Alexander Technique (AT) to these problems will be given, explaining the potential of AT to help people bring about improvements in balance and movement, and thereby contribute to the maintenance of independence. The format of the remainder of the thesis will be outlined and a final reflective paragraph included. This chapter will integrate first and third person tenses since some of it is personal experience. The remainder of the thesis will be in the third person except for a reflective element at the end of each chapter.

1.2 Background – personal experience and observations

This research study came about due to two main areas of interest and work experience. As a qualified social worker, I had been working for a number of years with adults over the age of

60 living in the community, and as a qualified teacher of the AT I had experience of teaching the AT to adults of all ages.

1.2.1 Social work

My role as a social worker within a multi-disciplinary community-based team brought me into contact with older adults who had experienced what was normally referred to in my team as a period of crisis. I was involved with short-term care management, rehabilitation planning with multi-disciplinary team colleagues, and assessment of ongoing care needs following rehabilitation. Over the years I have met a significant number of people for whom the crisis was an injurious fall, resulting in bone fracture or other less severe injuries such as sprains or bruising, but nonetheless all having a significant impact on the person. I have observed an understandable reduction in a person's confidence in the immediate aftermath of an event such as a fall. I have also seen how the level and duration of this response varies with the individual, regardless of severity of injury. Broadly speaking, the responses have come into two categories. Some individuals, once recovered from injury, and although having an increased awareness of the risk of falls, have not been 'held back' from regaining previous levels of independence over time. For other people I have worked with, however, the fear of having another fall has not diminished sufficiently to enable them to regain previous activity levels. Some have acknowledged in conversations that such fear has had a considerable impact on their life, despite recovery from any physical injury and despite apparently successful participation in rehabilitation programmes. Sometimes, support services which were intended to be short term have been required long term because people have not regained previous levels of functional ability (see Section 1.4.1, p8). There is an acknowledged difference between a 'normal' or 'reasonable' response to a fall and its progression to a 'debilitating condition' (Jung, 2008:215). I recognise the debilitating outcome from my professional experience, having observed that for a proportion of the people I have worked with, an initial injurious fall has been the start of a cycle of 'fall and recovery', each time compromising independence and often necessitating a steady increase in ongoing support services.

In my professional experience, a concern often stated by older adults in a crisis situation is their overwhelming desire to remain in their own home and to be as independent as possible, for as long as possible. An event, such as a fall, perceived to have threatened that independence resulted in some individuals becoming extremely reluctant to take any risks which could compromise their independence further. Threats to continuing independence have been found to be a main concern amongst those expressing fear of falling (Yardley & Smith, 2002). In addition, perception of 'risky' activities was often revised, to encompass activities the individual had previously enjoyed, often social activities outside of the home environment (Tinetti & Powell, 1993). I have also seen first-hand that, by emphasising that their loved one must 'be careful', family and friends can, unwittingly in many cases, add to the perception that the individual's independence is very fragile (Tinetti & Powell, 1993). As a result, increased dependence on family, friends or support services, along with activity reduction, led to what appeared to me as a professional, to be a more restricted experience of life and reduced social interaction for some people. I should point out, for completeness, that in my experience not everyone has this response to falls. I have, albeit on a less frequent basis over the years, met individuals who have fallen regularly and not regarded these experiences as unduly concerning, rather taking a stoical attitude to the perceived 'hazard' of older age (Delbaere, Close, Brodaty et al., 2010; NHS Wales, 2013).

As a member of a multi-disciplinary team I was working together with nursing, physiotherapy and occupational therapy colleagues, all committed to supporting people to remain as independent as possible in their own home. Individually-tailored programmes of support enabled many people to regain independence. Nevertheless, by the nature of the role of the team, our intervention was always short term and as a result of a crisis. Although the person could be helped to recover in the short term, it was apparent to me that there was a gap in what could be offered to equip people to remain as independent as possible for as long as possible. An intervention was lacking that would help people prevent the initial fall and associated fear of falling (FOF) from becoming an inevitable precursor to a continuing cycle of 'fall and recovery' and increased dependence (Deshpande et al., 2008). This strongly informed the focus of the research study.

1.2.2 Alexander Technique teaching

The Alexander Technique (AT) is a practical technique which people learn and apply for themselves (Door, 2003). Application of AT enables individuals to bring about improvements in their balance and movement (Woodman & Moore, 2012). Since qualifying in 1998 as an Alexander teacher (as qualified AT teachers are known) my teaching experience has been varied. I have taught individuals on a one-to-one basis and have been involved in teaching groups of adults of mixed ages, for example within adult education programmes, and I work on a continuous professional development programme for other qualified Alexander teachers. I have also been involved in developing and presenting, with colleagues, bespoke introductory sessions and courses devised for particular groups, such as continuing professional development days for school and college teachers.

From my experience of teaching AT to people on an individual basis and within groups, I have observed adults of all ages, including those over 60 years of age, bring about improvements in balance and movement by application of AT. Prior to this study, the experience I had of teaching the over 60s was spread over a number of years and I had not taught a group solely of that age group. There were regular occasions when talking with older adults in my capacity as a social worker when I was aware that, had I been there in my role as an Alexander teacher (see Section 1.6, p14), the skills I had to offer were different but directly relevant to their situation. I became increasingly interested to explore how AT could be helpful to older adults, particularly those struggling with balance and mobility, and to find out whether those older adults would be willing to embrace AT learning.

1.2.3 Two areas of interest converge

My experience and observations as a social worker meant that I was fully aware of the importance of being able to carry out the essential activities of daily life in order to remain independent in one’s own home. I had observed how confidence in balance and movement are fundamental to this and how FOF can have a major impact on the life experience of an individual. My personal application and AT teaching experience meant that I was aware that AT learning could be a valuable aid to older adults. Facilitated by my employer, I attended seminars at Keele University developed for social care practitioners, entitled ‘Making

Research Count'. These seminars brought to my attention the existence and value of research in developing future practice and particularly in my area of interest, the care of older adults. I began talking to my AT teaching colleagues about my interest in research and the difficulties I was observing older adults having with balance, movement and FOF. I was encouraged to explore the background to FOF and to consider how to investigate the potential contribution of AT in reducing it. With the support and encouragement of these colleagues, I began to explore possibilities and subsequently developed a proposal for this research study.

1.3 Research aims – outline and rationale

I was interested to find out whether adults of 60 years and over would be receptive to an introductory course in AT designed specifically for them. I was particularly interested in working with groups of adults as opposed to individuals, with a view to exploring wider dissemination of AT amongst this age group. I was also interested to see whether it would be feasible to teach an introductory course in AT in such a way as to enable the participants to become self-sustaining in their continued application of AT, without the requirement of ongoing instruction from an AT teacher, should that not be available.

My primary research question was to explore whether a short introductory course in AT would enable participants aged 60 years and over to improve their balance and movement, thereby increasing balance confidence and reducing FOF.

Secondary research questions were related to an evaluation of the AT course by the participants, with the main areas of exploration being:

- participants' responses to learning AT in a group environment
- whether once-a-week or twice-a-week sessions would make a difference to the outcomes, experience and learning of participants
- the nature of participants' experience and views of learning AT including course content
- participants' perception of the usefulness of AT in relation to balance and movement, balance confidence and FOF; how this was reflected in their application of AT outside of the learning environment and after the course had ended.

I was aware of other relevant studies regarding AT and adults over the age of 60 (Dennis, 1999; Batson & Barker, 2008) and subsequently Gleeson et al. (2015) and Glover et al. (2018). However, what had not been explored in these studies was an AT course for this age group run specifically on verbal instruction and demonstration alone and without AT teacher's 'hands work' (see Appendix 1.0). My motivation for exploring this mode of teaching for this particular age group was to potentially make the AT accessible to more people by facilitating work with groups rather than on a one-to-one basis.

The research incorporated mixed methods in exploring the effects of an AT intervention on balance and movement, balance confidence and FOF in older adults. Outcomes were evaluated using a combination of quantitative and qualitative data collection methods. Quantitative assessments were used with the aim of objectively assessing the outcomes of the intervention for the participants including a practical assessment of balance confidence and a self-report questionnaire about FOF. The secondary research questions required the participants' responses to the intervention, which formed the qualitative element of data collection. The combination of quantitative and qualitative approaches enabled maximisation of data obtained from this small-scale study.

1.4 Falls in older adults – compromising independence

The consequences of falls and associated injury have the potential to impact on the independence of older adults, either in the short or long term.

1.4.1 Impact of falls on basic activities of daily life

Remaining healthy, active and independent into later life depends on a combination of factors which will differ for each individual (Victor, 2005; Spirdusso et al., 2005). As a care manager I have been acutely aware of what might be classed as the essential activities required to maintain independence. These are generally classified into basic Activities of Daily Living (ADLs) and incidental ADLs (IADLs) (Mlinac & Feng, 2016). The essential or basic activities include: personal care (washing and dressing/undressing, managing toilet needs); eating and drinking; and mobility, which entails carrying out essential movements, with or without appropriate aids and equipment. Incidental activities include for example preparing meals, shopping and domestic tasks, which require an increased ability to move around and, for shopping, confidence to leave the home environment. Although assistance is possible within one's own home in the form of domiciliary home care, without basic ADL abilities in particular, movement and activity can be severely restricted when help is not to hand. One of the factors that I have observed and is widely acknowledged to have a demonstrable detrimental effect on abilities to undertake ADLs and IADLs is the experience of, or concern about, falling, which compromises independence (see Section 1.2.1, p2).

1.4.2 Frequency and impact of falls in older adults

Falls are of real concern to individuals due to potential pain, injury, distress, loss of confidence, loss of independence and mortality (Age UK, 2019). They are also of concern in terms of cost and use of resources (National Osteoporosis Society & Age UK, 2012). Of those living in the community, a third of people aged 65 years and over experience a fall at least once a year, increasing to half among those aged 80 years and over (NICE, 2013).

As stated in the Kings Fund Report (2013):

> ‘Falls are the commonest cause of death from injury in the over 65s and many falls result in fractures and/or head injuries. Even ‘minor’ falls can be very debilitating: individuals can lose confidence and become nervous about falling again. This means they may become unwilling to move about, and as a result become more isolated and more dependent on others. This leads to greater concerns for carers, and an increased likelihood that an individual will need residential care’ (Tian et al., 2013:1).

Public Health England's (PHE) Guidance on Falls (2018) stated the following:

- In 2017 to 2018 in England there were approximately 220,160 emergency hospital admissions in people aged 65 and over related to falls, with approximately 146,665 (67%) of these people aged 80 and over (Public Health Outcomes Framework, Dec 2019).
- Falls were the ninth highest cause of disability-adjusted life years (DALYS) in England in 2013 and the leading cause of injury.
- The total cost of fragility fractures[1] to the UK has been estimated at £4.4 billion, which includes £1.1 billion for social care; hip fractures account for approx. £2 billion of this sum.
- Short and long-term outlooks for patients are generally poor following a hip fracture, with an increased one-year mortality of between 18% and 33% with negative effects on daily living activities such as shopping and walking.
- Around 20% of hip fracture patients entered long-term care in the first year after fracture.

1.4.3 Fear of falling (FOF)

In addition to recovering from the physical injury which may result from a fall, concern about falling again is accepted as having a significant continuing impact on some individuals. While the associated health costs of FOF may be unknown and less easy to define than costs

[1] Fractures resulting from low-level trauma such as falls from standing height or less (NICE CG146, 2012)

directly relating to falls, it is likely to be significant, taking into account ongoing consequences such as self-imposed activity restriction, functional decline and decreased quality of life (Scheffer et al., 2008; Clemson et al., 2015) (see Section 2.2, p22).

Not only is FOF reported by a significant number of individuals who have experienced a fall, it is of widespread concern among older adults, including those who have not personally injured themselves by falling. Estimates of the proportion of older adults expressing FOF varies widely between studies and countries, ranging from 20.8% to 85%, although one study has reported a proportion as low as three per cent (Scheffer et al., 2008).

Self-imposed restriction of activity is a symptom of FOF which can have considerable consequences:

> 'As a result of inactivity, elderly persons experience preventable functional decline, loss of independence, and increased disease burden. Many lack the strength, flexibility, or endurance to rise from a chair, walk, or dress independently' (Phillips et al., 2004:S52).

This widely observed scenario resulting from inactivity following a fall has been reported to lead not only to reduced ability but its associated consequences such as social isolation and depression (Jung, 2008; Gaxatte et al., 2011).

1.5 Setting the context - Government policy

Two aspects of United Kingdom (UK) Government policy which are particularly relevant to this study are the commitment to enable individuals to live in their own homes for as long as possible, and the promotion of a healthy and active ageing policy.

1.5.1 Living in the community – first choice for individuals

The desire to be independent and remain living in one's own home throughout the duration of the life course is accepted as being the first choice for most individuals and is supported by UK National and local Government policy. For example, Shropshire Council stated that:

> 'The provision of personalised care that maximises independence will aim to include the use of equipment, adaptations, assistive technology and reablement care and support such as admission avoidance and early hospital discharge. Wherever possible we will help you find a solution that will allow you to live at home, with family and friends. We will explore alternative approaches and trial new types of support that keep people out of hospital; avoid delays in discharge and unnecessary re-admissions' (Shropshire Council, 2018:10).

This focus is illustrated by the discharge policy from hospital and rehabilitation services in Shropshire being based on 'Home First' as priority, whenever possible. This is a stated aim of Integrated Community Services in Shropshire, funded jointly by Shropshire Council and Community Health Services (Shropshire Community Health NHS Trust, 2017).

1.5.2 Healthy and active ageing policy

The National Health Service (NHS) Long Term Plan (NHS, 2019) emphasised, within the context of limited resources, prevention and taking responsibility for one's health through the life course:

> 'Wider action on prevention will help people stay healthy and also moderate demand on the NHS. Action by the NHS is a complement to - not a substitute for - the important role of individuals, communities, government, and businesses in shaping the health of the nation' (NHS, 2019:7).

Within the NHS Long Term Plan, action on several priorities previously identified by patients and the public (NHS Five Year Forward View, 2014) are carried forward including 'healthy ageing including dementia' (NHS, 2019:7). Detailed plans for managing major health conditions including cancer, cardiovascular disease, diabetes, musculoskeletal and respiratory conditions (NHS, 2019:56-67) will also affect care of older adults, and emphasis on integrated community services should assist in keeping older adults out of hospital. Few details are given within the document specifically about 'older adults' as the plan addresses all adults, with the implicit understanding that improved care across the life course will benefit individuals as they come to older age. A specific mention of falls prevention schemes is made in the context of the integration of primary care and community health teams working to help people maintain their independence: 'falls prevention schemes, including exercise classes and strength and balance training can significantly reduce the likelihood of falls and are cost effective in reducing admissions to hospital' (NHS, 2019:17). Overall, the agenda behind the plan is pro-active prevention in order to save costs.

1.6 Alexander Technique

The Alexander Technique (AT) was developed by F.M. Alexander (1869-1955) after whom the technique is named (Staring, 2005). His discovery was made while going through a detailed process in order to solve his voice problems, recounted in his book *The Use of the Self* (Alexander, 1932).

1.6.1 Defining the Alexander Technique

AT is a technique which is taught with the objective that the person learning applies it for themselves, consequently practitioners are called Alexander teachers (see Appendix 1.0). While AT is universal in its application, this introduction is addressed more specifically to the problems underlying this particular study, falls and FOF in older adults.

When expressing FOF, in my experience, some individuals say that they perceive the problem to be their balance. Well-documented age-related physiological changes, or a combination of them, may affect a particular individual's balance to varying extents (Spirduso et al., 2005; Victor, 2005). In addition, 'wear and tear' of joints can make movement more difficult sometimes resulting in the need for joint replacement (NHS, 2019). The impact of these factors for any particular individual is fully acknowledged and not underestimated in this research study. However, during the process which led to him solving his voice problems, Alexander discovered another factor. He came to understand that his habitual way of being upright involved more muscular effort than was required. In due course he found that this also applied to other people and that like him, others were unaware of this habit. Alexander discovered that it was possible to bring about an improvement in his situation by paying conscious attention to what he described as his ‘use’ of himself (Alexander, 1932; see Appendix 1.0, concept of ‘use’).

1.6.2 Applying Alexander Technique – what it involves for the individual

Learning to apply AT involves the individual becoming aware of how much they are reliant on habit in everything they do. For example, taking the activity of standing, people come to realise that they generally do not give conscious attention to the way that they stand, unless it becomes problematic. This lack of attention is important because, as Alexander found, an individual’s habitual way of standing involves more muscular effort than is needed (Alexander, 1932). As being upright is the basis of much of what we do, this extra effort is carried into all activity. Putting increased muscular effort into remaining upright restricts joint movement, bringing joint surfaces closer together, potentially increasing wear and tear on those surfaces. For example, increased contact stress is a possible predictor of knee osteoarthritis (Segal et al., 2009). Superfluous muscular contraction makes movement more difficult by increasing joint stiffness and thereby limiting movement (Ford et al., 2008). Research into muscle activity in human beings has shown that being upright is a fine balancing act requiring little muscular effort (Basmajian & de Luca, 1985). By application of AT it is possible to learn to stand, walk and carry out all activities with less muscular effort than is habitual, thereby bringing about improvements in balance and movement. In standing, for example, this involves amongst other things, attention to placement of the feet and position of the head (Door, 2003).

1.6.3 Advantages of AT over other approaches

It is possible to begin to apply AT for oneself from the very first session of instruction, demonstrated by the fact that Alexander did not have any instruction as he taught himself (Alexander, 1932). Therefore, people new to AT learning are able to bring about immediate beneficial changes, if they are motivated to do so. As pointed out by Gleeson et al. (2015) AT has the added advantage of being a technique which is applied to all activities within the course of daily life and does not require special clothing, equipment or attendance at a particular venue. Applying AT to activities such as standing, walking, getting into and out of chairs, getting into and out of cars etc., make it particularly pertinent to the challenges these activities pose for some older adults. It also provides ample opportunity to apply learning.

AT takes into account the unified nature of a person's responses, acknowledging that thoughts are an integral part of them. For example, I have found as an experienced AT teacher, that when talking to people about FOF, individuals recognise that when they have subjective experiences variously described as concern, anxiety, or fear, their response consists of thought (e.g. 'I can't do this', 'it's too difficult', 'I'm going to fall') and when asked whether the thought is accompanied by 'tensing up' they confirm that this is the case (see Appendix 5.29). It is usually evident to the person concerned that the thoughts and the 'tensing up' are inseparable parts of their whole reaction (see Appendix 1.0, 'unity'). While this response may be understandable, the 'tensing up' (increased muscular effort) does not help balance or movement.

After experiencing a set-back such as an injurious fall, most older adults are, in my professional experience as a social worker, very motivated to overcome difficulties and regain their previous abilities. People ‘try hard’ to succeed in the rehabilitation programmes offered to them as ‘trying harder’ is what they have always done to overcome difficulties. In this context trying harder is used to convey an attitude of determination to succeed or ‘do their best’ to achieve the goal set for them. From the perspective of the AT, trying harder frequently involves individuals observably putting additional muscular effort into the activities they are finding problematic. The combination of trying hard and tensing up compounds the habitual muscular effort which is already more than required, and can be counter-productive to achieving their aim of say, getting out of a chair. AT provides individuals with an alternative approach to trying harder. They learn instead how to go about activities using less muscular effort with a resultant improvement in balance, providing there is no other underlying condition (Door, 2003).

Application of AT does not rely on a particular level of ability, each individual can bring about improvements for themselves, provided they are motivated to do so. Therefore, AT provides a way for people to re-gain or increase confidence in balance and movement in the first instance, equipping them to build up activity levels, to the extent that they are able and wish to do so. AT therefore has a potential contribution to make towards the maintenance of independence.

1.7 Summary – background to the research study

It is accepted that mobility-related disability restricts independence (Pahor et al., 2014). Therefore, re-gaining mobility after a fall is fundamental to rehabilitation. However, it has also been noted that FOF should be taken into account in falls rehabilitation and prevention programmes (NICE, 2013).

Prevention as well as remedial action is important in supporting individuals to remain independent and also from the perspective of reducing costs to society, as indicated in the Long Term Plan (NHS, 2019). While the benefits of activity and exercise over the life course are well documented, self-report data reveal that in the UK less than half of adults achieve recommended levels of physical activity, and physical activity decreases significantly with age for both men and women (DH, 2011). Contrary to prevalent negative views on ageing (NVOA) which assume an inevitable decline (Brothers & Diehl, 2017) it is recommended that activity, as opposed to inactivity, is beneficial at any age, including for older adults, providing it is built up gradually for those who are inactive (DH, 2011; WHO, 2010). For the proportion of older adults whose behaviour is largely sedentary (Harvey et al., 2013) the exhortation to exercise may seem unrealistic, particularly for those whose inactivity is compounded by FOF. Attrition from rehabilitation programmes is also common (McPhate et al., 2013). Therefore, the challenge is to find preventive activity that is acceptable to the people who might benefit from it (PHE, 2018) as well as rehabilitation programmes that retain participants. This research study explores the potential contribution of AT to this problem.

1.8 Outline of Thesis

Following this introductory chapter, chapter two presents a literature review, in four parts. Firstly, it sets the study within the context of the problem of falls and FOF in older people. FOF is examined including outlining the extent of FOF among older adults, the relationship between falls and FOF, and characteristics and consequences for those who express FOF. Secondly, an outline is given of the approaches which have evolved for evaluating and quantifying FOF in research studies. Thirdly, it provides a summary of the variety of interventions which have been developed with the aim of reducing FOF. The final section of the literature review outlines relevant research into AT, specifically studies involving older adults. The third chapter outlines the approaches to research chosen for this study, which is a mixed-methods design. The reason for the decision to combine quantitative and qualitative elements of data collection, and the aims of this, is provided. The fourth chapter describes and explains the methods and procedures employed to conduct the research study. In chapter five, the results of the quantitative and qualitative data is presented. The sixth and final chapter consists of discussion, conclusions and recommendations which have emerged from this study, including indications of the value of further research into AT both as a remedial and preventive intervention for adults concerned about balance, movement and keeping active into older age. Each chapter ends with a personal reflection related to its content, arising either directly from the research process and experience, or emerging from writing about it.

1.9 Reflections

In preparing this introduction to my research study I have thought about the roles of social worker and Alexander teacher. While there are obviously differences, there are also similarities to the underlying ethos for each profession. As a social worker, whilst being instrumental in obtaining services on behalf of individuals when needed, my role has also been to work with the person to enable them to regain independence and dispense with support when able to. Similarly, as an Alexander teacher my role is to help people to come to understand the strength of their habitual responses, including in balance and movement, and to support them in learning how to bring about beneficial changes for themselves. Ultimately, I believe passionately, that the aim of the Alexander teacher, in this particular context as well as generally, is for the learner to become self-sufficient in application, without the need for ongoing support from a teacher. In both roles the emphasis is on working with the individual with care and commitment to support them as they make progress.

Chapter 2 – Literature review

2.1 Introduction

This chapter comprises a literature review which sets the research study in context. It is comprised of four parts, the first part (see Section 2.2, p22) begins by setting out the historical background to the emergence of FOF as a concept in the area of Gerontology. It shows how, allied to the development of investigation into falls amongst older adults, FOF was recognised as a concept in its own right and as having significant repercussions for some individuals. Early studies highlighted the necessity to explore aspects of FOF further, including: the prevalence of FOF amongst older adults (see Section 2.2.5, p30); who was most susceptible to FOF (see Section 2.2.7, p35); and what were the consequences for those individuals (see Sections 2.2.8, p38 & 2.2.9, p43). Secondly, a variety of assessment tools developed to measure FOF are summarised (see Section 2.3, p45). Thirdly, an overview is given (see Section 2.4, p58) of the various types of intervention which have been developed with the aim of reducing FOF amongst older adults in the context of prevention and rehabilitation. The final, fourth section (see Section 2.5, p71) outlines the limited amount of research to date related to the application of AT by older adults. It explains how this research study adds to that overall body of knowledge by aiming to explore the potential contribution of AT to reducing FOF among older adults. Details of the respective literature search processes are included within each section of the review. The chapter concludes with a summary and researcher reflections.

2.2 Fear of falling (FOF) as a concept in the area of Gerontology

The first section of the literature review provides an overview of the concept of FOF, providing the backdrop to this research study.

2.2.1 Search process, criteria and results – background and characteristics of FOF

A search of relevant literature was carried out using the PRISMA format (Moher et al., The PRISMA Group, 2009) (Figure 2.1, p23). The aim was to confine the search as much as practicable to research relating to the concept of FOF in all aspects relating to older adults and how they are affected by it, rather than interventions to alleviate FOF (see separate search process, 2.4, p58). The following individual databases were searched: Cochrane Database of Systematic Reviews, Joanna Briggs Institute, Cinahl Plus, Medline, PsychInfo, AMED, Web of Science, Social Services Abstracts. No start dates were imposed and the searches included publications up to 28th February 2019 on the advice of supervisors. Subsequent publications have been noted and commented upon as relevant, using the same search and evaluation criteria. It was found that a universal search term did not produce results for all databases, therefore alternatives were used where required for each database, detailed in Table 2.1, p24. Wildcard characters were used to allow for word ending variations in all cases.

Figure 2.1: Search process summary – background and characteristics of FOF

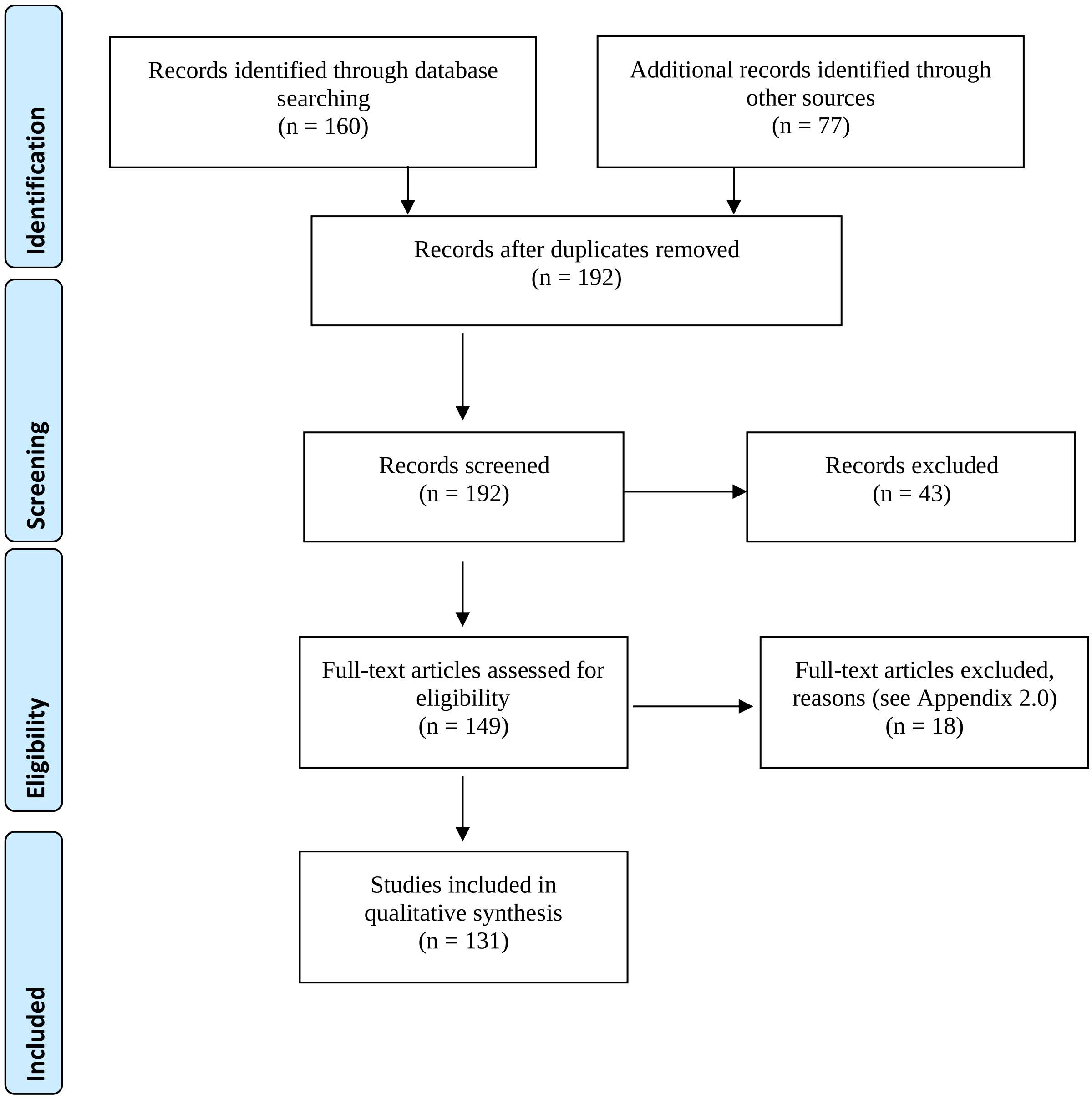


Table 2.1: Summary of search terms - background and characteristics of FOF

Database	**Search Terms**
Cochrane Database of Systematic Reviews	Fear of falling AND community dwelling/living or living at home AND older people or older adults or geriatric or senior AND definition or significance or characteristic*. *relating to a manifestation of the fear itself or the person expressing it.
Joanna Briggs Institute	Fear of falling AND older adults or older people or elder or geriatric or senior AND community dwelling/living or living at home NOT intervention.
AMED/Cinahl Plus	Fear of falling AND (old or aged or elder or geriatric or senior) AND (person or people or adult) AND community dwelling/living or living at home AND definition or significance or characteristics or consequence or quantify.
PsycINFO/Medline/Web of Science	Fear of falling AND older people or older adult or elder or senior AND community living/dwelling or living at home NOT intervention or prevention or treatment or therapy or program.
Social Services Abstracts (ProQuest)	Fear of falling AND older people or older adults or elder or geriatric or senior AND community dwelling/living or living at home NOT intervention.

2.2.2 Early recognition of falls as a problem among older adults

The problem of falls amongst older adults has been highlighted in published reports by clinicians since at least the 1950s (Droller, 1955; Sheldon, 1960), such reports growing in number with the emergence and expansion of Geriatrics as a specific discipline. Early research papers reported incidence and consequences of falls (Gryfe et al., 1977; Ashley et al., 1977; Prudham & Grimley-Evans, 1981); the longer-term outcome for those who had fallen (Wild, Nayak & Isaacs, 1981a, b & c); and a need for assessment of older adults to identify those at risk of falls (Tinetti, 1986; Tinetti & Ginter, 1988; Tinetti, 1989). An international group of clinicians produced the Kellogg Report (1987) on prevention of falls in older adults, indicating a growing international recognition of the scale of the problem at that time. While acknowledging the potentially serious consequences for the individuals experiencing injurious falls, the Kellogg Report emphasised that the majority of falls in older adults do not result in physical injury and clearly stated that falling is not an inevitable part of the ageing process, stating this as being a widely-held misconception. According to Kellogg, factors contributing to a fall broadly include: those intrinsic to the person (e.g. underlying physical illness, medications); the type of activity undertaken; and environmental and social factors (1987). Researchers at the time were not all in agreement, most notably Vellas et al. (1987) who reported a much 'bleaker' outlook from their study, with falls regarded not only as an inevitable consequence of increased longevity, but also as signalling the worst likely outcome for the individual in terms of independence. While clinicians began surveying patients about the circumstances of their falls (Wild et al., 1981c; Prudham & Grimley Evans, 1981), the 'voice' of patients was absent in these early studies, however, they drew attention to the importance of falls amongst older adults as an area requiring further investigation with a view to prevention (Tinetti et al., 1986; Tinetti & Speechley, 1988).

2.2.3 Fear of Falling (FOF) recognised as significant

During investigations into falls and their consequences, the concept, later referred to as 'fear of falling' (FOF) was observed. For some patients, their recovery from falls and fractures was noted to be particularly difficult and prolonged. Murphy & Isaacs (1982) highlighted these difficulties and drew attention to symptoms of what they 'tentatively' proposed as 'the post-fall syndrome' (Murphy & Isaacs, 1982:265). In its most severe form, the syndrome increased the likelihood of death or remaining in hospital during the period of four months after the index fall[2]. Bhala et al. (1982) working with older adults experiencing extreme fear following falls, proposed the term Ptophobia (not subsequently adopted) for ‘the phobic reaction to standing or walking’ (Bhala et al., 1982:190). These early papers illustrated the potential severe impact of FOF on mobility in a proportion of those who experienced falls.

In her work on assessing the reasons for falls, Tinetti (1986) advocated a move away from the predominant disease-oriented approach, which she argued didn’t necessarily help to understand a person’s mobility problems, which she stated were multifactorial ‘impaired mobility and falls, like most geriatric problems, are multifactorial and overlapping; a person’s clinical status is more than merely the sum of the separate disease processes’ (Tinetti, 1986:119). The performance-oriented assessment of mobility problems which she proposed (POMA) was based on a functional test of everyday balance including: sitting balance, rising from a chair, immediate standing balance (five seconds) etc.; as well as assessment of gait. Tinetti noted that anxiety or FOF was observed during assessments, with some individuals reluctant to attempt assessment items. Those who expressed FOF were found to walk at a very slow pace but were able to increase this when asked to do so, often to a ‘normal’ speed for their age. Commenting on FOF, Tinetti stated that anxiety or FOF was a contributor to immobility among older adults, and that ‘fear of falling likely results in a decline in activity, regardless of the source of the fear’ (Tinetti, 1986:125). In 1988 she and colleagues reported that ‘almost one quarter of those who fell had a serious injury; an approximately equal number restricted their activities because of fear of falling’ (Tinetti et al., 1988:1705). Tinetti and her colleagues’ recognition of FOF as an important concept for older adults marked the

[2] An initial fall, which is a risk factor for further falls (Anderson, 2008).

beginning of their ongoing research into interventions to reduce FOF and in particular, their significant contribution to developing tools to attempt to measure it (see Section 2.3.2, p48). As mentioned previously, Vellas et al. (1987) reported on the consequences of falls and concluded that they can lead to loss of independence, social isolation and depression. With reference to FOF, stating:

> 'even if the fall is not serious, the fear of falling is omnipresent – leading to the refusal to go out, or even to go as far as the bathroom. There is an increase in dependency leading to boredom, depression and, eventually to becoming bedridden' (Vellas et al., 1987:192).

They added that fear of recurrence of falls was associated with individuals becoming 'institutionalised'. Their rather fatalistic view was that falls were an inevitable consequence of the increase in longevity. The implication that falls are an inevitable part of ageing was in direct contrast to statements in the Kellogg report (1987) (see Section 2.2.2, p24). While the range of consequences of a fall for the individual concerned are acknowledged in this study, the generalised pessimistic view that ageing is inevitably associated with falls, is not helpful in encouraging older adults to overcome FOF and increase activity levels, and likely contributes to a proliferation of NVOA expressed by some older adults (see Section 1.7, p18). For example, an assumption that balance is necessarily problematic with older age is held by some older adults (see Section 5.11, p203). In a prospective study, Nevitt et al. (1989) found, like Tinetti et al. (1988) that approximately one quarter of falls in community-dwelling people over the age of 60 caused them to restrict their usual activities. This, they reported, was usually because of injury but also often due to FOF. Attention was drawn to those experiencing ‘long lies’ on the floor following a fall, potentially causing the person to feel helpless and fear further falls.

By the end of the 1980s therefore, these significant early studies drew increasing attention not only to physical injury resulting from falls in older adults, costly not only to the individual but also in terms of health provision, but also to the non-injurious consequences and the need for further research into what was, by then, largely being referred to as ‘fear of falling’ (FOF). Studies demonstrated that FOF was also expressed by adults who had not experienced a fall (see Section 2.2.5, p30) illustrating the complex relationship between falls and FOF (see Section 2.2.6, p33), highlighting the consequences for older adults expressing FOF (see Section 2.2.8, p38 & 2.2.9, p43) and the characteristics of those most likely to do so (see Section 2.2.7, p35). Having ‘set the scene’ by explaining how the importance of FOF came to the fore in the field of gerontology, the rest of this section of the literature review explores the concept and its consequences.

2.2.4 Defining the concept of Fear of Falling (FOF)

Early attempts to define the concept of FOF reflected the clinical or rehabilitation settings of the early studies. Murphy & Isaacs (1982) reported that in the severest form of their ‘post-fall syndrome’, patients variously ‘expressed great fear of falling when they stood erect, tending to grab and clutch at objects within their view, and showing remarkable hesitancy and irregularity in their walking attempts’ (Murphy & Isaacs, 1982:265). Bhala et al. (1982) in their description of ‘Ptophobia’ reported an ‘intense fear of standing or walking as a result of accidental falls’ (Bhala et al., 1982:187). Continued research began to reveal the complexity of the phenomenon beyond an initial recovery and rehabilitation period. In their definition

Tinetti & Powell (1993) included one of the main reported features of FOF, that of activity avoidance 'Fear of falling perhaps is best defined as a lasting concern about falling that leads to an individual avoiding activities that he/she remains capable of performing' and went on to elaborate:

> 'While differentiating this avoidance from appropriate avoidance of unsafe activities can be difficult at times, health care providers, family members, and elderly persons themselves often report the onset of anxiety or a self-imposed decline in activity that does not appear necessitated by physical disabilities or injury. This entity has become known as "fear of falling" ' (Tinetti & Powell, 1993:36).

While Tinetti & Powell's (1993) definition is widely quoted, no single definition of FOF has been universally adopted. Jung (2008) commented that the definition of FOF is still vague. Other succinct definitions have been suggested more recently, for example Clemson et al. (2015) 'a general concept that captures low confidence in avoiding falls or being afraid of falling' (Clemson et al., 2015:241) and Kumar et al. (2016) 'a persistent feeling related to the risk of falling during one or more activities of daily living' (Kumar et al., 2016:346). In the context of prevention or rehabilitation from falls, the fact that Tinetti & Powell (1993) emphasise avoidance of activity *which an individual is still capable of*, (emphasis added) makes this a practical and useful definition for the practitioner in the view of the researcher, as it indicates the potential for increasing or re-establishing confidence and thereby reducing FOF with appropriate and timely interventions.

With a growth of research in this field, the term FOF has increasingly been used as an 'umbrella' term for the various concepts used to describe and measure the non-injurious effects of falling (Zijlstra et al., 2007), more recently referred to as the 'psychological effects' of falling (Jørstad et al., 2005). The wide and differing use of the term FOF in many studies has led to questions as to whether concepts being explored are comparable across studies (Jørstad et al., 2005). It appears that a lack of clarity has arisen due to use of terms interchangeably, for example, balance confidence and FOF. In addition, the concept of falls-related self-efficacy (see Section 2.3.5, p54) is often used interchangeably with the term FOF, rather than making clear that the former is an operationalisation of the latter, as discusses later (see Section 2.3.5, p54). The solution to this confusion would appear to be the provision of clear information by researchers as to how they are employing the different terms (Jørstad et al., 2005; Moore & Ellis, 2008). Therefore, while FOF has the advantage as a generic term of clearly indicating the 'problem' being addressed, it is necessary to bear in mind that its precise use within a particular study needs to be clarified and if an operationalisation of the concept is used, this should be made clear, as in this study (see Section 3.6.2, p113).

2.2.5 Prevalence of FOF amongst older adults

The concept of FOF was originally reported amongst older adults who had fallen, however, it subsequently became apparent that FOF is also widely expressed by older adults who have not themselves experienced an injurious fall, as reported in early studies in the USA (Tinetti et al., 1988; Arfken et al., 1994). Estimates of the proportion of older adults expressing FOF has varied greatly. A systematic review by Scheffer et al. (2008) included 21 studies from various countries (Australia, Belgium, Canada, Japan, Netherlands, UK and USA). Apart from one study reporting three per cent, others reported between 20.8% and 85% prevalence of FOF amongst older adults. Studies within the same country may report widely differing prevalence. For example two recent studies in Korea reported 15.8% (Gazibara et al., 2017) and 75.6% (Oh et al., 2017) respectively. Of those who have experienced a fall, estimates of the proportion who express FOF are usually higher, for example Tinetti & Williams reporting 50% of fallers having FOF (1998). Other reports range from 29% (Howland et al., 1993) to 92% (Aoyagi et al., 1998).

Variations in reported percentages of people expressing FOF are due to factors such as differences in measurements used (Scheffer et al., 2008), and variations in study inclusion criteria such as age range, gender and baseline functional ability. Participants are variously included from 60, 65 years or older, however, one recent study included people at a lower age range of 55 to 64 years (Chippendale & Lee, 2018) and age upper limits, such as 65 to 84 years (Friedman et al., 2002) may affect prevalence as FOF is known to increase with age (Scheffer et al., 2008). Baseline functional ability of participants may vary depending on how they are recruited e.g. from community groups or, for example, among groups already receiving rehabilitation. The geographical location of a study has also been highlighted as a factor e.g. city, suburbs or rural.

Quantitative studies predominate in this field and most studies are cross-sectional in design and therefore unable to suggest causal connections (Scheffer et al., 2008), however some prospective studies have been carried out. For example, a 20-month prospective community-based study of adults between the ages of 65 and 84 years (*n*=2212) in the USA (Friedman et al., 2002) where prevalence of FOF at baseline was 20.8%. In this study participants were asked whether they experienced FOF other than when they were in a ‘high place’, which the authors considered would have distinguished between those who were afraid of heights per *sé*, and identified those with ‘true’ FOF. While this distinction seems somewhat questionable, it does illustrate how variations in the question about FOF could potentially affect prevalence rates reported. The baseline rate in this study was considered relatively low, another potential reason being the upper age range being cut-off at 84 years. The type of falls included in studies may also vary from ‘all falls’ to specifically defined ‘injurious falls’ as in a recent study by Clemson et al. (2015).

While recognising these variations due to different study criteria, it is acknowledged that there is likely to be a general under-reporting of FOF in research studies (Cummings et al., 1988; Arfken et al., 1994). Those who are most fearful are reluctant to leave their home and are more difficult to contact and unlikely to be willing to take part in research (Tennstedt et al., 2001). There is an acknowledgement that men are under-represented across studies (Jørstad et al., 2005). In addition, men are also less likely to report FOF, possibly due to perceived social stigma (Campbell et al., 1989; Maki et al., 1997; Pohl et al., 2015). Given the acknowledgement of under-reporting of FOF, it is clear that, regardless of the greatly varying levels of prevalence reported in different studies, FOF affects a large proportion of community-dwelling older adults. It has been acknowledged as a specific health problem (Legters, 2002; Scheffer et al., 2008) with a number of detrimental consequences (see Sections 2.2.8, p38 & 2.2.9, p43) for those who experience it (see Section 2.2.7, p35).

2.2.6 Relationship between falls and FOF

One of the main risk factors for developing FOF is consistently shown to be having experienced one or more previous falls (Howland et al., 1993; Arfken et al., 1994; Maki et al., 1991; Friedman, 2002; Murphy et al., 2003; Lavedán et al., 2018). In a recent Korean study (Oh et al., 2017) for example, adults with a history of falling were over six times more likely to exhibit FOF than those with no history of falling. Nevertheless, as stated previously, FOF is reported in a significant proportion of older adults who have no falls history (Tinetti et al., 1988; Arfken et al., 1994).

The relationship between FOF and falls has been examined in prospective studies. In their study of women who develop FOF in the USA, Murphy et al. (2003) found that 20% of the participants who had not experienced a recent or subsequent fall developed FOF over the course of one year. In a prospective community-based study of adults between the ages of 65 and 84 years (*n*=2212) also in the USA, Friedman et al. (2002) found that falls at baseline were an independent predictor of developing FOF 20 months later, and that the reverse was also true, with FOF being a predictor of falling at 20 months.

In an Australian study based on a population sample of 1000, Clemson et al. (2015) reported contrasting results, which they stated did not provide evidence that having an injurious fall predicts FOF, or that FOF predicted an injurious fall. Rather, they reported differing profiles in persons who would go on to have injurious falls compared to those who develop FOF. Clemson et al. (2015) put forward the view that the link between falls and FOF in other studies may be due to mediating intrinsic factors such as an individual's gait, balance, and effects of medication. Consequently they recommended the differentiation of interventions to meet what they state were two differing needs, those at risk of falls and those at risk of FOF. It is worth noting that in their study they strictly defined a fall as an injurious fall requiring medical follow-up, thereby differing from other studies which often have a broader range of severity of falls included. Therefore, it is conceivable that their study may have led to a lower number of reported falls. A recent study by Lavedán et al. (2018) which examined the relationship between falls and FOF in people (*n*=640) aged 75 and over (Northern Spain), reported that a previous history of falls made it more likely that a person will report FOF. However, when they examined whether FOF predicted falls, they found that their initial model showed FOF to be a predictor of falls over the next 25 months, but the final adjusted model did not.

A Belgian study by Delbaere et al. (2006) (*n*=263) emphasised the complexity of the relationship between FOF and falls. They examined the extreme responses from those who they regarded as exhibiting excessively high fear but with low actual risk of falls, and in those they regarded as having unwarranted low level of fear given their high actual risk, based on postural tests. Delbaere et al. (2006) argued that their study supported previous results indicating that balance could be an intermediary factor however, as their study was cross-sectional, they acknowledged that further evidence was required. In their paper re-examining the relationship between falls, FOF, and falls-related self-efficacy, Hadjistavropoulous et al. (2011) also introduced the possibility of a mediating factor being balance performance. In results from a qualitative study (*n*=6), participants stated that contributors to their experience of FOF included ‘poor balance or being unsteady, a previous fall, the aging process, and a history of fear of falling all of their lives’ (Tischler & Hobson, 2005:41). Although small, this rare qualitative study is valuable because it enables the voice of participants to be heard, confirming findings from other studies that a previous fall and concern about balance contributed to their FOF.

The varying results reported from different studies supports assertions that the relationship between falls and FOF is complex. Murphy et al. state that it is likely to be 'bidirectional' (Murphy et al., 2003:946), which is supported by the findings from Friedman et al. (2002). Scheffer et al. (2008), in their systematic review, reported that fall history is the main risk factor for FOF, at the same time noting that this is 'remarkable' given that FOF is found in so many people who have not fallen (Scheffer et al., 2008:23). It is understandable that an individual who has experienced a fall would experience FOF. However, it is also likely that older adults who have not personally experienced a fall are aware of other people in their age group who have. For example, as illustrated in this study, those living within housing schemes specifically for older adults are likely to come into contact with others who have fallen, which may potentially elicit heightened awareness of risk and FOF (see Section 5.16, p211).

2.2.7 Characteristics of those who express FOF

A variety of studies have explored the characteristics of those most prone to FOF (McAuley et al., 1997; Howland et al., 1998; Kressig et al., 2001; Murphy et al., 2003). Arfken et al. (1994) found that amongst community-dwelling people FOF was common in older adults and greater in women. Those who were moderately fearful were more likely to have decreased satisfaction with life, be more frail, have depressed mood and recent experience of falls. Those who were very fearful had additional characteristics of decreased mobility and reduced participation in social activities. In addition to confirming these findings, Howland et al. (1998) investigated additional factors which showed that those reporting FOF perceived that they had less control over falls, being more likely to report dizziness and vision problems. They were more likely to use a walking aid, have a lower perception of their general health, experience significantly more chronic body pain, have significantly lower mental health index scores and were less likely to be socially integrated. Multivariate analysis used in the study showed four variables to be significant regarding FOF among all respondents: being female; having experienced any fall within the last three months; having a fall requiring medical attention in the last five years; and having less contact with family and friends.

In a recent study using secondary data analysis in Korea (Oh et al., 2017) intrinsic factors were also investigated using multivariate analysis. Significant predictors of FOF were found to be: previous falls, limitations of exercise using lower extremities, being female, having more than three chronic diseases, limitations of IADLs, limitations of exercise using upper extremities, living without a spouse, poor self-rated health, limitations of muscle strength, increased age, lower levels of education and life satisfaction. This study, like many others, was cross-sectional in nature, therefore limiting interpretation of causal relationships.

As well as exploring the intrinsic factors associated with FOF, there have been other studies investigating the multi-dimensional nature of FOF, which has broadened the areas of investigation. Some recent studies have incorporated exploration of local environmental factors in FOF (Filiatrault et al., 2009; Lee et al., 2018) and one study has specifically explored factors associated with FOF outdoors as opposed to indoors (Chippendale & Lee, 2018). Psychosocial and lifestyle factors were also included in the study by Clemson et al. (2015).

While the many potential contributing aspects of, and risk factors for, FOF continue to be investigated, findings are not consistent across studies. In their systematic review, Scheffer et al. (2008) found that the three main risk factors for FOF were having at least one previous fall, being female and increasing risk with age. They called for more longitudinal studies in order to provide more evidence of causal factors. A subsequent systematic review carried out by Denkinger et al. (2015) found the parameters most strongly associated with FOF (across various FOF constructs) were: female gender, physical function (performance and questionnaire based) and use of a walking aid. They found a less strong association with history of falls and poor self-rated health. They noted conflicting results for depression and anxiety, multiple drugs and psychotropic drugs.

Differing results seem to illustrate that for each individual there are many potential factors associated with experiencing FOF. However, increasing risk with age and being female are consistent findings across studies using different methodologies. A factor to consider is that with increasing age there is an increasing prevalence of co-morbidity, which could arguably account for the increasing number of factors shown to be associated with FOF when explored using multivariate analysis, for example 13 factors are listed in the study by Oh et al. (2017). It is appreciated that in order to target interventions appropriately, characteristics of those most likely to report FOF are required. However, it is questionable how many different factors it is necessary to identify in order to do so.

2.2.8 Characteristic features of FOF - activity restriction and 'cycle of decline'

People identified as exhibiting FOF typically restrict their activities to avoid potential fall situations, especially outside of the home environment. Reports vary from 25-57% of those who have fallen exhibiting such avoidance behaviour (Tinetti & Speechley, 1988; Howland et al., 1998; Gaxatte et al., 2011). Restriction of activity was also noted in this study (see Section 5.11, p203). While it has been acknowledged that in the immediate aftermath of an injurious fall, some precautions may be necessarily and appropriate in order to reduce further risk, FOF has been identified as separate to this short-term appropriate response (Tinetti & Powell, 1993; Peterson, 2002). An alternative view about activity restriction is that appropriate caution contributes to fall prevention by facilitating careful choice about physical activity, and therefore constitutes normal prudent behaviour (Murphy et al., 2002; Hadjistavropoulous et al., 2011). However, it is considered that if FOF increases beyond an 'appropriate' response it constitutes a debilitating condition (Peterson, 2002; Jung, 2008) as observed by the researcher in social work practice (see Section 1.2.1, p2).

A 'cycle of decline' is a term which has been used to describe the series of events which may follow a fall, typically described as including: self-imposed restriction in activity, leading to physical deterioration and lack of confidence, being more likely to report being afraid of falling again, and ultimately leading to loss of independence (Vellas et al.,1998). While the cycle of decline scenario is often reported as one of the consequences of FOF it is not universally endorsed, with it being pointed out that cross-sectional studies predominating in this area cannot confirm causality, only that an association or co-relationship exists between factors (Clemson et al., 2015). While the exact relationship between falls, FOF and activity restriction may be open to debate (Brouwer et al., 2003; Hadjistavropoulous et al., 2011) it is nevertheless the case that self-imposed activity restriction amongst older adults with FOF (with or without a falls history) is widely reported in studies, with potential serious consequences for the individual. Exploration of the relationship between FOF and activity restriction has been undertaken in a number of studies (Martin et al., 2005; Wijlhuizen et al., 2007; Deshpande et al., 2008; Kempen et al., 2009; Perez-Jara, 2010).

In Italy, Deshpande et al. (2008) examined activity restriction, induced specifically by FOF, and its relationship to risk of disability and decline in physical function. A community-dwelling sample (*n*=673) of people aged 65 and over expressing FOF were evaluated at baseline and after three years. Cross-sectional analysis at baseline showed an increased disability in IADLs and worse physical performance in older individuals with severe activity restriction due to FOF. Longitudinal analysis of self-reported activity restriction showed that for people with FOF, severe activity restriction was a significant independent predictor of increased ADL disability and worse physical performance after three years, independent of age and sex. The study was seen by the researchers as providing evidence for the importance of developing interventions to encourage those with severe FOF to remain physically active and to teach those with FOF to carry out activities safely, in order to reduce self-imposed activity restriction.

Results from Deshpande et al. (2008) were supported by those from a study in the Netherlands (*n*=540) with community-living people aged 70+. Kempen et al. (2009) aimed to distinguish between levels of FOF and associated activity restriction, so that interventions could be targeted appropriately at those exhibiting the most severe FOF. Results from this study indicated that those with severe FOF and activity avoidance were of advanced age and had limitations to their ADL ability, potentially putting them at risk of losing independence and warranting rapid intervention to enable them to sustain their independence.

The significance of the research by Deshpande et al. (2008) and Kempen et al. (2009) for this study, is in showing an association between restriction in activity due to FOF and a decline in ability to carry out activities of daily life, emphasising FOF as a potential threat to independence for older adults (see Section 1.2.1, p2). It also indicates a role for interventions that are directly relevant for those for whom carrying out everyday activities presents an increasing challenge (see Appendix 5.29).

The cycle of decline scenario was not endorsed by Clemson et al. (2015) whose results, they stated, did not support it. The 11-year longitudinal study in Australia followed a population sample of 1000 people who were 65 years old at baseline. They aimed to find intrinsic, psychosocial and lifestyle factors predicting injurious falls requiring medical attention, or of developing FOF. Predictors of injurious falls and FOF were reported to be different in the study. Those for FOF were: increasing age; being from a non-English, Australian or European background; a degree of cognitive impairment and reduced social activity during the past five years. Those for falls were increasing age, but with a measure of frailty and being in a state of depression. Clemson et al. (2015) state that as their study and others have demonstrated that FOF is present without falls or falls injury, one does not predict the other. They make the point that while certain intrinsic factors are associated with people who fall and also express FOF, they support others (Binda et al., 2003; Brouwer et al., 2003; Hadjistavropoulous et al., 2011) in suggesting that these factors may be mediated by others such as gait, balance and medication side effects.

Clemson et al. (2015) interpreted their results as indicating that different interventions are required to address the specific and different needs of those with FOF and those with a history of falls. Social activity levels, which the authors stated were newly investigated in their study, indicated that a decline in regular social activities can predict FOF in the future. They suggested that the prevention of social isolation could be a factor in preventing FOF. Clemson et al.'s study highlights social isolation as a factor in those exhibiting FOF (see Section 2.2.9, p43) already an acknowledged consequence of activity restriction (Vellas et al., 1997; Martin et al., 2005; Wijlhuizen et al., 2007).

Loss of ability to move outdoors is particularly pertinent to independence and social and physical activities. This aspect of activity restriction was examined in a Finnish study (Rantakokko et al., 2009) with older adults (*n*=727; 75-81 years). At baseline, 65% of the women and 29% of the men reported fear of moving outdoors. At six-monthly follow-ups over the three and a half years of the study, those with fear of moving outdoors had over four times the adjusted risk of developing difficulties in walking 0.5 km and over three times the adjusted risk of developing difficulties in walking 2.0 km. While this study was primarily concerned with the outdoors environment, it indicates how restriction of activity is associated with reduced function over time. A study that investigated the 'life-space' mobility of older individuals, described as 'the spatial area a person moves through in daily life', reported an association between reduced life space and FOF (Auais et al., 2017: 459) when comparing individuals from different social and cultural contexts. The strength of the association was site-specific and included participants in Albania, Brazil and Canada (*n*=1841; 65-74 years).

Chippendale and Lee (2018) examined fall experiences and FOF outdoors and concluded that FOF was impacted by multiple levels of influence including intrinsic factors (age, gender, functional status), the neighbourhood environment (urban/suburban, stairs, and curbs) as well as factors associated with self-efficacy (e.g. personal experience of outdoor falls, ability to get up after a fall, etc.). These results appear to be supported by a study in Detroit, USA (Smith et al., 2016) where factors affecting reduced outdoor mobility were older age, more severe mobility impairment and FOF.

Although beyond the scope of this research project, but mentioned for completeness, recent studies have begun to look at how local environmental factors (e.g. condition of paving, lighting) may contribute to FOF and activity restriction. A recent descriptive study in Korea (Lee et al., 2018) examined predictors for FOF among community-dwelling older adults aged 65 and over, with specific interest in differences between those with and without a falls history. They found that the common predictive factors for FOF, for those with and without a fall history were being female and having a higher level of discomfort with their local environment. However, they also found that in those with FOF but without a fall history there were an additional 12 individual and environmental predictive factors. Conclusions were in support of 'an ecological model' (Lee et al., 2018:12) when studying factors related to FOF, including not only individual factors but also wider policies about suitable environments which are largely out of the control of individuals. A related point has been made that differing lifestyle factors such as transportation may influence different rates of FOF in different countries, for example, whether individuals primarily use public transport, as in Korea, in contrast to people predominantly using their own cars, as in the USA (Oh et al., 2017).

Research highlights the link between activity restriction and reduced social contact, particularly when activity is restricted outside of the home environment. While adaptive behaviour may alleviate some of the isolation, for example, going outside accompanied rather than alone (Gaxatte et al., 2011) this may not be easily facilitated by older adults without immediate support networks. In addition, the perceived need for such assistance could conceivably be viewed by some older adults as an unwelcome sign of declining independence.

2.2.9 Characteristic features of FOF - reduced quality of life (QoL)

QoL for older adults is accepted as being a complex concept, being described by van Leeuwen et al. (2019) as a 'dynamic web of intertwined domains' (van Leeuwen et al., 2019:2). Health-related QoL is often determined by use of the SF-36 questionnaire (Burholt & Nash, 2011) which includes domains relating to physical and mental wellbeing. For the purposes of this review comments are related to the association between self-imposed restriction in activity as a characteristic of FOF, and QoL.

FOF is associated with reduced QoL amongst older adults (Cumming et al., 2000; Rejeski & Mihalko, 2001; Li et al., 2003; Tischler & Hobson, 2005; Kempen et al., 2009; Perez-Jara, 2010; Patil et al., 2014; Joshi & Joshi, 2015). As previously discussed (see Section 2.2.8, p38) restriction of activity has been shown to be significant amongst those expressing FOF. As pointed out by Kempen et al. (2009), unwelcome as FOF may be for the individual concerned, it could be argued that the associated avoidance of activity is more significant with respect to reduced social contact, functional decline, further falls and reduction in QoL.

As commented by Perez-Jara et al. (2010), when FOF becomes severe and leads to restriction of activity, its practical consequences can extend beyond the individual experiencing FOF, affecting family members and, potentially, support services. In their review they note that severe FOF may be especially high among individuals with advanced age and limitations in ADLs, making their independence particularly fragile. This would seem to concur with a Finnish study of older women living in the community between 70-80 years of age (*n*=409) (Patil et al., 2014) in which 68% of the women reported moderate to high concern about falls. It was found that difficulties in instrumental activities of daily living, balance, outdoor mobility and poorer quality of life 'contributed independently to a greater concern about falling' (Patil et al., 2014:22).

In a pilot qualitative study in Canada (*n*=6), Tischler and Hobson (2005) interviewed participants to ascertain their main concerns related to FOF and how these concerns influenced QoL. The six main concerns were: physical injury; the feeling experienced when falling; becoming an invalid or burden; losing independence and being institutionalised; a long lie; and being confined to a wheelchair or unable to walk. When discussing the impact of these factors on QoL however, there were different responses. Some of the participants stated that despite experiencing FOF they considered themselves to have good life satisfaction and QoL for their age, while others said that FOF had an impact on their QoL. As pointed out by the authors of the study, qualitative information is important in understanding the concerns of individuals related to their FOF in order to help in devising appropriate interventions. However, qualitative research also facilitates increased understanding of the lived experience of the participants. In this case, for example, the concern about 'the feeling experienced when falling' was not anticipated by researchers but was obviously significant to the participants.

It is acknowledged that critique has been levelled at the assumption that being ‘active’ is necessarily ‘good’ for the wellbeing of all older adults (Katz, 2000). As found by Tischler and Hobson (2005) individual expectations of older age may mean that QoL is not necessarily seen as being reduced, and adjustments may be made which enable social interaction to be maintained, for example, by going out accompanied rather than unaccompanied (Gaxatte et al., 2011). Therefore, while recognising that assumptions cannot be made about QoL for any particular individual, it is apparent from research that restriction of activity associated with FOF and the related decline in functional ability can lead to reduced social interaction and put independence at risk, leading to reports of reduced QoL by older adults (Cumming et al., 2000; Rejeski & Mihalko, 2001; Li et al., 2003; Tischler & Hobson, 2005; Kempen et al., 2009; Perez-Jara, 2010; Patil et al., 2014; Joshi & Joshi, 2015).

2.3 Approaches to measuring FOF and associated instruments

Since the recognition of FOF as a debilitating condition, a range of interventions have been developed with the aim of reducing it (see Section 2.4, p58). Consequently, evaluation of such interventions was required in order to confirm whether they were effective. However, this presents some inherent difficulties as the individual experience of FOF is subjective, making it a problematic concept to measure objectively (Perez-Jara et al., 2010). Nevertheless, attempts have been made to measure the concept of FOF to facilitate quantitative analysis of interventions. Qualitative analysis has also been undertaken to elucidate features and consequences of FOF from the perspective of the individuals experiencing it, with the aim of facilitating development of interventions or measurement scales (Huang, 2005; Tischler & Hobson, 2005).

Research into FOF has grown since the 1980s with many different strands of enquiry. Diverse research approaches have resulted in an increasing number of measurement tools being developed. It is widely acknowledged that lack of a consistent approach to quantifying FOF makes comparison of results difficult (Jørstad et al., 2005; Zijlstra et al., 2007; Jung, 2008). The two main approaches which have been taken to quantifying FOF are, firstly, asking a direct question about FOF (see Section 2.3.1), and secondly, using the concept of falls-related self-efficacy to operationalise FOF in order to develop measurement scales (see Section 2.3.2, p48) primarily the Falls Efficacy Scale (FES) and its derivatives (see Appendix 2.3) and the Activities-Specific Balance Scale (ABC Scale) (see Appendix 2.4). Subsequently, further instruments have been developed (Simpson et al., 2009; Lachman et al., 1998; Velozo & Peterson, 2001; Huang, 2006) (see Appendix 2.5).

2.3.1 Direct question: are you afraid of falling?

Arguably the most straightforward method of ascertaining whether participants have FOF is to use a direct question requiring a dichotomous yes/no answer. This approach has been used in a number of studies (Tinetti et al., 1990; Cameron et al., 2000; Oh et al., 2017). Although simple and quick, the main critique is that such a question is not sufficiently sensitive to identify the greatly varying levels of FOF shown by different individuals (Hill et al., 1996) and is not sensitive to changes over time for the same individual. However, it could be argued that a single question is potentially useful for ascertaining an overall concern about FOF and facilitating a conversation about it, lending itself particularly to a role in qualitative approaches.

Other issues raised on determining fear by direct questions are for example, as pointed out by Tinetti et al. (1990), that fear does not necessarily predict behaviour. Therefore, someone may report experiencing FOF but nevertheless continue to carry out the activities they are fearful of, leading to inconsistencies which may potentially make interpretation of research findings difficult. In addition, it has been suggested that men in particular may under report FOF to avoid potential stigmatisation (Tinetti et al., 1994) and that there is the possibility of some individuals over-emphasising FOF in research studies. Over-emphasis of FOF may occur for a variety of reasons, such as participants anticipating what information is being sought or perhaps in some cases wishing to 'gain attention' as posited by Maki et al. (1991). This phenomenon is not unique to research about FOF and may realistically be difficult to overcome, although it is useful for the researcher to bear in mind and may warrant comment when reporting results.

Using a simple question has advantages as stressed in the report of a Korean study by Oh et al. (2017). In their study, which included those with cognitive impairment, Oh et al. argued that many of the other instruments available have too many questions for use with community-dwelling people with cognitive impairment, making a single question more appropriate for such older adults, despite its other limitations.

In response to concerns about lack of sensitivity, refinements to the direct question have been developed. Rather than a simple dichotomous choice, other response options have been developed, including numerical ratings (4 or 5 points) (Howland et al., 1993; Lachman et al., 1998; Resnick, 1999) and Likert-type responses (Yardley & Smith, 2002). While these options may provide a way of indicating change over time, they do not offer a satisfactory solution to the subjective nature of the concept which makes it difficult to make comparisons between individuals.

2.3.2 The self-efficacy approach

In an important step in seeking to identify those with FOF and quantify changes in the level of fear over time, Tinetti et al. (1990) applied the self-efficacy theory of Bandura (1982; 1995) to the measurement of fear of falling. This had the advantage of applying a practical approach in which individuals could be asked to estimate their level of self-efficacy related to a series of definite activities, rather than being asked about the more general and abstract concept of FOF, thereby enabling a continuous scale of measurement to be used. It also provided a potential link to functional decline as according to Bandura (1982; 1995), low perceived efficacy tends to lead to avoidance of an activity.

The theory of personal self-efficacy was set out by Albert Bandura and is defined as:

> 'Perceived self-efficacy refers to beliefs in one's capabilities to organize and execute the courses of action required to manage prospective situations. Efficacy beliefs influence how people think, feel, motivate themselves, act' (Bandura, 1995:2).

Bandura considered self-efficacy to have four main components, their relative significance being weighed-up through cognitive processing of the individual. They are briefly summarised, in Table 2.2.

Table 2.2: Summary of the components of self-efficacy according to Bandura (1995:2-4)

COMPONENT OF SELF-EFFICACY	SUMMARY

Mastery experiences	People experience successes, including those reached as a result of overcoming difficulties. Involves obtaining requisite skills and builds resilience in overcoming obstacles.
Vicarious experiences	Observing people similar to oneself persevering and succeeding, increasing belief that you are capable of similar things. Also applies to observing people fail, the extent to which the person is perceived to be similar is said to mediate the impact in either direction.
Social persuasion	Verbal persuasion from others that individuals possess the required capabilities, can increase the level and duration of effort that people are prepared to apply. Bandura makes the point that people who are successful in helping others to build efficacy do more than raise people's beliefs, they also create situations which bring success and avoid prematurely putting people in situations likely to result in failure.
Physiological and emotional states	Reactions such as 'stress' or 'tension' may be interpreted by individuals as signs of their vulnerability to poor performance. Mood can also affect whether self-efficacy is judged as increased or reduced.

Self-efficacy theory is applied in the context of FOF by asking individuals to rate how confident they are to carry out each of a number of specified daily activities without falling, enabling them to estimate a 'level' of efficacy for each activity, as seen in the original Falls Efficacy Scale (FES) (see Figure 2.2, p51). An overall 'score' for all items, indicating their perceived overall level of falls-related self-efficacy can then be obtained. According to Bandura (1982; 1995) an individual's perception is based on weighing up various elements of efficacy, including past experience of undertaking the activity, observations of other people and encouragement they receive from others. The individual's emotional states associated with the activity and current mood affect their interpretation. For example, if the person experienced what they perceived as 'stress' when last carrying out the activity, or is experiencing 'low' mood, these factors could affect how their capability is interpreted; for example potentially resulting in a pessimistic rather than optimistic assessment of falls-related self-efficacy.

2.3.3 Efficacy-based scales to assess FOF

The original Falls Efficacy Scale (FES) was the precursor to a number of such scales, including modifications to the original, a brief summary of the development follows.

Falls Efficacy Scale (FES)

The Falls Efficacy Scale (FES) was devised, initially in consultation with professionals, to identify how self-confident a person was in carrying out a specific activity without falling (perceived efficacy). Operationalising FOF as falls-related self-efficacy or falls efficacy, facilitated a practical measurement of FOF as perceived by individuals in their daily activities (Tinetti et al., 1990; Tinetti et al., 1994). The self-report questionnaire (see Figure 2.2, p51) asked about ten activities. Each question had a ten-point continuum, from a score of one denoting extreme confidence to ten denoting no confidence. Total scores ranged from 10 to 100, with a *higher score* being equivalent to *lower confidence or efficacy*.

Figure 2.2: Original Falls Efficacy Scale (FES)

Falls Efficacy Scale

Name:________________________________ Date:_________________

On a scale from 1 to 10, with 1 being very confident and 10 being not confident at all, how confident are you that you do the following activities without falling?

Activity:	**Score:** 1 = very confident 10 = not confident at all
Take a bath or shower	
Reach into cabinets or closets	
Walk around the house	
Prepare meals not requiring carrying heavy or hot objects	
Get in and out of bed	
Answer the door or telephone	
Get in and out of a chair	
Getting dressed and undressed	
Personal grooming (i.e. washing your face)	
Getting on and off of the toilet	
Total Score	

A total score of greater than 70 indicates that the person has a fear of falling

(Tinetti, Richman & Powell,1990)

Amended or modified versions of the original FES remain in use (see Appendix 2.3). These were developed due to a number of criticisms levelled at the initial research to develop the FES. These included the failure to involve older adults in its development (Powell & Myers, 1995); the range of activities included in the scale, which were all indoor tasks and regarded as having a low level of challenge; and a 'counter-intuitive' measurement scale whereby the low-high range of scoring on the confidence response scale equated to high-low levels of falls efficacy and vice versa. Nevertheless, in the view of the researcher the FES represented an important practical step forward in developing a reliable and valid instrument to measure

FOF, by operationalising it as falls-related self-efficacy. The revisions and modifications which have taken into account the various perceived shortcomings of the original scale are summarised in Appendix 2.3. As pointed out by Moore & Ellis (2008), lack of formal naming of all revisions and modifications to the FES to date led Jørstad et al. (2005) to do so in their review. The same acronyms have been used here for clarity and consistency.

Several versions since the original FES involved amendments to the measurement scale (rFES, amFES, MFES) and increased the range of activities to include more challenging items (MFES, FES-I, Icon-FES). The amFES resulted from amendments made for use in a large study, the FICSIT Trial (Buchner et al., 1993). This research group made a significant change to the cue question. Participants were asked whether they were *concerned* about falling in carrying out each of the activities, rather than whether they were *confident* in carrying out the activities without falling. The reasoning for this change was briefly and rather inadequately explained, stating that ‘negative wording of the question may increase the spread of scores’ (Buchner et al., 1993:303). However, this reasoning appeared somewhat inconsistent with the simultaneous reduction from 10 to four response levels on the questionnaire (see Appendix 2.3). The change in cue question did not alter the concept being assessed, which remained FOF operationalised as falls-related self-efficacy. However, the change in wording did not help the subsequent level of confusion about the precise concept FES is measuring and its appropriate use. The alternative wording however did distinguish it from the ABC Scale also based on self-efficacy theory (see Appendix 2.4).

The most recent development in versions of the FES has been an international version, Falls Efficacy Scale-International (FES-I) in association with the Prevention of Falls Network Europe (ProFaNE) (Yardley et al., 2005). The aim for this tool was to make it sensitive to different cultural contexts in the hope that a universal form of the FES would lead to more comparability across studies and countries. The FES-I has been validated (Hauer et al., 2009; Delbaere, Close, Mikolaizak et al., 2010) and has been translated into many languages. A short version (FES-I, short) was developed for use particularly in clinical or research settings with seven rather than 16 questions (Kempen et al., 2008; Delbaere, Close, Mikolaizak et al., 2010). Most recently a pictorial descriptive tool has been developed for the FES-I (Icon-FES) (Delbaere et al., 2011). As pointed out by Moore & Ellis (2008) the different versions of the FES make it important that researchers are clear about the appropriate choice of version and the concept it is measuring.

Activities-specific Balance Confidence (ABC) Scale

The Activities-specific Balance Confidence (ABC) scale (Powell & Myers, 1995) is also based on self-efficacy theory (see Appendix 2.4). It includes outdoor activities regarded as more challenging than the indoor-based activities of the original FES and therefore considered more appropriate for assessment of higher functioning individuals. Criticisms included recognition that some of the activities were rarely undertaken by older adults (e.g. walking on ice). Subsequently a shortened version of the ABC, the ABC-6 has been developed containing only the 6 most challenging items (Peretz et al., 2006). A simplified more ‘user friendly’ version, produced in French, ABC-Simplified (ABC-S) has been produced (Filiatrault et al., 2007), omitting the ‘walking on an icy surface’ item. Both FES and ABC have been demonstrated to be valid and reliable tools (Powell & Myers, 1995; Myers et al., 1998; Parry et al., 2001).

2.3.4 'Other' instruments devised to measure FOF

Other instruments have been developed to measure FOF (as summarised by Jørstad et al., 2005; Jung, 2008) aside from the various versions of FES and ABC Scales. These include CON-Fbal (Simpson et al., 2009), SAFE (Lachman et al., 1998), UIC FFM (Velozo & Peterson, 2001) and more recently, the GFFM (Huang, 2006) all summarised in Appendix 2.5.

Of the existing FOF measures, those based on self-efficacy theory are well established and validated, particularly the FES and its subsequent versions. Consequently, as explained later (see Section 4.4.1, p130) the FES-I (short) (Kempen et al., 2008) version of the tool was chosen as the basis of FOF assessment in this study.

2.3.5 Relationship between Fear of Falling (FOF), Falls Efficacy and Balance Confidence

As research into FOF has grown, the terms FOF, falls-related self-efficacy (or falls efficacy) and balance confidence have been used interchangeably leading to a lack of clarity about the concept each term represents.

FOF and falls-related self-efficacy (falls efficacy)

In originally using falls-related self-efficacy (falls efficacy) as an operationalisation of FOF, Tinnetti et al. (1994) appreciated that there were differences between the two concepts and reported that: 'while reporting fear, the majority of respondents in the study felt confident in their ability to perform activities without falling. While fear of falling and fall-related efficacy responses were associated statistically with each other, fall-related efficacy proved a better determinant of function.' (Tinetti et al., 1994: M144-M145). McAuley et al. (1997) also demonstrated a correlation between falls-related self-efficacy and FOF, however results led them to conclude that FOF and falls-related self-efficacy 'are related but empirically and theoretically distinct constructs' (McAuley et al., 1997:38).

Over the years the distinction between the original (FOF) and the operationalised (falls-related self-efficacy) concepts appears to have got somewhat lost, illustrated by the fact that in respective reviews, Jørstad et al. (2005) and Jung et al. (2008) argued that using falls-related self-efficacy or confidence measures may not be true representations of FOF. They reiterated that older adults may be confident to carry out a particular activity without falling, while at the same time remaining fearful of falling. While reviewing such papers the researcher has found it useful to bear in mind the original intention of applying efficacy theory to FOF. Falls-related self-efficacy was devised as an operationalisation of FOF, in order to facilitate empirical measurement of the concept. Operationalisation is carried out in research when the concept of interest, FOF in this case, cannot be directly measured. An operational definition of the concept is developed which is considered to represent it, thereby allowing the development of appropriate instruments to measure the operationalised concept (de Vaus, 2001). Tinetti et al. (1990) specified their operational definition of FOF as ‘low perceived self-efficacy at avoiding falls during essential non-hazardous activities of daily living’ (Tinetti et al., 1990:P239). By asking people whether they were confident (or concerned) to carry out certain activities without falling, the degree of an individual’s falls efficacy (operationalisation of their FOF) could be ascertained at different time points, facilitating evaluation of interventions. Over the years there have been increasing volumes of research in which the terms FES and FOF have been used interchangeably, without the clarification that one is an operationalisation of the other. Consequently, it could be argued that critique has been rather inappropriately levelled at them not being the same concept, as this was understood when efficacy theory was first applied to this area of research (Tinetti et al., 1994; McAuley et al., 1997). It is important to be clear, as in this study (see Section 4.4.1, p130), about the concept being investigated and in choosing an appropriate instrument to measure it (Zijlstra et al., 2007; Kumar et al., 2016).

Falls-related self-efficacy and balance confidence

Due to the differing cue questions of the amended FES and the ABC Scale (see Section 2.3.3, p50), the two instruments are generally considered to ascertain FOF and balance confidence respectively. However, it has also been argued that FOF and balance confidence evaluate different aspects of the same overall concept, that of falls-related self-efficacy (falls efficacy). It appears reasonable to equate low confidence to carry out an activity without losing balance or becoming unsteady, with increased concern about falling. Consequently, balance confidence and FOF have been described as ‘two sides of the same coin’ (Powell & Myers, 1995; Zijlstra et al.,2007) with both considered to be measuring aspects of falls efficacy. As both elements were to be evaluated in this study there was potential to explore the relationship between them (see Section 6.2.7, p233).

Having established the extent and consequences of FOF for older adults and outlined the main instruments developed to measure the concept, the next section of this review outlines the various types of intervention which have been developed with the aim of reducing FOF amongst older adults.

2.4 Interventions developed to reduce FOF

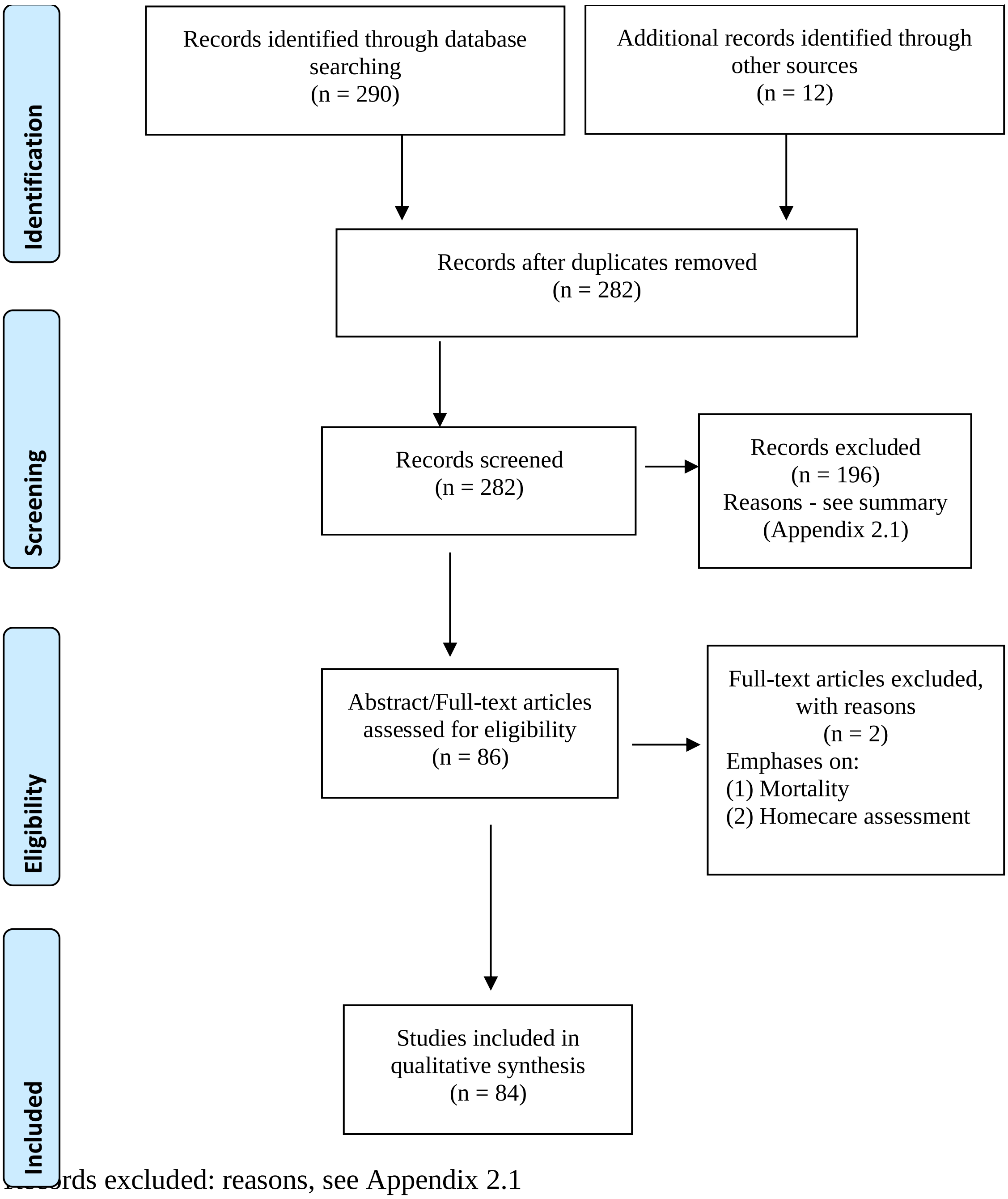
Given the prevalence (see Section 2.2.5, p30) and consequences of FOF (see Sections 2.2.8, p38 & 2.2.9, p43) amongst older adults, a variety of interventions have been developed with the aim of reducing it, both amongst those who have and haven't fallen. The types of intervention are summarised in this section of the literature review as a backdrop to the final section which looks at the potential contribution of AT to this area of research. The section begins with details of the literature search carried out to identify the main types of intervention developed with the aim of reducing FOF.

2.4.1 Search process, criteria and results - interventions to reduce FOF

A search of relevant literature was carried out using the PRISMA format (Moher et al., The PRISMA Group, 2009). The aim was to confine the search as much as practicable to research relating to interventions with the primary aim of preventing or reducing FOF. However, such research is often closely linked to preventing or reducing falls. There are fewer research projects aimed primarily at FOF, whereas research projects examining interventions to reduce falls often have FOF as a secondary outcome. For the purposes of this search therefore, research where FOF was a primary or secondary outcome was included.
The following individual databases were searched: Cinahl Plus, Medline, PsycInfo, AMED, Web of Science, Cochrane Database of Systematic Reviews, Joanna Briggs Institute. No start dates were imposed and the searches included publications up to 28th February 2019 on the advice of supervisors. Subsequent publications have been noted and commented upon as relevant, using the same search and evaluation criteria. It was found that a universal search

term did not produce results for all databases, therefore alternatives were used as necessary, detailed in Table 2.3 (p60). Wildcard characters were used to allow for variation in word endings.

Figure 2.3: Search process - interventions for fear of falling (FOF)



...rds excluded: reasons, see Appendix 2.1

Table 2.3: Search terms - interventions for fear of falling (FOF)

Database	Search Terms
Cochrane Database of Systematic Reviews	"Fear of Falling" AND "older people or older adult or elder or senior or aged or geriatric" AND "intervention" AND "prevention".
Joanna Briggs Institute	"Fear of Falling" AND "older people" AND "accidental fall" AND "prevention" and "interventions".
AMED/Cinahl Plus	(old, aged, elder, geriatric or senior within 4 words of (people or person or adults) AND "accidental fall" AND ("fear of fall" or "fall" within 4 words of "anxiety") AND ("prevent" or "control") AND subject (Community within 4 words of dwelling or living OR (living at home)).
PsycINFO/Medline	"Fear of falling" AND older adult or elder or older people or senior AND subject (interventions or strategies or best practices or treatment or therapy) AND (community dwelling or community living or living at home) AND subject "accidental falls".
Web of Science	"Fear of Falling" AND "older people" AND "Interventions".

2.4.2 Interventions to reduce FOF – categories

From the database searches described above the interventions reported fall into the following broad categories:

- Exercise (home based and/or individualised program; group based)
- Home modification & assistive technology
- Health promotion education including falls risk reduction
- Cognitive Behavioural Therapy (CBT)
- Other interventions e.g. fall training; guided imagery and relaxation
- Multi-factorial interventions

A brief summary of each category follows to give an overview of the main types of interventions developed to date aimed at reducing FOF. It is acknowledged that this is unlikely to be an exhaustive list of all interventions which may have beneficial effects for FOF due to this search being focused on reports with FOF as the main or a secondary outcome measure, resulting in 84 papers being identified (see Figure 2.3, p59 & Appendix 2.1).

<u>Exercise interventions</u>

The largest category of interventions developed to address FOF can be described in the broadest sense as exercise of various kinds. Within the overall categorisation of 'exercise', Lamb et al. (2011) developed a taxonomy of different types of exercise intervention on behalf of the Prevention of Falls Network Europe (ProFaNE) Group. ProFaNE encourages researchers to use this classification in order to facilitate comparisons of results across studies. The broad categories given by Lamb et al. (2011) are:

- Gait, balance, and functional training
- Strength/resistance training (including power)
- Flexibility training (e.g. static stretches, Pilates flexibility training, Yoga)
- 3D training, described as involving 'constant movement in a controlled, fluid, repetitive way through all 3 spatial planes or dimensions (forward and back, side to side and up and down' (Lamb et al., 2011:19). Tai Chi, Qi Gong and dance are given as examples of 3D training
- General physical activity
- Endurance training
- Others (exercises not described in the other categories).

Within each category exercises may be supervised or unsupervised, and delivered to a group or individual. Other important factors which should be stated when reporting, according to Lamb et al. (2011) are: duration, frequency (per month) and intensity (subjective or objective).

Kendrick et al. (2014) undertook a systematic review of exercise for reducing FOF in older adults living in the community, using the taxonomy recommended by Lamb et al. (2011). Kendrick et al. (2014) (30 studies, *n*=1692) noted that most exercise interventions have a reduction in falls as the main outcome measure, with a smaller number of studies in recent years having FOF as one of the main outcomes or reporting it as a secondary outcome. The review included 30 randomised and quasi-randomised studies. The interventions were varied including structured exercise classes comprising one, or a combination, of the following: strength, balance training, fitness (endurance) training, Wii-Fit activities, Yoga, Feldenkrais and Tai Chi. Home-based exercise programmes included those based on DVD and/or workbook instruction and physical therapist prescribed programs. Delivery was supervised and unsupervised.

The reported results were described as 'very tentative', due to stated potential bias of the overall review process due to lack of blinding of participants and assessors. The main outcome, stressed as being based on low quality evidence, was that exercise interventions are associated with 'small to moderate reductions in FOF immediately post intervention' (Kendrick et al., 2014:2) and very low-quality evidence that they *may be* associated with a small reduction in FOF up to six months and more than six months post intervention. It was reported that very low-quality evidence also suggested that exercise interventions which reported a reduction in FOF also reduced the risk of falling. This finding suggests that exercise interventions do not increase the risk of falls by reducing FOF, which is important, as reduced FOF has the potential to increase risk-taking.

Indications from this review are that there is at least a small potential immediate benefit potentially lasting for six months or more. There is no risk of increasing fall risk by older adults participating in exercise interventions to reduce FOF, regardless of type of intervention. The review itself was noted as having potential bias by excluding smaller studies which could have negative outcomes, underscoring the tentative nature of the reporting. However, it could equally be argued that smaller studies excluded would not necessarily be biased towards negative outcomes.

Systematic reviews and meta-analyses such as reported by Kendrick et al. (2014) by their very nature include randomised and sometimes quasi-randomised trials; therefore, many studies are not included as they do not meet the review criteria. For example, there have been studies relating to Tai Chi training for older adults over more than 20 years (Hackney & Wolf, 2013). Only six Tai Chi studies were included in the Kendrick et al. (2014) systematic review mentioned above. Hackney & Wolf (2013) argue that the diversity of study and different styles of Tai Chi has not lent itself to easily drawing conclusions from such meta-analysis, leading to repeated reporting of uncertain results and calls for more studies. Nevertheless, they argue that many researchers continue to view Tai Chi as worthy of investigation. As with other interventions, FOF is often not the primary outcome being measured. However, in a study of frail older adults over 70 years, where FOF was the primary outcome, Sattin et al. (2005) reported a reduction in FOF in those undergoing Tai Chi instruction when compared to a Welfare Education control group. Advantages of Tai Chi over other exercise options are regarded as being the ‘nonvigorous and gentle movements’ preferred by older adults and its elements of ‘strengthening, balance, postural alignment, and concentration’ (Wu, 2002:746).

The tentative conclusion of Kendrick et al. (2014) that any exercise intervention is beneficial for FOF immediately following, and potentially for six months or more after the intervention, indicates that exercise interventions (in the broadest sense) are essentially worthwhile for those experiencing FOF. As illustrated by the example of Tai Chi, small studies that are excluded from such analysis may in fact be those that are exploring interventions more suitable for those experiencing FOF. For example, the ‘gentle’ nature of Tai Chi may appeal to older adults with FOF due to being low intensity. Similarly, chair-based exercise programmes available to older adults (Karania, 2017) may appear more attainable to those who experience FOF and who are traditionally difficult to enroll into preventive interventions (Bunn et al., 2008).

Home modification and assistive technology

While interventions by Occupational Therapists and Physiotherapists are integral to community health services in the UK in the experience of the researcher (see Section 1.2.1, p2), few studies were located regarding these, as most outcomes reported in such studies primarily relate to falls risk, number of falls and functional ability rather than FOF. For example, in the Systematic Review conducted by Chase et al. (2012) only three (Gitlin et al., 2006; Lin et al., 2007; Logan et al., 2010) of the 33 studies included FOF as an outcome measure, although results were reported to be positive for this. Multicomponent studies were found to be most effective, such as that by Gitlin et al. (2006; 2008) which included Occupational Therapy and Physiotherapy intervention (*n*=319; 70 years plus). Reported outcomes were reduced FOF, increased confidence in managing daily activities and an increased use of control-oriented strategies compared with a control group. At six and 12 months post-intervention participants also reported less FOF than control subjects, whose fear increased. While this trial of a preventive intervention was effective, provision in the community could conceivably be limited due to potential cost implications related to the one-to-one provision by health professionals.

Relatively few studies were identified which examined the effects of assistive technology specifically related to FOF. A systematic review by Stewart & McKinstry (2012), which included 10 studies (Australia, UK & USA; total *n*=3324), reported that from the limited research to date on the use of pendant (emergency) alarms and automatic falls detectors, their contribution to reducing FOF was not clear, with a mixed response from users regarding effect on FOF. A very recent Dutch pilot study (*n*=64) indicated that provision of guiding night lights between bedroom and bathroom are effective in reducing FOF and increasing sleep quality, although inconclusive on fall rate requiring further investigation (Thölking et al., 2020).

<u>Health Promotion Education including falls risk reduction</u>

Health promotion interventions included multidisciplinary falls-risk assessment (Hansma et al., 2010; Netherlands, *n*=53) and comparisons of different falls prevention programs (Lin et al., 2007, Taiwan, *n*=150; Zidén et al., 2014, Sweden, *n*=459). Programs explored included education/information provision either individually or in group settings; encouragement of group discussion, mutual support and information sharing; home assessment and modification; and exercise training. Outcomes were that FOF was reduced following a multidisciplinary falls-risk assessment (Hansma et al., 2010) and exercise intervention (Lin et al., 2007). Falls efficacy was improved in the longer term following a preventive home visit or four Seniors meetings, both of which promoted physical activity and joining groups (Zidén et al., 2014) and have since been implemented in service delivery. Zidén et al. (2014) reported that the study showed the value of mutual support within a group environment, promoting successful attainment of the course aims, a factor noted in this study (see Section 5.18, p213).

Cognitive Behavioural Therapy (CBT)

Cognitive Behavioural Therapy (CBT) is defined as ‘a psychotherapeutic intervention aimed at modifying individuals’ thoughts and behaviour’ (Liu et al., 2018:521). CBT has been trialled with older adults experiencing FOF on the basis that they may, for example, have pessimistic views about potential outcomes of a fall which could be amenable to change with appropriate information. A recent systematic review of randomised controlled trials involving CBT with the aim of reducing FOF was carried out by Liu et al. (2018). Six studies (Hong Kong, The Netherlands, Taiwan, UK; total *n*=1626) met the review criteria (RCTs involving adults aged 60 and above, published in peer-reviewed journals, comparing CBT with inactive controls or comparing exercise therapy with and without CBT). Five of the studies were subsequently included in the meta-analysis. A small significant immediate effect on FOF was reported from the meta-analysis, with effects retained for up to 12 months. Follow-up studies were recommended with CBT and exercise combined and are classified here under ‘Multifactorial’ interventions.

Other interventions

Contrasting approaches to finding appropriate interventions to address falls and/or FOF or falls efficacy are illustrated by two particular studies. In a novel approach to fall risk, a small (*n*=18) pilot study in Switzerland (Donath et al., 2014) explored fall training with healthy and active adults aged 65 plus who were randomly assigned to either a fall training intervention or control group (three falls-risk education sessions). The intervention group had 12 falls training sessions over six weeks based on Tae kwon do. Conclusions were that the six-week training 'did not beneficially affect balance and gait performance and fear of falling under normal and dual-task conditions in a healthy and active population of older adults' (Donath et al., 2014:332). Perhaps unsurprisingly, doubt was cast as to whether this intervention could safely be provided to those who could potentially benefit most, the frail elderly with high FOF, due to increased risk of fall-related injury inherent in the activity. As stated by the authors, further exploration of this type of intervention would not appear appropriate for this particular target group.

In an innovative pilot study (*n*=91) in the USA, Kim et al. (2012) investigated guided relaxation and imagery specifically with the aim of increasing falls efficacy. Participants were randomised to receive an audio CD with guided relaxation and imagery (GRI Intervention) or audio CD with guided relaxation only, to be combined with the participants' music of choice (control). The GRI CD included guided imagery of tasks getting progressively more difficult, ranging from simple household activities to challenges such as walking on icy roads. Participants were requested to listen to the CD for 10-15 minutes twice a week for six weeks. Both intervention and control groups showed improvements in self-reported falls efficacy scores (short FES-I) and increased leisure time activity, and had a reduced time for the Timed

Up and Go Test (TUG) (Podsiadlo & Richardson, 1991) although the intervention group was reported to have greater improvements in scores. Kim et al. (2012) suggested that GRI might be especially helpful for those who cannot perform home-based exercise/activity and point out that it is a potentially cost-effective intervention. This is an interesting pilot study and subject to further research, as stated by the researchers appears to have potential for those most reluctant or unable to leave their home environment.

Multi-Factorial Interventions

Comparison of different interventions led to the combining of elements of various interventions as this was seen as potentially advantageous (Brouwer et al., 2003; Clemson et al., 2012). Multifactorial interventions have been developed including elements such as health and falls risk education with exercise or physical activity. An early multifactorial intervention developed by Tennstedt et al. (1998), called ‘A Matter of Balance’, promoted functional, physical and social activity and included a cognitive-behavioural component which focused on increasing falls efficacy. The approach was reported to show immediate benefits, with the level of intended activities and mobility control increasing. However, these increases were no longer evident at six-month follow-up. Subsequently the intervention has been increased to nine sessions (Peterson, 2002) and has been trialled in different countries. Zijlstra et al. (2009) conducted the study in the Netherlands (*n*=540) reporting significant results for levels of FOF, activity avoidance and concern about falling post intervention, with reduced FOF and perceived control over falling being maintained at 14 months. Other studies have also combined behavioural programmes with various forms of exercise (Huang et al., 2011; Azizan & Justine, 2015).

Jung et al. (2009) in a small meta-analysis of six studies, found that significant results were found in two interventions where exercise and education were combined (and also in one hip protector intervention), whereas exercise only interventions were found not to have statistically significant results. Results suggested that 'combining exercise and education is more effective than an exercise-only program because fear of falling is influenced not only by physical problems but also by psychological and cognitive issues' (Jung et al., 2009:14).

2.4.3 Summary of intervention categories

A variety of interventions with outcomes including preventing or reducing FOF have been devised, the main types described previously. They range from assessment of the home environment and provision of equipment or assistive technology as appropriate, education about healthy ageing and falls risk reduction, to various kinds of group or individual activity/exercise programmes. Results indicate that physical activity of any kind can be effective in reducing FOF immediately post-intervention and at short-term follow-up of approximately six months (Kendrick et al., 2014). Other interventions have also yielded positive outcomes, particularly in the short term, including multifactorial programmes (Tennstedt et al., 1998; Peterson, 2002; Huang et al. 2011; Azizan & Justine, 2015) and falls education/mutual support (Zidén et al., 2014). CBT was been found in one study to have an enduring effect on FOF of 12 months (Liu et al., 2014).

While reductions in FOF and improvements in falls efficacy are undoubtedly valuable to an individual even for a short period of time, sustained benefit is obviously the desired outcome for any intervention. It appears, however, that whatever the intervention, maintaining the benefits for participants in the longer term is the main challenge. Factors which could influence the maintenance of benefits are identifying interventions which are perceived by older adults as feasible for them to continue independently in the longer term and relevant to their daily lives, thereby promoting continued application of a program of learning and/or activity beyond the intervention period (see Section 5.21, p217). Some studies have also found a ‘follow-up’ or ‘booster’ session useful (Zijlstra et al., 2009).

It is also well established that uptake of falls prevention and related programmes is generally low (Yardley et al., 2006; Chen et al., 2016); therefore, in the first instance, recruitment strategies are important. Different approaches tailored to the individual, such as emphasising its value for maintaining independence, are suggested by the Centre for Ageing Better (2019).

Having outlined the different types of interventions developed for reducing or preventing FOF amongst older adults, the next section of the review sets out relevant research relating to AT application by older adults. This study builds on the existing knowledge about AT application by older adults and explores the contribution of AT to the problem of FOF.

2.5 Alexander Technique (AT)

There are relatively few published research studies about AT. While numbers have significantly increased over the last 20 years, this has nevertheless failed to yield a significant empirical basis upon which the impact of AT has been systematically evaluated. Two systematic reviews (Ernst & Canter, 2003; Woodman & Moore, 2012) have emphasised the 'relatively small evidence base' (Woodman & Moore, 2012:110).

2.5.1 Literature search process, criteria and results – Alexander Technique (AT)

A search of relevant literature was carried out using the PRISMA format (Moher et al., The PRISMA Group, 2009) (Figure 2.4, p72). The aim was to restrict the search to research relating to application of the AT by older adults living in the community. The specific area of interest was fear of falling; however, given the relatively small amount of research with older adults (demonstrated by preliminary searches) research associated with relevant background to this research project was included, in particular, research relating to AT and balance, movement or falls among older adults. Research was restricted to community-living older adults, excluding those living in residential or nursing home facilities, and excluded laboratory-based research.

The following individual databases were searched: Cochrane Database of Systematic Reviews, Cochrane Database of Trials, Joanna Briggs Institute, Cinahl Plus, Medline, PsycInfo, AMED, Web of Science. No start dates were imposed and the searches included publications up to 28th February 2019 on the advice of supervisors. Subsequent publications have been noted and commented upon as relevant, using the same search and evaluation criteria. It was found that a universal search term did not produce results for all databases; therefore, alternatives were used as necessary, as detailed in Table 2.4, p73.

Figure 2.4: Search process - Alexander Technique and older adults

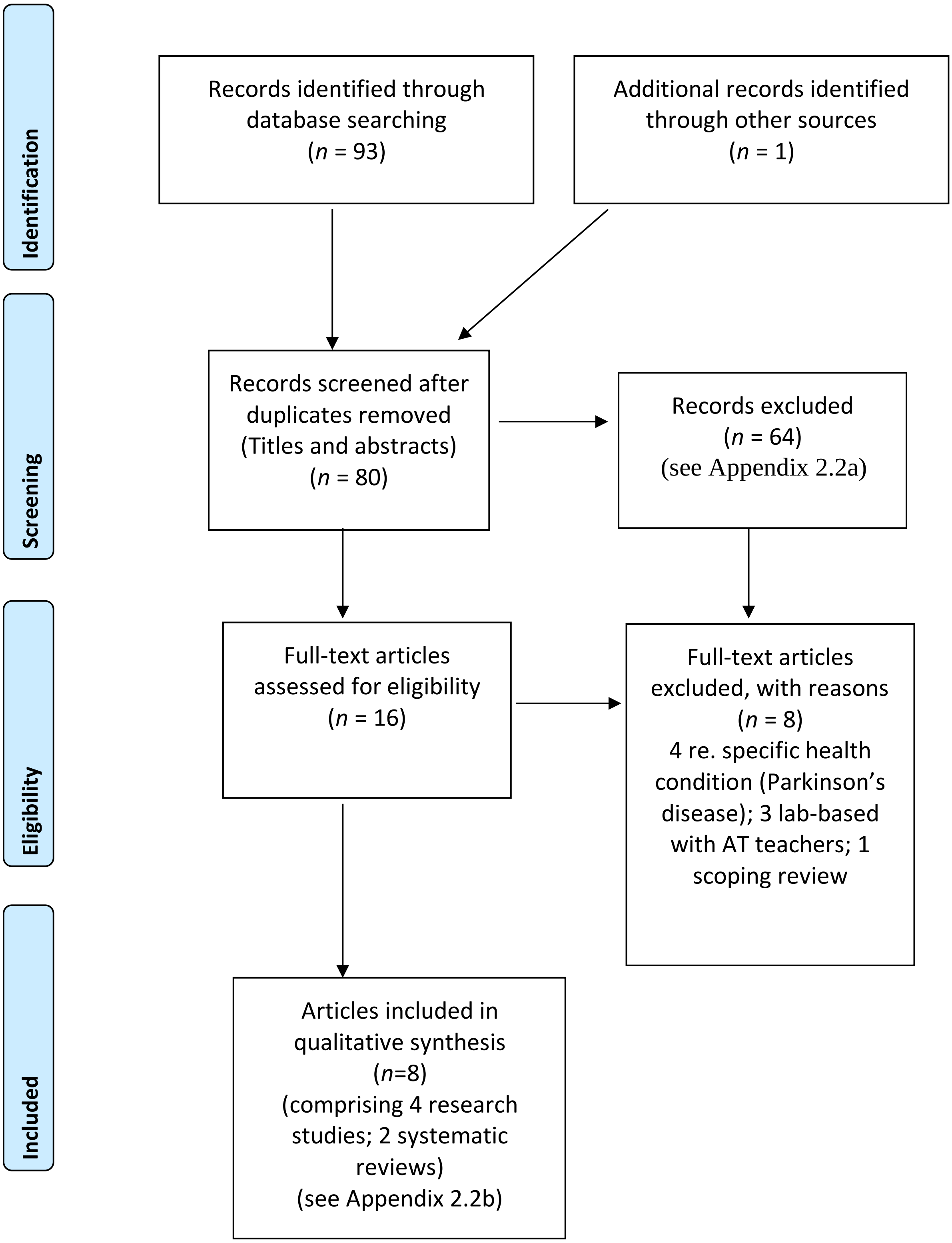


Table 2.4: Search terms - Alexander Technique and older adults

Database	**Search Terms**
Cochrane Database of Systematic Reviews/Joanna Briggs Institute	Alexander Technique *only*.
AMED	Alexander Technique *only* as the search term, with academic journals and English language specified, followed by a process of exclusion of non-relevant items.
Cinahl Plus/Medline/ PsycINFO	Alexander Technique AND either: accidental fall(s) *or* any of the following terms (using wildcard characters to enable variations on stems of words): fear/fall or fall/anxiety or concern/fall, within 4 words proximity to each other within the document.
Web of Science	Alexander Technique AND, (using wildcard characters) words including the stems "old" + adult OR "old" + people OR "elder" OR "senior".

2.5.2 Overview of Relevant Research

Database searches revealed a small emerging strand of research over the last 20 years of the study of application of AT by older adults living in the community. Explorations of AT application by older adults have so far looked at the effect on balance (Dennis, 1999), managing Parkinson's disease (Stallibrass et al., 1997, 2002, 2005; Cohen et al., 2015 and more recently Sedaghati et al., 2018), balance confidence (Batson & Barker, 2008), and balance and mobility in older adults with visual impairment (Gleeson et al., 2014, 2015, 2017). A recently published study has looked at the impact on FOF (Glover et al., 2018) the subject of this research study. The studies relating to Parkinson's disease have been excluded for consistency with the previous sections of this literature review, as they relate to a specific health condition. The relatively new area of investigation into application of AT by older adults illustrates how a body of evidence slowly emerges. It is an example of how relatively small pilot studies play an important role in new and developing areas of enquiry, and in trialling and developing appropriate methodologies (van Teijlingen & Hundley, 2001; Beebe, 2007).

2.5.3 AT research - application by older adults

There are few AT research studies directly relevant to this area; however, as the work in this thesis builds directly on those reported, some detail on each is given. Firstly, motivated by the incidence of falls in older adults, an exploration into AT and balance in older women (65+) was carried out in the USA by Dennis (1999). He examined the impact of AT in improving balance by assessing functional reach (FR, Duncan et al., 1990), a clinical measure of balance. Participants also completed a questionnaire about perception of their improvement in balance, strength and movement, as well as enjoyment of the course.

Pilot (*n*=6) and experimental groups (*n*=7) received AT instruction (one-hour sessions, twice a week, for four weeks). The intervention of AT instruction was provided by the researcher, an AT teacher, and included hands-on guidance (see Appendix 1.0, 'hands work'). Reported results stated that the pilot group increased FR by a mean of 40.8%; the experimental group increased by a mean of 32.2% following the intervention and decreased by a mean of 5.2% after a further one-month follow-up. Reduction after a month raised the issue of retention of AT learning (see Section 6.2.1, p223). The control group had a greater mean FR than the experimental group in the pre-test, attributed to self-selection of the experimental volunteers due to their perceived need. A reduction of a mean of 6.3% in FR for the control group at the post-test could not be explained although it was thought to be due to an issue of test-retest reliability for FR. A similar test item involving, 'reaching forward' was included in this study but modified before the pilot test, raising questions about the appropriate nature and utility of such tests for older adults, particularly those for whom balance and movement is a concern (see Section 4.4.3, p136).

Another anomaly in the study was inclusion of one man in the control group when the study was stated as relating to FR in women. Anomalous post-test results for the control group raise a question about the recruitment process and motivation of control group participants in this study.

The stated assumption of the research was that there would be improvement in FR after instruction in AT and accordingly one-tailed *t*-tests were used in the statistical analysis. However, the results of the control group, albeit considered anomalous, illustrated that a change in FR was possible in either direction. Consequently, one-tailed tests were not appropriate and therefore casts doubt on statistical results.

The qualitative element of the study (an eight-question questionnaire) with four possible responses was skewed towards positive answers as the questions asked about the participants *perceived improvements.* The author acknowledged that responses can be skewed towards the positive as a result of the regular input and enjoyment of interventions, a factor also acknowledged in this study (see Section 4.11, p172). However, Dennis did not acknowledge the positive wording of the cue question. More neutral wording would have been preferable.

Bearing the acknowledged limitations in mind, this study can be seen as pioneering in being the first reported research related specifically to exploring the impact of an AT intervention on balance among older adults. Particularly interesting features of the intervention were the provision of AT instruction on a group basis and the researcher's decision to provide AT input of two sessions a week. Group provision of AT, including frequency of delivery is an aspect explored further in this study (see Section 4.3.3, p127). Due to the small size of the study by Dennis and use of one-tailed statistical tests, caution is required over interpretation of the statistical results. However, along with favourable comments from participants, they indicated that AT had potential to bring about improvements in balance in older adults worthy of further exploration.

Batson & Barker's (2008) study, also in the USA (*n*=19), was concerned with both balance and balance confidence in older adults living in the community and was similarly delivered on a group basis. Assumptions were that a course of intensive AT instruction would improve balance and gait speed, resulting in improved balance confidence in the individuals. There was no randomisation of participants and no control group; therefore, the study was pre-experimental, with one group tested before and after the intervention (pre-intervention/post-intervention design).

Two outcome measures of balance were used: The Timed 'Up and Go' Test (TUG, Podsiadlo & Richardson, 1991) involving timing someone standing from an upright chair, walking three meters, turning and returning to the chair to sit down; and the Fullerton Advanced Balance Scale (FAB, Rose et al., 2006) a 10-item assessment of balance. The authors stated that balance confidence was ascertained using the Modified Falls Efficacy Scale (MFES, Hill et al., 1996) although the MFES was described as assessing FOF by Hill et al. (1996) (see

Appendix 2.3). Participants were also asked a single direct question about fear of falling (with three optional responses) (see Section 2.3.1, p46). In addition, video recordings of pre- and post-intervention performance were taken and viewed by objective viewers (not AT trained) to verify observations made by the researchers who were both qualified AT teachers.

Participants were aged 60+ with a falls history. Eligibility criteria were ability to walk 50 feet, with or without an assistive device, and requiring minimal assistance in transfers. Exclusion criteria included cognitive impairment/memory impairment, ascertained by a Mini-Mental State Examination score (MMSE) (Folstein, Folstein & McHugh, 1975) of less than 23. Other exclusions were significant visual and hearing impairment incompatible with taking part in the AT classes (assessed by interview). The intervention consisted of 10 AT classes of 90-minute duration held in a University dance studio, from Monday to Friday for two weeks. The Alexander teachers used hands-on guidance (see Appendix 1.0) during the second week of the intervention, but not the first.

Statistically significant results ($p \leq .05$) were reported for the TUG ($p = .006$) with average group results of a 1.7 second decrease post-intervention. FAB results were also reported as significant for the group as a whole ($p = .05$). The MFES results were not significant except for one task, light housework. There were no significant correlations between pre-intervention and post-intervention scores and age, or scores and falls.

Self-reported balance confidence was not significantly different post-intervention compared to pre-intervention, although this appeared to be contrary to an observed increase in confidence perceived by independent observers of video tapes of pre- and post-intervention performance. Batson & Barker (2008) drew attention to the established phenomenon that self-reported confidence does not always match functional ability, referring to Maki et al. (1991).

The study by Batson & Barker (2008) usefully extended the research begun by Dennis (1999) by working with a larger group (*n* = 19) of both men and women. They demonstrated that participants were willing to engage in an element of self-directed learning within the sessions, indicating that participants viewed the learning as relevant and useful. They also raised the issue of a potential difference in self-report as opposed to observed, balance confidence, also noted in the current study (see Section 6.2.7, p233). As with all small studies, statistical results must be viewed with caution but appeared to indicate the value of continued research in this area.

Batson & Barker (2008) concluded that it appeared feasible to include AT training 'within balance training' (Batson & Barker, 2008:103) stating that it improved scores on balance outcomes. It is interesting that the recommendation was for further controlled research into balance training with and without additional AT instruction. Exploring AT as an alternative to other balance training, rather than integration with it appeared to be an equally viable alternative, particularly as preliminary results reported from the study indicated a favourable response from participants towards AT.

Limitations of the study in the view of the researcher, were that more challenging items of the FAB could have increased anxiety in participants who had concerns about balance, for example 'spontaneous perturbations of postural reaction' or 'standing with feet together, eyes closed' to name just two (Batson & Barker, 2008:107). While using the MFES, which they described as ascertaining balance confidence, Batson & Barker (2008) used the term balance confidence interchangeably with FOF when reporting results. While it can be argued that balance confidence and FOF are two aspects of the same phenomenon, that of falls efficacy, as discussed previously (see Section 2.3.5, p54), it is important to be consistent and clear in using such terms to avoid perpetuating confusion.

The frequency of delivery of the intervention was intensive with classes held daily (Mon-Fri) for two weeks. Such delivery would have required considerable commitment on the part of the participants and does not appear realistic other than for research purposes. Such intense AT learning opportunities are not routinely available in the community in the UK for example. As AT teachers did not use hands-on guidance during the first week but did during the second, this raised the question which was not addressed in the study, about whether hands-on guidance could have been omitted altogether, given the stated aim of the research was to promote autonomous learning.

Exclusion on the basis of cognitive/memory impairment could arguably be justified, as a certain level of retention of information is required to apply AT learning. In the interests of inclusivity however, hearing and speech deficits could potentially be accommodated within a group setting, provided there were enough AT teachers available, potentially involving an increased ratio of teachers to participants.

The comprehensive report of the Batson & Barker (2008) study meant that a variety of its aspects could be taken into account and built on in the planning of the current study. In particular, the missing element of feedback from the participants on their experience of learning and applying AT which was an essential part of this study (see Section 3.7.1, p115). In addition, delivery of the intervention was explored on the basis of what would be practical in a community setting, rather than in a research environment (see Section 4.3.3, p127). The question raised by the Batson & Barker (2008) study about the necessity for hands work by AT teachers was addressed by conducting this study without this element of teaching (see Section 4.7.2, p151).

Further investigation into balance and mobility in older adults, this time specifically in older adults with visual impairments was undertaken in Sydney, Australia (Gleeson et al., 2015, ‘VISIBILITY’ study). Participants were randomised to intervention or control groups, with assessors unaware of allocation. Participants (*n*=120) were recruited from the client database of a community support organisation. Participants were included from the age of 50 to 90, justified by citing findings on vision and postural stability in women in their 50s (Choy et al., 2003). The mean age of both the intervention and control groups was 75 years. Participants were randomised to an intervention group (*n*=60) who received 12 weekly one-to-one lessons in AT within their own home, in addition to the usual care (received via community support), or a control group (*n*=60) who received usual care only.

AT lessons were provided by one teacher and were 30 minutes in length (including hands work). The lesson protocol included ‘everyday activities’ and was adapted as required for individual progress. Main (primary) outcome measures at 3 months were Short Physical Performance Battery (SPPB) items (Guralnik et al., 1994) subsequently assessed as secondary outcomes at 12 months. Other secondary measures were postural sway tests from the Physiological Profile Assessment (Lord et al., 2003), and maximum balance range test at three and 12 months. Calendars recording falls were submitted on a monthly basis by participants. FES-I (short form) (Kempen et al., 2008) was administered at baseline, three and 12 months to ascertain concerns about falling.

Results of the study were that there were no statistically significant differences between the intervention and control groups in the primary outcomes at three months. There was a reported improvement in the four-meter walk at three months, and postural sway in quiet standing improved in the intervention group at three months when standing on a firm surface with eyes open. The authors suggested this indicated an improvement in balance. Some additional sub-group analysis was carried out which showed that there were also greater intervention effects in the subgroup of multiple fallers. However, at 12 months there were no differences between the two groups in the SPPB items. The authors state that ‘there was a trend to better performance in the maximal balance range measure (p = .07) in the intervention group’ (Gleeson et al., 2015: 248); however, as indicated by the p value this was not significant. There were no significant differences in the Short (FES-I) questionnaire results at three months or 12 months, indicating no significant change in FOF.

This study specifically investigated how AT lessons could help older adults with visual impairments. While it did not report statistically significant results, it did give an indication that some improvements were evident at least at the three months stage in people in the intervention group in walking and postural sway. Referring to characteristics of AT where ‘focus is on quality of movement and economy of effort…’ (Gleeson et al., 2015: 256), the authors acknowledged that speed would not necessarily be expected to increase, although likely in those with poor baseline performance. In contradiction to this statement, the assessment tools chosen were nevertheless based on speed. In accordance with the feature of AT learning being that of conscious attention (see Appendix 1.0) to the process and quality of movement, speed was not included as part of the assessment process in this study (see Section 4.4.3, p136). Although it was intended that assessors did not know which group participants were in (assessor blinding), no indication was given of whether this proved realistic in practice. In the experience of the researcher, assessor blinding seems rather implausible in the circumstances described, given the tendency of participants to want to discuss new experiences. However, knowledge of group allocation should not, in theory, affect the scores awarded if an assessment protocol is followed.

Gleeson et al. (2015) state two major limitations of this trial. The first one being a lack of a placebo group to control for the effect of touch and personal attention received by the intervention group; the second one stated as the limitation of 12 AT lessons. These stated limitations are based on a comparison with a former trial regarding AT and back pain (Little et al., 2008). However, it could be argued that such a comparison is not wholly appropriate given, as they say, that a dosage level for a therapeutic effect has not been established (Gleeson et al., 2015:258). In addition, the assumption is made that all AT instruction requires hands work by an AT teacher. As mentioned previously, this study explores AT delivery comprising verbal explanation and demonstration only, with emphasis on encouraging observation by participants (see Section 4.7.2, p151). Lack of placebo for ‘touch’ by AT teachers also raises the question of how feasible it is for AT research to attempt to ‘fit’ into the requirements of quantitative studies such as randomised controlled trials (RCTs) (see Section 6.3.4, p239).

Supplementary quantitative data from this study has been reported subsequently (Gleeson et al., 2017) regarding vision-related emotional and social well-being. No statistically significant impact of the AT intervention was evident at three or 12 months compared to baseline. Incidence of depressive symptoms in those with visual impairment was noted. While attempts to evaluate emotional and social well-being outcomes in this study are laudable and interesting, lack of any qualitative element to data collection precludes a real insight from the participants' point of view. While inferences can and are made by the researchers, these could potentially have been more robust with qualitative feedback from the participants.

A UK study by Glover et al. (2018) investigated the effects of a group-delivered AT intervention on FOF. As with this research study, a mixed-methods approach was taken (see Section 3.5.3, p106), enabling reporting of feedback from participants, a useful and important addition to the predominance of quantitative approaches reported prior to this. Participants of 65 years and over with a FOF were recruited from the community (*n*=12). They took part in a 12 session AT group intervention over a period of 9 weeks. Sessions were for 90 minutes with a 10-minute break and included some hands work by the Alexander teachers.

Quantitative data was gathered using a number of standardised measures at four time points: baseline, pre and post intervention and one-month post intervention. The primary outcome measure of FOF was assessed using the FES-I questionnaire (Yardley et al., 2005; see Appendix 2.3). Secondary outcome measures were depression, measured by the GDS Short Form Geriatric Depression Scale (Sheikh & Yesavage, 1986); health status measured by the SF-12 Short-Form Health Survey (Ware et al., 1996); and balance using the short form of the Berg Balance Scale (Chou et al., 2006). The number of reported quantitative results were variable across outcome measures due to lack of complete data sets for all participants, which limited the possibilities of statistical analysis in this small study, acknowledged by the researchers. Quantitative results were reported as 'inconclusive' for the primary outcome measure on FOF.

Qualitative data was gathered from two focus groups (three and four participants respectively) and was analysed using thematic analysis. Main themes identified were (1) changes following participation in the group, (2) experience of AT, and (3) learning in a group. The qualitative data reported was relating to the first theme of changes following participation in the group, and was summed up as 'suggesting some profound changes with improvements in movement, mood and confidence' (Glover et al., 2018:79). Evidence of AT learning being seen as relevant and useful for older adults reporting FOF comes through from the voice of the participants, despite quantitative results being inconclusive. The qualitative element in the study suggests a richness of data as evident in this study (see Section 5.10, p202).

As application of AT by older adults is a relatively new area of research the existing studies are few in number and small in scale. Small numbers of participants inevitably mean that results of statistical analysis must be viewed with caution. However, it can be seen that where qualitative data has also been obtained (Glover et al., 2018), interesting additional information has helped to increase understanding of the impact of AT learning for the individual participants. A mixed-methods approach gives the possibility of triangulation of quantitative and qualitative results (see Section 3.5.3, p106).

To date, qualitative data has not reported in detail the views of participants regarding the schedule of course sessions or their content. Such feedback is important in developing courses that older adults are able and willing to engage in. It is established that engaging older adults in courses relating to physical exercise, falls prevention, balance and mobility can be problematic (Bunn et al., 2008); therefore, participants' views when developing interventions are crucial to this process.

In exploring the potential contribution of AT to reducing FOF in older adults, it is important to bear in mind the feasibility of such provision. The work in this thesis built upon the earlier studies (Dennis, 1999; Batson & Barker, 2008) which had demonstrated that group learning of AT had potential for older adults. Group learning is not only potentially more economically viable than individual provision, but social interaction alongside learning is known to be valued by older adults (NICE, 2013). The frequency of intervention most appropriate for older adults in a community setting was further investigated by comparing once and twice-a-week sessions (see Section 3.2.2, p89).

The studies reported here have all included an element of hands work by AT teachers. To date no research study has explored the possibility of providing group AT instruction for older adults entirely without hands work. Should exploration of such delivery prove feasible and beneficial, it would help equip individuals with AT learning which they could continue to apply independently, without any notion of reliance on an AT teacher. Group learning also has the potential to increase access to AT for a greater number of older adults.

2.6 Summary of chapter

This literature review illustrates the broad nature of research in the field of gerontology (Jamieson, 2002; Walker, 2014; Tinker et al., 2016). The context for this mixed-methods research study draws on research relating to the health and wellbeing of older adults affected by FOF; the variety of interventions developed with the aim of reducing FOF; and early stages in research indicating the potential contribution of AT to this widespread concern for older adults. These three areas set the backdrop to this research study investigating the contribution of AT learning to improving balance and movement confidence and thereby reducing FOF amongst older adults.

2.7 Reflections

The problem of FOF amongst older adults has been a long-held area of interest, making individual research studies of inherent interest. However, despite this, the seemingly vast array of literature related to FOF among older adults has at times seemed daunting and difficult to approach with the purpose of compiling this literature review. Many different strands of interest have beckoned, but ultimately it was necessary to strictly confine the areas of investigation to the most immediately relevant areas for this research study. Synthesis of material into summaries has proved challenging throughout.

Chapter 3 – Approaches to research

3.1 Introduction

The approach to this study was initially influenced by the researcher's existing knowledge, experience and understanding of AT, both personally and professionally (see 1.2.2, p4). The study aimed to explore whether a short course in AT would enable individuals of 60 years and over to bring about an improvement in their balance and movement, thereby increasing balance confidence and reducing FOF. The mixed-method design would enable the researcher to explore the intervention from different aspects. This included, firstly, whether potential changes in balance confidence and FOF could be assessed as direct measurable outcomes of the intervention by quantitative methods. Experience of quantitative evaluation within this study, however, led to a retrospective questioning of the contribution of quantitative methods to the evaluation of AT interventions (see Section 6.3.4, p239). Secondly, and of particular interest to the researcher with experience of working alongside older adults challenged by balance and mobility to varying degrees, was the lived experience of the participants as they undertook the intervention and afterwards. The views of the participants about AT and the course sessions were crucial in evaluating the potential for future development of the course for this age group (over 60s). It was anticipated that complex factors well documented as contributing to FOF (see Sections 2.2.7 - 2.2.9, pp35-43) were also likely to be evident or expressed in participants' responses to the AT course.

This chapter begins with the hypothesis behind the research study and introduces the research questions. The rationale, advantages and specific purposes of the mixed-methods design and how this emerged from consideration of the research questions is explored. An outline of the quantitative and qualitative methods employed is given, including the specific data collection methods for the quantitative and qualitative elements of the study (see Table 3.1, p100). The chapter concludes with a summary and the researcher's reflections. Full details of the methods and procedures used are not included in this chapter, they are set out later (see Chapter 4, p122).

3.2 Hypothesis and research questions

3.2.1 Hypothesis

The hypothesis underpinning the research study was that the application of AT learning would enable participants to bring about improvements in their balance and movement, potentially increasing balance confidence and reducing FOF.

3.2.2 Research questions

Primary research question: would a short introductory course in AT enable participants aged 60 years and over to improve their balance and movement, thereby increasing balance confidence and reducing FOF?

Secondary research questions would be explored by use of a post course evaluation by the participants, to ascertain:

- participants' responses to learning AT in a group environment
- whether once-a-week or twice-a-week sessions would make a difference to the outcomes, experience and learning of participants
- the nature of participants' experience and views of learning AT including course content
- participants' perception of the usefulness of AT in relation to balance and movement, balance confidence and FOF; how this was reflected in their application of AT outside of the learning environment and after the course had ended.

3.3 Background and location of the study within the field of gerontology

This research study arose from two aspects of the researcher's experience, as previously described (see Section 1.2, p1). Firstly, observation of a specific problem amongst older adults, FOF; and secondly, knowledge and experience of AT. Unanswered questions related to application of AT by older adults and the type of AT intervention most appropriate for this age group were the driving force behind the desire to conduct this research study. Research enables questions to be explored in a systematic way with the aim of increasing knowledge and understanding (Neuman, 2011). While the researcher had experience of AT teaching with older adults, this had been intermittent over the years, in effect arising 'by chance' as older adults had been taught on a one-to-one basis or as part of a group of adults of mixed ages. Therefore the research study was an opportunity to explicitly seek out older adults (over 60s) to work with. The research was a process (Matthews & Ross, 2010) by which further knowledge and information about the potential of AT learning and application within this age group could be generated. As the AT intervention was specifically aimed at older adults who expressed concern about balance and movement, the study is located within the discipline of gerontology.

The field of gerontology is broad (Jamieson, 2002; Tinker et al., 2016), defined as 'the interdisciplinary, holistic and wide-ranging study of older people and ageing' (Tinker et al., 2016:190), further divided into component disciplines encompassing health, including geriatric medicine, biology of ageing, and social gerontology. When making the case for multi-disciplinary research within gerontology, Walker (2014) made the point that 'people do not age in disciplinary boxes' (Walker, 2014:11), a sentiment which is illustrated well by this study as the background to it draws on research within the field of health in relation to falls and FOF amongst older adults (see Section 2.2.2, p24), while exploration of the lived experience of the participants can be located within the field of social gerontology.

Social gerontology is itself described as 'multifaceted and open-ended' (Jamieson, 2002:9), encompassing different concepts, frameworks and perspectives. It has developed from more traditional areas of study consisting of the social, economic and demographic characteristics of older adults and ageing populations, to include health, technology and overall lifestyle (Phillips et al., 2010:1). Two of the concepts in social gerontology particularly pertinent to this study are independence and quality of life (QoL). Phillips et al. (2010) have a useful and comprehensive definition of independence for older adults illustrating the different aspects which may constitute a perception of independence for any particular individual, being 'A sense or state of physical, psychological and spiritual autonomy, self-identity, self-respect, control and degree of functional capacity' (Phillips et al., 2010:131). It was anticipated that by exploring the lived experience of the participants of learning and applying AT in daily life that detail would be shared relating to concerns about balance and movement and how it impacted on their perceived independence. For example, a decline in balance and movement could lead to the requirement for assistance with daily tasks, potentially having an impact on an individual's perceived sense of control and autonomy.

QoL is acknowledged as a complex concept (Phillips et al., 2010). In a survey of older adults' perspectives on quality of life in the UK (Gabriel & Bowling, 2004), qualitative follow-up with a sub-set of participants (*n*=80), revealed a number of themes that contributed to QoL, including those relating to social relationships, home and neighbourhood, hobbies, leisure and social activities, health and mobility, and retaining independence and control over life. The findings of Gabriel & Bowling (2004) indicated a close inter-relationship of factors relating to this study. Over two-thirds of the respondents emphasised the importance of retaining independence for their quality of life, with 21 people stating that being able to walk and have good mobility was important to them. Mobility and independence were associated with going out and meeting people and avoiding being dependent on others. The mixed-methods design which emerged for this study (see Section 3.5, p99) had the potential to illuminate further the connection between the factors of mobility, independence and QoL. By collecting quantitative data relating to balance confidence and FOF, together with qualitative data relating to the lived experience of the participants, there was the possibility to explore the impact and relationships between these factors for the individuals in the study (see Section 5.16, p211).

The aim in planning this research study was to work directly with older adults. While it is appreciated that some older adults may be considered vulnerable due to individual factors, a generalised view of vulnerability simply due to chronological age is contentious (Age UK, 2015) and reliant on age stereotypes (Brocklehurst & Laurenson, 2008; Dionigi, 2015), and is not an underlying view of the researcher. Nevertheless, ethical compliance for this study included safeguarding considerations (see Section 4.3.1, p125 & Appendix 3.0). The researcher's approach in this study was to work collaboratively alongside each individual participant without preconceived assumptions or generalisations about ability or vulnerability (see Section 4.7.2, p151).

Recruitment of volunteers was a practical consideration. The design of the study (see Figure 4.1, p124) resulted in the requirement for two separate research groups plus a small pilot group. The researcher became aware of existing links between the university and Extra Care housing organisations in the area, which were known to be open to participation in research studies. Extra Care housing is a form of sheltered housing which has care facilities available, enabling a range of need amongst residents to be met (Phillips et al., 2010; Independent Age, 2020). The aim is for residents to live independent lives, engaging as they wish with communal activities and with individual care support available, subject to need and assessment. Communal facilities are usually available, for example at each of the research venues in this study there was a café or restaurant. Community rooms or a hall were also available for activities for the residents and in which the AT intervention sessions could be held. The advantage of such venues was in providing direct access to older adults living independently within their own homes, and with a range of mobility levels and support needs. Uptake by older adults of falls-related preventive or rehabilitation courses is low

(Yardley et al., 2006; NICE, 2013). Those who have concerns about balance and movement are particularly difficult to engage (Bunn et al., 2008). The nature of such concerns means that older adults may be reluctant to join-in with activities in the community, including courses potentially addressing their concerns. Therefore, it is acknowledged that existing university links with these venues was opportune for this study, although access and subsequent recruitment were not guaranteed (see Section 4.3.4, p129).

3.4 Development of the research design

There were two different aspects to the exploration of the AT intervention: an investigation of whether potential changes in balance confidence and FOF could be measured objectively, using quantitative methods; and facilitation of an assessment by the participants.

3.4.1 Qualitative data collection

The experience of the participants was of inherent interest to the researcher. With a background of working alongside older adults and being familiar with some of the challenges faced in daily life due to a reduction in balance and mobility, the researcher's interest was in gathering participants' views of the intervention based on their lived experience of learning AT. Information about what was of most help in terms of practical procedures and ways of learning would inform the further development of the AT course. The underlying desire as an AT teacher was to find the most effective way to deliver the intervention to enable participants to employ AT learning to help themselves. Participants' feedback was therefore central to the further development of the intervention, which would only be worthwhile if the participants confirmed it as being useful to them in everyday life. Therefore, participants' views, ideas and recommendations about the intervention were to be a crucial element in the assessment of it, drawing the researcher towards a qualitative approach for this aspect of the study.

Data gathered in qualitative research can take many forms although generally excluding numbers, which are associated with quantitative data (see Section 3.4.2, p97). For example, qualitative data may be in the form of words e.g. focus group or interview transcripts, diary entries or documents; or visual images such as video recordings, photographs, artwork etc. (Punch, 2005). Focus groups were chosen for this study with the intention to facilitate discussion between participants about their experiences during which it was hoped that their true opinions would emerge (Halkier, 2010) (see Section 3.7.1, p115).

Associated with an interpretivist paradigm, qualitative research is concerned with insights into people's beliefs and lived experiences. The social world is recognised as being multi-layered and complex, requiring a process of interpretation to reach understanding. The researcher is usually closely involved in the compilation and analysis of the data and it is accepted that they will not maintain objectivity in this process, as their experiences and identity will affect their thinking (Denscombe, 2017). The researcher was to be closely involved in the data collection and analysis in this small-scale study. It was acknowledged that personal understanding of AT as well as experience of teaching would mean that interpretation of the qualitative data (see Section 4.9.8, p168) would inevitably be carried out through the 'lens' of this background knowledge. While AT experience could be seen as a potential advantage in coming to an understanding of the data, a possible disadvantage was that certain ‘themes’ within the data could potentially be predicted. Having anticipated this potential, the researcher was aware of the importance of approaching the data collection and analysis without expectations of what may be discussed by participants and of being open to whatever was present in the data. The desire to understand the AT learning experience of the participants in this age group meant it was essential to remain open to any new or unexpected themes that might emerge from the experiences or perceptions of individuals within the two research groups (see Section 4.9.8, p168).

Prioritising the recommendations of the participants in the subsequent development of the course was an important consideration to the researcher for two reasons. Firstly, older adults involved in research typically express the desire for resultant changes to happen quickly (Ross et al., 2005) and accordingly, the intention was to provide courses for older adults in the community following the research study. Secondly, it would ensure that the voices of this hard to reach group of older adults would be heard, which is generally not the case (Velzke & Baumann, 2017; Davis et al., 2019). Recruiting older adults to research is established as being problematic (Harris & Dyson, 2001) but also necessary if services are to be appropriate for those who are to receive them. Older adults are uniquely able to give the benefit of their experience and indicate what will and will not work for them (Beresford, 2014). A critique of the historic involvement of older adults in research is that they have been confined to the role of data subject (Ray, 2007). However, developments have meant that increasing attempts have been made to involve older adults in an advisory capacity and in some cases in directing, developing and carrying out the research (Beresford, 2014). While a spirit of collaboration with participants was fostered throughout this study, subsequent reflections have indicated that more could have been done to involve them in its design and planning (see Section 3.9, p118). Valuing the time and effort of the participants meant that planning the end of the research was important (Tanner, 2010) so that they did not feel as if they were abandoned (Clough et al., 2006) once their involvement with the study ended. Therefore, preliminary indications of results were shared with both groups of participants following the end of the intervention and assessments (see Section 4.8.5, p160 & Appendices 4.15 & 4.16).

3.4.2 Quantitative data collection

Although not instinctively drawn to quantitative methods the researcher kept an open mind about the most appropriate research methods to answer the underlying research questions (see Table 3.1, p100). In addition to the interest in the lived experience of the participants and their assessment of the intervention, the researcher aimed to investigate the objective measurement of the two outcome measures of balance confidence and FOF. There were interesting questions relating to measurement of potential changes in balance confidence and FOF as research has shown that individuals' behaviour is not always in accordance with their stated level of concern. For example, individuals who express FOF may nevertheless carry out activities they are concerned about (Tinetti & Powell, 1993). In a study of older adults and AT (Batson & Barker, 2008) a difference was noted between self-reported balance confidence, i.e. what the person believed they could do and what was observed by independent reviewers of video recordings (see Section 2.5.3, p74). Differences in perceived and actual balance ability have also been shown to affect performance in research with older adults using postural balance tests (Delbaere et al., 2006). Therefore, in this study an alternative approach to self-reporting was explored for the outcome of balance confidence.

In assessing balance confidence in this study the aim was to explore whether it was feasible for changes to be observed by AT teachers trained in detailed observation (see Section 3.6.1, p111) rather than determining balance confidence by self-report questionnaire. This approach would potentially obtain an objective rather than subjective assessment of any change in balance confidence as it appeared that there may potentially be a discrepancy between them as indicated by other studies (Batson & Barker, 2008; Delbaere et al., 2006; Tinetti & Powell, 1993). The other outcome measure, FOF, was determined by self-report questionnaire as discussed later (see Section 3.6.2, p113). At the end of the study the researcher was able to reflect on the experience of using quantitative methods, which informed a view regarding the appropriateness of quantitative research methods in evaluating AT application (see Section 6.3.4, p239).

Quantitative research has characteristics which make it suited to replication, while exact replication of qualitative data can be seen as problematic, as the exact conditions of the study (individual participants and researchers involved, time, place etc.) cannot be fully reproduced. Denscombe (2017) summarised the quantitative approach to research as using numbers in the data analysis, usually being an analysis of specific variables which takes place after data collection and being associated with the positivist paradigm. The positivist paradigm when adopted by social research, applies a scientific model to investigations, with the belief that an independent reality exists which can be found and studied scientifically. While the researcher may be involved in the data analysis, usually characterised by quantitative data and statistics, the researcher is viewed as 'separate from' the data, which is seen as 'objective' and not subject to influence by the researcher (Bryman, 1984; Matthews & Ross, 2010). However, the researcher was aware that even in what may be seen as an objective scientific approach, decisions are required which cannot be entirely devoid of the influence of background and perspective. For example, in this study, the interest in exploring the observational skills of AT teachers in the assessment of balance confidence was obviously influenced by the researcher's background as an AT teacher. Decisions about assessment items within the Balance Confidence Assessment (BCA) (see Section 3.5) were similarly influenced by the researcher's experience as an AT teacher and also as a social worker with older adults, tailoring the items to activities considered representative of everyday activities for people in this age group. This acknowledgement of subjectivity within the decision-making process is more aligned to a post-positivist (Panhwar et al., 2017) rather than positivist perspective on the part of the researcher.

Keeping an open mind about appropriate research methods to answer the research questions in this study led to the inclusion of both quantitative and qualitative elements, as discussed, and therefore emerged as a mixed-methods data collection and data analysis research design.

3.5 Mixed-methods research - rationale

Mixed-methods in research is associated with pragmatism (Morgan, 2007) and is characterised according to Denscombe (2017) as 'the combination of different types of research within a single project…; a preference for viewing research problems from a variety of perspectives…; and the choice of methods based on "what works best" for tackling a specific problem…'(Denscombe, 2017:162-3). By adopting a pragmatic approach to research and being open to both qualitative and quantitative methods, it was possible to develop a design whereby the qualitative and quantitative elements could potentially inform each other (Onwuegbuzie & Leech, 2005). Assessment of the intervention encompassed the directly measured quantitative outcomes (see Section 3.4.2, p97) relating to balance confidence and FOF, and participants' views on AT and the course sessions, obtained by qualitative methods (see Section 3.4.1, p94). The combination of research questions and the data collection methods used to explore them is summarised in Table 3.1.

Table 3.1: Summary of research questions and data collection methods (Cont'd overleaf)

Exploration	Method - Quantitative	Method - Qualitative
Primary research question: Would a short introductory course in AT enable participants aged 60 years and over to improve their balance and movement, thereby increasing balance confidence and reducing FOF?	Quasi-experimental design with two (non-randomised) intervention groups (participants acting as their own controls). Two outcome measures: balance confidence (obtained by practical assessment) and FOF obtained by quantitative self-report questionnaire. Within-subject repeated measures testing at four time points: two before the intervention (control period) and two after the intervention. Outcome measurement tools: Balance Confidence Assessment (BCA), a practical assessment. FOF - self-report (operationalised as falls efficacy): FES-I (short, VAS) questionnaire	Focus groups and individual interviews (see secondary research questions below)

Table 3.1 (Cont'd): Summary of research questions and data collection methods

Exploration	Method - Quantitative	Method - Qualitative
Secondary research question: What would be the participants' responses to learning AT in a group environment?		Focus groups and individual interviews
Secondary research question: Would once-a-week or twice-a-week sessions would make a difference to the outcomes, experience and learning of participants?	Between-subjects analysis of outcome measures: Balance confidence assessment (BCA) FOF self-report (operationalised as falls efficacy): FES-I (short, VAS) questionnaire	Focus groups and individual interviews
Secondary research question: What would be the nature of participants' experience and views of learning AT including course content?		Focus groups and individual interviews
Secondary research question: What would be the participants' perception of the usefulness of AT in relation to balance and movement, balance confidence and FOF?		Focus groups and individual interviews
Secondary research question: How would the participants' perceptions (of the usefulness of AT) be reflected in their application outside of the learning environment and after the course had ended?		Focus groups and individual interviews

A quantitative approach was adopted for the purpose of examining the concepts of balance confidence and FOF as direct outcome measures relating to the intervention (see Section 3.4, p94). An innovative approach to assessment of balance confidence (the Balance Confidence Assessment, BCA) was devised by adapting existing functional assessments (see Section 3.6.1, p111). FOF was operationalised as falls-related self-efficacy (falls efficacy) and assessed using the short version of the Falls Efficacy Scale-International (FES-I) questionnaire, which was adapted for use in this study with a visual analogue scale (VAS) (see Section 4.4.1, p130). While quantitative approaches have the potential to provide measurable outcomes, caution is required in attempting to draw conclusions from data in small studies, which was acknowledged in this study (see Section 6.3, p234). However, one of the advantages of pilot studies is that they provide opportunity to evaluate new or adapted assessment tools (Van Teijlingen & Hundley, 2001; Beebe, 2007). This study gave the opportunity to evaluate the BCA tool which was devised specifically for this study (see Section 4.4.2, p135). In addition, the existing short FES-I questionnaire was adapted to use a VAS scale rather than a Likert-type scale (see Section 4.4.1, p130). Although a previous version of the FES, the MFES (Hill et al., 1996) had incorporated a VAS scale, to the researcher's knowledge a VAS scale had not been used before with the FES-I questionnaire. Consequently, an initial exploration of this adaptation could be carried out within the study to indicate whether further evaluation was warranted in the future.

A qualitative approach was taken for the secondary research aim of obtaining participants' responses to the intervention, including their advice for future adaptation and development of the AT course specifically for people in this age group (over 60s). There are various factors involved in engaging older adults in fall prevention interventions (NICE, 2013) (see Section 4.8.2, p157). Therefore, it is crucial to incorporate feedback from participants into the process of developing acceptable interventions. Focus groups and individual interviews (see Section 3.7.1, p115) enabled the participants to fully contribute to the development of future courses by giving their feedback on the course and their learning experience. The qualitative aspect of the research followed the quantitative element due to the research design and not due to any perceived hierarchy between quantitative and qualitative methods. Feedback from participants about the intervention had, of necessity, to come after the end of the intervention, whereas quantitative assessments of balance confidence and FOF were required at four time-points over the course of the study (see Figure 4.1, p124).

3.5.1 Mixed-methods design – advantages

The advantage of a mixed-methods design is that it allows researchers to combine the benefits of both quantitative and qualitative research. In particular, as Mortenson & Oliffe (2009) stated, it provided the opportunity 'to address research from multiple perspectives to facilitate understanding about multifaceted phenomena such as health, illness and occupation' (Mortenson & Oliffe, 2009:14). Rauscher & Greenfield (2009), in their discussion of mixed methods in physiotherapy research, point out that while quantitative research enables exploration of causal relationships, it does not explain how or why they exist. They point out the advantages of qualitative methods in illuminating the lived experience of the individual, an important aspect in the aims of this study:

> 'Qualitative methods can explore social and behavioural issues related to both illness and rehabilitation at a deeper level than quantitative methods allow, such as pain, injury, disease from the individual's lived experiences…' (Rauscher & Greenfield 2009:92).

While the quantitative analysis in this study was planned to directly measure the specific outcomes of the study, i.e. changes in balance confidence and FOF, measurement alone would not fully inform an understanding of the participants' response to the AT intervention. It would not give a full picture of how likely it was that an AT intervention would appeal to older adults, outside of the research context. Understanding the participants' experience of AT learning and application both within and outside of the course sessions would help inform future development of the intervention by illuminating as fully as possible the participants' experiences and perceptions of it. The fact that AT learning can be applied to activities of daily living provided an opportunity to obtain valuable insight into the participants' motivation to apply learning outside of the course sessions, as they would have frequent opportunity to do so. The combination of quantitative and qualitative methods gave potential for a greater increase in understanding on the part of the researcher than if one of the methods alone were undertaken (Bryman, 2006). The sequence of quantitative data collection followed by qualitative data collection is categorised as an explanatory sequential design (Denscombe, 2017).

In his brief history of mixed-methods research, Maxwell (2016) asserted that long before being identified as a particular type of research, the intentional use of qualitative and quantitative approaches in a single study was already taking place. Greene (2007) commented that designing a mixed-methods study did not involve following a 'formula' or 'prescriptions' but involved tailoring a mixture of approaches appropriate to the practical resources and particular contexts. Greene's (2007) view is particularly pertinent to this small unfunded study, where it was necessary to be realistic about available resources and accordingly to devise a practicable research design. Within the resource constraints it was important to the researcher to collect sufficient data to facilitate the exploration. Conversely, it was important to respect the time and effort of participants by avoiding collecting more data than required, potentially leading to data redundancy (Bryman, 2006). It was acknowledged that individuals who volunteered to take part in the AT course would be likely to find mobility challenging to a certain degree and therefore the number of assessments should be appropriate but not excessive. By using a combination of research methods to critically evaluate the intervention the aim was to strike a balance between all of these factors. For example, while completion of the practical assessment was required on four occasions over the course of the study, the number of assessment items was kept to a minimum consistent with provision of adequate range of challenge. The short version of the FES-I questionnaire, validated as being as effective as the original longer version (Kempen et al., 2008) was used to facilitate ease of completion within the fieldwork setting. The opportunity to participate in a focus group provided a contrast to the element of 'testing' of the participants and gave space for them to discuss their experiences.

3.5.2 Mixed-methods design – disadvantages

While the advantages of mixed-methods research can be stated as capitalising on the advantages of the respective methods (Östlund et al., 2011), critique has been levelled by stating the reverse: that the mixing of different approaches is to 'make up' for their respective shortcomings (Symonds & Gorard, 2008). While both points of view can be appreciated, the approach taken in this study was to regard each method as contributing to the overall aims of the research project. It was acknowledged that the resulting mixed-method research design was relatively ambitious and experimental for a small study. The requirement for qualitative and quantitative research skills within one study can be viewed as a disadvantage of mixed-methods designs (Denscombe, 2017). However, while acknowledged as a challenge, obtaining skills in both research methods provided potential for the researcher to discover respective advantages and disadvantages of each method in the evaluation of an AT intervention. Reflections on the experience are given later (see Section 3.9, p118).

3.5.3 Mixed-methods design – purposes within this study

In this section the specific purposes of mixed-methods designs are explored with reference to Greene et al. (1989) and Bryman (2006). Greene et al. (1989) detailed five purposes of mixed-methods design: 'Triangulation, complementarity, development, initiation, and expansion' (Greene et al., 1989:255). However, Bryman (2006) in his review of published mixed-methods research papers in five areas of the social sciences, listed substantially more purposes for mixed-methods research which came to light in categorising the papers he reviewed (see Table 3.2, p108). Bryman's (2006) study looked at what happens in practice, comparing purposes stated by researchers at the outset with purposes evident after the studies were completed and found that these often did not match. Bryman (2006) concluded that researchers should be 'explicit about the grounds on which multi-strategy research is conducted, but to recognize that, at the same time, the outcomes may not be predictable' (Bryman, 2006:111). He suggested two ways of looking at the findings from his research. While on the one hand, he stated, it could be concluded that multi-strategy research was not thought through sufficiently; on the other it could indicate that such research produces a wealth of data that is not anticipated. Therefore, while there were three specific aims in using a mixed-methods design in this study, it was acknowledged that unexpected findings or areas of discovery could emerge within the research process. The purposes of mixed methods related to this study are elaborated below, and are: initiation (exploratory discovery), expansion (extending scope of enquiry), and triangulation (corroboration) (Greene et al., 1989; Bryman, 2006).

Initiation (exploratory discovery): a critical exploration of whether it was possible to objectively assess balance confidence using a practical assessment formed part of this study. This was exploratory because balance confidence assessments are usually based on self-report methods (Hatch et al., 2003), where questionnaires such as the ABC Scale (Powell & Myers, 1995; see Appendix 2.4) are typically used, in which individuals indicate their level of confidence to carry out a number of specified activities without falling. In this exploration, AT teachers assessed participants undertaking a series of practical activities, using their skills in observation (see Section 3.6.1, p111) to award a score for level of observed confidence in completing each assessment item. The exploration in this study was to determine whether balance confidence could be assessed by detailed observation rather than self-report methods, potentially giving an objective assessment of changes in balance confidence and exploring the feasibility of a new means of assessment.

Expansion: gathering qualitative data about personal experience enabled the expansion of the data to include feedback not only on whether balance confidence and FOF was affected by the intervention but also any consequences in terms of the lived experience of participants. For example, whether the intervention led to a change in activity levels inside or outside the home. This information represented an expansion of enquiry beyond the direct impact on balance and mobility confidence, and gave indications of contributions to quality of life. This qualitative data would complement and expand on the quantitative data results.

Table 3.2: Purposes of mixed-methods research. Comparison of Green, Caracelli & Graham (1989) and Bryman (2006) (descriptions are quoted from the original papers). Continued overleaf/

Purpose	**Description by Greene, Caracelli & Graham (1989: 259-262)**	**Description by Bryman (2006:105-107)**
Triangulation	Seeks convergence, corroboration, correspondence of results from the different methods.	Triangulation or greater validity refers to the traditional view that quantitative and qualitative research might be combined to triangulate findings in order that they may be mutually corroborated.
Complementarity (Greene, Caracelli & Graham) Equated by Bryman with his category of: Enhancement or building upon quantitative/qualitative findings	Complementarity: Seeks elaboration, enhancement, illustration, clarification of the results from one method with the results from the other method.	Enhancement or building upon quantitative/qualitative findings: This entails a reference to making more of or augmenting either quantitative or qualitative findings by gathering data using a qualitative or quantitative research approach.
Development (Greene, Caracelli & Graham) Equated by Bryman with his categories of: Instrument development and Sampling	Development: Seeks to use the results from one method to help develop or inform the other method, where development is broadly construed to include sampling and implementation, as well as measurement decisions.	Instrument Development: Refers to the contexts in which qualitative research is employed to develop questionnaire and scale items – for example, so that better wording or more comprehensive closed answers can be generated. Sampling: Refers to situations in which one approach is used to facilitate the sampling of respondents or cases.
Initiation	Seeks the discovery of paradox and contradiction, new perspectives of [*sic*] frameworks, the recasting of questions or results from one method with questions or results from the other method.	
Expansion	Seeks to extend the breadth and range of inquiry by using different methods for different inquiry components.	
Offset		Refers to the suggestion that the research methods associated with both quantitative and qualitative research have their own strengths and weaknesses so that combining them allows the researcher to offset their weaknesses and draw on the strengths of both.

Table 3.2, Continued: Purposes of mixed-methods research. Comparison of Green, Caracelli & Graham (1989) and Bryman (2006) (descriptions are quoted from the original papers).

Purpose	**Description by Greene, Caracelli & Graham (1989:259-262)**	**Description by Bryman (2006:105-107)**
Completeness		Refers to the notion that the researcher can bring together a more comprehensive account of the area of enquiry in which he or she is interested if both quantitative and qualitative research are employed.
Process		Quantitative research provides an account of structures in social life but qualitative research provides sense of process.
Different research questions		This is the argument that quantitative and qualitative research can each answer different research questions.
Explanation		One is used to help explain findings generated by the other.
Unexpected results		Refers to the suggestion that quantitative and qualitative research can be fruitfully combined when one generates surprising results that can be understood by employing the other.
Credibility		Refers to suggestions that employing both approaches enhances the integrity of findings.
Context		Refers to cases in which the combination is rationalized in terms of qualitative research providing contextual understanding coupled with either generalizable, externally valid findings or broad relationships among variables uncovered through a survey.
Illustration		Refers to the use of qualitative data to illustrate quantitative findings, often referred to as putting 'meat on the bones' of 'dry' quantitative findings.
Utility or improving the usefulness of findings		Refers to a suggestion, which is more likely to be prominent among articles with an applied focus, that combining two approaches will be more useful to practitioners and others.
Confirm and discover		This entails using qualitative data to generate hypotheses and using quantitative research to test them within a single project.
Diversity of views		This includes two slightly different rationales – namely, combining researchers' and participants' perspectives through quantitative and qualitative research respectively, and uncovering relationships between variables through quantitative research while also revealing meanings among research participants through qualitative research.

Triangulation (corroboration): the combination of quantitative and qualitative methods of data collection and analysis enabled an exploration of whether this design led to a triangulation of results from the two approaches. For example, whether the comments made by participants about their learning experience and application of AT supported the results of practical assessments of balance confidence and the self-report questionnaire about FOF. Triangulation is described as ‘the deliberate linking of qualitative and quantitative data to support a particular conclusion…’ (Maxwell, 2016:14). It was, however, acknowledged that outcomes from the qualitative and quantitative data would not necessarily support each other in this research study and that divergent findings are equally important in mixed-methods research (Mortenson & Oliffe, 2009; Maxwell, 2016).

Having established the purposes of mixed methods design within this study, an outline of the reasoning for specific data collection methods follows, with full details provided later (see Section 4.4, p130).

3.6 Quantitative methods

In this section a brief explanation of the quantitative data collection methods for each of the two outcomes measures, balance confidence and FOF will be provided, including an element of innovation and adaptation in each case for the purposes of this study. Statistical data analysis (hypothesis testing) was used to compare baseline scores with post-intervention scores and to establish whether changes were statistically significant, and is detailed later (see Section 5.5, p181).

3.6.1 Balance Confidence Assessment: innovative approach to assessment of balance confidence

In this current study the assessment of balance confidence was developed further. Balance confidence is usually ascertained by quantitative self-report methods (i.e. questionnaires). For example, the ABC Scale (Powell & Myers, 1995) or Dizziness Handicap Inventory (DHI) (Jacobson & Newman, 1990). However, in this study a quantitative exploratory approach was used to investigate whether a discernible change in balance confidence could be objectively assessed, by means of a practical assessment (BCA; see Section 4.4.2, p135). It was hypothesised that, following the intervention, participants would be able to bring about improvements in their balance and movement with an associated increase in balance confidence. The experimental element in this assessment method was to find out whether such potential changes in balance confidence could be observed and assessed by AT teachers skilled in observation of individuals' use of themselves (see Appendix 1.0, AT concept of 'use').

In addition to the objective observations of any change in balance confidence, there was an additional interest in comparing these results with self-report data gathered from participants regarding their FOF (operationalised as falls efficacy; see Section 3.6.2, p113). This was gathered using a quantitative questionnaire FES-I (short, VAS) details of which are provided (see Figure 4.3, p134 & Appendices 4.1 & 4.2). The combination of quantitative data together with qualitative data could potentially add to understanding of the relationship between the concepts of balance confidence, FOF and falls efficacy (see Section 2.3.5, p54).

A practical assessment was devised, based on existing functional assessments: the Fullerton Advanced Balance Scale (FAB) (Rose et al., 2006); ‘Get-up and Go’ Test (Mathias et al., 1986); Timed ‘Up & Go’ Test (TUG) (Podsiadlo & Richardson, 1991); ‘Turn 180’ (Simpson et al., 2002; Fitzpatrick et al., 2005) with appropriate adaptations aimed at assessing balance confidence rather than functional ability. Existing functional balance assessments are aimed at assessing individuals to identify those who are at high risk of falls. In addition, clinical balance assessments investigate the underlying medical causes of increased risk (Tinnetti, 1986; Mancini & Horak, 2010). While such assessments have valid preventative and medical diagnostic purposes, they do not address the issue of confidence to carry out activities in daily life, which was the focus of this study, giving an indication of likely activity levels outside of the assessment context. The resulting innovative assessment is referred to as the Balance Confidence Assessment (BCA) (see Section 4.4.2, p135).

The assessment items comprising the BCA were intended to provide a range of challenge but not provoke ‘fear’ or ‘anxiety’ in participants, as this was counter-productive to the overall aim of the study of increasing balance confidence and reducing FOF. Assessment items were trialled with a pilot group, with one particular item assessed and adapted with AT teaching colleagues, prior to testing with the pilot group. This was due to concerns about the safety of this particular test item. Full details of the assessment items, adaptation, and scoring are included later (see Section 4.4.2, p135).

3.6.2 FOF operationalised as falls-related self-efficacy (falls efficacy)

As outlined in section 2.2.4 (p28), FOF is a widely used term in research; however, there is no single definition. In carrying out this research study, it was acknowledged that the interpretation of questions about FOF would vary for each individual depending on their experience of balance and mobility. This would potentially make evaluation between individuals and over time, challenging (Perez-Jara et al., 2010). However, an approach which enables evaluation to be carried out when generic or subjective concepts such as FOF are the subject of research, is to use an 'operational definition' that it is possible to work with in practice (Matthews & Ross, 2010:61). This enables concepts that may be interpreted or understood differently by different people, or at different times, to be investigated and is termed operationalisation. For the purposes of this research study it was considered that falls efficacy was a practicable operationalisation of FOF sufficiently close in concept to indicate changes over time in FOF. Falls efficacy is based on the self-efficacy theory of Bandura (1982) as previously discussed (see Section 2.3.2, p48). Testimony to the rigorous theoretical basis of the concept of falls efficacy, is that adaptations and derivations of the original Falls Efficacy Scale (FES) (Tinetti et al., 1990) have endured over time and are still prevalent in research into FOF (see Section 2.3.3, p50 & Appendix 2.3).

3.6.3 Relationship between balance confidence and FOF

The relationship between the concepts of balance confidence and FOF and the differences in the instruments devised to quantify them have been the subject of debate (Powell & Myers, 1995; Zijlstra et al., 2007; Moore & Ellis, 2008; see Section 2.3.5, p54). The assumption underlying this study was that an increase in balance confidence would equate with a decrease in FOF and vice versa, in line with the suggestion that FOF and balance confidence are both aspects of the same concept: falls efficacy (Powell & Myers, 1995; Zijlstra et al., 2007). Observations regarding the relationship between balance confidence, FOF and falls efficacy found in this study are discussed later (see Section 6.2.7, p233). One of the advantages of the mixed-methods design of this study was the opportunity to gather quantitative and qualitative data relating to balance confidence and FOF, potentially increasing understanding of the relationship between them.

In summary, quantitative methods in this study would provide a set of statistical data comprising BCA and FOF scores (operationalised as falls efficacy), which could be analysed to determine any effects of the intervention for the participants and whether they were statistically significant, including a comparison of results between the two groups of participants (see Section 4.9.3, p163).

3.7 Qualitative methods

In this section an overview will be provided of the qualitative approach and methods selected to obtain feedback from the participants, which illustrates the necessity to be responsive to the reality of fieldwork situations (see Section 3.7.3, p117).

3.7.1 Importance of participant feedback

The purpose of the qualitative approach was to obtain data consisting of the experiences and views of the participants about AT and the intervention. As AT learning was in a group context it was planned to continue on that basis by facilitating focus group discussions enabling participants to discuss their experiences (see Section 3.7.2). Feedback from the participants was important in order to develop the AT intervention during and beyond the research study, to make it as appropriate as possible to the needs of this particular age group (over 60s).

3.7.2 Focus groups – rationale

As part of the process of evaluation of the course, it was important to obtain 'candid' views of the intervention in order to find out whether future development of the course was appropriate. Focus groups offered a potential means to ascertain such views. Advantages of focus group interactions include the likelihood that issues of concern to the group members will emerge through the group's interactions (Halkier, 2010). Participants are likely to challenge each other's views, and in the process a realistic account of what individuals really think is potentially more likely to emerge than in one-to-one interviews (Bryman, 2008).

As the subject matter of the focus groups was not considered sensitive and would revolve around the AT intervention, a group discussion was considered appropriate. Each focus group would consist of a purposive sample of participants who had attended the intervention together, having shared experiences of the intervention to draw on. The purpose of facilitating the focus group was to listen to the participants with the aim of increasing understanding of their views and opinions (Krueger & Casey, 2009), in this case about AT learning and application. By attending the course sessions together, the participants would have got to know each other and it was hoped that by the end of the AT intervention they would be comfortable with talking to each other and to the researcher (Rabiee, 2004).

As a novice researcher, facilitation of the focus groups would be a new experience and the aim was to create an ambiance in which the individuals felt comfortable to express their views. The same set of open-ended questions would be used for both focus groups and some additional ‘prompts’ prepared to facilitated discussion should they be needed. A feature of focus groups is the group dynamics through which, ideally, a richer form of data can be generated than that obtained from an individual interview. However, it is also possible that within a focus group certain individuals can dominate discussion making it difficult for others to join in or to contradict if they do not agree with the point of view being expressed. Moderation by the facilitator is required to manage these situations and to facilitate participation by all who wish to contribute, particularly the quieter group members (Krueger & Casey, 2009). As the researcher was to be involved in delivery of the intervention it was possible that problematic group dynamics could be anticipated and an appropriate strategy planned to deal with them.

3.7.3 Individual interviews

However carefully research is planned, when it is being undertaken 'in the field' some flexibility to respond to real-life conditions may be required. In this study, some individual interviews were arranged after the first focus group, following additional ethical approval being granted (see Appendix 3.0). The interviews were arranged due to practical communication issues within the first focus group relating to a combination of poor acoustics in the room and hearing impairments of some participants. The same open-ended questions that were used for the focus group were used in the individual interviews, to maintain continuity across the study. Interviews were carried out by the researcher with volunteers from the group and took place in their home at a pre-arranged date and time (see Section 4.8.4, p159). In addition, at the AT1 venue an interview was arranged with the sheltered housing scheme manager (SM). This was due to unsolicited comments made to the researcher about the outcome of the intervention for individual participants, indicating the scheme manager's detailed knowledge of participants' baseline abilities.

3.8 Complex intervention

Various aspects of the design of the mixed-methods research described in this thesis categorise it as a complex intervention according to the *Medical Research Council (MRC) New Guidance on Developing and Evaluating Complex Interventions* (Craig et al., 2006). Aspects of complexity relating to the intervention itself encompass having two separate intervention groups to explore variation in frequency of delivery, ongoing tailoring and development of the intervention during delivery, and intention for future development of the intervention based on participants' feedback comprising the qualitative data. Complexity is also evident due to the combination of quantitative outcomes to be examined, encompassing evaluation of balance confidence and FOF, with each quantitative assessment tool having innovative or adaptive aspects.

The explorative and developmental aspects of the intervention and the quantitative outcomes measures in this study, together with the importance of feedback from participants, situate it within the Feasibility/Piloting phase of the development-evaluation-implementation process of the MRC Guidance (Craig et al., 2006).

3.9 Summary of chapter

Following a statement of the hypothesis and the primary and secondary research questions for this study, the considerations leading to the formation of the research approaches were detailed. By considering the questions underlying the research and how best to go about answering them (see Table 3.1, p100), a mixed-methods research approach emerged. It was evident that the two main aspects of the research required different methods of evaluation, quantitative and qualitative. Both aspects were required for a thorough exploration of the effectiveness and acceptability of an AT intervention for older adults experiencing FOF. The question of whether AT instruction would enable the participants to bring about measurable improvements in their balance confidence and FOF required a quantitative approach. In devising this approach an innovative assessment tool was developed (BCA) and an existing assessment tool was adapted (FES-I, short). However, regardless of potential changes in balance confidence and FOF following the intervention, the outcome would be 'academic' if the intervention was not acceptable to the participants. Therefore, feedback from the participants was an equally important part of the research. In order to allow participants to fully share their experiences and express their views about AT and the intervention, a qualitative approach was taken. Focus groups, and subsequent individual interviews, meant that use of open-ended questions would not constrain the participants' contributions to the discussion/conversation.

It was acknowledged that the enthusiasm of a novice researcher led to a relatively ambitious design for a small-scale unfunded study. The chapter ends with the researcher's reflections on the fieldwork including a particular learning point about the role of older adults in ageing research and how this could be improved in future studies.

3.10 Reflections

In reflecting on my approach to this research study, I believe that I aimed to go through the planning process on a reasoned basis, with the information I had at the time. For example, I was able to draw on other research studies about falls amongst older adults and FOF, experience of working with older adults as a social worker, as well as previous research studies relating to AT and older adults and of teaching AT to adults of all ages. As someone who had no prior experience of research, however, I could not fully anticipate the reality of fieldwork and how the planned approaches may or may not come to fruition in practice.

There was both challenge and opportunity in having a mixed-methods research design. As someone who is inherently drawn to the practical rather than the theoretical, the pragmatic approach to research associated with mixed-methods was a perspective I could identify with. However, it did require gaining skills in both quantitative and qualitative methods which was challenging in terms of time to gain understanding of the associated concepts. However, by gaining experience in both methods I was able to explore more fully where my preferences lie as a researcher and also gain experience on which to consider what works best in assessment of AT interventions.

With hindsight I realise that my lack of experience in fieldwork meant that I was perhaps overly-ambitious in my plans for quantitative evaluation of balance confidence and FOF, particularly in my adaptations of existing functional assessment scales to devise the balance confidence scale and also in adapting the falls efficacy questionnaire to a VAS format. My enthusiasm meant that I approached the quantitative evaluation creatively, but with hindsight I think also with a lack of fundamental questioning about the merits of quantitative assessment for an AT intervention, as discussed later (see Section 6.3.4, p239).

In both areas of my work experience, social work and AT teaching, I have always worked alongside each individual according to need and have tended to view service users and learners as 'collaborators' in a process we were going through together. Therefore, this is the approach I brought to my personal interactions with the participants in the study, and consequently during the fieldwork I did not think of them as being 'data subjects'. However, since then, I have realised that in terms of the overall research that is what they were, regardless of approach on an individual level and this has been rather a 'difficult' realisation to come to. Therefore, in future research I would seek to address the issue of older adults being data subjects by involving the participants in the design and planning of the study. I believe such involvement would more explicitly acknowledge their accumulated life experience which should appropriately be applied to planning a study concerned with ageing.

Chapter 4 – Methods and procedures

4.1 Introduction

Having outlined the approaches to this mixed-methods research study, this chapter sets out the methods and procedures by which it was conducted, and follows the chronological order of events. As previously explained (see Section 3.4, p94) in order to fully explore different aspects of the intervention (AT introductory course for people of 60 years and over), both quantitative and qualitative elements of data collection were required (Bishop & Holmes, 2013). Consequently, the chapter begins with the substantial planning and preparation for fieldwork which was required, including recruitment of volunteer AT teaching colleagues (see Appendix 1.0) to assist with assessment and delivery of the intervention; identification of potential research venues; and compiling introductory material for potential participants. Following successful ethical approval (see Appendix 3.0), the process for recruitment of participants is established, resulting in the recruitment of a pilot group and two research intervention groups. A diagrammatic summary of the research methods and timings is provided in Figure 4.1, p124.

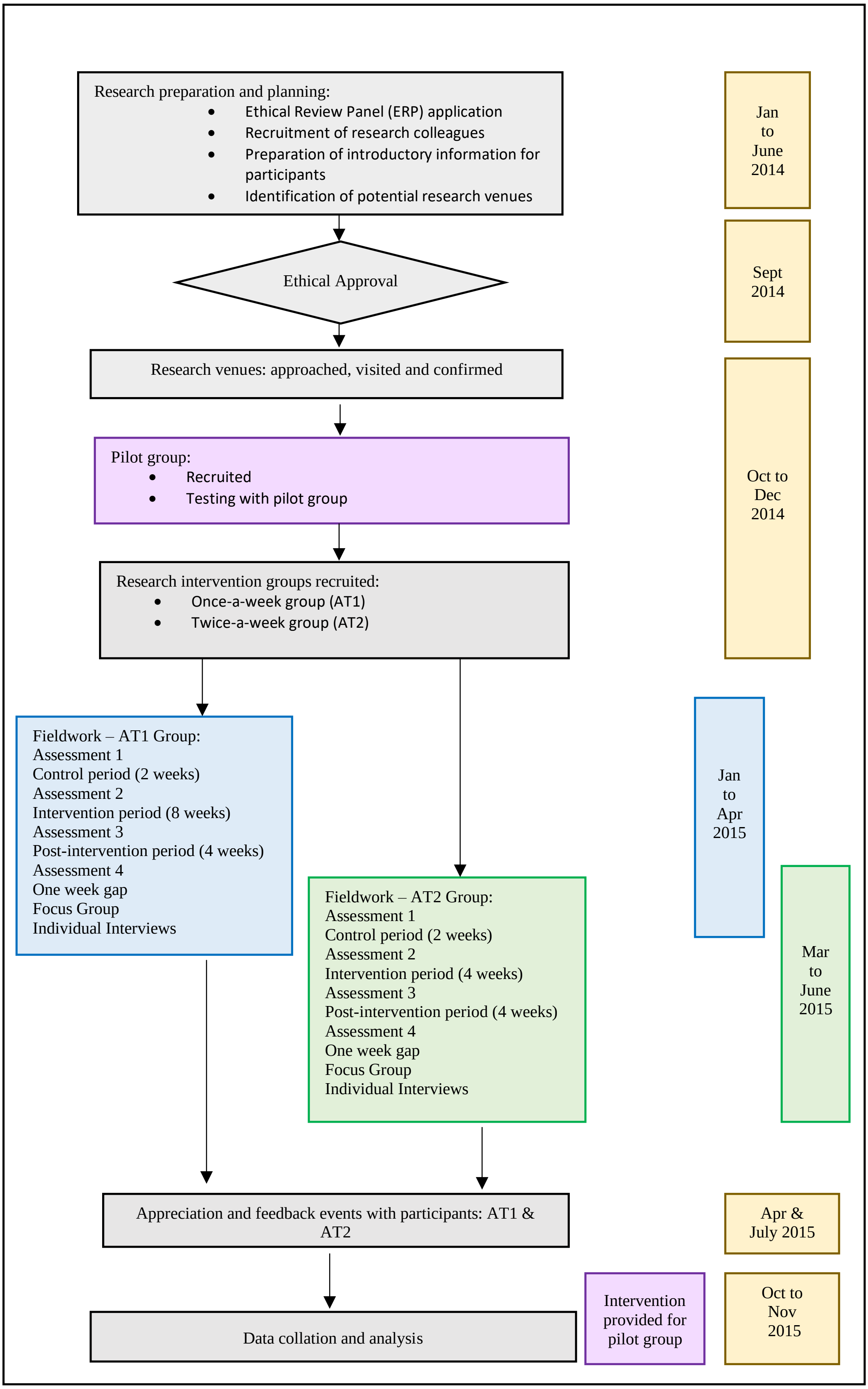
The reasoning which led to the choice, amendment and development of the quantitative assessment tools (see Sections 4.4.1, p130 & 4.4.2, p135) is explained and the process by which this was carried out is described. Fieldwork with the pilot group to test assessments and the intervention sessions is detailed, which subsequently informed the research with the intervention groups. Fieldwork with the two research intervention groups is set out on a chronological basis. The approach behind the intervention is explained. An outline of the collation of the quantitative and qualitative data is given, along with the data analysis processes employed. A summary of the chapter and the researcher's reflections on the fieldwork experience conclude the chapter.

4.2 Main dimensions of the research process - overview

The main dimensions of the research process are summarised briefly as follows, and shown in diagrammatic form in Figure 4.1 (p124).

Following work with a small pilot group, two research intervention groups were recruited in separate locations. One group received the eight-session introductory course in AT (the intervention) on a once-a-week basis (AT1 Group) and the other group received the intervention on a twice-a-week basis (AT2 Group). Quantitative assessments were carried out on four occasions: before and after an initial control period of two weeks when there was no intervention; at the end of the respective intervention periods which followed-on immediately after the control period; and, after a four-week post-intervention period. Two quantitative assessment tools were used on each occasion: a practical balance confidence assessment and a self-report questionnaire about FOF. Following completion of the intervention and quantitative assessments, the qualitative element of the research was conducted. A separate focus group was held with the participants from each intervention group (AT1 and AT2). After the focus groups, a number of individual interviews were undertaken, following confirmation of ethical approval.

Figure 4.1: Methods flow chart to show the timings of the research process



4.3 Research preparation and planning

Procedural methods are crucial to the success of a research study, requiring detailed planning and preparation of the fieldwork including ethical approval.

4.3.1 Ethical application and approval

Before any research can be conducted involving human subjects, independent scrutiny of the intentions throughout the study is required. The research proposal was initially submitted to the Keele University Ethical Review Panel in May 2014. Following the clarification of a number of points regarding data collection, including video recording of participants (see Sections 4.5.2, p141 & 4.6.5, p149) ethical approval was granted in September 2014 (see Appendix 3.0). As previously discussed (see Section 3.3, p90) older adults taking part in this study were not regarded as vulnerable due to chronological age. Nevertheless, it is acknowledged that a proportion of older adults will be considered vulnerable due to individual factors and co-morbidities (NICE, 2015; Age UK, 2018). Ethical compliance for this study included safeguarding procedures, including a Disclosure & Barring Service (DBS) (Gov.UK, 2020) check for the researcher. Two amendments to the study were subsequently agreed by the Ethics Review Panel (see Appendix 3.0): an amendment to the 'reach forward' item and associated instruction within the BCA, approved in January 2015 (see Section 4.4.3, p136); and approval for individual interviews, granted in May 2015. Permission was not sought to follow-up participants who dropped out of the study due to the inexperience of the researcher. Consequently, information was not obtainable from participants who did not voluntarily give reasons for discontinuing, leaving a gap in understanding about reasons for attrition (see Figure 5.1, p179).

Eligibility criteria were required for this study (see Appendix 3.1). As it was a group intervention, people with very high individual supervisory needs or those with potentially unstable medical conditions were not eligible, as their specific needs could not be catered for within the scope of the study. Information about one-to-one sessions was provided in such instances (*n*=1). Ability to remember the course sessions sufficient to apply learning is required in order to progress with AT, therefore ability to remember and retain information from the course sessions was needed. People who were already taking part in regular exercise/fitness activity were precluded as it would be difficult to demonstrate that any change was due to the intervention. Agreement to video recording of all assessments and focus groups, as well as both pilot group sessions was required. A questionnaire (see Appendix 3.1) was used to ascertain eligibility and whether additional help would be required e.g. due to hearing or visual impairment which would not necessarily preclude participation.

4.3.2 Recruitment of AT teaching colleagues

Volunteers were sought from amongst AT teaching colleagues (see Appendix 1.0). Six colleagues were involved at various stages in the assessment process (see Section 4.6.4, p148 & 4.6.5, p149) and delivery of the AT Course sessions (Introductory Course in AT for the over 60s) (see Section 4.7, p150).

4.3.3 Research venues – identification of potential housing facilities for the research study

The aim was to recruit volunteers in three separate Extra Care sheltered housing facilities (see Section 3.3, p90). A separate pilot group was required in the first instance to test the assessment procedures and course session structure and content. As naïve subjects were required for the intervention groups, it was considered less problematic if the pilot group was held in a separate location, as this would avoid the possibility of pilot participants volunteering for the research groups and being disappointed as they would not be eligible. Pilot group participants were subsequently provided with the AT intervention once the research fieldwork was completed, separate from the research study (see Section 4.8.5, p160). In order to evaluate any effects of frequency of delivery of the intervention, two research intervention groups were required, one to have the intervention delivered on a once-weekly basis and the other to have the intervention delivered on a twice-weekly basis. Extra Care schemes run by different housing associations and situated a few miles apart were prioritised. The intention was to reduce the chance that volunteers in the different research intervention groups would become aware of details of the other group's intervention, prior to completion of the fieldwork. The separation would reduce the possibility of participant alienation or discontent, where participants perceive their allocated intervention to be less desirable than an alternative (Cook & Campbell, 1979). Such discontent could result in individuals losing commitment to the research and discontinuing participation. The frequencies of intervention were chosen based on experience of teaching AT to groups of adults, which indicated that they would be feasible within a community setting. More intensive frequency of delivery (Mon-Fri for two weeks) had been trialled in a previous research study (Batson & Barker, 2008); however, this was not considered a viable model for course delivery within the community, as it would require an unrealistic level of commitment from participants.

Three Extra Care housing schemes were prioritised from 12 in the surrounding area, using criteria including size, location and variation of housing association. Each of the three potential venues was managed by a different housing association and they were situated a few miles apart within an overall 10 mile radius. The pilot venue was located in a suburb one and half miles from the local city centre. It was a relatively newly opened (six years) development of 60 individual apartments. Located next to a road junction, it was part of a wider housing development with a local supermarket, pharmacy and health centre close by. Communal facilities were spacious and 'airy' including a large lounge and conservatory, a separate 'activities' room, and a café/restaurant. The housing manager and residents' committee of this venue were very welcoming to university researchers and permission was readily obtained for recruitment of residents to take part in the study (see Section 4.5.1, p140).

The second venue was in a large village approximately six miles from the same city centre. It was also a relatively new (five years) apartment complex with 63 units. The entrance was integrated with facilities for use by the surrounding community, including a large hall, shop and hairdressers, with a privately-run café situated in the foyer. Despite its close integration with community facilities there were areas with a 'homely' feel such as the residents' lounge area. Residents had taken part in other research studies previously and the housing manager and colleagues, who knew all of the residents, were happy to arrange for the researcher to meet with residents at a regular residents' coffee morning.

The third venue was in a busy suburban area of a neighbouring city with an industrial heritage. It was also newly opened (four years) and was a large complex with 112 housing units. Facilities were open to the wider community and included a gym, hairdressers, several community/activity rooms and a large restaurant. This venue had a ‘busier’ ambiance than the other two venues, illustrated by having its own newsletter to promote the programme of events open to residents and others. As a consequence of being a large venue the staff did not know all of the residents, particularly the most active and independent. It was not clear whether residents had participated in other research but the staff and residents were welcoming and open to taking part in the study.

4.3.4 Preparation of introductory information

An introductory letter was prepared (see Appendix 4.9), ready to be sent to each of the potential research venues on receipt of ethical approval. The letter outlined the aims of the research study and requested a meeting to explore the possibility of residents taking part in the study. Information leaflets (see Appendix 4.10) were prepared providing information about the purpose and content of the AT introductory course for people over 60 years of age, ready for distribution to potential participants at each venue. Wording of the leaflets did not include the phrase ‘fear of falling’ due to evidence that people may ‘worry’ about falling but do not necessarily describe themselves as being ‘afraid’ of falling (Tennstedt et al., 2001). It was possible that fewer people would identify with the term ‘fear of falling’ either because they did not perceive themselves as being ‘afraid’ or because they did not wish to identify with the term as it may indicate weakness or fallibility. Men in particular are thought to under-report FOF (Pohl et al., 2015) possibly due to this reason. In order to maximise uptake of potential participants, and to reflect the content of the intervention (see Section 4.7, p150), alternative wording was chosen for information leaflets for this study which was addressed to those with 'concern about balance and movement' (see Appendix 4.10). While introductory material was being developed, and potential research venues identified, preparatory work also took place on developing assessment tools (see Section 4.4).

4.4 Assessment tools – choice and development

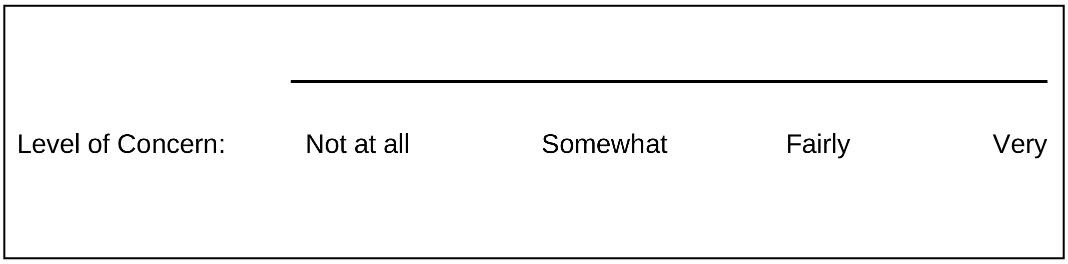
The aim of the quantitative element of the study was to objectively measure levels of balance confidence and FOF for each participant before and after the intervention (including a control period prior to the intervention and a post-intervention period afterwards). Tools were chosen to measure these two concepts on four occasions over the study and were therefore a key component of the research.

4.4.1 Fear of falling (FOF) – operationalised as falls-related self-efficacy (falls efficacy) and adaptation of short FES-I

As previously discussed (see Section 3.6.2, p113) measuring FOF directly is problematic given its subjective nature. Consequently, for this study the operationalised concept of falls efficacy was used to measure FOF, as it was considered a sufficiently close concept to FOF, giving a practicable means of assessment. Potential quantitative self-assessment questionnaires were critically explored in order to assess their suitability for this study. Requirements were for an established and verified questionnaire, which would also be relatively short and simple to administer as it would be used several times. As discussed previously (see Section 2.3, p45) there are various instruments available for this purpose (Jørstad et al., 2005; Jung, 2008). Self-report data can be perceived as problematic and subject to bias due to factors such as lack of understanding of the question or potential conscious manipulation of responses by participants for various reasons. According to Baldwin (2000) these may include: a perception by an individual of what are acceptable responses; the desire to give a favorable impression; or a perception of what response is 'expected'. However, self-report may be the only source of data if the concept being explored is a subjective experience, as in the case of FOF. Despite reservations about its accuracy, Baldwin (2000) points out the importance of self-report data as being 'essential to behavioural and medical research' (Baldwin, 2000:08). The approach taken in this study is in line with Baldwin's (2000) assertions that there are instances where the only way to obtain information is to ask the person about their experiences. This may be done in several different ways e.g. interviews, diary keeping, questionnaires. In this study a questionnaire was used to obtain individuals' perceptions of their FOF on four occasions.

A validated shortened version of the FES-I was identified for use, the FES-I (short) (Kempen et al., 2008; see Appendix 4.0), which met the criteria of being short and simple to administer. The shortened FES-I, with seven rather than 16 questions, was found to have excellent internal and four-week test-retest reliability, comparable to the FES-I (Kempen et al., 2008) with the advantage of being shorter for older adults to complete. However, a modification was made by changing the type of scale. The original Likert-type scale was replaced by a continuous scale (after Hill & Schwarz, MFES, 1996; see Appendix 2.3). Likert scales are considered to measure intensity of feeling towards an issue (Bryman, 2008). They typically have a five or seven point scale of response to each statement ranging from 'strongly disagree' to 'strongly agree'. The adaptation to a Visual Analogue Scale (VAS) (Figure 4.2) was made to reduce the possibility of manipulation of scoring by participants over the course of the study. The researcher considered it to be potentially more difficult for participants to remember where they had previously put a mark on a scale line than which response they had previously chosen on a Likert scale. It has also been noted that in some studies participants may select the same response ‘box’ for every statement on a Likert questionnaire without giving full attention to the individual statements concerned (Hartley, 2013). Selecting responses in this way potentially results in responses not being fully considered and consequently not giving an accurate reflection of true opinion or perspective. Therefore, the adaptation to a VAS scale for this study aimed to decrease the likelihood of responses being biased in this way or through deliberate manipulation of responses. The adapted version of the FES-I (short) used for this research study is referred to as FES-I (short, VAS) (see Appendices 4.1 & 4.2).

Figure 4.2: VAS used for pilot group



The FES-I (short, VAS) had a horizontal scale line of 100 millimetres (mm) in length. The first version of the VAS Scale used with the pilot group had four statements at intervals beneath the line (see Figure 4.2). Participants were asked to mark a place on the scale line (marking a vertical line) to indicate their level of concern about falling when completing each activity. The score was then determined by measuring the distance from the beginning of the scale to the marked score, the length in mm translating as the score out of a total of 100 for each question, with a total possible score of seven hundred indicating the highest FOF. Following work with the pilot group the VAS scale was adapted further as shown in Figure 4.3 (p134). By removing intermediate prompts beneath the scale line, continuous data could be collected making it suitable for parametric statistical tests (see Section 5.5.1, p182). This adapted version of the short FES-I was, as far as is known, the first with a VAS scale. The contribution of this version of the scale was to require participants to consider their level of concern 'afresh' and in detail on each occasion, potentially giving a more accurate representation of their level of concern than might be the case when simply required to 'tick a box'. Manipulation of scoring whether deliberate or unintentional was also considered to be less feasible than with a Likert-type scale.

Figure 4.3: FES-I (short, VAS) showing final version of VAS scale

I would like to ask you some questions about how concerned you are about the possibility of falling. Please reply thinking about how you usually do the activity. If you currently do not do the activity, please answer to show whether you think you would be concerned about falling **IF** you did the activity. For each of the following activities, please mark the scale line to show how concerned you are that you might fall if you did this activity

Name:

Date:

Please mark the following lines to show what you think ***today***:

1. Getting dressed or undressed:

Level of Concern: Not at all Very

2. Taking a bath or shower:

Level of Concern: Not at all Very

3. Getting in or out of a chair:

Level of Concern: Not at all Very

4. Going up or down stairs:

Level of Concern: Not at all Very

5. Reaching for something above your head or on the ground:

Level of Concern: Not at all Very

6. Walking up or down a slope:

Level of Concern: Not at all Very

7. Going to a social event (e.g. religious service, family gathering or club meeting):

Level of Concern Not at all Very

4.4.2 Balance confidence - developing the Balance Confidence Assessment (BCA)

As previously explained (see Section 3.6.1, p111) a practical assessment of balance confidence was developed. The basis for developing the assessment was a range of existing functional assessments. They were a useful starting point as they included a number of items already established for assessing everyday activities in older adults, albeit with a different primary focus to this study, that of functional ability as opposed to balance confidence. Functional ability in older adults is usually assessed either by self-report or standardised performance measures (Guralnik et al., 1989). Physical performance measures (PPMs) assess how well an individual is able to perform a specific action or set of actions according to set criteria (Reiman & Manske, 2011) and requires the presence of an assessor (Lang, 2011). Functional balance and mobility assessments for older adults vary in length and complexity. Single-task assessments include the functional reach assessment (Duncan et al., 1990) and timed walking assessments (Lyons et al., 2015) and short sequences of movements are involved for example in the Timed Up and Go Test (TUG) (Podsiadlo & Richardson, 1991). Longer multi-item assessments include the Berg Balance Scale (Berg et al., 1992) and Fullerton Advanced Balance Scale (FAB) (Rose et al., 2006).

The FAB (Rose et al., 2006) was selected as the basis for developing the BCA. The advantage of the FAB was that it was based on everyday actions suited to the age range of the participants and required little equipment (see Appendix 4.3), therefore being suited to this small unfunded study. It consisted of ten assessment items, giving scope for a range of challenge without being excessive in length for participants to complete. The FAB was designed to assess functional balance, whereas the BCA that was developed from it was devised with the intention of assessing balance *confidence.* A review of whether this was achieved in practice is discussed later (see Section 6.3.3, p237). Based on experience of AT teaching, assessment items from the FAB were removed or adapted if they were considered likely to unduly heighten FOF, as this would have been counter-productive to the overall aims of the research. In addition, an assessment item was removed if it did not represent an activity likely to be undertaken in daily life by people of 60 and over. Three of the more challenging assessment items were retained with the aim of avoiding a 'ceiling effect'. This is where a participant's scores are consistently high in assessments due to the lack of challenge for their individual ability, limiting scope for assessment of any changes over time (Kimberlin & Winterstein, 2008). One item (lean forward) was adapted slightly for this specific age group (see Section 4.4.3). The resultant BCA consisted of nine assessment items (see Table 4.1, p137).

4.4.3 Pre-testing of the BCA

The necessary equipment for the BCA was obtained (see Appendix 4.6). In order for AT teaching colleagues from PAAT to assist with pre-testing of the BCA, the equipment was set out in a large room according to estimated measurements. The pre-testing confirmed that dimensions allowed sufficient space for completion with various walking aids (see Appendix 5.1). The order of items three and four of the assessment were swapped for more economical use of space (Step up onto low (3.5 inch) platform; Walk around one cone, 180 degrees). The revised order of the nine assessment items was used with the pilot group (see Table 4.1, p137) to ensure it was safe and suitable in terms of floor area. A draft instruction script to explain to participants how to complete the BCA had been prepared by the researcher (see Appendix 4.7). Colleagues listened to the draft script and gave critical feedback. The feedback led to the inclusion of the offer to participants to observe a demonstration ‘walk through’ of the BCA prior to the first occasion they were to undertake it.

Table 4.1: Balance Confidence Assessment (BCA) - assessment items with order of completion

1. Stand up from upright chair
2. Walk/weave between three cones
3. Walk around one cone (180 degrees)
4. Step up onto low (3.5 inch) platform and down again
5. Step up and over (6 inch) platform
6. Lean forward 6 inches to reach item
7. Walk in straight line to chair
8. Turn round in front of chair
9. Sit down in upright chair

One particular assessment item, the ‘lean forward’ item adopted from the FAB (Rose et al., 2006) was tested with AT colleagues due to the researcher’s concerns about safety of participants. As a result of feedback from colleagues taking part and observing the testing, the lean forward distance was reduced from ten to six inches. AT teaching colleagues who tested this item confirmed that the ten-inch distance was too great for participants with balance and mobility concerns. Although AT colleagues did not have such concerns, they found the distance challenging and thought that it could put participants at risk of over-reaching, compromising safety. After testing shorter distances, a six-inch distance was found to retain a significant challenge to balance while reducing possibility of over-balancing with an outstretched arm. An additional instruction was also added on colleagues’ advice, which was for participants to take a step or steps forward if required to reach the object (a pencil). Other researchers have made adaptations to the FAB due to 'safety concerns' (O'Neill et al., 2015:476) although these did not include the 'lean forward' item. The resulting layout of the BCA is provided (see Appendix 4.4).

A score sheet was developed by the researcher for the BCA (see Appendix 4.8) based on the FAB score sheet (Rose et al., 2006) with possible scores ranging from 0 to 4 for each item. The description of scoring criteria for each of the items was adapted with the aim of assessing confidence in completing the item rather than functional ability. For example, features such as visible hesitation or uncertainty prior to or during the undertaking of an assessment item were criteria rather than physical completion alone. Therefore, it was possible to award a score of 4, indicating confidence and independence (with or without use of usual walking aid), despite some unsteadiness. Speed of completion was not part of the assessment criteria and a reminder of this was included as part of the instruction script read out to participants on each occasion (see Section 4.6.5, p149 & Appendix 4.7). Speed of completion is an integral part of some functional assessments. For example, the Timed Up and Go Test (TUG) (Podsiadlo & Richardson, 1991) and timed walking assessments (Bohannon, 1997; Lyons et al., 2015) use a comparison of individual scores with established average scores for a particular age group to determine risk of functional decline including falling (Bohannon, 1997). However, as speed is not essential for safe balance and movement in daily life it was not considered an appropriate criterion for this study.

The BCA was an innovative attempt to ascertain balance confidence by direct observation rather than by the traditional method of self-assessment questionnaire. The aim was for the objective assessment to give as true a picture as possible of an individual's balance confidence, replicating their behaviour in daily life, away from the confines of the research environment. As an operationalisation of FOF, the FES-I (short, VAS) would explore whether the AT intervention led to changes in FOF, and in addition it would trial an adapted version of the instrument by substituting a VAS scale, with the objective of potentially increasing the accuracy of response. Therefore, together, these two innovative assessment tools would contribute to knowledge about assessment of these two concepts amongst older adults.

4.4.4 Research venues – initial approach

Following favourable ethical approval, the previously prepared introductory letter (see Appendix 4.9) was circulated by post to the housing scheme manager of each of the first three prioritised Extra Care housing venues. Follow-up telephone calls resulted in visits to explain the research study in more detail. The initial meetings involved the researcher and either the scheme manager or activities co-ordinator and additionally, in one case, a member of the residents' committee. Permission was granted in all three cases for the researcher to approach residents to recruit volunteer participants. Discussion took place regarding the calendar of activities scheduled for the three venues over the following months. Based on this information it was agreed which of the venues would be allocated to the pilot group, with the other two venues allocated to the research intervention groups, assuming recruitment was successful. A room was provisionally booked for the dates required for the pilot group.

4.5 Pilot group

A small pilot group was required as previously explained (see Section 4.3.3, p127). The process of recruitment and testing with the pilot group is summarised in Figure 4.4.

Figure 4.4: Pilot group – summary of process

Pilot group:

- Recruitment (*n*=5)
- Testing with pilot group
    - BCA assessment & FES-I (short, VAS) questionnaire
    - AT intervention - course session + participant feedback

4.5.1 Pilot group - recruitment

The first stage in the fieldwork was to recruit and work with a small pilot group (*n*=5) in order to trial the AT intervention and assessment tools (see Section 4.3.3, p127). An estimate of a ratio of five participants per AT teacher was based on previous AT teaching experience with adults of all ages. This ratio was found to be sufficiently large for group delivery of AT instruction, whilst at the same time enabling individual learning needs to be met by the teacher. The aim was to test this ratio with the researcher and five pilot group participants. At the venue identified for the pilot group, the residents' committee publicised the research study at a residents' meeting. Information leaflets had been provided (see Appendix 4.10) to display at the venue and circulate to interested residents. In the event, the residents' committee sought to actively recruit participants for the pilot group at their meeting, rather than leave the researcher to follow-up with an information stand at the venue. Consequently, the recruitment of pilot group participants was taken out of the researcher's control, which was unexpected as it was not what had been discussed at the prior meeting. It was an early illustration of one of the features of research encountered during the fieldwork, that plans are not always fulfilled as expected (see Section 4.11, p172). Contact was made by the researcher with the potential volunteer participants and visits arranged. Additional information was provided, such as the form the practical assessment would take and what would happen in the AT course session. Eligibility was confirmed and two copies of the two-part consent forms signed, one for the participant and one for the researcher (see Appendix 4.18). Part one of the consent form was regarding agreement to take part in the pilot study, and part two was regarding use of quotes. A short demographics form was completed (see Appendices 4.17 & 5.0). Following visits with five potential participants all agreed to take part and a pilot group was formed. It was established by phone that the remaining individual was unable to take part due to other commitments. Dates for the individual pilot assessments and for the pilot group AT course session were confirmed by letter (see Appendix 4.11).

4.5.2 Pilot group – testing of assessments

Timed appointments for the assessments were scheduled forty-five minutes apart. All participants completed the FES-I (short, VAS) prior to carrying out the BCA. The FES-I (short, VAS) questionnaire was tested for ease of understanding and use, with the researcher giving a brief explanation of the questionnaire and reading out the instruction paragraph to each participant. The researcher supervised the participants in completion of the questionnaire, as required, and no difficulties were encountered in using it. Participants understood what was required and marked the scale for each question independently. However, there was some variation in the way the line was marked by the participants. Variations included not marking the scale as instructed with one single line, for example, with more than one stroke of the pen making the mark ‘wider’ than a single pen stroke. It was also noted that in some cases the line was sloping as it crossed the line. For consistency of approach a protocol was established whereby the score was determined to be at the left-hand edge of the mark as it intersected the scale line, regardless of slope or width of the mark.

Subsequent to the pilot group assessments, statistical supervisory consultation led to the adaptation of the VAS scale to enable continuous data to be collected, which was preferable for parametric statistical data analysis, as explained later (see Section 5.5.1, p182). By removing the intermediate written statements beneath the scale (Somewhat; Fairly), leaving only the first and last statement at each end of the scale (Not at all; Very) the data were regarded as continuous. This final version of the FES-I (short, VAS) (see Figure 4.3, p134) was used with the research intervention groups AT1 and AT2 (see Appendix 4.2).

After completion of the questionnaire, participants were invited to walk over and sit down in an upright chair for the BCA assessment. They were reminded that they would be video recorded. They had all previously given written consent to this and all re-confirmed verbally. The video recorder was operated by an AT teaching colleague. The BCA was tested for safety and the instruction script was tested for clarity and accuracy. It was confirmed that there was adequate space for participants to manoeuvre around the assessment items for those using walking aids (*n*=2). As explained in the instruction script (see Appendix 4.7), the researcher walked alongside participants at all times, sufficiently close to assist if requested or obviously needed, while giving the participant space to move freely and independently. A procedure was tested for when participants who were using a walking aid were required to step up onto, or up and over a small platform (see Table 4.1, items 4 & 5, p137). The researcher assisted by moving the walking aid to the side of the step and returning to the participant on completion of the assessment item. If needed the participant could hold onto the hands of the researcher for stability while undertaking these or any other assessment item (which was taken into account in the scoring system) (see Appendix 4.8).

The ‘lean forward’ assessment item was trialled with a six-inch lean forward distance (reduced from ten inches) established by previously testing the assessment item with AT teaching colleagues (see Section 4.4.3, p136). The pilot group participants were all able to reach forward by six inches although with varying levels of difficulty. Therefore, while the pilot assessment demonstrated that it was safe to continue with the amended item’s inclusion for the research intervention groups, emphasis of the instruction to take steps forward if necessary was confirmed as being important. Video recording was tested for angles and best positioning of the operator to obtain all views necessary for subsequent reviews of assessments. The scoring sheet was tested for ease of completion by an AT teaching colleague. Following the pilot assessments the scoring sheets for the five participants were examined for consistency of completion and scoring was reviewed by observing the video recordings (see Section 4.9.2, p162). Approximate time required for completion of assessments was noted for future scheduling, indicating that 45 minutes between appointments was more than required.

4.5.3 Pilot group – testing of the intervention (AT introductory course)

The first session of the planned intervention (AT introductory course) was delivered by the researcher with the pilot group of five participants. It was video-recorded by an AT teaching colleague for the purpose of review and reflection by the researcher. At the end of the one-hour course session, the participants were asked a number of questions including comments on the length, content and format of the session (see Appendix 4.12). Feedback confirmed that an hour was an appropriate length of time for the session. The mixture of explanatory talks and practical activities and the proportion of each within the session was thought to be appropriate. The participants reported that they had received sufficient individual assistance, confirming that the ratio of one AT teacher to five participants was adequate. On the basis of the feedback from the pilot group participants no changes were made to the planned AT course sessions comprising the intervention prior to their delivery to the first intervention group (see Section 4.7.5, p154).

4.6 Research intervention groups – pre-intervention and intervention fieldwork

A summary of the fieldwork process up to the post-intervention assessment is outlined in Figure 4.5.

Figure 4.5: Research intervention groups – summary of fieldwork up to Assessment 3

Recruitment: **AT1 Group** & **AT2 Group**

Assessment 1

Control period (2 weeks)

Assessment 2

Intervention period:
AT1 Group (8 weeks)
AT2 Group (4 weeks)

Assessment 3

Once recruitment of the pilot group was complete, recruitment of the intervention group participants began. This was undertaken by the researcher at each of the Extra Care housing venues allocated to the research intervention groups. The two venues were located approximately eight miles apart, one in a large village and the other in the suburb of a city as previously described (see Section 4.3.3, p127). The approach to recruitment was tailored to the particular venue and the opportunities available. Information leaflets had been prepared for each venue (see Section 4.3.4, p129; Appendix 4.10) and were distributed to potential participants on the researcher's visits (see Sections 4.6.1, p146 & 4.6.2, p147). Allocation of the once-a-week and twice-a-week interventions to the respective groups was organised by the researcher (see Section 4.6.4, p148). Provisional room bookings were made accordingly at each venue.

4.6.1 Intervention groups - recruitment of the once-a-week (AT1) group

Following initial contact by letter (see Appendix 4.9) a meeting with the housing scheme manager and residents' support worker took place. An invitation to attend the next residents' coffee morning ensued, at which the researcher talked to attendees individually or in small groups. Leaflets were given out and contact details gathered of those expressing an interest in taking part in the research study. Additional leaflets were placed in the reception area of the venue. Follow-up contact was made by telephone and individual visits arranged to potential participants. Letters were distributed to confirm appointments, enclosing an information sheet and consent forms (see Appendices 4.13 & 4.19). At the visit, the information was read through with the individual, if required. Questions were answered and if the individual confirmed their interest in taking part in the research project, the eligibility questionnaire (see Appendix 3.1) was explained and completed. If willing and eligible two copies of the two-part consent form were signed (one for the participant and one for the researcher) either on that occasion or subsequently (see Appendix 4.19). Participants were encouraged to discuss participation with family or friends before signing the consent forms. Once the consent forms were signed, a short demographics questionnaire was completed (see Appendix 4.17) either on that occasion or at a subsequent visit. The questionnaire established information with which to compare the two intervention groups at baseline. Demographic information requested was kept to a minimum and by restricting data to that which could be obtained by direct question rather than requiring reference to further records, it was anticipated that information would be forthcoming. Data gathered was considered to have the potential to impact on outcome measures, and included: age; gender; self-perception of health; number of prescribed medications (self-report), an indicator of health status (Charlesworth et al., 2015); walking aids used indoors and outdoors as an indicator of level of mobility; age on leaving school and number of educational or other qualifications. A summary of this data is shown in Table 5.1 (p177). Following recruitment (exclusions = 1), room bookings were confirmed for all assessment and AT course sessions. Confirmations were provided for the participants with individual appointments for the first two (pre-intervention) assessment sessions and subsequently for times and dates for the AT Course and assessment sessions three and four (see Appendix 4.14).

4.6.2 Intervention groups - recruitment of the twice-a-week (AT2) group

Recruitment of the twice-a-week (AT2) group was essentially the same as for the AT1 group. There were some variations due to being a different location, including meeting with the events' organiser rather than the manager and an invitation to have a publicity table in the reception area of the venue rather than attend a specific residents' event. The publicity table was manned by the researcher on two afternoons, publicised beforehand in the residents' newsletter. Names and contact details were collected for the residents who were interested in participating. Contact details were also taken for visitors to the venue who also expressed interest (*n*=2). Follow-up contact and procedures were as for the AT1 group (see Section 4.6.1, p146). The two non-residents met with the researcher in the lounge at the venue as this was most convenient for them (exclusions = 0).

4.6.3 Intervention groups - fieldwork programming

Programming of the interventions and assessment sessions for both research intervention groups (AT1 and AT2) was carried out after consultation with the staff and some of the volunteer participants at the two venues. Taking into account the existing timetables of events at the respective venues and availability of rooms, it became apparent which venue would be best suited to each intervention group on the basis of practicality and convenience and was organised accordingly by the researcher. The once-a-week intervention sessions (AT1 group) took place first, the twice-a-week intervention sessions (AT2 group) began after completion of delivery of the AT1 intervention. In the original planning of the research it was envisaged that the first two assessments and start of both intervention courses would take place in parallel. However, this was not possible in practice due to the established events timetables at the respective venues. The resulting programme was as shown in Table 4.2.

Table 4.2: Fieldwork programme with frequency

Research Group	**Dates of Assessments, Course Sessions, Focus Groups and Interviews**						
	Assessment 1	Assessment 2	Course Sessions	Assessment 3	Assessment 4	Focus Group	Individual Interviews
AT1 Group	09.01.15	23.01.15	30.01.15 to 20.03.15 (once a week)	24.03.15	24.04.15	01.05.15	12.06.15
AT2 Group	31.03.15	14.04.15	21.04.15 to 14.05.15 (twice a week)	19.05.15	16.06.15	23.06.15	26.06.15

4.6.4 Quantitative assessments - preparation

Following recruitment, the first step in the intervention phase of the fieldwork was to undertake the assessments before and after the control period (Assessments 1 & 2). On allocated assessment days, the researcher and two AT colleagues prepared the room for the series of appointments with individual participants. Chairs were placed outside the door to the assessment room so that anyone arriving early would be able to rest while waiting. Appointments were schedule thirty minutes apart following experience from the pilot assessments (see Section 4.5.2, p141).

The BCA assessment items were set out according to the established plan, confirmed with the pilot group. Upright chairs were put around the room at strategic points in case it was necessary for a participant to sit down at any point during the assessment. Assessment sheets were available and the video recording equipment was prepared. For the FES-I (short, VAS) questionnaire, two chairs were placed side by side at a table (for the participant and the researcher) with copies of the questionnaire and pen for use by the participants. Envelopes was available for completed questionnaires and BCA assessment sheets.

4.6.5 Quantitative assessments - procedures

On arrival for their individual timed assessments each participant was guided to sit at the table in order to complete the FES-I (short, VAS) questionnaire (see Appendix 4.2). If required, the questionnaire statements were read out to the participant prior to them marking the scale line to indicate level of concern about falling while undertaking each of the seven activities specified. When the participant had finished the questionnaire they were invited to walk over to sit in the chair for the start of the BCA.

The BCA instruction script (see Appendix 4.7) was read out by the researcher. After this, on the first occasion only and if the participant wished, an AT colleague completed the BCA to demonstrate what was required. The participant was reminded that the assessment would be video recorded, to which all had previously given written consent. During the assessment, assistance with moving walking aids and providing stability by holding the participants' hands was provided by the researcher, if required (see Section 4.5.2, p141). Collation, review and analysis of quantitative data is explained later (see Section 4.9, p161).

4.7 The intervention

4.7.1 Introduction

The intervention was an eight-session introductory course in the Alexander Technique for people aged 60 years and over. An outline plan of the course was prepared in advance by the researcher, together with detailed draft plans for each session (see Appendices 4.20 & 4.21). The first session had been trialled with the pilot group (see Section 4.5.3, p144). The course was based on introductory courses for adults of all ages, run by the Professional Association of Alexander Teachers (www.paat.org.uk). The intention was to work with the participants, being receptive and adaptable to their learning needs. It was intended that session plans would be flexible and amended as the course progressed, in order to meet the needs of the individual participants in each group. There was an acknowledgement that developing a course for this specific age group would be a learning process for the researcher and AT teaching colleagues, as well as for the group participants.

4.7.2 Collaborative learning – rationale

The AT introductory course for adults of 60 years and over was devised on a basis of exploration and discovery for the participants. A collaborative approach to learning was promoted, with AT teachers working with the participants in the group, providing explanations behind suggested procedures and answering questions as they arose. Sessions comprised work on practical activities (75-80%) interspersed with short 5-minute explanatory talks about AT. The talks were delivered to provide participants with some understanding of the reasoning behind the practical approach taken in AT learning (see Appendix 1.0). Talks were provided in a spirit of collaboration, using illustrative examples pertinent to participants' experiences. Participants were empowered by being invited to judge for themselves how useful their AT learning was for balance and movement in everyday activities. They were aware that their feedback formed an important element of the study. Comments by participants about the content of the course, including the ratio of practical activities to explanatory talks, are reported later (see Section 5.18, p213).

Teaching of AT during the course involved demonstration and explanation of practical activities, along with the short explanatory talks. AT hands work (see Appendix 1.0) by teachers was not used on this introductory course as previously stated (see Section 1.3, p6). The AT teaching experience of the researcher and colleagues with groups of adults over a number of years has shown that explanation and demonstration is effective in teaching AT. Minimal individual AT hands work (see Appendix 1.0) in group teaching situations has not, of itself, been detrimental to learning, providing participants are well motivated to apply their learning outside of course sessions. Other research studies with older adults have included

AT hands work content (Dennis, 1999; Batson & Barker, 2008; Gleeson et al., 2015; Glover et al., 2018). Exploration of a course for older adults based solely on demonstration and explanation had not previously been reported, leaving a gap in knowledge about the possibility and effectiveness of such delivery. This study would constructively inform this knowledge gap. A specific aim of the intervention in this study was to assist the participants to bring about improvements for themselves by application of AT. This would enable them to improve their balance and movement in their daily lives without access to an AT teacher on an ongoing basis, should that not be available. This method of teaching did not preclude assistance being given to participants by way of a steadying hand, as and when required. Each participant had some individual supervision within the group session, including explanation, observation and encouragement. A ratio of one AT teacher to five participants was confirmed as sufficient to facilitate this (see Section 4.5.3, p144).

In order to facilitate individual learning, skills in observation were developed and feedback amongst participants was encouraged. This was in addition to observation and feedback from AT teachers. The purpose of this element of learning was to enable participants to improve their observation skills in respect of themselves (see Appendix 1.0, AT concept of 'use') and of other participants. Depending on numbers present and the particular activity, practical activities were predominantly carried out in small groups. This approach facilitated mutual support and encouragement between participants. In addition, those who found practical participation most difficult could nevertheless take a full part in activities by contributing their observations, making the sessions fully inclusive for all participants.

4.7.3 Development of pedagogy - collaboration with AT colleagues

As planned, a flexible outlook was maintained throughout delivery of the eight-session course. Course delivery was undertaken by the researcher and AT teaching colleagues. A collaborative approach was taken to developing and adapting AT teaching for this age group. A continual process of learning from teaching on each course session took place, with the accumulation of previous learning being incorporated into planning the next course session. By this means teaching skills evolved and were refined continually during provision of the intervention to the two research intervention groups in this study (AT1 and AT2).

4.7.4 Development of pedagogy - increased self-efficacy in balance and movement

The aim of the intervention was to enable participants to be self-sustaining in their continued application of AT learning after the end of the introductory course. Elements of the approach to AT teaching as demonstrated in this study can be seen to encompass sources of efficacy beliefs identified by Bandura (1982; 1995; see Table 2.2, p49). During the AT introductory course individuals were supported by AT teachers in learning a process to employ in going about their activities which is beneficial rather than detrimental to their balance and movement (Appendix 1.0). The learning process was one of progression at the pace of the individual, thereby promoting improvements in balance and movement, which could be termed ‘mastery’ experiences (Bandura, 1995:3; see Table 2.2, p49).

Encouraging individuals to develop their observation skills during the AT group sessions facilitated support and encouragement of each other in application of AT learning. This was helpful to participants in perceiving that such progress was possible for themselves as well as fellow participants, an example of 'vicarious' experiences (Bandura, 1995:3) (see Section 5.18, p213). 'Verbal or social persuasion' (Bandura, 1995:4) could be seen at work in the combination of demonstration, explanation and encouragement from AT teachers, and from fellow participants in observing and giving feedback to each other. Encouragement of fellow participants was evident within course sessions and noted by the researcher and AT teaching colleagues, and mutual support between course sessions was reported by participants. Reminding and prompting each other to put AT learning into practice between sessions can be viewed as an example of social persuasion (see Section 5.13, p206).

The practical approach taken in this AT introductory course, including support for each individual within the course sessions, engendered an atmosphere of mutual learning with an emphasis on individual progress rather than one of particular expectation or competition. The session delivery was encouraging and supportive, with the aim of minimising the potential for adverse experiences of participants likely to arouse 'emotional states' (Bandura, 1995:4) such as fear or anxiety. The ethos of AT teaching on the course is summed up by Bandura's (1995) observations that helping people to build efficacy necessitates bringing about situations in which an individual can achieve success and avoids putting them in situations where they are perceived to have failed.

4.7.5 Delivery of the intervention to the once-a-week (AT1) group

The eight one-hour sessions were delivered once a week for the AT1 group and took place on Friday mornings. The sessions were led by the researcher with two AT teaching colleagues. A plan of the course sessions is provided (see Appendix 4.20). The one-hour sessions were divided into 45 minutes of practical AT learning interspersed with three, five-minute short explanatory talks about AT. Participants sat down during the talks and were encouraged to sit down at any time during the practical sessions as needed. Practical activities were usually carried out in small groups supervised by an AT teacher. After each session the researcher and AT teaching colleagues reviewed the learning progress of the group and individuals. The plan for the following session was adapted as required (see Section 4.6.3, p148).

4.7.6 Delivery of the intervention to the twice-a-week (AT2) group

The intervention with the AT2 group began after completion of fieldwork with the AT1 group. Reflection on learning points from delivery of the course to the AT1 group and feedback from the AT1 focus group and individual interviews, all informed the planning of the AT2 course. While the same course was planned, the researcher and colleagues had gained experience of teaching the course to this age group (over 60s). As a result, delivery to the AT2 group was not identical, although content was essentially the same, taking into account variation for individual learning needs. The pedagogy had developed during delivery to the AT1 group and it continued to evolve during the AT2 course. The eight sessions took place over four weeks, with two sessions per week on Tuesday mornings and Thursday afternoons. As previously described for the AT1 group, after each course session the researcher and AT teaching colleagues reviewed the learning progress of individuals in the group. The plan for the following session was amended as required (see section 4.7.3, p153). For example, during the AT2 course a change was made to the structure of the session, with talks amalgamated and reduced to two rather than three, as the participants were able to sustain practical work for longer than the AT1 group. Explanations of practical procedures continued to evolve in detail and precision, tailored for this age group.

The interactive nature of delivery of the course sessions between AT teachers and participants, led to ad hoc feedback from participants to the researcher and AT teaching colleagues. Comments were noted as they arose if they related to delivery or content of the sessions or the wider research aims. Feedback from participants was incorporated into the review of each session and planning of the next one, as appropriate.

4.8 Research intervention groups - post-intervention fieldwork

A summary of the post-intervention fieldwork process is shown in Figure 4.6.

Figure 4.6: Post-intervention period – fieldwork summary

Post-intervention period AT1 & AT2

End of the intervention - within a week:
Assessment 3

(4 weeks)

Assessment 4

(1 week)

Focus Group
Individual Interviews

4.8.1 Quantitative assessments

Prior to the end of the respective courses for the AT1 and AT2 groups, individual appointments were made for the post-intervention assessments (Assessments 3 & 4). The first of these were held within a week of the end of the intervention (Assessment 3) and the other after a further 4 weeks (Assessment 4; Figure 4.6, p156). The assessments and procedures were as detailed previously for the BCA and FES-I (short, VAS) questionnaire (see Section 4.6.5, p149) for consistency of data collection.

4.8.2 Qualitative data collection - focus groups rationale and preparation

Participants' views were an important part of the evaluation of this intervention as previously discussed (see Section 3.7.1, p115). Their comments would inform the further development of the AT course during and beyond the research study, to make it as appropriate as possible to the needs of this particular age group (over 60s). Focus groups were appropriate for this purpose as the participants in each group (AT1 and AT2) had a shared experience of learning AT which gave potential to generate group discussion about the intervention (Matthews & Ross, 2010).

In obtaining the participants' opinions of AT and the course content, the following areas were considered by the researcher to be particularly relevant: firstly, potential participants' perception of the intervention as being relevant to their particular needs (DH, 2011; NICE, 2013; Centre for Ageing Better, 2019); secondly, the level of engagement with learning during the course sessions; thirdly, the degree to which participants applied AT learning outside the learning environment, in their daily lives. It was anticipated that participants would complete the course only if they viewed it as 'worth' learning as attrition levels from courses or programmes involving older adults is relatively high (NICE, 2013).

As previously stated (see Section 1.6.3, p16), AT can be applied to any activity, it does not entail learning or rehearsing repetitive 'exercises' or strength training. AT learning included in this intervention was focussed on activities of most concern to individuals in the AT1 and AT2 groups, such as: getting out of a chair, standing, and walking during the course of everyday life. Feedback on daily application of AT was therefore important to this research study, to ascertain whether such application was perceived as useful and whether it was undertaken by participants as encouraged.

4.8.3 Qualitative data collection - focus group procedures

Two separate focus groups were held with the participants from the AT1 and AT2 groups, respectively. Each was held one week after the last assessment (Assessment 4). The focus group was held in a room at the Extra Care housing venue for each group on a day and time previously arranged with the participants. Chairs were placed in a circle prior to participants arriving and the video recording equipment was prepared. The researcher sat in the circle with the participants in order to facilitate the discussion. A focus group schedule of open-ended questions was prepared to encourage focused discussion (see Appendix 5.27). With prior agreement from the participants, confirmed on the day, the focus groups were video and audio recorded. This was for ease of transcription and to allow the researcher to fully engage with facilitating the group discussion, rather than also taking notes. The verbatim transcriptions from the focus group discussions would form the qualitative data for this study. The participants comments would then be analysed to draw out themes from their feedback about the AT intervention and their AT learning (see Section 4.9.8, p168). The video recordings of the focus groups were not in the end required for data transcription as the audio recordings were clear. However, the video footage was helpful in reflecting on and learning from the experience of facilitating the focus groups which the researcher had not done before (see Section 4.11, p172).

Some practical difficulties were encountered during the first focus group. Poor acoustics in the room combined with hearing impairments of some of the participants meant that discussion was hampered in the group setting. At the end of the AT1 focus group it was apparent that some of the participants had not contributed as much to the discussion as might have been expected, given their participation and comments during the AT course sessions. Consequently, individual interviews were offered to participants.

4.8.4 Qualitative data collection – individual interviews

Some participants (*n*=5) from the AT1 group were agreeable to having an individual interview. Ethical approval was sought for them and when granted (see Appendix 3.0) these interviews were arranged, taking place within two weeks of the focus group and approximately 12 weeks after the end of the AT1 intervention. The same schedule was used for the individual interviews as for the focus group. Interviews were audio recorded with the permission of the participants. The AT2 focus group was not hampered by the same practical difficulties and participants appeared to be able to speak readily and fully, as desired.

However, for consistency of approach, individual interviews were also offered to participants in this group. One person volunteered and an individual who had not been able to attend the focus group also participated in an interview (*n*=2). These two interviews took place three days after the focus group which was six weeks after the end of the AT2 intervention.

At the AT1 venue the housing scheme manager was involved on a day-to-day basis with residents, she knew them all well and was familiar with their baseline abilities. Unsolicited comments made by the scheme manager to the researcher indicated that she had valuable observations about progress of participants from the AT1 group which were pertinent to the research study. Consequently an interview with her was requested, agreed and arranged. The interview provided comments from an independent observer who was not involved in delivery of the course and had no prior knowledge of AT, other than having heard of it. The interview was audio recorded with permission. Questions were regarding her observations of behavioural change in residents who took part in the course (see Appendix 5.28) (see Sections 5.13, p206; 5.15, p210; 5.16, p211).

4.8.5 Follow-up and feedback with participants

Approximately one month after completion of all fieldwork, participants from the AT1 and AT2 groups were sent an invitation (see Appendix 4.15) to afternoon tea at their respective research venues, hosted by the researcher and an AT teaching colleague. During the social event participants were provided with a brief update on the research study, including an outline of preliminary findings, and were thanked for their participation (see Appendix 4.16). Contact was also made with the venue for the pilot group as previously arranged. An AT introductory course was offered to residents there, which took place in the autumn and was not part of the research (the ‘autumn course’). Participants included some of those who had taken part in the pilot assessment and pilot course session (see Section 4.5, p140). The autumn course was provided to show appreciation to the residents for hosting and participating in the pilot group. The developing pedagogy over the duration of the research study was evident in the delivery of the autumn course sessions and continued to evolve further during the provision of the course although it was not part of the research study (see Figure 4.1, p124).

4.9 Data collation and analysis processes

Following completion of each of the four quantitative assessments and the focus groups and interviews (see Figure 4.1, p124) collation of the data was necessary prior to analysis.

4.9.1 Quantitative data - FES-I (short, VAS) questionnaire

Scores for each of the seven items on the questionnaire were determined by measurement of the distance along the 100mm scale line in accordance with the protocol previously described (see Section 4.5.2, p141). The range of scores was from 0 to 100 per question, with a possible maximum score for the questionnaire of 700, indicating the highest level of concern about falling (see Appendix 4.2). When measuring the scale line to determine scores, fractions of millimetres were rounded-down to the previous whole number. Scores for each item on the questionnaire were then transferred to a summary sheet for each participant. Each participant completed the FES-I (short, VAS) questionnaires four times in total over the course of the study (see Figure 4.1, p124).

4.9.2 Quantitative data - balance confidence assessment (BCA)

As previously described (see Section 3.6.1, p111) this research study used an innovative approach to assessment of balance confidence. Scoring of balance confidence was carried out by an AT teacher, skilled in observation of individuals' use of themselves (see Appendix 1.0, 'use'). The AT colleague (scorer) used the scoring sheets devised (see Appendix 4.8). The majority of the assessment scoring was carried out by the same individual. However, there were two occasions when due to other commitments, other AT colleagues took on this role (two occasions, two different colleagues). Review of video recordings ensured consistency of scoring across the research project.

After the completion of all assessments, the BCA scores were reviewed by the researcher who viewed all videos of assessments and allocated scores (review one). These scores were then compared to those of the original scorer. Any queries or differences in scoring with the original scorer were noted and listed for a further review. A second review (review two) was undertaken by a panel consisting of three AT teachers, including the original scorer and the researcher. A sample of videos were viewed where the panel awarded a score, in accordance with the score sheet description (see Appendix 4.8) for each assessment item, as an additional check on consistency of scoring. Any differences were noted and the assessment added to the list for final panel review. Cases for final panel review were then viewed and a consensus regarding the scoring was reached by repeated review of the videos, as required. A weighting system for the assessment items was proposed by the researcher and verified by the two AT teaching colleagues in the review panel. Increased weighting was attributed to three assessment items due to the relative challenge (as evidenced by observation of participant response and performance) compared to the other items (see Table 5.4, p181).

4.9.3 Quantitative data analysis – introduction

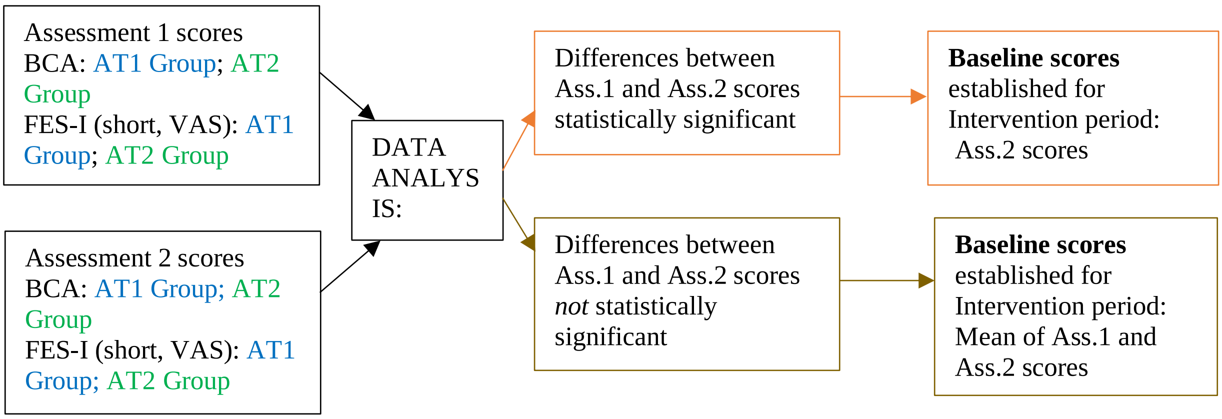
Hypothesis testing was the basis of the quantitative data analysis for this study and was used to ascertain whether the intervention had a statistically significant effect on balance confidence and FOF in participants. Hypothesis testing provides a series of stages for deciding whether to accept or reject a hypothesis (Hinton, 2004). The null hypothesis for this research study was that the intervention would have no effect on balance confidence or FOF (see Section 5.5, p181). Therefore, if data analysis resulted in a statistically significant effect ($p \leq .05$) it would indicate that the intervention had made a statistically significant difference to the outcome measures of balance confidence and/or FOF.

The pre-intervention control period which preceded the start of the intervention for each group, enabled participants to act as their own controls and eliminated the need for a separate control group. After the end of the intervention there was a 4-week post-intervention period prior to the last assessment to evaluate the level of continued application of learning. Assessments using the BCA and FES-I (short, VAS) took place prior to the control period (Assessment 1), after the control period (Assessment 2), at the end of the intervention (Assessment 3) and at the end of a 4-week post-intervention period

(Assessment 4). Appropriate parametric tests: *t*-tests and analysis of variance (ANOVA) were used for analysis of data from the pre-intervention control period (see Section 4.9.4) and intervention and post-intervention periods respectively (see Section 4.9.5, p165). Additional non-parametric tests were carried out, where available, in order to determine whether choice of test had affected results. Results from the quantitative data analysis are presented later (see Section 5.6, p183).

4.9.4 Quantitative data analysis process – control period and establishing the baseline scores

Figure 4.7: Quantitative data analysis process – establishment of baseline scores



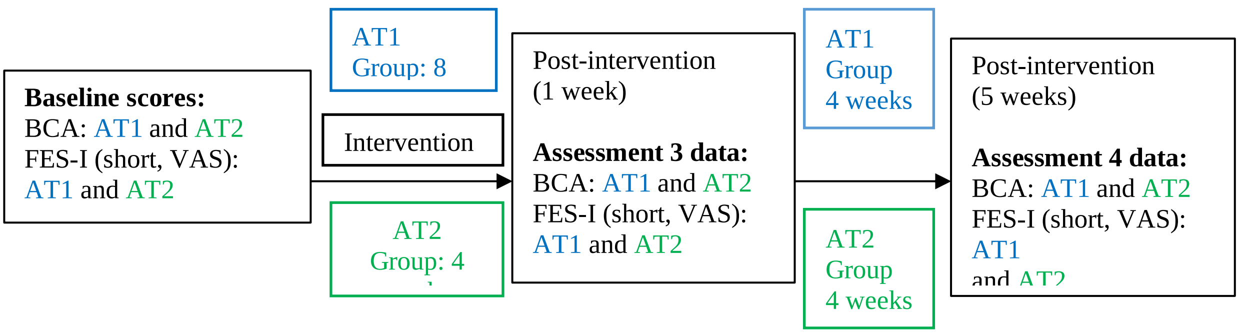
Prior to any statistical data analysis all scores were checked by the researcher for calculation of weighting, addition of scores and accurate transfer of scores to spreadsheets. The purpose of the control period for the two intervention groups (with each person acting as their own control) was to take account of any change in performance of the participants prior to the start of the intervention. For example, potential changes in performance could be possible due to having completed the assessment once and therefore being familiar with the test procedure resulting in improved scores on the second occasion, the 'practice' effect

(Cook & Campbell, 1979; Field, 2018). By comparing the scores before (Assessment 1) and after (Assessment 2) the control period of two weeks it was possible to determine whether there had been any statistically significant change in scores over that period. Results of this analysis determined the appropriate baseline score for the intervention period (see Figure 4.7, p164 & Section 5.6, p183). As two sets of data were being compared for the control period (Assessments 1 and 2) an appropriate statistical test for this analysis was the *t*-test (Hinton, 2004).

4.9.5 Quantitative data analysis process - intervention and post-intervention periods

Once baseline scores were established for the intervention period, data analysis took place for the intervention and post-intervention periods (see Figure 4.8).

Figure 4.8: Quantitative data analysis process - intervention and post-intervention periods



The aim of the data analysis was to establish whether the intervention had a statistically significant effect on the scores of the participants after the intervention (post-intervention) compared to their scores before the intervention (baseline). The post-intervention assessment had two components: an assessment took place within one week of the end of the course (Assessment 3); a final assessment took place after a further four weeks (Assessment 4). The purpose of the final assessment was to determine whether any potential effect was maintained after a period without any intervention. In summary, the quantitative data analysis was undertaken to ascertain:

- whether there were any changes in performance following the intervention, and if so,
    - whether the changes were statistically significant, and
    - whether any changes were maintained after the intervention
- to compare the performance of the two intervention groups (AT1 & AT2).

Both research groups had received the same intervention but over different periods of time. Comparison of the two groups within the data analysis could indicate whether the frequency of delivery of the intervention (once-a-week or twice-a-week) had affected the outcome (see Section 5.7.1, p186).

4.9.6 Quantitative data analysis test – analysis of variance (ANOVA)

Analysis of three sets of data (Baseline; Assessment 3; Assessment 4) was required for the intervention and post-intervention periods. Use of analysis of variance (ANOVA) enables a comparison of more than two sets of data without increasing the risk of a Type I error, when a significant difference is erroneously reported (Field, 2005). ANOVA can be used for testing data with different attributes, as for the data within this study. The quantitative data had the following characteristics:

- data from the same individuals on several occasions (three for this analysis), described as within-subjects ‘repeated measures’ ANOVA.

- a comparison of the results of two different groups, AT1 and AT2, who had received the same intervention but over different timescales. This is described as between-subjects or independent ANOVA.

Computer software (IBM SPSS, v.24) is available to take into account both of the above characteristics, which enables the different types of data to be analysed: between-subjects and within-subjects with repeated measures. However, a further consideration in the data analysis for this study was:

- the possible existence of differences between the two research intervention groups (AT1 and AT2) prior to the start of the study.

In order to ‘take out’ or ‘control’ for the influence of any such existing differences between the groups in the analysis, the baseline scores were used as a covariate in the analysis (Field, 2005).

In summary, the appropriate statistical test (ANOVA) was carried out using computer software (SPSS, v.24). This test enabled an analysis of individual performance over time including a comparison between the two groups, ensuring that any pre-existing differences between the two groups were accounted for and did not affect results. Details of the statistical results are presented later (see Section 5.7, p185).

4.9.7 Qualitative data analysis - focus groups and individual interviews

Verbatim transcriptions were produced by the researcher from the audio tapes of the focus groups. Video recordings were also available, to confirm the contributor and/or words spoken. In the event the video recordings were not required for transcription; however, they were valuable for researcher reflection and learning on facilitation of focus groups (see Section 4.11, p172). In the case of the individual interviews there were audio tapes only. Transcript-based analysis was used in order to obtain the fullest detail of the contributions of the individual participants. Although this level of analysis can require more resources than other methods such as use of abbreviated transcripts or notes (Krueger & Casey, 2009) it was feasible for this size of study. Participants were allocated pseudonyms which were used in the transcripts to preserve confidentiality. Once produced and checked by the researcher, transcripts from the focus groups and interviews were uploaded using qualitative data analysis computer software (QSR International, NVivo v.11) to facilitate the organisation and analysis of the data.

4.9.8 Framework analysis

Framework analysis (Ritchie & Spencer, 1994) was the process used for analysing the qualitative data in this study due to the consistent format of the focus group (and subsequent interview) schedule. Features particularly suited for Framework analysis include 'research that has specific questions and a limited time-frame' (Srivastava & Thomson, 2009:72). By using a structured process of analysis to identify themes within the data, the aim was to be transparent in method and decision-making. It was accepted, in line with Braun and Clarke

(2006), that the process of interpretation of data would, inevitably, reflect the researcher's background and prior experience (AT teacher and social worker), influencing the identification of themes, sub-themes and links within the data. However, by following a clear structured process, it could be followed by others.

Framework analysis has a five-stage structured process, comprising: 'familiarisation; identifying a thematic framework; indexing; charting; mapping and interpretation' (Ritchie & Spencer, 1994:178). In this study the purpose of the qualitative data analysis was 'evaluative' (Ritchie & Spencer, 1994:174) examining the effectiveness of the intervention from the point of view of the participants. In line with the Framework process, it was expected that themes within the data would reflect responses to the questions in the focus group schedule, but also that additional themes would be identified from the participants' responses. The five-stage process was carried out for this study, as follows:

- Familiarisation with the transcripts (step 1): The researcher knew all of the individuals involved in the study and had facilitated the focus group discussions and conducted the individual interviews. The pseudonyms, together with passage of time between producing the transcripts and analysis facilitated a fresh approach to the data with a focus on the words set down, rather than recollections about what an individual may have been conveying. The amount of material meant it was possible for the researcher to read and re-read all of the transcripts, becoming fully immersed and familiar with the whole range of the data.

- Identification of themes (step 2): During familiarisation with the data, notes were made of initial themes emerging. In addition to those arising directly from the questions asked, other related themes also emerged from the participants' comments and all were noted.

- Indexing and charting (steps 3 & 4): These 2 steps as described by Ritchie and Spencer (1994) can also be seen as 'managing the data' (Rabiee, 2004:658). This was done by scrutinising the responses to each of the questions from the focus group (and interview) schedule. One or more codes was assigned to each of the participants' comments in line with the broad themes identified within the data. Following classical focus group analysis strategy (Krueger & Casey, 2009) each response was then allocated as either: directly relevant to the question; relevant to another question; requiring further scrutiny. Further scrutiny of the additional comments led to the creation of additional groupings of themes relevant to the research aims.

- Mapping and interpretation (step 5): Continued familiarisation meant that themes were refined and sub-themes emerged from the initial groupings as further detailed analysis of the data continued. Themes were studied and organised allowing a structure to emerge from the data. Diagrammatic representations of the data were formed using NVivo software (see Appendix 5.29) to map the responses of the participants to the intervention.

Details of the qualitative results are reported in section 5.10, p202.

Following completion of quantitative and qualitative data analysis the results were viewed 'as a whole' to investigate whether the results enabled potential connections to be made from the different types of data, as discussed later (see Section 5.21, p217).

4.10 Summary of chapter

This chapter has outlined the methods and procedures employed in this mixed-methods research study, including development of innovative quantitative assessment tools. The research design, with a combination of quantitative and qualitative data collection and analysis methods, led to a series of structured steps constituting the fieldwork plan. Outlining the methods and procedures undertaken has illustrated the detailed level of planning required to work with groups of participants. As explained, despite careful planning, changes and adaptations were required during fieldwork, some of which were outside the researcher's control. Examples included the recruitment of the pilot group of volunteers being undertaken by the residents' committee (see Section 4.5.1, p140) and scheduling of the research interventions needing to meet the practicalities of the 'real-life' situations of the housing venues (see Section 4.6.4, p148). Neither of these changes was considered material to the study itself, however they illustrated the unpredictable nature of fieldwork.

4.11 Reflections

It is evident on reflection that as a novice researcher I did not anticipate some of the practical difficulties in putting a research plan into action with 'real' participants. For example, when the residents' committee at the pilot venue recruited the pilot group participants themselves, I was somewhat 'taken aback' as I had not anticipated a variation to the plan I had shared with them. In the event, as it was the pilot group I did not consider that this constituted a material change to the research plan. However, it was an early example of the potential for variations to occur as the fieldwork progressed. It alerted me to the fact that I could not assume that everything would turn out 'according to plan'.

There were some events that it was possible to anticipate but impossible to influence, such as participants having medical appointments preventing them from attending sessions. There were other things however, which I could perhaps have anticipated but did not, despite having relevant professional experience that could have helped me to do so. For example, having delivered AT introductory courses to adults for a number of years I had failed to take into account the fact that over a number of sessions one 'gets to know' the attendees to a certain, albeit limited, extent. Had I thought about this more I would have planned, if possible, for someone who was not involved in the delivery of the courses to facilitate the focus groups and undertake the individual interviews. The goodwill between myself and my AT teaching colleagues and the participants, while positively enhancing the course sessions, may have inadvertently restricted more candid comments from participants during the focus groups and interviews. Another example was that having worked with older adults for a number of years as a social worker I could perhaps have anticipated the potential practical difficulties with a group discussion in the room scheduled for the first focus group due to the acoustics in the room and the hearing impairments of some participants. Not anticipating or adjusting for possibilities such as these at the planning stage or during fieldwork is rather frustrating with hindsight, but forms part of the experience that would contribute to future research planning.

Review of the video recordings of the focus groups, while somewhat challenging to watch from a personal point of view, revealed useful learning points for future presentation or facilitation opportunities. These included, for example, habitual arm and hand gestures when talking, and repetitive use of certain words and phrases. In terms of facilitating the group discussion, equal eye contact with different group members was not fully sustained throughout.

I acknowledge that it is important to keep to the research design as approved by the ethics panel, but believe on reflection that I was not always quick to realise where a slight but not material change in plan could improve a situation. Fortunately, close collaboration with my AT teaching colleagues meant that they were often able to draw my attention to possibilities for refining of procedures. The reality of actually undertaking a research study, as opposed to planning it, highlights the value of working with colleagues who are all committed to the research aims and are able and willing to be flexible in approach.

Chapter 5 – Results

5.1 Introduction

This chapter begins with a summary of demographic data for the small pilot group and the two groups of participants recruited for the intervention (AT1 and AT2). This data provides a profile of the participants involved in the study and allows a comparison of the AT1 and AT2 groups. Following on, results are presented in the chronological order in which the data was gathered, the rationale for which was explained previously (see Section 3.5.1, p103). Consequently, the quantitative data analysis is presented first, comprising analysis of changes in balance confidence and FOF, represented by participants' scores from the BCA and FES-I (short, VAS) questionnaire, respectively. Hypothesis testing is used to determine if changes were statistically significant over the course of the study. Qualitative data analysis is presented next and is structured into four summaries which emerged from the data themes. These are: FOF, the background to this research study; outcomes of the intervention; participants' feedback about the intervention; and participants' comments about AT. A brief discussion regarding possible triangulation of the quantitative and qualitative data follows. The chapter concludes with the researcher's reflections on the data analysis process.

5.2 The participants – baseline characteristics

A small pilot group was recruited in order to test the quantitative assessment tools and intervention, as previously described (see Section 4.3.3, p127). With consent, demographic data was collected as outlined for the intervention groups and a summary is shown in Appendix 5.0. The group comprised two female and three male participants, with ages ranging from 72 to 87 years. The median age was the same as that for the AT2 intervention group (79 years) and all other characteristics were similar to those of the AT1 and AT2 groups.

The intervention participants were recruited in separate Extra Care sheltered housing venues, as previously described (see Section 4.6.1, p146). With participants' consent, baseline demographic information was obtained in order to compare the two groups (see Section 4.6.1, p146). As well as age and gender, the data collected aimed to compare other factors which could potentially have an impact on outcome measures for the study. These included health as indicated by self-perception of health and number of prescription medications. When comparing general health, increased prescription medication use is associated with worse health status compared to those taking less medication (Charlesworth et al., 2015) and is associated in the over 65s with need for assistance with activities of daily living (ADL) (Moody et al., 2017). Use of mobility aids indoors was taken as an indicator of level of mobility. An indication of intellectual ability was obtained from age on leaving school and qualifications, as AT is a taught technique which entails learning (see Appendix 1.0). Demographic data is shown in Table 5.1 (p177) and is summarised briefly here.

The AT1 group (*n*=13) with a median age of 85 years, included two male and 11 female participants, while the AT2 Group with a median age of 79 years was all female (*n*=16). Lack of male representation in health research involving older adults is not unusual (Anderson et al., 2016). Reflecting their slightly older age, 62% of the AT1 group left school at 14 years of age with 15% of them having educational or vocational qualifications. In the AT2 group, 75% remained at school beyond 14 years of age and 50% had educational or vocational qualifications (see Section 6.3.2, p237). Amongst the participants, a similar percentage in each of the research groups took four or more prescription medications (AT1, *n*=10, 77%; AT2, *n*=12, 75%). 69% (*n*=9) of the AT1 group described their health as average or above, as did 88% (*n*=14) in the AT2 group. Taking the use of walking aids indoors as an indicator, mobility was more restricted for participants in the AT1 group (*n*=9, 69%) than the AT2 group (*n*=4, 25%). Walking aids were used outdoors by a higher percentage in both groups (AT1 group, *n*=12, 92%; AT2 group, *n*=12, 75%). Overall, therefore, the AT1 group of participants were slightly older and less mobile than the AT2 group, and by self-report viewed themselves as having lower health status, compared to the average for their age, than those in the AT2 group. With the exception of the number using mobility aids indoors (p = .027, Fisher's Exact Test, 2-sided; see Appendix 5.2), differences between the two research groups were not statistically significant (see Appendices 5.2-5.8; see Section 6.3.2, p237).

Table 5.1: Comparative demographics of groups AT1 and AT2

	NO	GENDER		AGE				SELF-PERCEPTION OF HEALTH					PRESCRIPTION MEDICATIONS (NUMBER) (SELF-REPORT)				
		M	F	Mean μ	Range	Median	IQR	Poor	Below Ave	Ave	Good	Excellent	1	2	3	4	4+
AT1 GROUP:																	
ALL RECRUITS	13	2	11	83	30 (63-93)	85	7.5 (81.5-89)	3	1	6	2	1	0	1	2	3	7
AT2 GROUP:																	
ALL RECRUITS	16	0	16	80	22 (71-93)	79	8 (76-84)	2	0	4	10	0	2	2	0	0	12

	NO	AGE ON LEAVING SCHOOL (YEARS)					QUALIFICATIONS (ANY)		WALKING AIDS USED INDOORS (I) OUTDOORS (O)													
									None		Stick		3 or 4 WW		WWF		RT		Wheelchair + Helper		Stick or WW + Helper	
		14	**15**	**16**	**17**	**18**	**Y**	**N**	**I**	**O**	**I**	**O**	**I**	**O**	**I**	**O**	**I**	**O**	**I**	**O**	**I**	**O**
AT1 GROUP:																						
ALL RECRUITS	13	8	4	0	1	0	2	11	4	1	1	2	6	6	0	0	2	0	0	1	0	3
AT2 GROUP:																						
ALL RECRUITS	16	4	8	3	0	1	8	8	12	4	1	7	2	2	1	0	0	0	0	1	0	2

KEY:

I	Indoors (within apartment or Extra Care sheltered housing complex)
O	Outdoors (outside Extra Care housing complex)
3 or 4 WW:	3-wheeled or 4-wheeled ‘rollator’ walker (see Appendix 5.1)
WWF:	Wheeled walking frame (‘zimmer’ frame) (see Appendix 5.1)
RT	Rutland Trolley (see Appendix 5.1)
Wheelchair + Helper	Wheelchair pushed by a helper
Stick or WW + Helper	Use of stick or wheeled ‘rollator’ walker + helper to accompany

5.3 Participation levels in study - attrition and attendance

There were withdrawals from both research groups during provision of the intervention (see Table 5.2, p180). Reasons were unknown in some cases as ethical approval was not sought to follow-up on those who discontinued without explanation. As previously explained, this omission was due to the inexperience of the researcher (see Section 4.3.1, p125). Two participants in the AT1 group were unable to complete all assessments and were therefore excluded from the data analysis due to incomplete data. The total attrition rate for the study was 41% including these two participants. Figure 5.1 (p179) shows the flow of participants through the research study.

Each AT introductory course comprised eight sessions in total. A summary of attendance levels for each group is shown in Table 5.3 (p180). Individual participant attendance levels are provided (see Appendix 5.9). For participants completing the AT course and all assessments, attendance was 86%, (AT1, *n*=8) and 87% (AT2, *n*=9) respectively. This compares favourably with attendance rates for group exercise programmes for fall prevention, found to be 74% by McPhate et al. (2013). Overall attendance rates were 67% (AT1) and 60% (AT2) respectively.

Figure 5.1: Flow of participant numbers through the research study

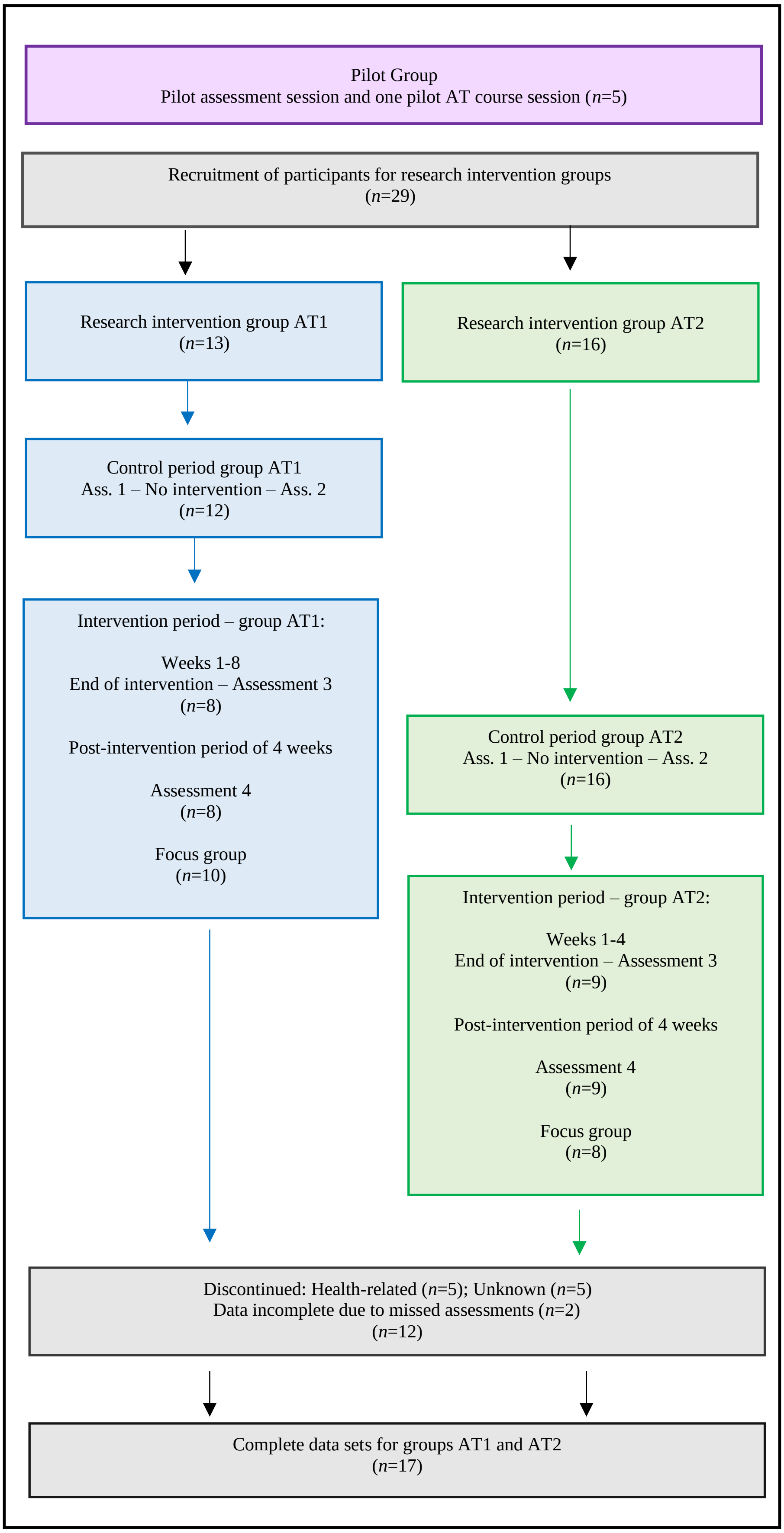


Table 5.2: Summary of participant recruitment and withdrawals from the research study

	AT1 Group	AT2 Group	Study Total
Total recruited	13	16	29
Total complete data sets	8	9	17
Withdrawals - reasons:			
Health	3	2	5
Unknown	0	5	5
Sub-total (percentage)	3 (23)	7 (44)	10 (34)
Data incomplete – unable to attend all assessments (other commitments)	2	0	2
Total Number withdrawn or data incomplete (percentage)	5 (38)	7 (44)	12 (41)

Table 5.3: Intervention - attendance summary

Research Intervention Group	Attendance at AT Course sessions (all recruits)	Attendance at AT Course sessions (complete data sets only)
AT1 group (all recruits, *n*=13)	67%	
AT1 group (complete data sets only, *n*=8)		86%
AT2 group (all recruits, *n*=16)	60%	
AT2 group (complete data sets only, *n*=9)		87%

5.4 Quantitative data analysis – outcome measures

The research hypothesis for this study was that the application of AT learning would enable participants to improve their balance and movement, thereby increasing balance confidence and reducing FOF (see Section 3.2.1, p89). As previously described (see Section 4.4, p130), two quantitative assessment tools were used to measure outcomes of the intervention. Firstly, a practical assessment devised to assess balance confidence (BCA), which consisted of nine assessment items varying in difficulty (see Table 5.4, p181 & Appendices 4.4 & 4.5). Weighting was attributed to assessment items according to their relative challenge, as evidenced by observation of participant response and performance. Six items were given a weighting of one, two items were given a weighting of one-and-a-half, and one item was given a weighting of two.

Table 5.4: BCA assessment items with weighting

Number of item	Description of item	Weighting	Maximum Score for item
1	Stand up from upright chair	1.0	4
2	Walk/weave between three cones	1.0	4
3	Walk around one cone (180 degrees)	1.0	4
4	Step up onto low platform and down again	1.5	6
5	Step up and over platform	2.0	8
6	Lean forward six inches to reach item	1.5	6
7	Walk in straight line to chair	1.0	4
8	Turn round in front of chair	1.0	4
9	Sit down in upright chair	1.0	4
Maximum total weighted score			44

Secondly, a self-report questionnaire asked participants about their level of concern about falling when carrying out seven daily living tasks FES-I (short, VAS) (see Appendix 4.2). Details of the questionnaire and how it was adapted to a VAS format for this study were given previously (see Section 4.4.1, p130).

5.5 Hypothesis testing

Hypothesis testing was used to ascertain whether the intervention had a statistically significant effect on balance confidence and FOF in participants. The null hypothesis for this research study was that the intervention would have no effect on balance confidence or FOF. The level of significance was set at $p \leq .05$. Two-tailed tests were used as it was not possible to discount a potential difference in scores in either direction (Sim & Wright, 2000) due to the complex nature of the phenomenon of FOF, shown to be influenced by physical, psychological and cognitive issues (Laybourne et al., 2008; Jung et al., 2009). Appropriate statistical tests were carried out for the control period (see Section 5.6, p183) and for the intervention/post-intervention periods (see Section 5.7, p185). Statistical analysis was undertaken using computer software (IBM, SPSS, v.24). Parametric statistical tests were used in the analysis.

5.5.1 Parametric statistical tests

The advantage of parametric tests is that they are usually more powerful than the alternative, non-parametric tests (Pallant, 2016), and therefore more likely to detect effects when they are present. However, certain assumptions about the data are required. While some tests require additional specific assumptions, the most universal assumptions are: the level of measurement is interval or ratio; independence of observations; normal distribution of the populations from which the samples are taken; homogeneity of variance (Pallant, 2016) and, as with most statistical tests, random sampling is assumed.

Most parametric tests are considered to be ‘robust’ and therefore may be applied to data despite not all assumptions being met. However when sample sizes are small, as in this study, caution must be exercised in interpreting results. For example, the assumption of random sampling is not always practical when dealing with real-life situations such as those present in this small study (Pallant, 2016). Both quantitative assessment tools used, BCA and FES-I (short, VAS) provided continuous data, which also approximated to the ‘normal’ distribution as shown by the histograms of residuals produced (see Appendix 5.10). Histograms were used to examine the distributions as calculations to test normality are subject to the influence of sample size (Sim & Wright, 2000). Although the intervention was delivered within a group setting, all assessments were undertaken individually away from the group situation, therefore observations were considered to be independent (i.e. observations from any one participant did not influence, and were not influenced by, observations from any other participant).

Tests carried out for homogeneity of variance for the intervention period indicated that the assumption was met for FES-I (short, VAS) but not for BCA (see Appendices 5.15a & 5.17a). Nevertheless the statistical test (analysis of variance) is considered robust to violations of this assumption when the size of groups is similar, as in this case (Pallant, 2016). Sensitivity analysis was carried out using appropriate equivalent non-parametric tests when they existed, to indicate whether choice of test had affected the results. As the total number of complete data sets for each research group was small (AT1, n=8; AT2, n=9) they were amalgamated for statistical analysis (n=17). Use of analysis of variance (ANOVA) enabled comparison between the two research intervention groups within the analysis.

5.6 Quantitative data analysis – control period

As previously explained (see Section 4.9.4, p164) the purpose of the control period (where each participant acted as his or her own control, pre-intervention) was to take account of the possible change in performance of the participants prior to the intervention which could have occurred, for example, due to the practice effect (Cook & Campbell, 1979; Field, 2018). By comparing the scores before (Assessment 1) and after the control period of two weeks (Assessment 2) it was possible to determine whether there had been any statistically significant change in scores and therefore establish appropriate baseline scores for the research intervention period which followed-on immediately.

5.6.1 Control period – statistical tests, results and setting of baseline scores

The paired samples *t* test is an appropriate parametric test to compare group data at two time points, where the same individuals are tested at each point (Hinton & McMurray, 2017). *t* tests were carried out on data from the BCA and FES-I (short, VAS) scores from Assessment 1 and Assessment 2 to evaluate whether any changes took place in the participants' scores over the control period. Due to the small number of complete data sets following the intervention/post-intervention period (n=17), results for both research intervention groups are combined (see Section 5.7, p185). Therefore, for consistency, the results for the control period are reported on the same basis here.

Results for BCA scores for the AT1 and AT2 groups combined were $t = 1.961$, $df = 27$, $p = .060$. The mean increase in BCA scores was 1.125 (95% CI: 0.052 to 2.302). The eta squared statistic (0.125) indicates a moderate effect (Pallant, 2016) (see Appendix 5.11).

Results for the FES-I (short, VAS) scores for the AT1 and AT2 groups combined were $t = 0.065$, $df = 27$, $p = .949$. The mean decrease in FES-I (short, VAS) scores was -1.250 (95% CI: -38.449 to 40.949). The eta squared statistic (0) indicates no effect (see Appendix 5.12).

As $p > .05$ in both cases, none of the results for the control period were statistically significant, although the BCA results were approaching significance. Data analysis reports for the paired sample *t* tests are provided (see Appendices 5.11 & 5.12). Sensitivity analysis using the non-parametric Wilcoxon signed rank test for related samples was carried out and confirmed these results (see Appendices 5.13 & 5.14); therefore, the choice of test had not affected the results.

As none of the results for the BCA or FES-I (short, VAS) were statistically significant ($p \geq .05$) for the control period, it can be concluded that there was no change in balance confidence as demonstrated by the BCA scores, or FOF operationalised as falls efficacy and shown by the FES-I (short, VAS) scores. Consequently, as previously explained (see Section 4.9.4; Figure 4.7, p164), the baseline scores for the intervention and post-intervention periods were determined using the mean of the Assessment 1 and Assessment 2 scores for both of the quantitative evaluation tools.

5.7 Quantitative data analysis - intervention and post-intervention periods

To establish whether there was any change in balance confidence and FOF as a result of the intervention, baseline scores were compared with scores following the intervention. Analysis was completed using three sets of data for each of the two outcome variables:

Baseline data (mean of Assessment 1 and Assessment 2 scores).

Assessment 3 scores, within one week of the end of the intervention.

Assessment 4 scores, after a post-intervention period of four weeks.

The aim of the data analysis was to ascertain:

- whether there were any changes in balance confidence as indicated by participants' scores for the BCA; and FOF, operationalised as falls efficacy and measured using the FES-I (short, VAS) questionnaire. Baseline results were compared with two time points after the intervention.
- whether frequency of intervention resulted in any difference in the performance of the two groups (AT1 & AT2).

For the purposes of statistical analysis the data from the two research intervention groups was combined into one data set (*n*=17) for the intervention and post-intervention periods, as the number of complete data sets in each group was small. A separate comparison of the two groups within the data analysis was to indicate whether the frequency of delivery of the intervention had affected the outcome.

5.7.1 Intervention and post-intervention periods – statistical tests

The elements of the data analysis for the intervention and post-intervention periods were as follows:

- Comparison of scores for the same individuals on different occasions over the course of the research study (within-subjects analysis). This consisted of three sets of data for each participant (repeated measures): Baseline, Assessment 3 and Assessment 4.

- Comparison of the scores of the two separate intervention groups, AT1 and AT2, (between-subjects analysis).

Within-subjects repeated measures and between-subjects attributes within the data set were accommodated using computer software (IBM, SPSS v.24). Analysis of variance (ANOVA), a parametric statistical test, enables a comparison of more than two sets of data (in this case Baseline, Assessment 3 and Assessment 4) without increasing the risk of a Type I error. A Type I error is when a result is erroneously reported as being significant (Field, 2005; Hinton et al., 2014), which could occur if multiple tests were conducted between pairs of sets of data. In the case of statistically significant results, post-hoc pairwise comparisons allow differences between the individual time points to be identified, applying appropriate corrections as required such as Bonferroni (SPSS statistical package v.24).

A one-way between-groups analysis of variance was conducted to compare the effectiveness of two different frequencies of delivery (AT1, once a week and AT2, twice a week) of the intervention aimed at increasing balance confidence and reducing FOF. The independent variable was the frequency of delivery (once-a-week or twice-a-week) and the dependent variable consisted of scores from completion of the BCA assessment or scores from the FES-I (short, VAS) questionnaire. The possibility of pre-existing differences between the two research groups prior to the intervention was taken into consideration by adjusting for, or statistically 'taking out', the differences between the two groups at baseline, referred to as 'controlling for' the baseline scores (Pallant, 2016). This was done by using the participants' scores at baseline (pre-intervention) as a covariate in the analysis.

5.7.2 Intervention and post-intervention periods – analysis of BCA scores

Assumptions for parametric tests were checked, as previously outlined (see Section 5.5.1, p182). In addition, the key assumption for repeated measures ANOVA, that of sphericity, was also checked (Hinton, 2014) (see Appendices 5.15 & 5.17). Results over the three time periods (Baseline, Assessment 3 and Assessment 4) (see Figure 5.2, p189) using within-subjects repeated measures ANOVA showed there was no significant main effect on mean BCA scores over time, comparing baseline scores with two post-intervention scores, at the $p \leq .05$ level, $F (2, 32) = 3.108$, $p = .058$. However, the results were approaching significance. A large effect size is indicated by partial eta squared (0.163). The means and standard deviations are presented in Table 5.5 and results shown in Figure 5.2 (p189).

Table 5.5: BCA scores - means and standard deviations

Time period	N	Mean	Standard deviation
Baseline (pre-intervention)	17	35.471	6.878
Assessment 3 (immediately post-intervention)	17	36.029	5.792
Assessment 4 (four-weeks post-intervention)	17	37.324	4.700

As previously stated (see Section 5.5.1, p182), non-parametric tests were used where available in order to confirm that choice of test had not affected results. The non-parametric Friedman test however showed a significant main effect on BCA scores over time , $\chi^2 = 7.065$, $df = 2$, $p = .029$ (see Appendix 5.16). The difference in parametric and non-parametric results therefore indicate that choice of test affected results in this instance although, as previously stated, the sample size was small, so statistical results should be viewed with caution. Consequently, both parametric and non-parametric results are reported here with the results remaining inconclusive regarding statistical significance.

Post-hoc tests (Bonferroni correction applied) indicated no significant difference between baseline and Assessment 3 scores (p = .797) and a significant difference between Assessment 3 and Assessment 4 scores (p = .021) (see Appendix 5.16a).

Figure 5.2: Estimated mean BCA scores for all participants at baseline and post-intervention (n=17)

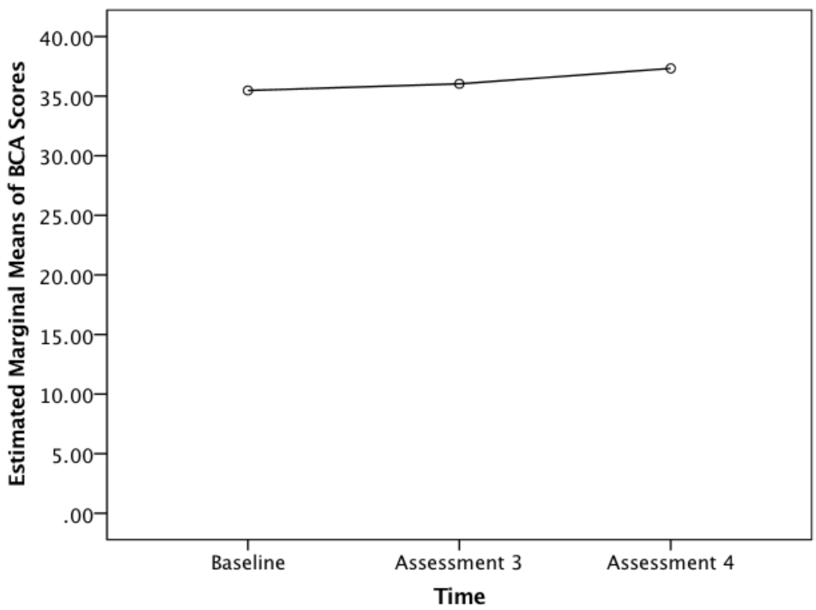
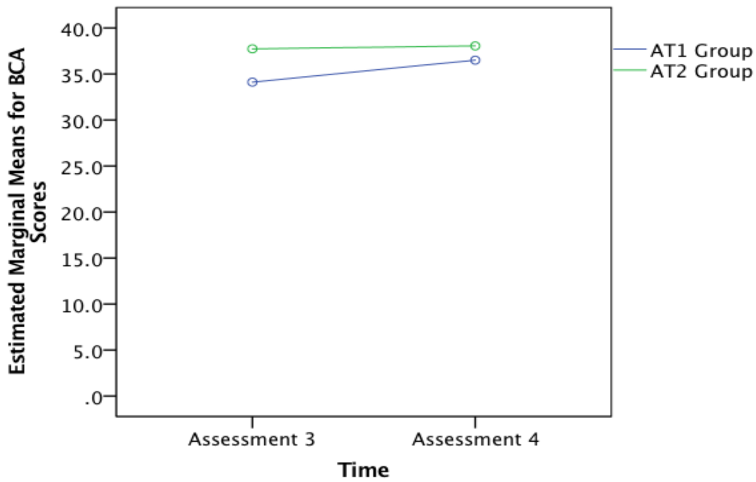


Figure 5.2 shows the increase in balance confidence overall for all participants (n=17) at assessments 3 and 4, compared with baseline scores. Parametric tests indicated this result was not significant (although approaching significance p = .058). Non-parametric tests indicate that it is significant (p = .029). Non-parametric post-hoc analysis show that this increase was not statistically significant between baseline and assessment 3 (p = .797) but was statistically significant post-intervention between Assessment 3 and Assessment 4 (p = .021) (see Section 6.3, p234).

The mean scores of the two groups (AT1 and AT2) were compared, with the baseline scores used as a covariate, as shown in Figure 5.3, p191. Due to the use of a covariate, further checks on the data were required prior to carrying out the analysis. Checks were conducted in addition to those already carried out for repeated measures ANOVA (see 5.7.2, p188), for violations of the additional assumptions of: linearity of the relationship between the covariate and the dependent variable; homogeneity of variances; homogeneity of regressions slopes; that there was reliable measurement of the covariate; and that there were no outliers (Pallant, 2016). As previously discussed (see Section 5.5.1, p182) the assumption of homogeneity of variances was not met for BCA scores (see Appendix 5.15a). In addition it was found that there was one outlier in the data set (see Appendix 5.21). As BCA was an innovative assessment tool used in this study, it had not been previously validated and therefore reliable measurement of the covariate (baseline BCA scores) could not be confirmed. The analysis was carried out, however, taking into consideration these violations and the small data set, results are regarded with caution.

Taking baseline scores as a covariate and looking at the two groups (see Figure 5.3, p191), results showed that there was no significant interaction between frequency of intervention (AT1 and AT2) and time at the $p \leq .05$ level, F (1, 14) = 3.264, $p = 0.092$, indicating that the changes in scores between Assessment 3 and Assessment 4 were not significantly different in the two groups. There was also no statistically significant effect over time (between Assessment 3 and Assessment 4) at the $p \leq .05$ level, F (1, 14) = 2.079, $p = .171$.

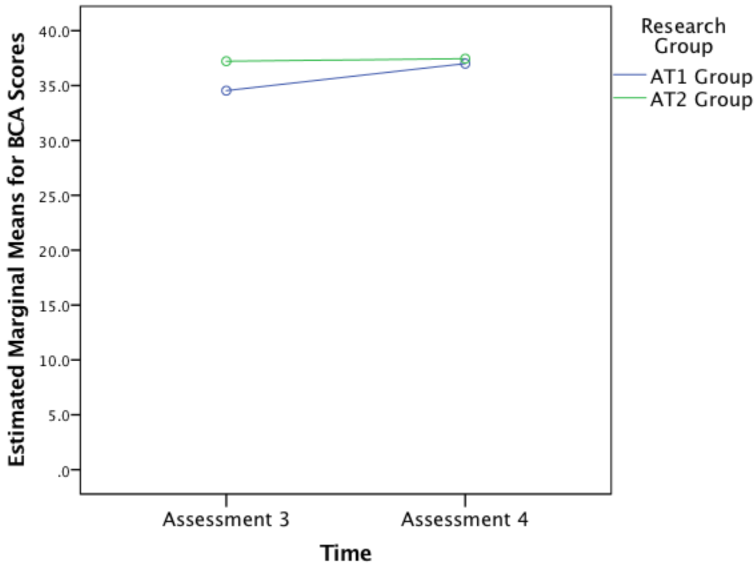
Figure 5.3: Estimated mean BCA scores post-intervention, comparing groups AT1 and AT2. Baseline scores are used as a covariate (values are adjusted in relation to the mean baseline score of 35.47)



The main effect comparing the two groups (intended to evaluate frequency of intervention) was significant at the $p \leq .05$ level, $F(1, 14) = 6.878$, $p = .020$ (see Appendix 5.15). Therefore, there was a statistically significant difference between the performance of the two groups post-intervention, when the baseline score was used as a covariate. Partial eta squared (0.329) indicated that the difference between the two groups was very large.

As mobility level indoors was significantly different between the two groups at baseline, with 69% of the AT1 Group compared to 25% of the AT2 Group using a mobility aid indoors (p = .027, Fisher's exact test), the analysis was run again controlling for mobility as well as baseline scores (see Figure 5.4, p192). Taking into account use of a mobility aid indoors as an indication of mobility, differences in BCA scores between the two groups were no longer statistically significant $F(1, 13) = 2.432$, $p = .143$, indicating that frequency of intervention did not affect results. Partial eta squared (0.158) indicated that a large (non-significant) difference remained between the BCA scores of the two groups (see Appendix 5.25).

Figure 5.4: Estimated mean BCA scores post-intervention, comparing groups AT1 and AT2 while controlling for use of mobility aid indoors. Baseline scores are used as a covariate (values are adjusted in relation to the mean baseline score of 35.47)



The results for balance confidence using a parametric test indicated that there was a large but non-significant increase in mean BCA scores for all participants (*n*=17) over the course of the study. A non-parametric test indicated that the difference was statistically significant. Post-hoc comparisons show that the statistically significant difference was in the post-intervention period, indicating that AT learning and application was enduring post-intervention over the 4-week period (see Section 6.3, p234). When both baseline scores and mobility levels were taken into account there was no significant difference in balance confidence between the two groups post-intervention, which indicates that frequency of intervention (once or twice-weekly AT sessions) did not affect results. As shown in Figures 5.3 and 5.4, BCA scores were lower in the AT1 Group compared to the AT2 Group, which might be expected given the comparative demographics (see Section 5.2, p174; Table 5.1, p177).

5.7.3 Intervention and post-intervention periods – analysis of FES-I (short, VAS) scores

Preliminary checks for parametric tests were conducted to ensure that there was no violation of assumptions, as previously outlined (see Sections 5.5.1, p182; 5.7.2, p188; Appendices 5.17, 5.22-5.24). Analysis of results over the three time periods (Baseline, Assessment 3 and Assessment 4) using within-subjects repeated measures ANOVA showed there was no significant main effect on mean FES-I (short, VAS) scores over time, comparing baseline scores with two post-intervention scores at the $p \leq .05$ level, F (2, 32) = 0.309, $p = .736$. Means and standard deviations are presented in Table 5.6 and results shown in Figure 5.5 (p194). Partial eta squared (0.019) indicated a small effect (Pallant, 2016).

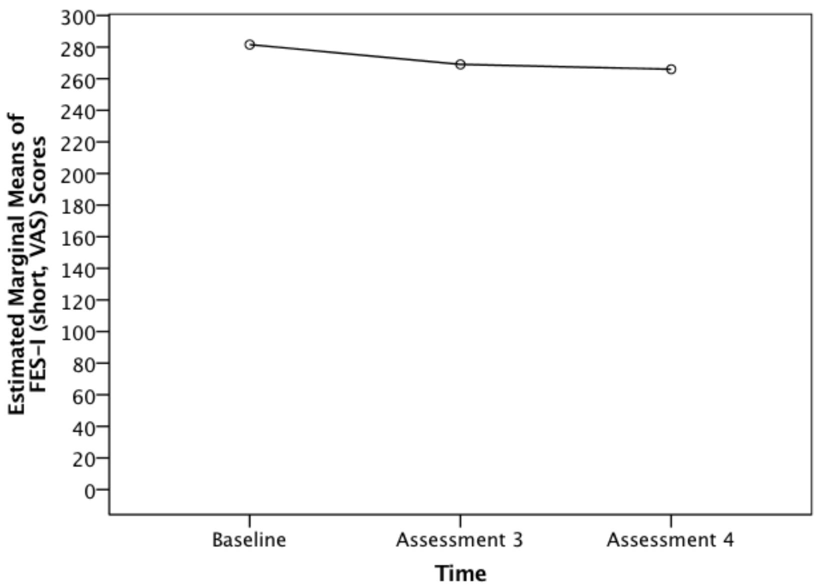
Table 5.6: FES-I scores – means and standard deviations

Time period	N	Mean	Standard deviation
Baseline (pre-intervention)	17	281.59	138.192
Assessment 3 (immediately post-intervention)	17	269.06	136.872
Assessment 4 (four-weeks post-intervention)	17	266.00	152.688

The non-parametric Friedman test confirmed no significant main effect on FES-I (short, VAS) scores over time , $X^2 = 1.059$, $df = 2$, $p = .589$.

Figure 5.5 (p194) shows the mean scores for all participants with complete data sets (n=17) indicating an overall reduction in FOF, measured using FES-I (short, VAS) scores immediately after the intervention (Assessment 3) and after a further four weeks (Assessment 4); however, the change in scores was small and not statistically significant.

Figure 5.5: Estimated mean FES-I (short, VAS) scores for all participants at baseline and post-intervention (n=17)

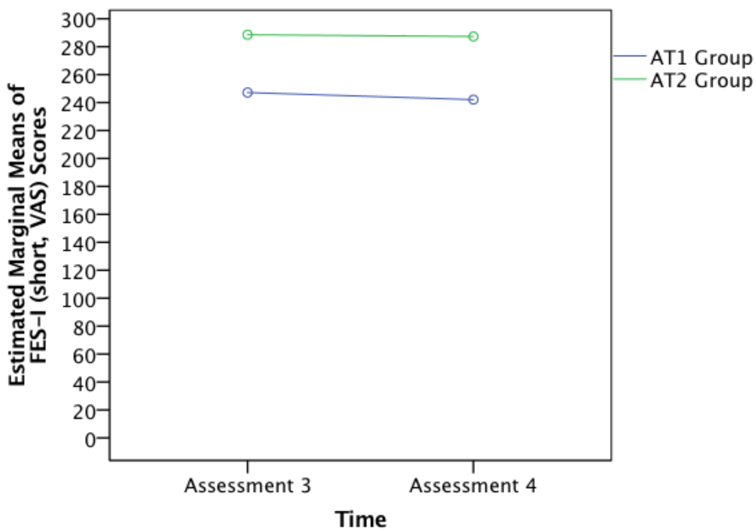


The scores of the two groups (AT1 and AT2) were compared, with the baseline scores used as a covariate, shown in Figure 5.6 (p195). This required further checks prior to carrying out the analysis, as described previously as for the BCA analysis (see Section 5.7.2, p188). FES-I (short, VAS) was an adaptation of an existing validated assessment tool, however, this adaptation had not been previously validated and therefore reliable measurement of the covariate, baseline FES-I, (short, VAS) scores could not be confirmed.

There was no significant interaction between frequency of intervention and time, F (1, 14) = 0 .008, *p* = .931, showing that the changes in scores between Assessment 3 and Assessment 4 were not significantly different in the two groups. There was no significant effect over time at the $p \leq .05$ level, F (1, 14) = 0.295, *p* = .595 with partial eta squared (0.021) indicating a small effect. Therefore, the change in scores between Assessment 3 and Assessment 4 were not significant when controlling for the baseline scores.

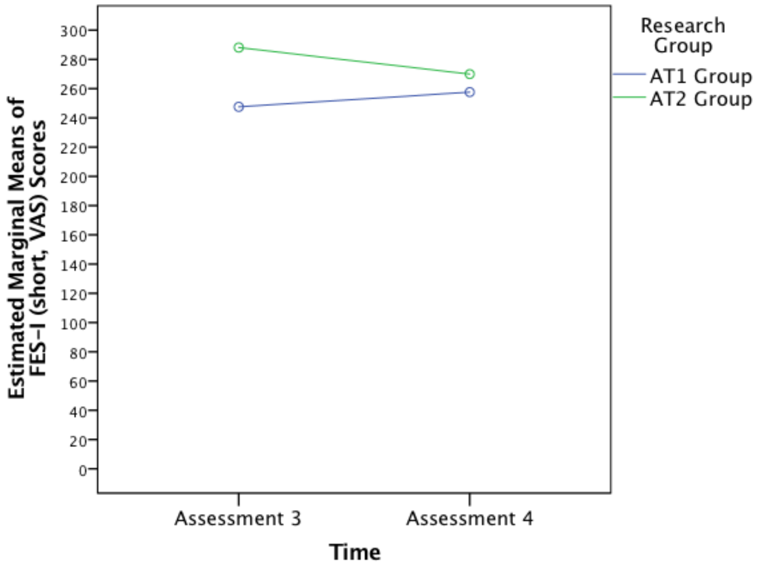
As can be seen from Figure 5.6 where the post-intervention scores are shown separately for each group, there are differences in the mean scores of the two groups; however, these were non-significant, F (1, 14) = 1.247, *p* = .283 and moderate (Partial eta squared = 0.082). Figure 5.7 (p196) shows that differences in FES-I (short, VAS) scores between the two groups remained non-significant when taking into account mobility level as well as baseline scores, F (1, 13) = 0.331, *p* = .575. Partial eta squared (0.025) indicated a small effect (see Appendix 5.26).

Figure 5.6: Estimated mean FES-I (short, VAS) scores post-intervention, comparing groups AT1 and AT2. Baseline scores are used as a covariate (values are adjusted in relation to the mean baseline score of 281.59)



Although differences between the groups were small and non-significant, Figure 5.6 (p195) shows that after taking into account baseline scores, the AT1 group had lower mean FES-I (short, VAS) scores relative to the AT2 group, indicating lower FOF. This remained the case when mobility was also taken into account (see Figure 5.7). The respective levels of FOF between the groups post-intervention could be viewed as somewhat unexpected given that the AT1 group were, overall, less mobile than the AT2 Group (see Section 5.2, p174). However, relative to the mean baseline score for all participants (281.59, see Table 5.6, p193) the mean score for the AT1 group was lower immediately post intervention, whereas the mean score for the AT2 group was slightly higher as seen in Figures 5.6 and 5.7. The differing trajectories of the mean scores for each group between Assessment 3 and Assessment 4 as seen in Figure 5.7, may indicate a return towards baseline levels. However, as overall results are non-significant no conclusions can be drawn.

Figure 5.7: Estimated mean FES-I (short, VAS) scores post-intervention, comparing groups AT1 and AT2 while controlling for use of mobility aid indoors. Baseline scores are used as a covariate (values are adjusted in relation to the mean baseline score of 281.59)



5.8 Individual scores

Scores for individual participants varied considerably within each group for both balance confidence (BCA) (see Figures 5.8, p199 & 5.10, p200) and FOF (FES-I, short, VAS questionnaire) (see Figures 5.9, p199 & 5.11, p200). Comments on a small sample of individual results follow. These give a 'snap shot' of the varying results of individuals within the study. They illustrate the spread of different levels of baseline balance confidence and FOF amongst participants; and give an indication of how they responded individually to the intervention. All names used are pseudonyms, which will be used throughout to preserve confidentiality.

Participants with particularly low balance confidence and high FOF at baseline were Jean (AT1) and Jenny (AT2). It appears from the changes in Jean's BCA and FES-I (short, VAS) scores (see Figures 5.8 & 5.9, p199) that the intervention was effective in enabling her to increase her balance confidence which was sustained post-intervention. While her FOF was reduced immediately after the intervention, it increased again once the intervention ended, although it did not return to the baseline level. Jean expressed how FOF affected her daily life prior to the intervention (see Section 5.16, p211). Jenny had very low balance confidence at baseline and a relatively high FOF (see Figures 5.10 & 5.11, p200). The change in her scores were consistent with the intervention enabling her to increase her balance confidence and reduce her FOF, shown at Assessment 3, with both changes continuing to improve by Assessment 4. Jenny commented on her improved balance confidence (see Appendix 5.29, p436).

For those who began with higher balance confidence at baseline there were mixed results. For example, Diana (AT1) began with a high BCA score which initially decreased after the intervention but increased to higher than her baseline score by Assessment 4. Diana's FOF decreased steadily over the course of the study. Beverley (AT2) began with a very high BCA score which decreased slightly over the course of the study. This may have been due to an increased awareness of risk (see Section 5.17, p212). Beverley's FOF was low and remained so throughout the study. Vera's (AT2) high baseline BCA scores appear to show a 'ceiling effect' as her score increased to the highest score for Assessment 3 and 4. Vera's baseline FOF was very low and declined further during the course of the study.

While Phyllis (AT2) began with a high balance confidence score which increased after the intervention and was maintained, her baseline FOF was high and remained so throughout the study. Mo (AT2) also began with a high balance confidence score however this declined continually during the study while at the same time her FOF score steadily increased, which was supported by her comments (see Section 5.11, p203).

Figure 5.8: BCA scores for individual participants in the AT1 Group

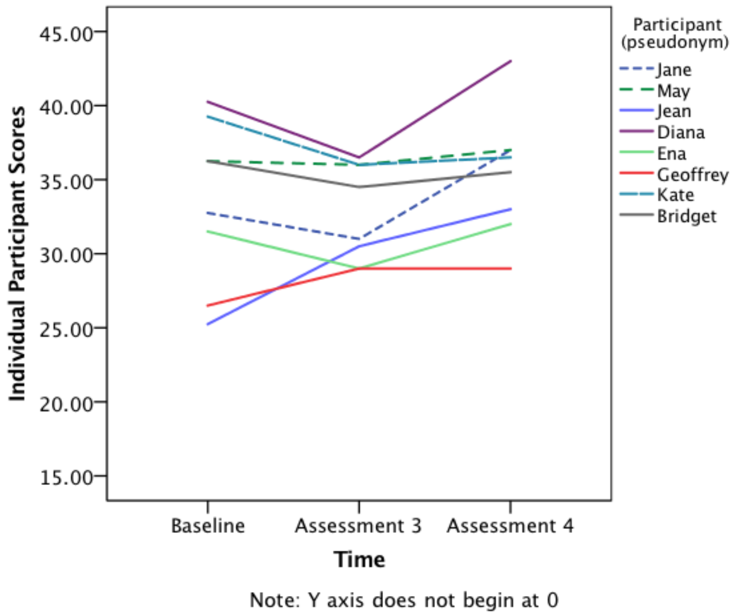


Figure 5.9: FES-I (short, VAS) scores for individual participants in the AT1 Group

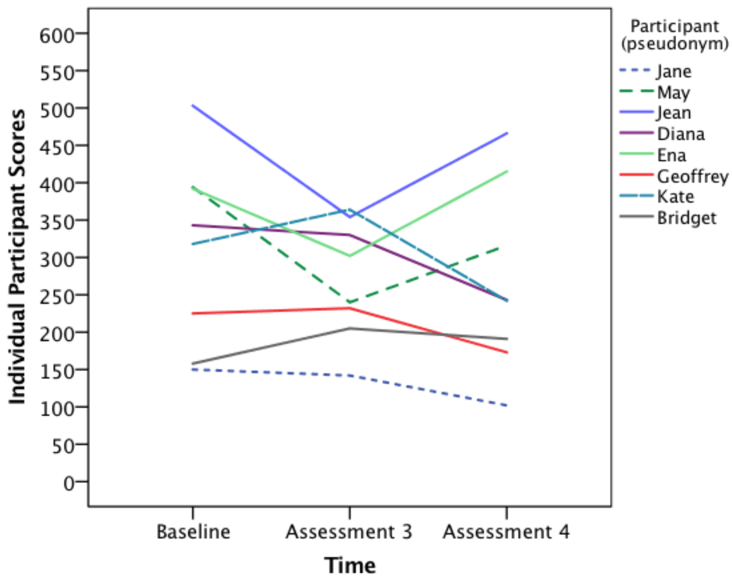


Figure 5.10: BCA scores for individual participants in the AT2 Group

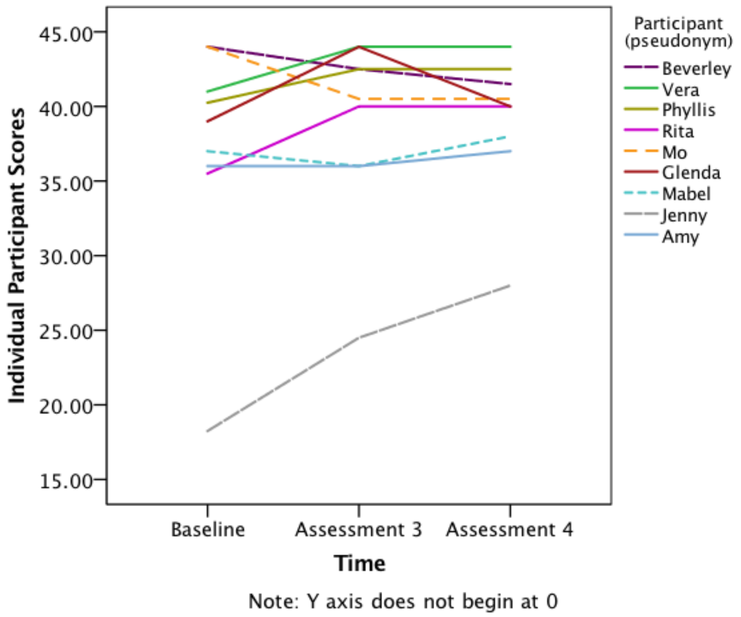
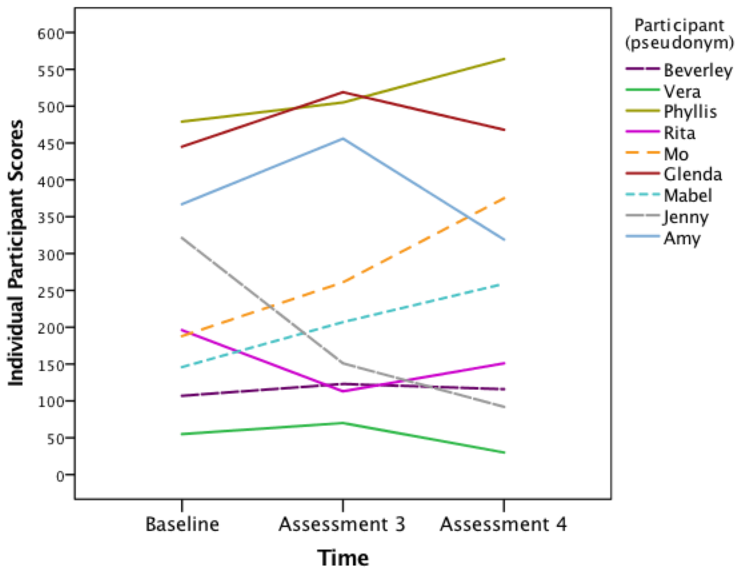


Figure 5.11: FES-I (short, VAS) scores for individual participants in the AT2 Group



5.9 Summary of quantitative results

Results for the two quantitative assessment tools used in this study differed. Those for the BCA scores were conflicting, the parametric test results indicating a large but non-significant increase in BCA scores over the course of the study for all participants (*n*=17). However, a non-parametric test indicated a statistically significant increase (*n*=17). Consequently, these results are inconclusive regarding statistical significance as parametric and non-parametric tests gave different results. Comparison of results for the AT1 and AT2 groups after controlling for baseline scores showed a significant difference between them. However, when level of baseline mobility was also taken into account there was no significant difference between the groups, indicating that frequency of intervention did not affect the results.

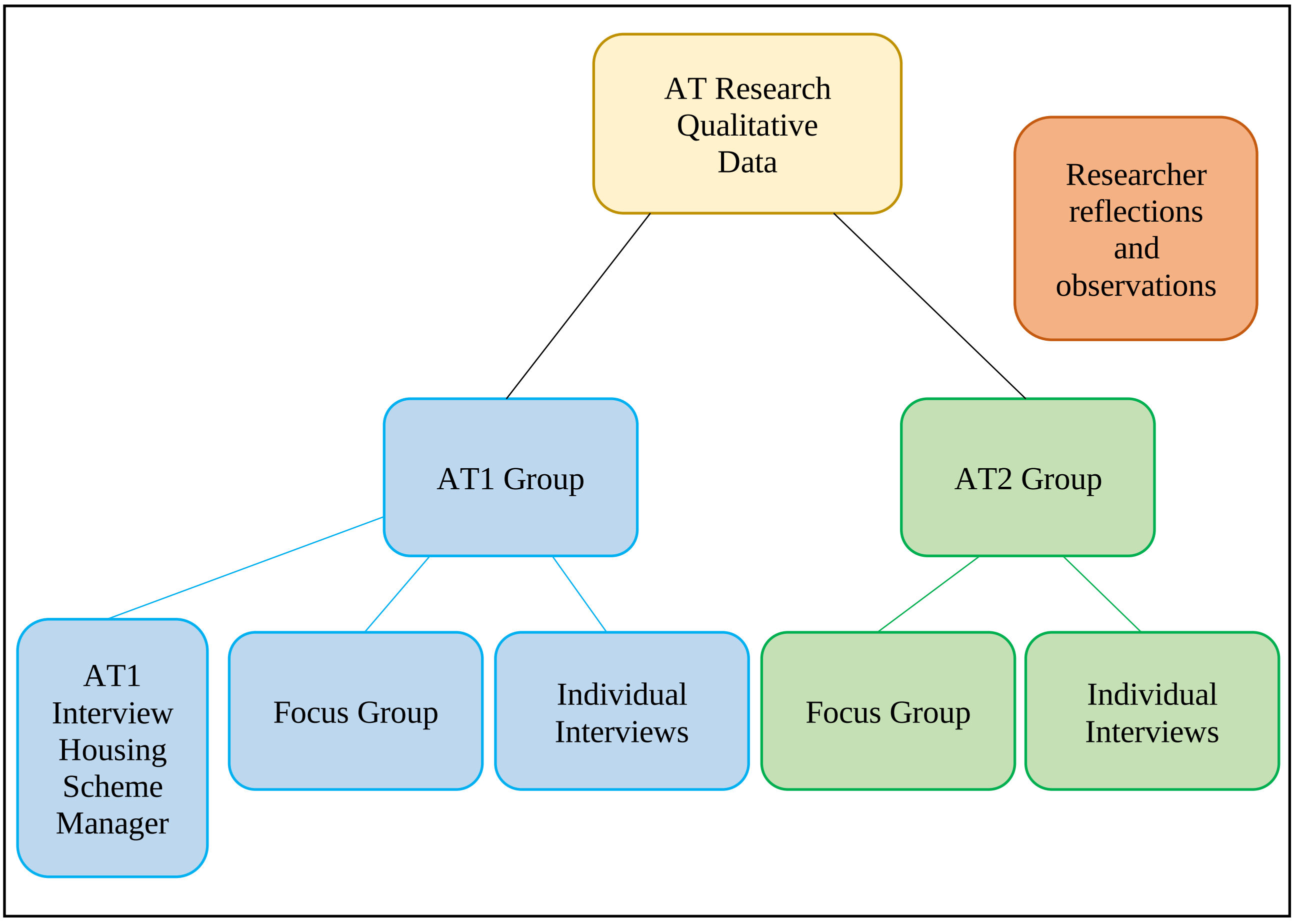
Results for the FES-I (short, VAS) scores showed a small non-significant reduction and, therefore, provided no evidence to doubt the null hypothesis that there was no change in FOF. There was no significant difference between the two groups for FES-I (short, VAS) scores indicating that, as for the BCA scores, frequency of intervention did not affect results.

The quantitative results will be evaluated together with the results of the qualitative data analysis which follows (see Section 5.10, p202) as both form part of the overall analysis in this mixed-methods study.

5.10 Qualitative data analysis

The qualitative data in this study was gathered following completion of the intervention and quantitative assessments, as its purpose was to gather participants' feedback of their experiences, not because there was any perceived hierarchy between the quantitative and qualitative data sources. Participants were asked to reflect on three particular elements: their experience of the intervention, AT learning, and usefulness of AT application in daily life. Themes which emerged from the data were grouped around four key areas of research interest (see Section 3.2.2, p89). These were: (1) FOF, the background to this research study; (2) outcomes of the intervention; (3) participants' feedback about the intervention, and (4) participants' thoughts and reflections about AT. Diagrammatic summaries of the data from these four key areas of interest, with samples of quotations from the thematic analysis, are set out in full in Appendix 5.29. A summary of the data follows in this chapter and is presented with illustrative quotations from participants. All quotations are referenced with the individual's first name, research group, and whether from focus group discussion (FG) or individual interview (Int). Quotations are reported verbatim, including colloquialisms, to preserve authenticity of the comments. As previously stated (see Section 5.8, p197) all names used are pseudonyms. A diagrammatic summary of qualitative data sources is presented in Figure 5.12, p203.

Figure 5.12: Summary of qualitative data sources



5.11 FOF, the background to this research study

It is well established that FOF is widespread amongst older adults, including amongst those who have not themselves experienced a fall (Jung, 2008; Scheffer et al., 2008; Gaxatte et al., 2011). It was therefore not surprising that FOF was prevalent amongst the participants in this study, being a recurrent theme throughout the qualitative data. Participants were aware of risks due to their own fall experiences, but also from awareness of consequences of falls for other people, as illustrated by one participant's comment:

> *'I've seen one or two in here as have broken bones, and then you're stuck aren't you' (Kate.AT1.Int).*

An acceptance of the inevitability of falls was apparent, for example, regarding the importance of knowing 'why' the fall had occurred:

> *'You know, I knew the reason I was falling. It's when you don't know isn't it' (Ena.AT1.Int).*

A 'resignation' about the need for help if a fall did happen was another illustration of the acceptance of their inevitability:

> *'If I do fall I can't get up again I have to have assistance' (Geoffrey.AT1.Int).*

Experience of deterioration in balance is associated with ageing by some older adults (De Groot & Fagerström, 2011) and this was reiterated by participants in this study with five different participants mentioning it in the AT1 focus group, for example:

> *'It's your balance, sometimes I'm all over the place' (Kate.AT1.FG).*
>
> and
>
> *'You see, you lose your balance, that's the trouble' (May.AT1.FG).*

Self-restriction of activity is a recognised consequence of FOF (Phillips et al., 2004; Deshpande et al., 2008; Rantakokko et al., 2009) and was specifically mentioned by four of the participants in this study, illustrated by the comment:

> *'I can't be quite as confident wandering round like I normally do in lots of places, I think, oh-no, I won't go that far' (Mo.AT2.FG).*

The comments made by participants confirmed that they had concerns about balance and movement (see Appendix 5.29) and that FOF was having an impact on their daily lives. It was against this backdrop that they were asked to evaluate the AT intervention.

5.12 Participants' feedback about AT

Given the research demonstrating the difficulty of engaging older adults with falls prevention and rehabilitation (see Section 2.4.3, p69) it is worth noting that in this study feedback from participants was overwhelmingly positive, despite some perception of AT as being 'difficult'. Such a positive response was something of a surprise to the researcher as application of AT requires commitment to practice by paying attention to balance and movement which is not what we are used to attending to (see Section 6.2.1, p223). There was a general consensus within the focus groups that the practical AT instruction which related to everyday activities was particularly appreciated rather than explanatory talks, as illustrated by one participant's comments:

> *'Yes, I mean and also, doing things. If you'd sat there explaining and went over an hour, you don't take it in, especially at our age'* (Kate.AT1.Int).

The perception that AT was 'difficult' was evident in statements by two individuals in the AT1 focus group, although they did not elaborate in detail, saying:

> *'It's hard isn't it'* (Kate.AT1.FG).
>
> and

'It was very difficult' (May.AT1.FG).

A comment by one participant in the AT2 focus group, with agreement indicated by others, was that explanatory talks about AT were complicated, which may reveal the source of the perception of difficulty:

'Some of the chat, the bits you read out to us, some of it was a bit complicated for us' (Mo.AT2.FG).

However, as this perception was not explored further in focus group discussions, the reasons underlying it cannot be confirmed. Despite a perception of difficulty expressed by some, participants engaged with AT learning during the course sessions. Having gained experience during the sessions, participants could then practice their application at other times. The fact that they were doing so was evidenced by the comments made about their individual experiences in the following section.

5.13 Outcomes of the intervention – embracing AT learning

A number of challenges were identified by participants about their AT learning experience. For example, remembering to apply learning was mentioned by six participants, for example:

'It's keeping it up isn't it, you've got to remember all the time haven't you' (Ena.AT1.FG).

Strength of habit was acknowledged by one participant as a contributing factor when not remembering to apply learning:

'To start off with I had to stop and think, I shouldn't have done that, I should have done it the other way. You know, because you're so used to doing things the one way' (Kate.AT1.Int).

Age-related decline in memory was specifically mentioned by one participant:

'Well, yes, really, because our memories are going a bit you know … ' (Jean.AT1.FG).

However, despite this additional difficulty, it was reported by the same participant that the usefulness of AT learning was an aid and incentive to remember:

'… I could remember them a bit more, you know, a bit more, but, er, it's because it's things that you want to know' (Jean.AT1.Int).

Encouragement of fellow-participants, and engaging family and friends as support, was a strategy used by some participants to aid application outside course sessions. Jean (AT1) was particularly enthusiastic about reminding others, and a participant in the AT2 group reported enlisting family:

'Yes … Jean keeps onto us, you know Jean don't you … she keeps saying "1,2,3,up" ' (Ena.AT1.Int).

and

'My grandchildren do it with me now' (Rita.AT2.FG).

Engagement with AT learning was remarked upon by the housing scheme manager (SM) at the AT1 venue. Attendance levels for various other courses meant she had not expected participants to complete the course:

> *'We thought people would just drop off and you'd end up with none, ... so they must have seen some benefit and must have been quite positive about it to do that' (SM.AT1.Int).*

Comments made by participants in both research groups as well as the SM at the AT1 venue, confirmed that participants were motivated to apply AT learning. Comments affirmed that application of AT learning was perceived to be individually achievable, despite varying capabilities. Participants reported incorporating AT practical procedures into daily life to bring about improvements in balance and movement, requiring some apparent changes in behaviour as illustrated in the next section.

5.14 Outcomes of the intervention – changes in behaviour recognised

Changes in behaviour were acknowledged by participants as resulting from application of their AT learning. For example, in the AT2 focus group there was a general consensus of increased conscious awareness of activities in daily life, as voiced by one participant:

> *'As you say, the awareness … and think about it instead of just doing it' (Phyllis.AT2.FG).*

Participants in both the AT1 and AT2 group realised that thinking about balance and movement in daily life was something they had not been doing before, as illustrated by one individual:

'You have to stop and think about it. See, you don't always think about things do you and sometimes it pulls you up, quite sharp and you have to think what you're doing' (Ena.AT1.Int).

Specific practical activities included in the course sessions were appreciated as being particularly useful, including getting in and out of a chair, sitting in a chair, standing, walking, lowering the height and reaching. Getting out of a chair prompted several comments, again stressing the importance of thinking, for example:

'Like when you are getting out of a chair, thinking about it, you know' (Amy.AT2.FG).

Alleviation of discomfort was reported by one participant:

'Well I've had a bad back this last three weeks, very bad, very bad and it's helped me ... it hasn't hurt to do that, to get up, now if I got up how I used to get up it does' (Rita.AT2.FG).

These comments reinforce that AT learning was perceived as useful in daily life. The participants realised that thinking more than previously about 'what they were doing', was central in enabling them to bring about beneficial change. Rita's comments about application of AT learning to manage back pain illustrate how her practical AT learning had increased her control over her situation.

5.15 Outcomes of the intervention – increased balance confidence

Application of learning was reported as leading to increased confidence in activities of daily living. For example, one participant in the AT1 group described resuming outings with her daughter which she enjoyed and attributed her increased confidence to the course. Another participant, in the AT2 group, began walking to the course sessions on her own rather than being accompanied by her daughter. The Scheme Manager (SM) at the AT1 venue observed increased confidence in participants, particularly in getting out of chairs and walking. She reported that some participants had previously struggled and required a lot of help to stand up from a chair but were now able to get up independently:

> *'… and then they're up, they're up on their feet without any of that struggling' (SM.AT1.Int).*

The SM, who knew the participants well, reported that certain participants had returned to visiting the communal areas of the housing complex whereas previously they had confined themselves to their own apartments. She commented on two friends who had done the course:

> *'... because she hadn't been coming down at all, but she has and it's been brilliant. And it's nice for Ena and Kate as well because they're friends. Nice for them to have done it together' (SM.AT1.Int).*

Examples such as these indicate that increased levels of balance and movement confidence amongst participants led to them becoming more active within and beyond the sheltered housing settings, potentially contributing to an increased quality of life.

5.16 Outcomes of the intervention – reduced impact of FOF

The impact of FOF on daily life appeared diminished for some participants by application of AT learning. This was noted by the SM at the AT1 venue who, when initially discussing a specific participant, said:

> *'… I've seen such a vast difference. Jean, she's just happier … she comes in with a particular task that she needs help with. She's more constructive. So whether it's changed her and made her feel more positive I don't know. Maybe that's why her daughter is spending more time. So, it can change things dramatically can't it, just by their feeling a little bit more able' (SM.AT1.Int).*

When discussing the impact of FOF on the participant known as Jean, the SM widened out her observations to the rest of the group, adding:

> *'I'd say that's the same with them all, especially living somewhere like this, they see residents fall and they see how long they are in hospital and see them trying to recover and I think that scares a lot of them, which it would. So, it does stop them doing things. So, something like this has been brilliant' (SM.AT1.Int).*

In the case of Jean, learning a new practical procedure which enabled her to get out of a chair independently had made a significant difference to her balance confidence. She had gained a means of helping herself rather than being concerned about reliance on others. This appears to have increased her sense of agency so that she was able to manage individual challenges, requesting help only when required, resulting in a more positive outlook on life. As she put it:

'… beforehand I was very nervous, very nervous. I used to think, if I'd got to go somewhere the next day, I'd be in bed all night thinking: I've got to do that tomorrow, how am I going to do this, you know' (Jean.AT1.Int).

5.17 Outcomes of the intervention – individual experiences shared

Participants were all learning AT and therefore, as would be expected, had similar, shared experiences. For example, an increase in conscious thought about daily activities was widely reported and was summed up by one of the AT2 participants:

'I think we are actually all thinking a lot more of what we are doing really. I feel that is one of the biggest things ...' (Mabel.AT2.FG).

However, the individual nature of AT learning and application was also highlighted by this participant. Mabel reported in an interview that her increased thought had brought about a change in her behaviour, associated with a decline in habitual 'rushing'. She gave several examples including no longer dashing to catch the bus or cross the road and taking time to think about what she needed to take with her before leaving her apartment. She attributed this change to the course, confirming:

'I think it's stopped me rushing' (Mabel.AT2.Int).

Letting go of habitual ‘rushing’ appeared to have made a significant impact on Mabel’s quality of life, seeming to give her an increased sense of ‘control’. Within the AT2 group in particular, there was an acknowledgement that the course had been a learning process. This resulted in a significant change in outlook expressed by one of the participants:

> *‘I can remember when I first enrolled … I was actually saying I don’t think I need to do this but I’m coming to keep Phyllis company. You see, it’s your own perception. I think sometimes you can approach things with a closed mind and think what have you got to teach me, like teaching your grandmother to suck eggs and all those sorts of things, but I think it has made us open our minds, this has. Because you’re never too old to learn no matter what anybody says (laughter in group)’ (Beverley.AT2.FG).*

Despite initial scepticism, Beverley acknowledged that the course had been a beneficial learning experience, despite her age. Both Mabel and Beverley readily shared these positive changes which appeared to have empowered them, in one case by a specific change in behaviour, and in the other by a change in general outlook on life.

5.18 Participants’ feedback about the intervention – AT course structure and content

An eight-session introductory course was found an acceptable length by participants. Members of each group adapted to the frequency of course session allocated to them, despite some comments indicating that this was not always easy. For the AT1 group who met once a week for eight weeks, the time between sessions was said by one participant to detract from retention of learning:

'Well, it's a long while between each session ... wasn't it really ... it would have been better having them a bit closer together … well Friday morning's alright but it's a long while in-between. You've forgotten by the time you come the next time' (May.AT1.FG).

However, comments were also made about other activities that were available and the problem of 'fitting everything in'. Attending course sessions twice a week for four weeks was a significant commitment for members of the AT2 group who also mentioned the problem of scheduling attendance:

'Beverley and I found twice a week quite a lot to fit in' (Phyllis.AT2.FG).

However, an advantage was seen as enhancing retention of learning as reported by one participant who said:

'… I think it was easier to remember' (Vera.AT2.FG).

An hour was considered to be an appropriate duration for the sessions. While there was an acknowledgment that the sessions were relatively short, there was no recommendation for them to be increased:

'We couldn't have done it in less, because we always seemed to have a little bit of a rush at the last few minutes' (Beverley.AT2.FG).

As previously mentioned practical content of the sessions was preferred by the majority of participants, and summed up by one who reported:

> ' … *I will admit, I told the others* [about the interview] *and they said it's a lot of talk, like, you know ...'* (*Jane.AT1.Int).*

Allied to the preference for the practical content were statements indicating enjoyment of learning in a group and watching others progress, for example:

> *'... knowing that other people were finding it useful as well' (Phyllis.AT2.FG).*
>
> and
>
> *'I thought Jenny did exceptionally well. That older lady. I thought she really tried didn't she ...' (Mabel.AT2.Int).*

These comments show that the achievements of less mobile participants, who were particularly enthusiastic about the value of their learning, appeared to encourage others. The value of peer support within the groups seemed to enhance motivation for AT application, despite varying individual capabilities within the groups. The variety of abilities did not appear to detract from individual learning experiences.

5.19 Participants' feedback about the intervention – perceived limitations due to joint problems

An additional theme which emerged from the qualitative data was that participants viewed joint deterioration as a limiting factor in their ability to apply AT learning in some activities. One participant, for example, remarked about her arthritis:

> *'Yes, and I mean, I don't pick a lot of things up, but sometimes … I do try that to stand with your legs and bend me knees, I do try, to bend me knees, but I've had arthritis that bad ... (laughs) but er, yes, it comes easier, with practice, it's like everything, isn't it' (Kate.AT1.Int).*

There was general agreement within the AT2 focus group with a statement by one participant that learning AT at an earlier age would have been an advantage. An interview with a participant who could not attend the focus group reinforced these recommendations:

> *'I think it's good but I do think with having such bad joints if I'd been shown it a little bit earlier I would have benefitted more by it. I do try you know when I'm getting up or that, so yes, I think it's very good but I do think it should be done perhaps when people are a little bit more healthy' (Glenda.AT2.Int).*

These comments seemed to be an acknowledgement by participants of the potential preventive contribution of AT learning to maintenance of balance and movement, if learned at an earlier age.

5.20 Qualitative data summary

Qualitative data from this study confirmed that FOF was a concern to participants, with an acknowledgement that it led to restriction of activity. Feedback from participants demonstrated how they engaged with AT learning and applied it in activities in daily life. This was evidenced by comments made about the challenges of learning (e.g. remembering due to strength of habit) and benefits of application (e.g. increased conscious thought about activities of daily life). Balance confidence was reported to be increased by application of AT learning. Observations of changes in their own and other participants' behaviour were reported. In addition an independent observer reported increased levels of activity for some participants, which indicated a reduced impact of FOF and an increase in quality of life. An introductory course consisting of eight one-hour sessions was found to be acceptable to participants who enjoyed learning in a group environment. Feedback was given on the content and structure of the sessions including advantages and disadvantages of the respective once and twice-weekly sessions. Overall, once-a-week appeared most sustainable for participants, taking into account other commitments. Practical content was preferred rather than explanatory talks. A recommendation for AT learning to be available for adults at an earlier age (less than 60 years) emerged from the participants.

5.21 Summary of mixed-methods results

This mixed-methods research study consisted of a combination of quantitative and qualitative data collection the results of which have been reported here. Quantitative assessment tools were used to give an objective assessment of whether there was a change in balance confidence and FOF following the intervention, and whether frequency of delivery made any difference to the outcome. Qualitative methods were used to gather feedback from the participants about their experience and views of AT learning and application, as well as their thoughts about course content and structure.

The more specific purposes of the mixed methods in this study were set out previously (see Section 3.5.3, p106) and were: initiation (exploratory discovery); expansion; and triangulation (corroboration). Discussion of the element of initiation relating to the balance confidence assessment (BCA) is included later (see Section 6.3.3, p237). As can be seen from the range of comments from the participants in this study, expansion of knowledge to include the lived experience of the participants was achieved. In sharing information about their AT learning and application participants recounted experiences from daily life including changes in activity levels with implications for QoL. This information was supported by comments from an independent observer, the SM at the AT1 venue.

Results from the quantitative and qualitative data gave the potential for triangulation (corroboration) of results from these different methods. Quantitative analysis indicated a large increase (inconclusive regarding statistical significance) in balance confidence when results for all participants completing the study were analysed together as a group (n=17). There was a small (non-significant) difference in FES-I (short, VAS) scores (n=17), indicating no change in FOF. However, the direction of respective changes in the outcome measures are consistent with an increase in balance confidence and reduction in FOF after the intervention when compared to baseline. It is acknowledged that the individual results are very variable. Post-hoc analysis indicated that the significant difference in balance confidence shown by the non-parametric analysis was in the post-intervention period, indicating retention of learning and application in this period. After taking into account baseline scores and mobility levels in the two groups, frequency of intervention (AT1 group, once a week: AT2 group, twice-a-week) was not significant. The small sample size and differing parametric and non-parametric results for BCA scores in particular (see Section 5.7.2, p188) mean that these statistical results should be treated with caution.

The qualitative data from this study demonstrated that adults of 60 years and over were willing to engage in AT learning provided on a group basis. Despite some acknowledged challenges due to the power of habit and memory decline, participants of varying baseline capabilities perceived AT application as achievable and worth perseverance. Reporting on daily experience they realised that increased thought about their activities was crucial in bringing about beneficial change in balance and movement. Some individuals reported an increase in balance confidence and increased levels of activity. An independent observer noted what she viewed as increased QoL for some participants. While participants continued to express FOF, an increase in balance confidence and associated activity levels for some participants indicated a reduction in the impact of FOF. Participants in each research group adapted to the frequency of intervention provided. While both once-a-week and twice-a-week sessions were seen to have advantages and disadvantages, it appears that once-a-week provision is more sustainable within a community setting for individuals with competing commitments. There was a recognition of the potential preventive value of AT learning and recommendations for opportunities to learn AT from an earlier age.

The quantitative (inconclusive regarding significance) and qualitative results both appear to support an increase in balance confidence following the intervention, with an indication that retention of learning over the post-intervention period was achieved. A small but non-significant reduction in FES-I (short, VAS) scores for all participants (*n*=17) do not support a rejection of the null hypothesis, indicating no change in FOF. Participants continued to mention FOF as a concern throughout the study, appearing to support the quantitative data. However, at the same time increased activity levels following the intervention suggest that the *impact* of FOF on their daily lives may have been reduced. Therefore, the quantitative and qualitative results can be seen to provide corroboration for the effects of the intervention on balance confidence and ostensibly for FOF. However, results for FOF are less clear if changes in behaviour are also taken into account (see Section 6.2.7, p233).

5.22 Reflections

Use of new computer software has been an interesting learning experience during the process of data analysis for this study (i.e. IBM SPSS for statistical analysis and QSR International NVivo for qualitative data analysis). While both seemed incomprehensible to begin with, I reached proficiency in both sufficient to carry out the analysis required. This was not without personal challenge along the way involving amongst other things, overcoming habitual reluctance to engage with detailed written instructions. However, recommendations of certain explanatory texts proved a saving grace, in particular Pallant (2016), Hinton (2004) and Hinton et al. (2014).

There have been challenges in analysing the data, both quantitative and qualitative. While I have gained an understanding of basic statistical concepts this has not been without internal 'struggle'. Statistical tests have proved difficult to grasp. It seemed that no sooner had I gained some understanding of a statistical test, it became apparent that the research data did not 'fit' its exact requirements for use, or the computer software did not appear amenable, leading to many more questions than answers.

Qualitative data provided a different experience. While it did not have the inherent stimulus of statistics, it did require an element of discipline in carrying out the analysis. I was grateful for the structure provided by the Framework Analysis process adopted. Sorting data into the emerging themes involved an eventual acceptance that this could not be an 'exact science' and that I would inevitably be interpreting the data based on my existing knowledge and understanding. I came to see that there was no 'right answer' as such but only a process to go through by which a structure emerged from the data, despite my initial doubt that this would be the case.

Chapter 6 – Discussion, conclusions and recommendations

6.1 Introduction

This chapter begins by setting the research study within the context of the lifelong ageing process and popular perceptions of ageing. As populations live longer, there is a need to explore how individuals can empower themselves by taking responsibility for their own health and wellbeing. This study shows that there is a glimmer of hope because it demonstrates that older adults are willing to embrace and apply learning when they perceive it as relevant to their daily lives and continuing independence. The discussion draws on the main points from the qualitative findings and the explorative quantitative element of the study, outlines the limitations of the study, and ends with conclusions and recommendations for future provision of AT interventions and AT research. The researcher's reflections on the research study conclude the chapter.

6.2 Discussion

Within the context of the lifelong ageing process it is possible for individuals to improve their health outcomes with favourable implications for maintenance of function and independence (Age UK, 2015; Buck et al., 2018). Nevertheless, negative views on ageing tend to persist, despite the efforts of health professionals to disseminate positive information about personal agency relating to continued health and wellbeing (Lindland et al., 2015). Maintaining or increasing physical activity levels is an important contributory factor in personal health outcomes (DH, 2011) and is recommended for all adults, including those over 65 (WHO, 2010). Despite such recommendations, inactivity generally increases with age (Harvey et al., 2013; McPhee et al., 2016) and low expectations of ageing are associated with low levels of physical activity among sedentary older adults (Sarkisian et al., 2005). Perceptions also prevail that increased physical activity can be a risk to health and safety (O'Brien Cousins, 2000, 2003). Against this background of general decline in activity with age, a well-recognised consequence of FOF is self-imposed restriction of activity (Deshpande et al., 2008), potentially leading to social isolation and depression (Arfken et al., 1994; Gaxatte et al., 2011). This leaves those with FOF further disadvantaged within the overall context of taking responsibility and keeping active. Interventions which aim to empower individuals to reduce, manage or prevent FOF have a potential contribution to make in reducing this disadvantage. However, it is understood that individuals expressing FOF are even less likely than others to view interventions as being appropriate for them (Rasinaho et al., 2007). Rehabilitation or activity programmes are often acknowledged by potential participants as being of general benefit, but not necessarily relevant to their specific needs and daily lives (Rejeski & Mihalko, 2001; Yardley et al., 2006). A challenge therefore exists in finding interventions which are perceived by older adults with FOF to be possible for them to participant in and which can equip them with the practical means to maintain or even increase activity levels.

6.2.1 Perceptions of AT intervention

This study demonstrated that AT learning was perceived by the participants as directly relevant to them. Participants in both research intervention groups readily embraced AT learning during the course sessions. Significantly, however, they were sufficiently interested in AT to apply learning outside of the sessions, indicating that they considered it relevant to their daily lives. Application of learning was evident in feedback from the participants, either about their own experiences or their observations of fellow participants, with their comments being reinforced by an independent observer, the housing scheme manager at the AT1 venue (SM).

Participants were happy to share their experiences, for example not always remembering to apply learning due to strength of habit and perceived memory issues (see Section 5.13, p206). Motivation to persevere with application in daily life was evident from the way individuals developed strategies to help with remembering, such as reminding fellow-participants and enlisting family and friends for support and encouragement between course sessions (see Section 5.13, p206). One participant who acknowledged decline in memory, said that she was motivated to remember the practical procedures because she found them helpful in her daily life.

While learning to apply AT was reported to require perseverance, comments indicated that participants considered it was possible and beneficial for them to do so. Perception of a direct benefit is significant, as without the intention to complete interventions and continue application of learning, participants do not maximise the potential gain from taking part (Nyman & Victor, 2012). Amongst those who embraced AT learning and completed the introductory course in this study (*n*=17), there was a high level of attendance at the course sessions (AT1, 86%; AT2, 87%). This level of attendance demonstrated their perseverance with AT learning, requiring commitment to prioritising the course within 'busy' schedules (see Section 5.18, p213), and confirmed the positive feedback from participants about usefulness of learning to daily life. Statistical results, although viewed with caution, indicate that there was a significant increase in balance confidence during the post-intervention period of four weeks (see Section 5.7.2, p188). Continued application of AT learning in activities of daily life would lead to increased consistency of application over time, potentially resulting in continued improvements in balance and movement confidence as indicated by these results.

Despite the perceptions of at least three of the participants that AT was 'difficult' (see Section 5.12, p205) and the perseverance required in application of learning as noted by participants (see Section 5.13, p206) the overall feedback was overwhelmingly positive. Such a positive response was somewhat unexpected as application of AT learning entails paying conscious attention to activities of daily life in a way which is not usual (see Appendix 1.0). When considering that the median age of the participants in the intervention groups was 85 (AT1, *n*=8) and 79 (AT2, *n*=9) years respectively, it would not have been surprising to the researcher if participants had perceived AT learning as requiring too much effort. The encouraging responses from participants however demonstrated that older adults were willing to learn something new despite the challenges, if they perceived it to be worthwhile.

6.2.2 Perceptions of personal ability

Mobility-related disability is acknowledged as a potential threat to independence (Pahor et al., 2014) and this was evident amongst participants in this study. The individuals taking part had a range of baseline abilities, with balance and movement being a very real concern within an overall context of the desire to maintain independence. Participants, as well as an independent observer (SM), indicated that application of AT learning contributed to an increased confidence in balance and movement, including those for whom reduced mobility was affecting daily life. The most noticeable differences commented on by the SM were increased confidence in getting out of a chair and walking, both of which are fundamental activities required for maintenance of independence. Participants had previously been observed to *'struggle'* in getting out of a chair (SM.AT1.Int; see Section 5.15, p210). Other practical activities included in AT learning and mentioned by participants as being particularly helpful were: standing, getting into a chair, sitting in a chair, lowering height and reaching. Observations of increased activity levels amongst individuals at the AT1 venue was associated by the SM with participation in the intervention. According to Bandura (1982) an individual's perception of self-efficacy relates to their judgement of how capable they are to carry out a course of action required. It appeared from notable increases in activity amongst some participants that their perception of what they were able to do had increased. During the course sessions, participants were provided with practical AT procedures which gave them the means to accomplish or 'master' (Bandura, 1982) activities they had previously found a 'struggle' (see Section 5.15, p210). They were supervised by AT teachers during the course sessions and were able to practice their learning between sessions as it related to everyday activities. It appears that the increased understanding of how to go about the activities with improved use (see Appendix 1.0) contributed to an increased perception of self-efficacy observable in some participants.

6.2.3 Perception of limitations to application of AT learning

Some participants in the study perceived that their application of AT learning was held back due to restriction of joint movement which they associated with their age (see Section 5.19, p216). Although physical limitations may be present, benefits can still be brought about by individual application of AT as demonstrated by this study. However, it was perhaps understandable that participants perceived their age as a disadvantage in obtaining maximum benefit from learning. Accordingly, there was a general consensus in the AT2 group that they would have appreciated the opportunity to learn AT when they were younger. Provision of AT introductory courses for adults at a younger age would meet this perceived need. The aim of such courses would be to enable individuals, by application of AT, to improve balance and movement and maintain functioning into older age. By learning to employ good 'body mechanics' encompassed in improved use of themselves (see Appendix 1.0, 'use'), motivated participants would be able to apply AT learning to increase levels of activity, with implications for health. An anticipated challenge of such provision would be to appeal to individuals who may not perceive a need for such preventive action at earlier stages in their life.

Various participants in the study commented that one of the challenges of AT application was remembering to apply their learning. While participants alluded to this being to do with their age and 'made light' of it generally, one of the AT1 participants stated that memory was a particular issue. As previously discussed, high motivation on the part of this participant (Jean; see Section 5.15, p210) meant that she was able to remember practical procedures and was also instrumental in encouraging others between course sessions.

An inherent challenge of AT application particularly for the novice is remembering to apply learning, irrespective of age (see Appendix 1.0). Therefore, it appears that in this respect, the experience of the participants in this study was not substantially different to that of adults of any age.

6.2.4 Impact of AT learning on FOF and QoL

The influence of FOF on the QoL of older adults is acknowledged (Iglesias et al., 2009) with FOF consistently shown to be associated with low QoL (Shoene et al., 2019). The association was illustrated in this study by the experience of one of the participants in the AT1 group in particular. Jean had been struggling to get out of a chair and reported high levels of FOF, to the extent that she worried about having to go out: *'… I'd be in bed all night thinking: "I've got to do that tomorrow, how am I going to do this", you know'* (Jean.AT1.Int; see Section 5.16, p211). She also expressed concerns about her independence and reliance on others, especially her daughter (see Appendix 5.29, p435). The example of this participant illustrates the fine line between independence and reliance on others when mobility-related disability is experienced. Renewed confidence in getting out of a chair and walking enabled Jean to maintain her level of independence, which she had been fearful of losing, and which was fundamental to her QoL. Application of her practical AT learning meant that she was confident that she would be able to get out of a chair and walk which, she reported, gave her the confidence to go on outings with her daughter without fear about how she was going to cope impinging on her preparation or enjoyment of the outing. Jean was not the only participant for whom increased confidence in balance and movement appeared to have had a significant impact on their daily life. It was reported by the SM that other individuals who had previously restricted their activity to their own apartments were increasingly seen in the communal areas of the housing complex, returning to activities with fellow residents such as weekly coffee mornings and visits to the café. Increased trips with family members were also noticed (see Appendix 5.29, p437).

6.2.5 Group AT learning meeting individual needs

This study demonstrated that participants with a variety of mobility levels were successfully accommodated within each group and able to apply AT learning as a result. Individual baseline abilities ranged from use of a wheeled walking aid (see Appendix 5.1) to those who were mobile without aids, but nevertheless faced challenges such as pain, restricted joint movement, or both. Participants were able to apply AT learning to bring about beneficial changes in balance and movement, commensurate with their baseline abilities. Application of learning appeared to increase balance confidence and reduce the impact of FOF. Therefore, delivery of AT learning is indicated as beneficial for this age group. A considerable advantage of AT learning is that it can be applied by an individual to the extent of their need and ability (see Appendix 1.0) as the main requirement for progress is motivation to apply learning (Alexander, 1932). Although the ability to understand and remember practical instructions is necessary for independent application of learning, it was evident in this study that when motivation is strong, individuals employ strategies to support their application (see Section 5.13, p206). Therefore, although the AT course was delivered within a group setting, individual needs were adequately addressed, with each participant given the means to apply AT for herself or himself.

Other studies have also explored AT instruction with older adults in group settings (Dennis, 1999; Batson & Barker, 2008; Glover et al., 2018); however, this study demonstrated that AT instruction was feasible and effective for this age group based on explanation, observation and demonstration only, without AT hands work by teachers (see Section 4.7.2, p151; Appendix 1.0). This was evident as participants were able to understand and independently apply AT practical procedures to bring about changes in balance and movement. Delivery of AT instruction by this method could have potential implications for wider availability of AT interventions; however, it would depend on the range of ability within a group as the ratio of teachers to participants should remain adequate to meet individual need. The ratio of five participants to one teacher was adequate for the groups in this study; however, in practice, the ratio was smaller in some course sessions.

While group learning was enjoyed by the participants, AT application is essentially individual and experiential (see Appendix 1.0). Consequently, while elements of AT application were commonly acknowledged and discussed by participants of all abilities, their individual experiences were interpreted differently. For example, participants generally appreciated that conscious thought about daily activities was required in order to apply AT learning (see Appendix 1.0). '*Thinking about what they were doing*' (see Section 5.14, p208) as described by several participants was recognised as something they did not habitually do. One participant described needing to give full attention to how she was walking, rather than looking at what was going on around her, which she realised was her habit: '*…because I used to have a terrible habit of, my eyes were anywhere but where I was going'* (Kate.AT1.Int; see Appendix 5.29, p430). Application of AT learning requires the full attention of the individual as they think about their use, whether being active as when walking or sitting in a chair (see

Appendix 1.0). Such attention was understood to be beneficial, lapses of attention being accepted by participants such as Kate as a potential contributory factor in falls. Impaired capability amongst older adults to undertake a second cognitive or manual task when walking has been shown to predict falls (Lundin-Olsson et al., 1998; Beauchet et al., 2009) and reinforces the importance of paying attention while walking for older adults. As well as a general recognition of its benefits 'thinking about what she was doing' appeared to have far-reaching implications for one participant's approach to life. Mabel described letting go of her previous habit of rushing, and giving increased attention to preparation before she left her apartment, all of which she attributed to AT learning. Participation in the AT course was acknowledged as a 'learning process' during the AT2 focus group, with one participant describing it as having made the participants *'open our minds'* (Beverley.AT2.FG; see Section 5.17, p212). Beverley had thought she had no personal need for the sessions and had nothing to learn. However, when she accompanied a friend to the course, she embraced AT learning and brought about beneficial changes by conscious attention to her balance and movement, and changed her point of view about learning in older age. The variation in experiences reported by participants highlights the individual nature of application of AT learning, while at the same time demonstrating its universal applicability (Alexander, 1932).

6.2.6 Strength of AT pedagogy

The strength of AT pedagogy is based on comprehensive AT teacher training which encompasses knowledge of human anatomy, physiology and movement studies (Skills for Health, 2010; PAAT, 2020) all of which are encapsulated in good 'body mechanics' (see Appendix 1.0) central to AT practical procedures. Taking the example of standing, participants were encouraged by observation of themselves and fellow participants to discover habits of use (see Appendix 1.0) in standing. As upright posture for human beings is a 'fine balancing act' (Basmajian & de Luca, 1985:253) participants were supported to discover that standing with more muscular effort than required interferes with optimal balance. They were shown how to bring about improvements in balance by explanation and demonstration and encouraged in observation of themselves and others. Instruction in practical AT procedures enabled participants to begin to learn to stand, and carry out other activities, with less muscular effort than was habitual, thereby interfering less with the finely regulated postural mechanisms which allow balance with minimal muscular effort (Basmajian & de Luca, 1985:255-257).

The approach to AT teaching in this study could be seen to encompass sources of self-efficacy beliefs identified by Bandura (1982; see Section 4.7.4, p153). Learning took place in an environment where individuals were supported by AT teachers to achieve improvements in their use (see Appendix 1.0, 'use') and were supported and encouraged by fellow participants, without any expectation of specific results. By being taught practical procedures which could be applied outside of the course sessions, participants were encouraged to build up experience according to their own needs and pace. This pedagogical approach appeared to be positive for the participants who seemed to increase their balance and movement confidence, resulting in increased levels of activity. Therefore, elements of self-efficacy theory were not only evident within the AT pedagogy but also in the outcomes for the individual participants, where increased 'mastery' (Bandura, 1982) of practical AT procedures appeared to contribute to a change in perceptions about what they could achieve.

6.2.7 Relationship between falls-related self-efficacy (falls efficacy), FOF and balance confidence

Falls efficacy was used as an operationalisation of FOF in this study as previously explained (see 3.6.2, p113). Participants completed the FES-I (short, VAS) questionnaire on four occasions (see Figure 4.3, p134) with a reduction in score indicating a lower concern about falling. When all participants' results were taken together (*n*=17), FES-I (short VAS) scores were reduced following the intervention, indicating a small (non-significant) reduction in concern about falling when carrying out these specific activities.

Balance confidence was shown to increase over the study when all participants' BCA results were analysed as a group (*n*=17) although whether this was statistically significant is inconclusive. This change was evidenced by increased levels of activity observed and reported by participants in focus groups and individual interviews.

Despite increased balance confidence scores and a small reduction in FES-I (short, VAS) scores, participants nevertheless continued to express FOF, although its impact in terms of restriction of activity appeared to be reduced (see Section 5.16, p211). This supports the findings of previous researchers, that falls efficacy and FOF are closely related but not the same (Tinetti et al., 1994; McAuley et al., 1997) and that falls efficacy is a more accurate indicator of function than FOF (Tinetti et al., 1994). Previous AT studies with older adults have also found inconsistencies between self-report quantitative data relating to balance confidence and FOF, with observations or qualitative data (Batson & Barker, 2008; Glover et al., 2018).

The results of this and previous studies confirm the inherent difficulty of quantifying a subjective concept such as FOF. They also reinforce the necessity to be explicit about use of terms within research, particularly being clear when one term (e.g. FES-I, short, VAS) is being used as an operationalisation of another (e.g. FOF), as in this study.

6.3 Quantitative data

The quantitative results in this study were disappointing because they were not 'clear-cut' regarding significance of changes in balance confidence and did not support a rejection of the null hypothesis for FOF. However, this was not surprising given a number of factors. The total number of participants recruited (*n*=29) was less than originally hoped for (30+) and consequently the number of complete data sets was smaller than ideal after attrition (*n*=17). Despite the information leaflet (see Appendix 4.10) seeming to appeal to potential participants, and several visits being made by the researcher to the research venues, recruitment numbers were ultimately outside of the researcher's control.

Quantitative assessment tools were used in the study to examine changes in: balance confidence, represented by changes in results from the BCA; and in FOF, operationalised as falls efficacy, and represented by results from the FES-I (short, VAS) questionnaire. Due to the small number of data sets, results were amalgamated for both research intervention groups (*n*=17). Data sets being small, the data analysis should be viewed with caution. In particular, the analysis of balance confidence (BCA) scores using the intended parametric test gave a non-significant result, whereas a non-parametric test (used for the purpose of sensitivity analysis) showed a contradictory result. Therefore, while there was a large increase in BCA scores over the course of the study, statistical significance remains inconclusive. Although reported with caution for reasons already stated, the non-parametric post-hoc results indicated that the significant increase in BCA scores occurred in the post-intervention period. This indicates retention of AT learning and application after the AT course sessions had ended, potentially accounting for continued improvements in BCA scores.

Despite a small data set (*n*=17), quantitative results indicated an overall large increase in balance confidence (inconclusive regarding significance) and an overall small (non-significant) reduction in FES-I (short, VAS) scores over the course of the study. This suggests that, as demonstrated by the qualitative results, the intervention contributed to an increase in balance and movement confidence for the participants taken as a whole group. However, as BCA results were inconclusive with regard to statistical significance, they cannot be generalised to the wider population of older adults. Individual results were variable (Figure 5.8, p199; Figure 5.10, p200). Taken as a whole group, the small (non-significant) reduction in FES-I (short, VAS) scores did not support a change in FOF. Consequently, these results are similarly not generalisable. Individual results were also variable (Figure 5.9, p199; Figure 5.11, p200) with some participants appearing to experience an increase in FOF over the study. This phenomenon is not unique to this intervention or study and may be due to an increased awareness of potential risks. As shown by the qualitative results (see Section 5.11, p203), participants continued to express FOF despite an overall increase in BCA scores. Increased levels of activity were also reported and observed amongst participants, indicating a reduced impact of FOF, which nevertheless appeared to remain a continued concern for participants.

As previously described, there was an innovative adaptation and development of quantitative assessment tools in this study which were therefore experimental and not previously validated. Further discussion regarding specific aspects of the quantitative tools and assessments follows later (see Section 6.3.3, p237).

6.3.1 Frequency of AT intervention

One of the aims of this research study was to explore whether the frequency of intervention delivery (once or twice-a-week) affected either the outcomes of the intervention or the participants' experience of it (see Section 3.2.2, p89). As discussed, due to the small number of complete data sets (AT1, *n*=8; AT2, *n*=9), participants' results (*n*=17) were amalgamated for statistical analysis. Using parametric tests, it was possible to take the two separate groups into account within the analysis. A comparison of results for the two groups was undertaken post-intervention using baseline scores as a covariate. Initial analysis showed that there was a statistically significant difference between the two groups for balance confidence (BCA) scores (see Figure 5.3, p191). However, as baseline mobility levels were significantly different between the two groups it was possible that baseline mobility could have been a confounder in this analysis. Consequently, a second analysis was undertaken, taking baseline mobility into account, which resulted in a non-significant difference between the two groups (see Figure 5.4, p192). No significant difference in FOF was found between the two groups (see Figures 5.6, p195 & 5.7, p196). This indicates that frequency of intervention (once or twice a week) did not affect the quantitative outcomes, BCA scores or FES-I (short, VAS) scores. Qualitative feedback, however, indicated that once-a-week sessions were preferable for participants (see Section 5.18, p213).

6.3.2 Demographic comparison between the two research intervention groups

Comparison of the two groups using baseline demographics (see Section 5.2, p174) showed that the AT1 group were older (median 6 years), less mobile and considered themselves to be less ‘well’ compared to average for their age, than the AT2 group. Of the demographic differences between the groups at baseline, one was statistically significant, which was the category ‘use of a walking aid indoors’. This was pertinent to the study as, if taken as an indication of mobility, meant that there was a statistically significant difference in mobility levels between the two groups at baseline. Consequently, as indicated (see Section 6.3.1, p236) mobility levels were taken into account when comparing post-intervention scores in the two groups.

6.3.3 Quantitative assessment tools

The quantitative data assessment tools used in this study, although based on existing data collection tools, were adapted in an innovative way and therefore there are several elements which are worthy of reflection and note. The first assessment tool was based on the validated short version of the Falls Efficacy Scale, International (FES-I, short). This was adapted (after Hill et al., 1996) to a Visual Analogue Scale (VAS) as previously described (see Section 4.4.1, p130). The reasoning behind the change in type of scale was to potentially reduce any chance of participants manipulating their scoring over time, as the same questionnaire was used on four occasions. The adaptation of the short FES-I scale to VAS format was of itself not validated, although both the short FES-I (Kempen et al., 2008) and the MFES (Hill et al., 1996) have been previously validated. Consequently, use of this adapted scale should be viewed as experimental. An advantage of the VAS adaptation used in this study was that it produced data which was continuous and therefore suitable for parametric statistical analysis. A disadvantage, however, was that it resulted in a large differential in possible scores, from 0 to 700 for each questionnaire.

The Balance Confidence Assessment (BCA) was developed using an existing validated functional assessment as the starting point, as previously described (see Section 4.4.2, p135). However, the BCA was innovative as its aim was to assess balance *confidence* rather than functional ability. As an experimental assessment tool, it was unsurprising that various limitations became evident during the study, particularly during the review of the BCA assessment video recordings. While no substantial differences in scoring by AT teachers emerged during the review process, limitations to the scoring system itself were apparent. Observation of the recordings by the review panel resulted in detailed discussion about participants' use (see Appendix 1.0) and confidence in undertaking the assessment. Unfortunately, the subtlety of observations made by the scorer and review panel were not adequately reflected within the limited scoring system, with a score range of 0 to 4 for each assessment item. The variety of assessment items included in the BCA were to accommodate a range of baseline abilities, with higher weighting given to the more challenging items (see Table 5.4, p181). While there was a balance to be struck between safety and challenge for the participants, it became apparent that although there was sufficient challenge for most participants, there was a ceiling effect for the more able, for example, Vera in the AT2 group (see Figure 5.10, p200), which meant that any potential for improvements in her score could not be reflected in the results.

The aim of the BCA was to explore whether it was possible to objectively assess balance confidence by observation. From the detailed observations made by the AT teachers involved in initial scoring and reviewing of the BCA recordings (see Section 4.9.2, p162), it was evident that this was possible. However, it was also clear that in practice balance confidence and functional ability are closely inter-related. For example, in this study participants who were confident in getting out of a chair in accordance with their AT learning exhibited no hesitation in doing so and displayed proficiency in undertaking the movement, all of which were evident to the scorer and review panel. Bandura (1982) stated that perception of capability is reciprocally linked to functional ability, a view which is supported by Brouwer et al. (2004) in their study with fearful seniors. Li et al. (2002) suggest that FOF affects levels of falls efficacy, in turn influencing balance and physical ability. The aim of the BCA was to assess balance confidence rather than functional ability. However, it appeared that the BCA observations and scoring were in fact encompassing elements of functional ability *and* balance confidence. The close inter-relationship between these concepts suggest that it may not be feasible, in practice, to observe them in isolation from each other. The exploration of the BCA represents an element of initiation or exploratory discovery, being one of the specific purposes of this mixed-methods study, as previously stated (see Section 3.5.3, p106).

6.3.4 Capturing ‘individual’ AT experience

As confirmed by this study and others (Dennis, 1999; Batson & Barker, 2008; Glover et al., 2018) AT instruction can be provided within a group setting while still meeting the individual needs of older adults. There was evidence of universal learning experiences, such as the acknowledgement amongst participants that increased conscious thought about their activities was required for application of learning. However, the qualitative data also illustrated that AT learning and application is an individual experience. For some participants in this study the most benefit was gained by learning how to apply AT to practical procedures such as getting out of a chair or walking. For others however, in addition to changes to balance and movement, other aspects of their experience were viewed as equally significant. These included changes in behaviour which seemed to participants to result from AT application. For example, no longer 'rushing' was a significant change for one participant, as was a broadened outlook on ageing and learning for another. Such comments, rich in individual experience, would not be captured by quantitative research methods alone. While there are limitations to the quantitative data in this study, based as it is on innovative assessment tools, that is not to say that more appropriate quantitative assessment tools could not be found or devised for future studies. Whatever tools are considered, it is necessary to bear in mind the problematic nature of conveying experiential information in a way that is truly comparable between individuals or groups. A solution is required to the tension which seems to exist between an inevitable need to attract funding, usually allied to a demand for 'quantifiable' results associated with Randomised Controlled Trials (RCTs), with the essential qualitative nature of AT experience. Arguments supporting the value of qualitative data within healthcare, for example within the context of 'the humanization of healthcare' (Todres et al., 2009), provide hope of a favourable climate for qualitative research in the future in which the value of AT application for older adults can be further explored.

6.4 Limitations to the study

As previously acknowledged, the study was small in scale and therefore best viewed as a pilot study. The venues used were Extra Care sheltered housing settings and therefore it is appreciated that they are not typical of wider community situations. One of the known barriers to participation for older adults is good access, including availability of transport (Yardley et al., 2006) and motivating older adults to engage with interventions, particularly those with reduced mobility, is recognised as problematic (Rasinaho et al., 2007; Cohen-Mansfield et al., 2003). As the AT courses sessions were held on site, with the exception of two of the participants there were no travel or access considerations. This may have contributed to the relatively high attendance rates amongst the participants who completed the intervention (see Section 5.3, p178). Consequently, the results from this study may not be generalisable to other community living older adults. It would be interesting in future studies to explore recruitment and retention of participants for courses held in more typical community settings, such as local halls or community centres. Despite high levels of compliance amongst the enduring participants, individuals dropped out of both groups. Unfortunately, as ethical approval had not been sought to contact those who dropped out of the study without explanation, this left questions unanswered about overall attrition rates and reasons. The omission to the ethics panel application was one of the consequences of the study being undertaken by a neophyte researcher, which is acknowledged as a limitation (see Section 6.7, p246). However, the PhD is recognised as a research training and carrying out the study was a huge learning curve for the researcher. Any future research would be carried out differently in light of this significant learning experience.

6.5 Conclusions

This study demonstrated that by participating in a short introductory course in AT, the older adults in the research groups were able to independently apply their AT learning to bring about improvements in balance and movement confidence. Participants of varying baseline abilities embraced the practical nature of the intervention which was seen as relevant to their daily lives. Increased levels of activity were observed and reported by the participants as well as an independent observer, indicating a reduction in the impact of FOF, with implications for increased QoL.

Advantages of group learning were demonstrated, engendering an environment of mutual support and encouragement between participants, while at the same time meeting individual learning needs. Participants were enthusiastic and readily discussed their learning experiences, indicating a commitment to application outside of course sessions. AT instruction and support was successfully delivered by explanation and demonstration, and was sufficient to enable independent application of learning amongst participants.

The short introductory course which comprised eight one-hour sessions was acceptable to the participants, who recommended once-weekly frequency as most sustainable. As previously stated (see Section 6.2, p222) older adults with FOF can be difficult to engage in interventions. This study has shown that AT learning was embraced and applied by participants to meet their individual needs and is an appropriate intervention for older adults with FOF. Individuals were not necessarily expecting big changes, but it was evident that small changes could make a big difference as illustrated by the oldest participant in the

AT1 group who, at the age of 93 years, commented: 'It's given me confidence as I could walk all round there on my own' (Jane.AT1.FG; see Appendix 5.29, p434).

There is a small but growing evidence base regarding application of AT by older adults. This study has contributed to this body of knowledge by taking exploration forward in a number of unique ways. Firstly, it has demonstrated that AT instruction can successfully be provided on a group basis to older adults based on instruction and demonstration only, with implications for wider dissemination of AT learning amongst this age group. Secondly and crucial to the development of AT courses for older adults was the gathering of feedback from participants about their views of the intervention, including course content and structure. Allied to this feedback, having two intervention groups enabled comparison of once and twice-a-week delivery, both in terms of outcome and participants' experience. The findings from the study will directly inform future provision of AT courses for this age group (over 60s). Finally, the study took an innovative approach to quantitative assessment tools, involving exploration of an objective assessment of balance confidence, and adaptation of the short FES-I (Kempen et al., 2008) for use with a visual analogue scale.

6.6 Recommendations

This research study has shown that group delivery of AT instruction is suited to older adults in a community setting. Participants embraced AT learning and applied it to bring about improvements in their balance and movement in daily life. The median ages of the participants in the two research groups were 85 and 79 years respectively. The willingness of older adults in these age groups to persevere with a new learning experience illustrates the potential of lifelong learning to empower older adults to bring about beneficial changes in their lives. Feedback from the participants about their experiences of AT learning, application and the AT intervention, together with indications from the quantitative and qualitative data and the researcher's reflections meant that there were many recommendations which have evolved from the research. However, the key recommendations related to provision of courses within a community setting, pedagogy and future research, are:

- Wider access of group provision of AT instruction for older adults (over 60s) living in the community.
- Older adults with mobility-related disability should be targeted for AT instruction.
- Increased opportunities for AT learning for adults at a younger age consistent with taking individual responsibility for health and wellbeing across the life course (NHS, 2019).
- Further research exploring group delivery of AT interventions including AT teaching based primarily on explanation and demonstration.

- A longitudinal research study is indicated to explore the role of AT application in empowering cohorts of adults to maintain balance and movement into older age.

6.7 Reflections

The experience of undertaking a research project for the first time has been a very rich and diverse one, encompassing 'highs' and 'lows' along the way, generating much material for self-reflection. By far, the main highlights for me were working with the other people involved, the volunteer participants and my fellow AT teaching colleagues. The willingness of participants to embrace the project and give up their time so generously was remarkable. Not only did they attend the AT course sessions, they were willing to share their experiences within focus groups and individual interviews, providing such rich qualitative data. The additional commitment shown in attending four practical assessment sessions is, on reflection, rather humbling. Getting to know the participants during provision of the interventions and during the assessment sessions was an enriching experience which confirmed my admiration for the mix of optimism and stoicism so often demonstrated by older adults. Close collaboration with my AT teaching colleagues enhanced the learning process as, in undertaking this project together, we explored and developed our AT teaching practice and individual application. While my main interest was primarily in the experience of the individual participants, I appreciated the potential value of quantitative analysis within this mixed-methods study. I tried to keep an 'open mind' about necessary 'statistical' analysis and the steep learning curve that would entail. The experience, nevertheless, confirmed my original thoughts, that statistics is not my forte and that I am much more 'at home' with qualitative data gathering and analysis.

As a new researcher this study represented a huge learning experience. Reflection has highlighted a number of areas where I would do things differently on future occasions. Those most notable include the omission to the ethical approval request to allow follow-up of participants who dropped out, which meant that a valuable source of information was not available. When reading and analysing the qualitative data it was apparent that I had missed opportunities to follow-up on responses from participants, meaning that potential in-depth information from participants had been lost. This was due to my over-reliance 'on the day' of the focus group schedule, in an effort to make sure all 'areas' were covered, however this meant that there was a lack of flexibility in my facilitation of the discussion. Similarly, in interviews I was over-reliant on the schedule. The resulting lack of information about reasons for attrition and failure to follow-up on topics in focus groups and interviews proved very frustrating when I noticed it after the event. While there may be a lot to be said for enthusiasm, on reflection it is clear that it is no substitution for experience 'in the field'.

Undertaking this study took a considerable amount of planning and a lot of work and commitment in implementation not only by me but also by my AT teaching colleagues and the participants involved. Considering the collective effort and the length of the study, my recommendations do not seem to do it justice.

Despite the practical co-ordination required and the unpredictable nature of fieldwork, I found it very enjoyable and rewarding working with the participants in the research groups and collaborating with AT teaching colleagues. Writing up the study in the form of a thesis has been the most challenging part of the whole process, which at times has seemed insurmountable, but in the end was achieved with considerable encouragement and support from others.

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APPENDICES

Appendix 1.0

Alexander Technique – glossary of terms*

***Explanations in this glossary are based primarily on the experience of the researcher as a qualified teacher of the Alexander Technique for over 20 years.

AT teaching colleagues	AT teaching colleagues referred to in this research study are all qualified Alexander teachers, all being members of the Professional Association of Alexander Teachers (PAAT; www.paat.org.uk)
Alexander teacher (AT teacher)	Qualified Alexander Technique practitioners are called Alexander teachers because AT is a taught practical technique, delivered with the aim of the learner (traditionally called a 'pupil') applying AT for herself or himself, and not being reliant on an AT teacher in the long term.
Alexander teacher training	At the heart of AT teacher training is the practical application of the student to bring about personal change. In addition, academic study includes: analysis of the books of F. M. Alexander; analysis of books on the AT by other authors; understanding of human anatomy, physiology and movement studies (www.paat.org.uk).
Alexander teaching	AT teaching involves a combination of skills including observation, verbal explanation and instruction, and hands work (see separate entry). National Occupational Standards (NOS) for Alexander Technique teaching are registered with Skills for Health (tools.skillsforhealth.org.uk/Alexander Technique teaching). In addition, Alexander Technique Professional Associations have their own requirements for teacher qualification and ongoing continual professional development (see, for example www.paat.org.uk).
Biomechanics	'The biomechanics of human movement can be defined as the interdiscipline that describes, analyzes and assesses human movement' (Winter, 2009:1).
Body mechanics	'The field of physiology that studies muscular actions and the function of muscles in maintaining the posture of the body' (Mosby's Medical Dictionary, 1998).
Habit (of use)/habitual use	The way that an individual stands, walks and does everything else is based on habit, unless giving conscious attention to the activity. Strength of habit is acknowledged by learners as being one of the challenges in application of AT.

‘Hands work’ by AT teachers (sometimes referred to as ‘hands-on guidance’)	AT teachers traditionally use gentle hand contact to aid the learner (pupil) to become aware of aspects of their use (see separate entry) which are unhelpful. The hand contact is consciously directed by the AT teacher and is based on the teacher’s skilled observation (see separate entry) of the pupil’s use combined with knowledge and understanding of human anatomy and movement. My experience as an AT pupil, student and teacher is that the hand contact helps the learner to bring about beneficial changes in their use. Crucial in this process is the teacher’s maintenance of conscious direction of their own use.
Individual experiential nature of AT learning	Practical AT procedures can be taught in a group situation. However, it is understood that each individual has their own experience as a result of their personal application. Consequently, individuals will experience learning and application differently. In addition to bringing about change in how an individual stands, sits, walks, etc., some may also notice changes in habitual ways of thinking.
‘Use’ as a concept in AT	Whatever we are doing, whether it involves sitting, standing or moving around, we are employing what we might call our ‘bodily machinery’ (Door, 2003:25). We don’t tend to pay conscious attention to *how* we engage the different parts of our ‘machinery’ in activity because we rely on habit (see separate entry). Instead, our attention is usually on the task in hand whether working at a computer, doing the washing up or gardening. For example, do we wrap our legs round the chair legs as we sit at the computer? Do we grasp the items very tightly as we wash up? Alexander’s discovery was that he, and in his teaching experience, everyone else, was using more muscular activity than required in everything they did (Alexander, 1932). The consequence of using ‘too much’ muscular effort is that we can very easily distort our flexible framework, which is not beneficial for us. In Alexander’s case he discovered that the distortion was the source of his voice problems, as related in his book *The Use of the Self* (Alexander, 1932). It has been shown that for humans, upright posture is a fine balancing act (Basmajian & de Luca, 1985). Therefore, if we use more muscular effort than is required we interfere with this fine balance, which we do more or less constantly, as much of what we do involves being upright. Improving our use (of ourselves) involves learning to be upright and do everything else with less muscular effort than is habitual, and is consistent with good body mechanics and biomechanical principles (see separate entries).
‘Use’ as a concept in AT (Cont’d)	AT can be applied to any activity, however, it is usual to begin with bringing about improvements to everyday activities such as standing, sitting, taking a step, walking, lowering the height etc., by following practical procedures (see Door, 2003).
Use – increased awareness through conscious attention	Practical AT application involves paying conscious attention to the various parts that make up the whole of ourselves. For example, when we are standing, there are lots of aspects of our use to notice

	when we bring our conscious attention to them, such as the placement of the feet. Are they close together or further apart? Are they parallel to each other or at an angle? What is the weight distribution? Do we have more weight on one foot than the other? How is the weight distributed over the soles of the feet? Are we raising our shoulders? Where are we looking? As individuals we are generally unaware of such details of *how* we stand because we don't consciously consider them, we rely on our habitual way of standing. Experience of practical application of AT brings increased awareness of habitual use which enables the individual to bring about beneficial changes.
Use – skilled observation by qualified AT teachers	Experience based on personal application, teaching and training means that AT teachers are skilled in observing the details of their own and others' use (see separate entry).
Universal applicability of AT	Alexander discovered the technique through his own perseverance in wanting to solve his voice problems and stated that anyone could learn AT, the main requirement being motivation to apply it (Alexander 1932; reprint 1985:15). There are no set criteria for being able to learn AT. However, as it is learned, a level of understanding and memory is required to be able to independently retain and apply the learning.
Unity (of the individual)	Fundamental to AT is the recognition that each individual is a unified 'whole' in which the 'physical' (body) cannot be separated from the 'mental' (mind). Alexander stressed that use involves the whole of the 'psycho-physical mechanisms' (Alexander:1932, reprint 1985:22).
Practical nature of AT	AT is a practical technique which requires motivation to learn and apply. Conscious attention to the detail of *how* we go about our activities is not usual for most people and requires the decision to give attention to our use, whatever we are doing.

Appendix 2.0

Literature search, part 1.

Background and characteristics of FOF – table of exclusions with reasons

Reason for Exclusion	**Number**
Not in English	1
Environmental, location specific	1
Hospital-based intervention/not community dwelling	3
Falls-specific	1
Balance or gait-related	3
Specific health conditions	8
Dietary-related	1
Total	18

Literature search, part 2.

Interventions developed to reduce FOF - table of exclusions with reasons

Reason for Exclusion	**Number**
FOF predictors/characteristics	35
Age less than 60	1
Participants not community-dwelling	9
Medication-related	2
Fall prevention/risk/risk assessment (not including FOF)	57
Falls and/or FOF measures/instruments	11
Related to specific medical conditions	38
Nursing procedures and clinical guidelines	6
Health Screening/goal setting	4
Homecare and carer-related	1
Falls and falls-injury surveys	7
Activity reduction	6
Assistive technology (not FOF-related)	5
Experiential/descriptive/narrative	11
Study protocol only	3
Total	196

Literature search, part 3.

(a) Alexander Technique and older adults – table of exclusions with reasons

Reason for Exclusion	Number
Non-research articles ('popular' or news articles)	44
AT research not related to study	9
AT survey	1
Research not related to AT or older adults	10
Total	64

(b) Alexander Technique and older adults – articles included in qualitative synthesis

Articles	Description
Dennis (1999)	Research study directly related to older adults' application of AT.
Batson & Barker (2008)	Research study directly related to older adults' application of AT.
Gleeson et al. (2014, 2015, 2017) 3 papers related to one study, including study protocol.	Research study directly related to older adults' application of AT.
Glover et al. (2018)	Research study directly related to older adults' application of AT.
Ernst & Canter (2003)	Systematic Review of controlled clinical trials (background/historical information).
Woodman & Moore (2012)	Systematic Review (background/historical information).

Appendix 2.3

Versions of the Falls Efficacy Scale (FES), acronyms as used by Jørstad et al. (2005), bold highlight added

Name of Scale	Authors	Sample Size & Age Range or Mean Age	Details	Cue Question	Scoring system	Concept being assessed (as stated by authors)
Falls Efficacy Scale (FES)	Tinetti, Richman & Powell (1990)	n = 74; aged 65-91 years	Devised to assess 'the degree of perceived efficacy (i.e. self-confidence) at avoiding a fall during each of 10 relatively non-hazardous activities of daily living' (1990:P239)	How **confident** are you that you can (……) **without falling**? 10 activities listed: Get dressed and undressed; Prepare meals (not requiring carrying heavy or hot objects); Take a bath or shower; Get in and out of a chair; Get in and out of bed; Answer the door or telephone; Walk around the house; Reach into cabinets or closets; Light housekeeping; Simple shopping.	Ten-point continuum for each question, *higher score* equivalent to *lower confidence or efficacy*. Possible scores range 10-100. (higher the score, lower the confidence)	FES is an instrument to measure fear of falling based on the operational definition of fear as "low perceived self-efficacy at avoiding falls during essential non-hazardous activities of daily living" (1990:P239)
Amended FES (amFES) As used in the 'FICSIT' trials.	Buchner, Hornbrook, Kutner, Tinetti et al. (1993)	n=2538 (total, 8 sites); mean age range 73 to 88 years, over 8 sites	'Several modifications were made in the Falls Efficacy Scale for use in the FICSIT trials. Based on interviewers' observations that many older person had difficult with the 10 levels of response categories, the measure was changed to a four-category scoring system. In addition, wording was changed from 'how confident' to 'how concerned' because negative wording of the question may increase the spread of scores'. (1993:303)	How **concerned** are you about the **possibility of falling** when (……..) 10 activities listed: Cleaning the house; getting dressed; preparing simple meals; taking a bath or shower; simple shopping; getting in and out of a chair; going up and down stairs; walking around the neighbourhood; reaching into cabinets or closets; answering the telephone.	Four-category scoring system: not at all concerned; somewhat concerned; fairly concerned; or very concerned.	Fear of Falling based on the operational definition of fear as "low perceived self-confidence at avoiding falls during essential, relatively non-hazardous activities" (1993:303)

Versions of the Falls Efficacy Scale (FES), acronyms as used by Jørstad et al. (2005), bold highlight added

Falls Efficacy Scale (FES) with 'reversed' scoring (rFES)	Tinetti, Mendes de Leon, Doucette & Baker (1994)	n=1103, aged 72-98 years	'The instrument was slightly modified for the present study with low score corresponding to low rather than high, confidence'. (1994:M141)	How **confident** he or she felt in doing (……) **without falling**. 10 activities (some slightly different to the original list of 1990): Cleaning house; getting dressed and undressed; preparing simple meals; taking a bath or shower; simple shopping; getting in and out of a chair; going up and down stairs; walking around the neighbourhood; reaching into cabinets or closets; hurrying to answer the phone.	Ten-point scale with zero corresponding to 'not at all' and ten to 'completely'. (higher the score, more confident)	Fear of Falling
Modified Falls Efficacy Scale (MFES)	Hill, Schwartz, Kalogeropo-ulos & Gibson (1996)	n=200 (total, 3 groups); mean age range 74-79 over 3 groups	'In the present study we decided to utilize the original 10-item FES, with 4 additional items incorporating tasks commonly reported by fallers as inducing greater fear of falling.' 'The first 10 items are as described by Tinetti et al (1990) except that the scale as described by Tinetti has been reversed and extended to go from 0 (not at all confident the task can be performed without overbalancing) to 10 (completely confident), instead of the 1 to 10 scale originally described' (1996:1026).	How **confident** are you that you can (…….) **without falling**. 14 items (4 outdoor activities added to the original 10 indoor activities). Get dressed and undressed; prepare a simple meal; take a bath or shower; get in/out of a chair; get in/out of bed; answer the door or telephone; walk around the inside of your house; reach into cabinets or closet; light housekeeping; simple shopping; using public transport; crossing roads; light gardening or hanging out the washing; using front or rear steps at home.	'A visual analogue scale (VAS) was used, marked at the 0%, 20%, 40%, 60%, 80% and 100% points along the line beside each item' (1996:1026). (higher the score, more confident)	Fear of Falling

Versions of the Falls Efficacy Scale (FES), acronyms as used by Jørstad et al. (2005), bold highlight added **Appendix 2.3**

Falls-Efficacy Scale International (FES-I)	Yardley, Beyer, Hauer, Kempen, Piot-Ziegler & Todd (2005)	n=704; aged 60-95 years.	In order to develop a modified version of the FES to assess: 'both easy and difficult physical activities and social activities for use in a range of languages and cultural contexts, permitting direct comparison between studies and populations in different countries and settings' (2005:614)	Level of **concern about falling** when carrying out each activity. Original ten items retained with an additional six added to include outdoor/social activities: Cleaning the house; getting dressed and undressed; preparing simple meals; taking a bath or shower; going to the shop; getting in or out of a chair; going up or down stairs; walking around outside; reaching up or bending down; answering the telephone. walking on a slippery surface; visiting a friend or relative; going to a place with crowds; walking on an uneven surface; walking up or down a slope; going out to a social event	Four-item response ranging from: 1= not at all concerned, to, 4=very concerned	Fear of falling. 'Although the term 'Falls Efficacy' has been retained in the title to acknowledge the historical development of the scale, the FES-I actually assesses 'concern' about falling, a term that is closely related to fear, but is less intense and emotional (and therefore may be more socially acceptable for older people to disclose)' (2005:617)
Falls-Efficacy Scale International (short version) (FES-I, short)	Kempen et al. (2008)	n=704 , aged 60-95; +300, aged 70-92 years;	A shortened version of FES-I, developed for potential use by researchers or clinicians, 'especially when used as part of a battery of scales for screening purposes'. Developed using data from the UK study (Yardley et al., 2005); validated in this Dutch study with 300 people.	Level of **concern about falling** when carrying out each activity. 7 items from the full version: Getting dressed or undressed; taking a bath or shower; getting in or out of a chair; going up or down stairs; reaching for something above your head or on the ground; walking up or down a slope; going out to a social event (e.g. religious service, family gathering or club meeting)	Four-item response: not at all concerned; somewhat concerned; fairly concerned; very concerned	Fear of Falling

Versions of the Falls Efficacy Scale (FES), acronyms as used by Jørstad et al. (2005)

Falls Efficacy Scale – pictorial (Icon-FES)	Delbaere, Smith & Lord (2011)	n=250, 70 – 90 years	A 30-item Icon-FES with the aim to include a range of activities from lower to higher extremes of demand in order to avoid 'floor' and 'ceiling' effects. A short 10-item Icon-FES was also developed	30 line drawings depicting activity scenarios of varying demand. Participants asked to look at the picture and if they do not undertake the activity usually, to imagine that they do using their normal walking aid.	As for the FES-I: 4-point scale from 1=not at all concerned, to 4=very concerned (with facial expression icons indicating level of concern)	Fear of falling

Variations of the ABC Scale (bold highlight added) **Appendix 2.4**

Name of Scale	Authors	Sample Size & Age Range or Mean Age	Details	Cue Question	Scoring system	Concept being assessed (as stated by authors)
Activities-specific Balance Confidence (ABC) Scale/ ABC-16	Powell & Myers (1995)	n=60, 65 – 95 years	Designed to have a wider continuum of activity difficulty and more detailed descriptors than the FES with which it was compared in the study	How **confident** are you that you will not lose your balance or become unsteady when you… 1. Walk around house 2. Up and down stairs 3. Pick up slipper from floor 4. Reach at eye level 5. Reach on tiptoe 6. Stand on chair to reach 7. Sweep the floor 8. Walk outside to nearby car 9. Get in/out of car 10. Walk across parking lot 11. Up and down ramp 12. Walk in crowded mall 13. Walk in crowd/bumped 14. Escalator holding rail 15. Escalator not holding rail 16. Walk on icy sidewalks	Items rated from 0% (no confidence) to 100% (complete confidence)	Situation-specific measure of Balance Confidence
ABC-6	Peretz et al. (2006)	16 groups: n=70, mean age 78 years; n=68, mean age 75 years, n=19, mean age 72 years, total n=157	Short-form of the ABC Scale (referred to as the ABC-16) to address the demands of assessment and therapy situations	The six most challenging of the items from the ABC-16 according to ratings by participants: How **confident** are you that you will not lose your balance or become unsteady when you… 5. Reach on tiptoe 6. Stand on chair to reach 13. Walk in crowd/bumped 14. Escalator holding rail 15. Escalator not holding rail 16. Walk on icy sidewalks	Scores between 0 and 100	Balance Confidence

Appendix 2.4

Variations of the ABC Scale (bold highlight added)

ABC-Simplified (ABC-S)	Filitrault et al. (2007)	n=200, mean age 73.9 years	Modified version of the ABC Scale modified to increase user-friendliness and promoting better congruence of the scale with public health falls prevention strategies. Modifications involved simplifying the cue question and response format and removing the last item (walk on icy sidewalks)	Up to what point are you **confident** that you will maintain your balance when you do the following activities? 1. Walking in the house 2. Going up and down stairs 3. Bending down to pick up a slipper off the closet floor 4. Stretching to take a small can off a shelf at eye level 5. Getting up on your toes to reach an object over your head 6. Getting up on a chair (or a stepladder) to get an object 7. Sweeping the floor 8. Going out of the house to get to a car parked in the driveway 9. Getting in and out of the car (regular car) 10. Crossing a parking lot to get to the shopping centre 11. Going up or down a slope (access ramp) 12. Walking through a shopping centre crowded with people who are in a rush 13. Getting jostled by people as you are walking through a shopping centre 14. Using an escalator while holding the ramp 15. Using an escalator without being able to hold the ramp because your arms are full	4-item response format: 0=not at all confident 1=slightly confident 2=moderately confident 3=very confident	Balance Confidence

Name of Scale	Authors	Sample Size & Age Range or Mean Age	Details	Cue Question	Scoring system	Concept being assessed (as stated by authors)
Confidence in Maintaining Balance Scale (CONFbal)	Simpson et al., 2009	Two studies: n=45, mean age 81 years; n=153, mean age 81 years	Scale of balance confidence, developed within a rehabilitation setting, with the aim of clarifying the relationship between falls self-efficacy and balance confidence (2009:104) Balance confidence described as ‘people’s conviction in their ability to engage in everyday functional tasks without losing their balance’ (2009:104) Developed from Hallam and Hinchcliffe’s (1991) ‘Confidence in everyday activities instrument’ consisting of 21 activities.	How confident are you that you can… 1. Sit down on a chair without losing your balance? 2. Get up out of a chair without losing your balance? 3. Pick up something from the floor without losing your balance, not holding on to any support? 4. Stand unsupported for about 5 minutes without losing your balance? 5. Walk without support for about 10 yards indoors without losing your balance? 6. Walk up a gentle slope indoors without losing your balance, using your usual walking aid if necessary? 7. Walk down a gentle slope indoors without losing your balance, using your usual walking aid if necessary? 8. Walk over an uneven pavement without losing your balance, using your usual walking aid if necessary? 9. Go downstairs indoors, without using the handrail, without losing your balance? 10. Go upstairs indoors, without using the handrail, without losing your balance?	Respondents must rate their confidence to perform the activity without assistance from another person: 3=not confident 2=slightly confident 1=confident Higher scores reflect more problems with balance confidence and lower scores reflect fewer problems	Balance confidence, can also be referred to as a ‘falls self-efficacy scale’ (2009:103)

Survey of Activities and fear of falls in the Elderly Scale (SAFE); also referred to as SAFFE	Lachman et al., 1998	n=270; 62-93 years, mean age 76 years	Aim to develop an instrument 'to operationalize fear of falling, assess activity restriction and enable examination of the relationship of FOF to activity restriction and quality of life' (1998:P44)	Eleven items: Go to the store; prepare simple meals; take a tub bath; get out of bed; take a walk for exercise, go out when slippery; visit a friend or relative; reach overhead; go to place with crowds; walk several blocks outside, bend down.	For each activity several questions are asked: Do you currently do it (yes or no); If you do the activity, when you do it how worried are you that you might fall (0=not at all worried, 1=a little worried, 2=somewhat worried, 3=very worried; If you do not do the activity because of worry, are there also other reasons that you do not do it (if yes, specify); For those not worried, what are the reasons that you do not do it (specify); Compared to 5 years ago would you say that you do it (1=more than you used to, 2=about the same, 3=less than you used to).	FOF and activity restriction

Summary of 'other' instruments devised to assess FOF **Appendix 2.5**

University of Illinois at Chicago Fear	Velozo & Peterson, 2001	n=21, 62-95 years, mean age 76 years	Aimed to use a Rasch analysis approach to devise a scale which would	16 items: 1. Take a walk	For each item asked to indicate one of three levels: very	Fear of Falling (with an indication of

of Falling Measure (UIC FFM)			indicate by the 'score' what activities the participant would be most fearful of carrying out, i.e. linking the measure to the description of their individual FOF.	2. Pick up something lightweight off the floor 3. Carry a full plate 4. Get in/out of car 5. Walk on a crowded sidewalk 6. Climb up well-lit stairs 7. Climb up poorly-lit stairs 8. Carry bundles up well-lit stairs 9. Carry bundles up poorly-lit stairs 10. Climb up bus stairs 11. Use a step stool to reach a cabinet 12. Step off a curb 13. Get in/out of bathtub 14. Stand on a moving bus 15. Use an escalator 16. Walk outside alone when it is icy	worried; moderately worried/a little worried; not at all worried	what specific range of activities the person would be likely to be fearful of)

Geriatric Fear of Falling Measure (GFFM) Geriatric Fear of Falling Measure (GFFM) Cont/d	Huang, T-T, 2006	Two studies: n=100, mean age of 75 years; n=384; mean age 74 years	Aim to develop a FOF measure culturally sensitive for Taiwanese elders living in the community. Built on previous qualitative study with older adults identifying four broad themes for managing FOF (subsequently reduced to three themes in the final scale)	Consists of 15 items in three subscales: PS=psychosomatic symptoms RP=adopting an attitude of risk prevention MB=modifying behaviour RP To avoid climbing up high, I will take advantage of new tools or techniques, such as using a long-handled mop to wipe tiles; When walking on steep terrain or going outdoors, I will use an umbrella or cane for support to prevent myself from falling; I will sit on a chair when taking a bath or hold some support; I need assistance when going out (e.g., I used to take buses, but now I either take a taxi or ask others for a ride); Nowadays, I do less housework that requires more walking, such as sweeping and mopping. MB When there is an obstacle on the ground or floor, I prefer to detour than go over it; I go out less during rainy days; I will ask others for help when I need something that's too high to reach. I will take care to avoid passing too close to places where objects are piled up; Nowadays, I do less outdoor activities (e.g. trips, community activities, or visiting friends); I have changed my exercise style (e.g. from active to passive, from outdoor to indoor, or less frequent). PS I don't sleep well because I worry about falling;	Designed for completion by healthcare providers. Items scores ranging from 1=never to 5=always.	Fear of Falling ('quick screening instrument to evaluate FOF in community-dwelling elders as an outcome indicator of nursing interventions' (2006:363)

				My heart races when I think about falling after climbing to reach something high; I frequently recall terrible experiences I've had falling; I have become more sensitive, agitated, irritable, and critical of others.		

Appendix 3.0

Ethical Approval Documents – approval following clarifications and revisions as requested by Ethical Review Panel

RESEARCH AND ENTERPRISE SERVICES

REF: ERP2220

18th September 2014

Elizabeth Tunnicliffe
8 Hardwick Drive
Shrewbury
SY3 8UZ

Dear Elizabeth,

Re: Alexander Technique: a means of overcoming 'fear of falling' in people aged 60 and over?

Thank you for submitting your revised application for review. I am pleased to inform you that your application has been approved by the Ethics Review Panel. The following documents have been reviewed and approved by the panel as follows:

Document	Version	Date
Summary of Proposal	V3	August 2014
Letter of Invitation	V2	July 2014
Information Sheets	V3	August 2014
Consent Form	V3	August 2014
Consent Form for the use of quotes	V3	August 2014
AT Pilot Study Leaflet	V2	July 2014
AT Pilot Study Group Sessions Outline	V2	July 2014
AT Pilot Group Feedback Questions	V2	July 2014
Questionnaire	V2	July 2014
Balance Confidence Assessment Outline	V2	July 2014
Balance Confidence Assessment Instructions Script	V2	July 2014
AT Study Courses Leaflet	V2	July 2014
AT1/AT2 Course Outline	V2	July 2014
AT1/AT2 Focus Group Questions	V2	July 2014

If the fieldwork goes beyond the date stated in your application, you must notify the Ethical Review Panel via the ERP administrator at uso.erps@keele.ac.uk stating ERP2 in the subject line of the e-mail. If there are any other amendments to your study you must submit an 'application to amend study' form to the ERP administrator stating ERP2 in the subject line of the e-mail. This form is available via http://www.keele.ac.uk/researchsupport/researchethics/

Research and Enterprise Services, Keele University, Staffordshire, ST5 5BG, UK
Telephone: + 44 (0)1782 734466 Fax: + 44 (0)1782 733740

Appendix 3.0

RESEARCH AND ENTERPRISE SERVICES

If you have any queries, please do not hesitate to contact me via the ERP administrator on uso.erps@keele.ac.uk stating ERP2 in the subject line of the e-mail.

Yours sincerely

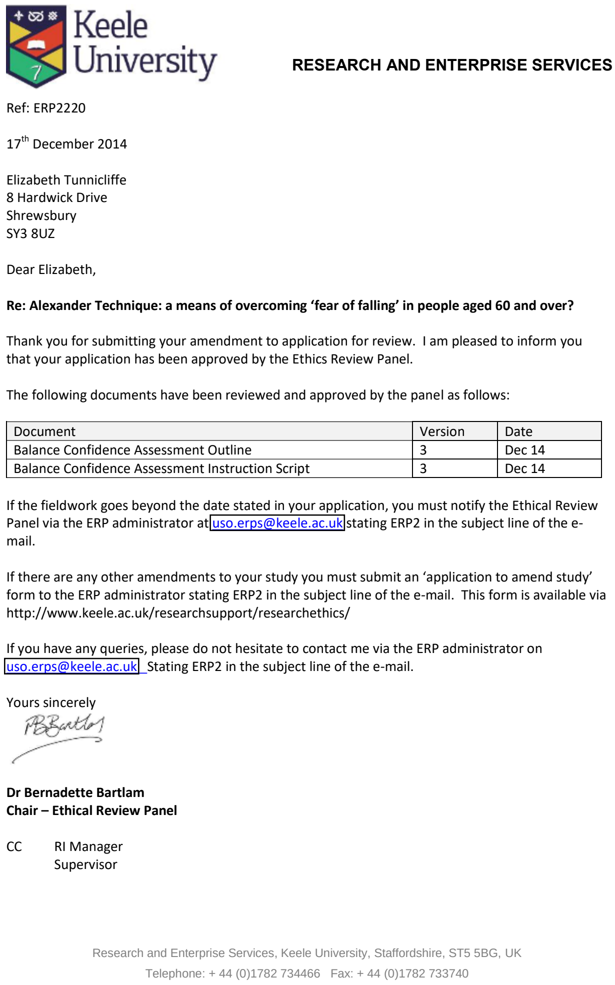
Dr Bernadette Bartlam
Chair – Ethical Review Panel

CC RI Manager
Supervisor

Research and Enterprise Services, Keele University, Staffordshire, ST5 5BG, UK
Telephone: + 44 (0)1782 734466 Fax: + 44 (0)1782 733740

Appendix 3.0

Application for revision to 'lean forward' item on BCA



Keele University RESEARCH AND ENTERPRISE SERVICES

Ref: ERP2220

17th December 2014

Elizabeth Tunnicliffe
8 Hardwick Drive
Shrewsbury
SY3 8UZ

Dear Elizabeth,

Re: Alexander Technique: a means of overcoming 'fear of falling' in people aged 60 and over?

Thank you for submitting your amendment to application for review. I am pleased to inform you that your application has been approved by the Ethics Review Panel.

The following documents have been reviewed and approved by the panel as follows:

Document	Version	Date
Balance Confidence Assessment Outline	3	Dec 14
Balance Confidence Assessment Instruction Script	3	Dec 14

If the fieldwork goes beyond the date stated in your application, you must notify the Ethical Review Panel via the ERP administrator at uso.erps@keele.ac.uk stating ERP2 in the subject line of the e-mail.

If there are any other amendments to your study you must submit an 'application to amend study' form to the ERP administrator stating ERP2 in the subject line of the e-mail. This form is available via http://www.keele.ac.uk/researchsupport/researchethics/

If you have any queries, please do not hesitate to contact me via the ERP administrator on uso.erps@keele.ac.uk Stating ERP2 in the subject line of the e-mail.

Yours sincerely

Dr Bernadette Bartlam
Chair – Ethical Review Panel

CC RI Manager
Supervisor

Research and Enterprise Services, Keele University, Staffordshire, ST5 5BG, UK
Telephone: + 44 (0)1782 734466 Fax: + 44 (0)1782 733740

Appendix 3.0

Application for addition of individual interviews

Keele University

REF: ERP2220

3rd June 2015

Elizabeth Tunnicliffe
8 Hardwick Drive
Shrewbury
SY3 8UZ

Dear Elizabeth,

Re: Alexander Technique: a means of overcoming 'fear of falling' in people aged 60 and over?

Thank you for submitting your application to amend study for review.

I am pleased to inform you that your application has been approved by the Ethics Review Panel.

The following revised documents have been reviewed and approved by the panel as follows:

Document	Version	Date
Summary Document	5	May 2015

If the fieldwork goes beyond the date stated in your application (31st July 2015) you must notify the Ethical Review Panel via the ERP administrator at uso.erps@keele.ac.uk stating ERP2 in the subject line of the e- mail.

If there are any other amendments to your study you must submit an 'application to amend study' form to the ERP administrator stating ERP2 in the subject line of the e-mail. This form is available via http://www.keele.ac.uk/researchsupport/researchethics/

If you have any queries, please do not hesitate to contact me via the ERP administrator on uso.erps@keele.ac.uk stating ERP2 in the subject line of the e-mail.

Yours sincerely

pp C H Bateman

Dr Colin Rigby
Vice Chair – Ethical Review Panel

CC RI Manager
Supervisor

Research and Enterprise Services, Keele University, Staffordshire, ST5 5BG, UK
Telephone: + 44 (0)1782 734466 Fax: + 44 (0)1782 733740

Appendix 3.1

Eligibility Questionnaire:

1. Are you taking part in any other exercise/fitness-type classes (e.g. “Extend”) or self-directed activity (e.g. gym or walking group etc.).

2. Are you able to walk with or without a walking aid (stick or frame)?

3. Are you able to hear with or without an aid?

4. Are you able to see with or without glasses?

5. How would you describe your ability to remember instructions from one week to the next?

6. Have you been diagnosed with any long-term medical conditions that are unstable and may affect your ability to attend 8 sessions? E.g. Multiple Sclerosis; Rheumatoid arthritis, Parkinson’s disease?

7. Are you willing to be filmed during the assessment sessions and the focus group discussion?

Short Falls Efficacy Scale-International (short FES-I)

Now we would like to ask some questions about how concerned you are about the possibility of falling. Please reply thinking about how you usually do the activity. If you currently do not do the activity, please answer to show whether you think you would be concerned about falling IF you did the activity. For each of the following activities, please tick the box which is closest to your own opinion to show how concerned you are that you might fall if you did this activity.

		Not at all concerned 1	*Somewhat concerned 2*	*Fairly concerned 3*	*Very concerned 4*
1	Getting dressed or undressed	1 ☐	2 ☐	3 ☐	4 ☐
2	Taking a bath or shower	1 ☐	2 ☐	3 ☐	4 ☐
3	Getting in or out of a chair	1 ☐	2 ☐	3 ☐	4 ☐
4	Going up or down stairs	1 ☐	2 ☐	3 ☐	4 ☐
5	Reaching for something above your head or on the ground	1 ☐	2 ☐	3 ☐	4 ☐
6	Walking up or down a slope	1 ☐	2 ☐	3 ☐	4 ☐
7	Going to a social event (e.g. religious service, family gathering or club meeting	1 ☐	2 ☐	3 ☐	4 ☐

From:
Kempen, G.I.J.M. et al. (2008), The Short FES-I: a shortened version of the falls efficacy scale-international to assess fear of falling, Age and Ageing, Vol. 37, 45-50

Appendix 4.1

FES-I (short, VAS) – version used with pilot group (2 pages)

I would like to ask you some questions about how concerned you are about the possibility of falling. Please reply thinking about how you usually do the activity. If you currently do not do the activity, please answer to show whether you think you would be concerned about falling **IF** you did the activity. For each of the following activities, please mark the scale line to show how concerned you are that you might fall if you did this activity.

Name:

Date:

Please mark the following lines to show what you think ***today***:

1. Getting dressed or undressed:

Level of Concern: Not at all Somewhat Fairly Very

2. Taking a bath or shower:

Level of Concern: Not at all Somewhat Fairly Very

3. Getting in or out of a chair:

Level of Concern: Not at all Somewhat Fairly Very

4. Going up or down stairs

Level of Concern: Not at all Somewhat Fairly Very

5 Reaching for something above your head or on the ground:

Level of Concern: Not at all Somewhat Fairly Very

6. Walking up or down a slope:

Level of Concern: Not at all Somewhat Fairly Very

7. Going to a social event (e.g. religious service, family gathering or club meeting):

Level of Concern: Not at all Somewhat Fairly Very

Thank you for completing the questionnaire.
Liz Tunnicliffe, Alexander Technique Research Study, 2014.
Adapted from: Kempen, G.I.J.M. et al. (2008), The Short FES-I: a shortened version of the falls efficacy scale-international to assess fear of falling, Age and Ageing, Vol. 37, 45-50

Appendix 4.2

FES-I (short, VAS) – version used with intervention groups (AT1 & AT2) (2 pages)

I would like to ask you some questions about how concerned you are about the possibility of falling. Please reply thinking about how you usually do the activity. If you currently do not do the activity, please answer to show whether you think you would be concerned about falling **IF** you did the activity. For each of the following activities, please mark the scale line to show how concerned you are that you might fall if you did this activity.

Name:

Date:

Please mark the following lines to show what you think ***today***:

1. Getting dressed or undressed:

Level of Concern: Not at all Very

2. Taking a bath or shower:

Level of Concern: Not at all Very

3. Getting in or out of a chair:

Level of Concern: Not at all Very

4. Going up or down stairs:

Level of Concern: Not at all
Very

5. Reaching for something above your head or on the ground:

Level of Concern: Not at all
Very

6. Walking up or down a slope:

Level of Concern: Not at all
Very

7. Going to a social event (e.g. religious service, family gathering or club meeting):

Level of Concern: Not at all
Very

Thank you for completing the questionnaire.
Liz Tunnicliffe, Alexander Technique Research Study, 2014/15

Adapted from: Kempen, G.I.J.M. et al. (2008), The Short FES-I: a shortened version of the falls efficacy scale-international to assess fear of falling, Age and Ageing, Vol. 37, 45-50

Appendix 4.3

Score Sheet for Fullerton Advanced Balance Scale

From Rose, D.J., 2010, *FallProof! : A Comprehensive Balance and Mobility Program*, Champaign, IL: Human Kinetics

(Redacted)

Appendix 4.3

Score Sheet for Fullerton Advanced Balance Scale

From Rose, D.J., 2010, *FallProof! : A Comprehensive Balance and Mobility Program*, Champaign, IL: Human Kinetics

(Redacted)

Appendix 4.3

Score Sheet for Fullerton Advanced Balance Scale
From Rose, D.J., 2010, *FallProof! : A Comprehensive Balance and Mobility Program*, Champaign, IL: Human Kinetics

(Redacted)

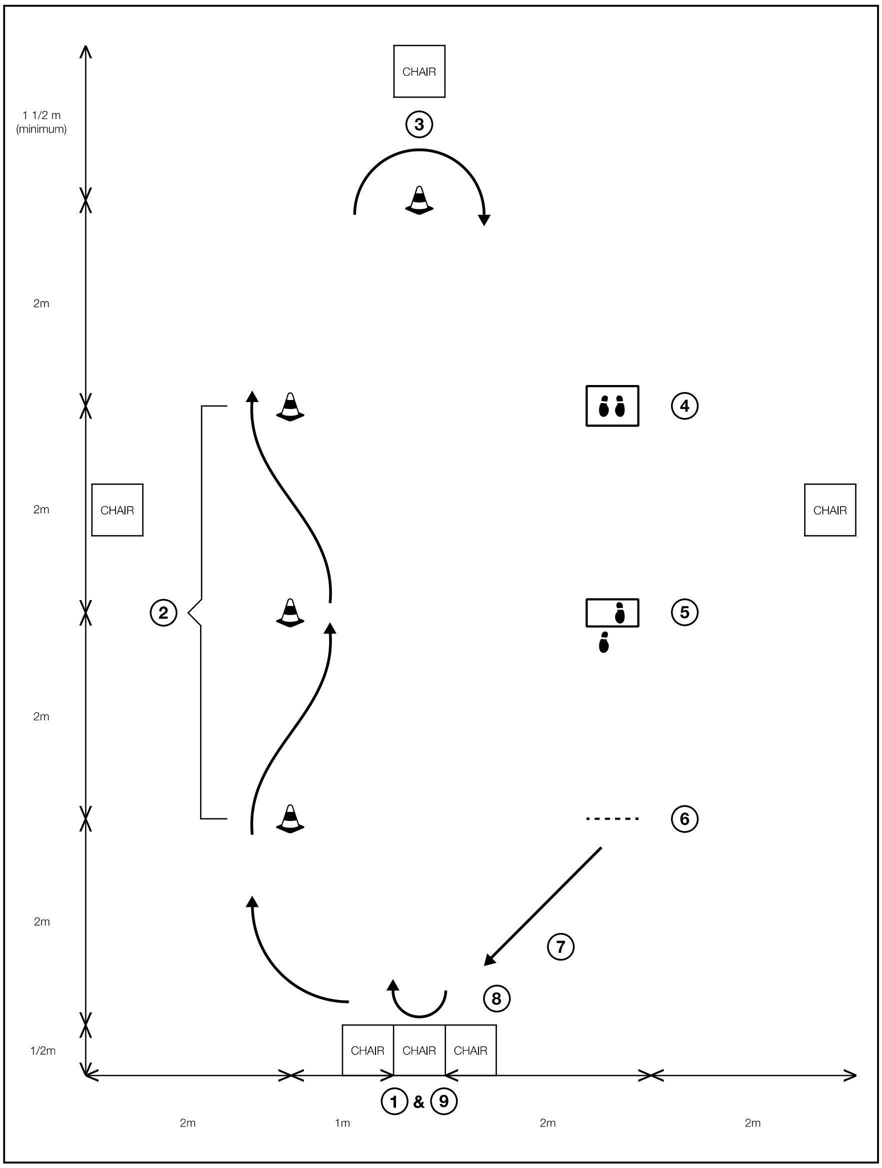
Appendix 4.4

Appendix 4.4

BALANCE CONFIDENCE ASSESSMENT (BCA) PLAN

ASSESSMENT STARTS AND ENDS SITTING IN A CHAIR

1. Stand up from chair
2. Walk/weave between 3 cones
3. Walk around cone (180°)
4. Step up onto platform
5. Step up and over
6. Lean Forward
7. Walk in straight line to chair
8. Turn in front of chair (180º)
9. Sit down in chair



Appendix 4.5

Balance Confidence Assessment (BCA) – photograph

Appendix 4.6

BALANCE CONFIDENCE ASSESSMENT (BCA) - equipment:

One upright chair with arms
Two additional upright chairs (arms not essential)

Four plastic marker cones

One plastic rectangular step (platform)
Dimensions (inches): H:3.5, W:19.5, D:15.5

One plastic rectangular step
Dimensions (inches): H:6.0, W:26.0, D:10.5

Masking tape (to mark line on floor)

One pencil

One 6-inch x 1 inch piece of card for measuring

One large measuring tape (for accurate measurement of distances)

Additional chairs for positioning around the room

Appendix 4.7

Balance Confidence Assessment - Instruction Script:
[Follows after participant has filled-in the Questionnaire]

[Invite participant to sit in chair]

Begins: when participant is seated in upright chair.

[Name] - This is the Balance Confidence Assessment.

As you can see there are several activities included in the assessment, and they start and finish with sitting in the chair as you are now.
When you are ready, I will explain what to do.
When I've finished, I will repeat the explanation if you would like me to.
After that, I will ask my colleague [Name] to carry out the assessment so that you can see what you will be doing.
[If appropriate: You can use your stick/frame/walker as usual.]

Time is **not** important, so please walk at a pace that is comfortable for you.

During the assessment I will be walking by your side but not too close. I can remind you what to do next and take your hand to steady you if needed, but I won't offer you help if you don't need it. If you need to rest there are chairs around the room so just say and we will get a chair for you to sit down.

If you are not confident to carry out one of the items just say so and go on to the next.

When it comes to stepping onto the platform or over the small step, if you would like me to hold your hand(s) to help you to steady yourself please ask [as appropriate: you will be able to leave your stick/frame/walker by the step]

My colleague [Name] will be recording but, as I've said, time doesn't matter so please go at a comfortable pace.

Do you have any questions so far?
[Q & A, as required]

This is what I would like you do: when I have finished explaining, and when [Name] has demonstrated - when you are ready:

- Please Stand up
- Then walk up to and (walk/weave) between those three cones over there, please go to the left of the first one cone.
- Then walk up to and around the red cone ahead of you, so that you are facing this way.
- Walk to the low square platform and step up onto it with both feet and then step off the other side.
- Then walk to the next step and put one foot onto it (whichever foot you prefer) step straight over it with the other foot, then step off with your first foot.
- Walk towards [Name] who will be holding a pencil in her hand. Please stop in front of the line on the floor and follow the instructions she will give you to reach forward to take the pencil from her. [Name] will then take the pencil back before you continue walking.
- Then walk back to this chair in a straight line, and stop just in front of it, facing the chair
- Turn round
- Sit down in the chair.

Have you got any questions?
Would you like me to repeat the instructions?
[Repeat Instructions, if required]
My colleague [Name] will now demonstrate
[Demonstration]

When you are ready, please begin, and I will walk beside you.
[Assessment video recorded]
N.B. Participants will be given time to rest in the chair after completing the assessment.

Thank you very much for completing the Balance confidence Assessment.

Instructions for: (6) Reach Forward:

Please stand behind the tape on the floor, with your feet a little way apart, approx beneath your hips.

Please put your arm (of choice) out in front of you so it is straight, like this (demonstrate) and hold it there. [measure 6 inches from tip of middle finger, hold pencil in place at that distance]

When you are ready, I would like you to reach forward to take the pencil from me, if possible without taking a step forward, but please take one or more steps if you need to.

[Take pencil back from participant and direct them towards the chair]

Appendix 4.8

Balance Confidence Assessment – Score Sheet:

Group: **Name/Ref No:** **Mobility aid used:**

Upright chair (with arms)

1. **Stand Up from chair:**

May use arms of chair if needed

0	Declined – unable/unwilling to attempt	
1	Completed – but with delay/hesitation, requiring encouragement and some help	
2	Completed - but with delay/hesitation requiring encouragement and close supervision (but with no help)	
3	Completed - independent – with some delay/hesitation and/or unsteadiness	
4	Confident – independent without hesitation (may be some unsteadiness)	

2. **Walking (weaving) round three cones (with or without use of walking aid):**

[Going left round first cone]

0	Declined – unable/unwilling to attempt	
1	Completed - but unable to negotiate round the cones without prompting/assistance for direction and with frequent stops	
2	Completed - independently but with some stops and/or inconsistent course around the three cones	
3	Completed – independently without any stops. May have irregular speed and/or course around the cones	
4	Confident - able to negotiate round the cones independently, at regular speed and with a smooth course around the cones	

3. **Walk towards and around cone (180 degrees turn while walking):**

0	Declined – unable/unwilling to attempt	
1	Completed - but unable to negotiate round the cones without prompting/assistance for direction and with frequent stops	
2	Completed - independently but with some stops and/or inconsistent course around the cone	
3	Completed – independently without any stops. May have irregular speed and/or course around the cone	
4	Confident - able to negotiate round the cone independently, at regular speed and with a smooth course around the cone	

4. Step up onto low platform with both feet and off the other side:

0	Declined – unable/unwilling to attempt	
1	Attempted independently - but not fully completed or not completed as instructed	
2	Completed – but with encouragement and assistance (holding hands only)	
3	Completed – requiring close supervision (but no help) may be hesitation/caution and/or some apparent instability	
4	Confident – completed independently, without hesitation. May have some apparent instability	

5. Step up and over 6" bench with one foot and step straight over with other foot (adapted from FAB, one direction only, preferred foot to lead):

0	Declined – unable/unwilling to attempt	
1	Attempted independently - but not fully completed or not completed as instructed	
2	Completed – but with encouragement and assistance (holding hands only)	
3	Completed – requiring close supervision (but no help) may be hesitation/caution and/or some apparent instability	
4	Confident - completed independently, without hesitation. May have some apparent instability.	

6. Lean forward to reach an object (pencil) held at shoulder height (adapted from FAB, start with feet hip's width apart, coming forward from hips, pencil *6* inches away):

0	Declined – unable/unwilling to attempt	
1	Attempted following encouragement/close supervision. Able to reach pencil with more than 2 steps forwards.	
2	Attempted following encouragement/close supervision, able to reach pencil by taking two steps forwards.	
3	Completed confidently and independently – taking one step forward.	
4	Completed confidently and independently without taking a step forwards.	

7. Walk in straight line (to chair):

0	Declined – unable/unwilling to attempt	
1	Attempted with frequent stops and needs encouragement to continue and/or prompting for correct direction towards target	
2	Completed – with encouragement, with some stops and/or inconsistency of direction towards target	
3	Completed – may have some initial hesitation but able to walk without stopping. May have some inconsistency of speed and/or inconsistency of direction towards target	
4	Confident - able to walk without hesitation, at consistent speed and direction to target	

8. Turn round "on the spot" in front of chair, ready to sit down in it (adapted from TURN 180):

Note whether turns to left or right; if asks which direction to turn say the direction they prefer

Note number of steps taken to turn: [ ]

0	Declined – unable/unwilling to attempt	
1	Completed after hesitation, with chairs placed either side of participant; touches or holds onto chairs during turn.	
2	Completed after hesitation, with chairs placed either side of participant; but does not touch or hold onto chairs during turn.	
3	Completed independent but with hesitation and/or requiring encouragement. May be some unsteadiness.	
4	Confident - completed independent without hesitation. May be some unsteadiness.	

9. Sit down in upright chair:

0	Declined – unable/unwilling to attempt	
1	Completed - with delay/hesitation, requiring encouragement and some help to position self correctly in front of chair (holding hand/s)	
2	Completed - independent but with delay/hesitation requiring encouragement/close supervision	
3	Completed - independent – with some hesitation and/or unsteadiness	
4	Confident – independent without hesitation. May be some unsteadiness	

Overall confidence score:

0	Unable to complete course despite reassurance
1	Able to complete course with frequent assistance and reassurance (6 items +)
2	Able to complete course with moderate assistance and reassurance (3-5 items)
3	Able to complete course with minimal assistance and reassurance (2 items or less)
4	Able to complete course independently with reassurance
5	Able to complete course independently, no reassurance required, but frequent stops and/or hesitation
6	Able to complete course independently, no reassurance required, no frequent stops or hesitation.

Appendix 4.9

Introductory letter to potential venues:

Scheme Manager

[Address]

19th October 2014

Dear

PhD Research Project - Alexander Technique: a means of overcoming 'fear of falling' in people aged 60 and over?

I am a PhD research student within the Faculty of Humanities and Social Sciences at Keele University. I am carrying out a study into the Alexander Technique as a means of overcoming fear of falling in people aged 60 and over.

As you know, falls in older people are of considerable concern both in terms of injury and the impact such an event can have on a person's confidence. Research has shown that *fear of falling* is common among older people; including those people who have not personally experienced a fall. The aim of my study is to find out if learning to apply the Alexander Technique in activities of daily life improves confidence in balance and movement and therefore reduces fear of falling.

The Alexander Technique involves learning how to go about everyday activities in a more efficient way, using less muscular effort. Learning to give careful conscious attention to carrying out activities such as standing, stepping, walking, getting into and out of chairs (to give just a few examples) it is possible to bring about beneficial change in the way you go about them, regardless of age or level of mobility.

Continued/2

My research will involve working with groups of volunteers who are 60 years of age and over, and who are interested in improving their balance and movement confidence. I will run a free 8-session introductory course in the Alexander Technique for each group. Each session is for one hour and consists of practical everyday activities and listening to short talks about the Alexander Technique. There will be at least one fully qualified Alexander Teacher per five participants so each person will have plenty of help to take part according to their own ability. Participants will be asked to complete a short questionnaire and a balance confidence assessment at regular intervals before, during and after the course, and to take part in a focus group discussion. Balance confidence assessments will be filmed, for evaluation purposes only.

I am a mature student and a qualified teacher of the Alexander Technique (Professional Association of Alexander Teachers, PAAT) with 16 years experience of teaching groups and individuals. I am also a qualified social worker with over 10 years experience of working with older people in the community, which I continue to do on a part-time basis. My research, which is unfunded and part-time, combines my experience and interest of working with older people as a social worker and my knowledge of the Alexander Technique. I have a current DBS check relevant to my research project.

I have two PhD supervisors at Keele University: Professor Mo Ray has a social work background with research expertise in the field of gerontology. Doctor Victoria Door specialises in education. In addition, she has expertise in the Alexander Technique, both in working with the general public, and in the continuing professional development of Alexander Technique teachers.

I would welcome the opportunity to meet with you to explain more about the Alexander Technique and my research, and to discuss whether some of the residents at [Name of Venue] may potentially like to take part in one of the study groups. I will telephone in a few days to see whether this is possible and if so, to arrange a convenient time for my visit. In the meantime if you would like to contact me, please feel free to do so by telephone or email as given below or by post c/o Prof. Mo Ray, Keele University, Keele, Staffs, ST5 5BG.

Yours sincerely

Liz Tunnicliffe
Tel: 07847 812960 Email: e.tunnicliffe@keele.ac.uk

Information Leaflets provided to potential participants
(text from A5 folded leaflet used in study)

Confidence in Movement
with the
Alexander Technique

Are you 60 years of age or over?
Do you have concerns about balance or movement?

Find out how the Alexander Technique can help:

Introductory Course for the over 60s
[Venue Name]
beginning 30th January 2015.

Do you have concerns about balance or movement?

If you do, you are not alone, as such concerns are common in people over 60 years of age. You may wonder whether your concerns have any effect on your life? As you will know from experience, when we are faced by difficulty or uncertainty, we tend to react by 'tensing up'. This reaction applies to difficulties with balance and movement as well as with other problems in life. When we 'tense up' we stiffen and fix our joints, which interferes with balance and makes movement more difficult. So, what can we do? Sometimes we attempt to overcome problems by 'trying harder' because that is what we have always done. But, in trying harder, we use even more muscular effort which, although we don't realise it, makes the underlying *problem* worse. That *problem* is that

Image ©Accent-*Fotofolia.com*

Appendix 4.10

we have learned to stand and do everything else by using more muscular effort than we need to.

How can the Alexander Technique help you?

The Alexander Technique offers an alternative to 'trying harder'. It involves learning how to go about your activities in a more efficient way, using less muscular effort. No matter what your age or level of mobility, by learning to give careful conscious attention to how you stand, step, walk, get into and out of chairs (to give just a few examples) it is possible to bring about beneficial change in the way you go about these activities. The Alexander Technique offers a practical way of coping with those challenges of ageing.

The Course:

The Introductory Course in the Alexander Technique consists of eight one-hour sessions. The course is free and no special clothing or equipment is needed.
It will be held in the Hall, [Venue Name] on Friday mornings at 11.00am.

What do you do now?

If you are interested in taking part in the Introductory Course in the Alexander Technique, please contact the number overleaf for more information*.
*This course is being run as part of a *research study*. Taking part will involve signing a consent form; and
completing a short questionnaire and a balance confidence assessment, at regular intervals.

The Course will be run by Liz Tunnicliffe who is a qualified Alexander Teacher (member of the Professional Association of Alexander Teachers, PAAT) and a research student at Keele University. The course is adapted from the PAAT Introductory Course and all teachers on the course are qualified members of PAAT (www.paat.org.uk). If you are interested in taking part and would like more information please contact Liz (details below).

....

I am interested in taking part in the Alexander Technique Study

Name:
Address:
Telephone number:
Please return to: Liz Tunnicliffe, c/o Prof. Mo Ray, Keele University, Keele, Staffs, ST5 5BG. Tel (Liz): 07847 812960 Email: e.tunnicliffe@keele.ac.uk

Appendix 4.11

Introductory correspondence (Pilot Group)

Keele University

To [name and address of potential pilot participant]

[date]

Dear Mr/Mrs [ ]

Alexander Technique for people aged 60 and over.
Pilot Sessions at [Venue] on Thursday 4th & Thursday 11th December 2014.

Thank you for enquiring about the pilot sessions for the study about the Alexander Technique for people aged 60 and over.

As discussed in our telephone conversation on [day and date]I would like to visit you to explain more about the Alexander Technique study and the pilot sessions, and to confirm that you are eligible to take part.

I am enclosing an Information Leaflet and two copies of a consent form for you to read. If you decide to take part you will be asked to sign these forms (one for you to keep and one for me). I will go through the form with you and answer any questions you may have when I come to see you.

I would like to visit you on Thursday 27th November 2014. I will telephone you in a few days to see if this is convenient. If it is not, I hope we can re-arrange my visit for another day.

I look forward to meeting you.
Yours sincerely

Liz Tunnicliffe
Tel: 07847 812960
e.tunnicliffe@keele.ac.uk

Encs.

Appendix 4.12

Feedback Questions for Pilot Group

Pilot: Introductory Session in the Alexander Technique for people aged 60 and over.

Feedback from the Group - questions to be asked (to the group) at the end of the second session (one-hour introductory session in the Alexander Technique):

1. What do you think about the length of the session today?
    - Too long?
    - Too short?

2. Do you think the session could be improved? For example:
    - Amount of individual help received
    - Talks
    - Practical work
    - Anything else you would recommend?

3. From your brief introduction to the Alexander Technique today
    - What have you found most useful/interesting?
    - What have you found least useful/interesting?

4. Would you like to learn more about the Alexander Technique?
    - If yes, what are the activities you would most like to apply the Alexander Technique to?
    - Would you be interested in attending a course on the Alexander Technique at a later date?
    - If no, is there any specific reason?

5. What did you think of the Questionnaire you filled-in last week?
    - Was it easy to understand?
        - If not, what was difficult?
    - Was it easy to complete?
        - If not, what was difficult?
    - Do you think it could be improved in any way?
        - Is so, what would you recommend?

6. What did you think of the Balance Confidence Assessment you did last week?
   - How did you find the explanation and instructions?
     - Do you think they could be improved?
     - If so, what would you recommend?
   - What did you think of the assessment tasks?
     - Were they activities you do often?
     - How did you find them
       - easy?
       - moderately difficult?
       - too difficult?
     - Do you think the assessment could be improved?
     - If so, what would you recommend?

N.B. Feedback session to be video recorded (with audio). Consent to video recording is an eligibility requirement.

Appendix 4.13

Introductory/Appointment Letter (AT1 & AT2 venue)

Keele University

To [name and address of potential participant (AT1 or AT2)]

[date]

Dear Mr/Mrs [ ]

Alexander Technique for people aged 60 and over.
8 Session Course to be held at [venue] on [day(s) and time (s)] beginning on [date].

Thank you for enquiring about the Introductory Course in the Alexander Technique for people aged 60 and over.

As discussed in our telephone conversation on [day and date] I would like to visit you to explain more about the Alexander Technique study and the course, and to confirm whether you are eligible to take part.

I am enclosing an Information Leaflet and two copies of a consent form for you to read. If you decide to take part you will be asked to sign these forms (one for you to keep and one for me). I will go through the form with you and answer any questions you may have when I come to see you.

I would like to visit you on [day, date, time]. I will telephone you in a few days to see if this is convenient. If it is not, I hope we can re-arrange my visit for another day.
I look forward to meeting you.

Yours sincerely

Liz Tunnicliffe
Tel: 07847 812960
e.tunnicliffe@keele.ac.uk

Encs

Appendix 4.14

Date confirmation notes for participants, examples (AT1 Group)

Dear ....

Alexander Technique for people aged 60 and over.

Thank you for agreeing to take part in the Introductory Course in the Alexander Technique for people aged 60 and over.
Your first Assessment appointment is on:
Friday 9th January 2015 at **.....................................** in the **Hall, [venue name].**
I look forward to seeing you then.
Liz Tunnicliffe
Tel: 07847 812960
e.tunnicliffe@keele.ac.uk

Dear ....

Alexander Technique for people aged 60 and over.

Thank you for agreeing to take part in the Introductory Course in the Alexander Technique for people aged 60 and over.
Your second Assessment appointment is on:
Friday 23rd January 2015 at **....................................** in the **Hall, [venue name].**
I look forward to seeing you then.
Liz Tunnicliffe
Tel: 07847 812960
e.tunnicliffe@keele.ac.uk

Appendix 4.14

Date confirmation notes/reminders for participants, examples (AT1 Group)

Keele University

Dear ....

Alexander Technique for people aged 60 and over.

Thank you for agreeing to take part in the Introductory Course in the Alexander Technique for people aged 60 and over.
The 1st of the 8 Alexander Technique sessions is on:
Friday 30th January 2015 at **11.00 am** in the **Hall, [venue name].**
I look forward to seeing you then.
Liz Tunnicliffe
Tel: 07847 812960
e.tunnicliffe@keele.ac.uk

Keele University

Dear ....
Alexander Technique for people aged 60 and over

The dates for all the sessions are as follows:

Course sessions: 11.00 am on Friday mornings. Last session is on Friday 20th March.
Individual assessment No. 3: Tuesday 24th March – time to be arranged.
Individual assessment No. 4: Friday 24th April – time to be arranged.
Focus Group: Friday 1st May at 11.00 am to 12.00 noon.
All the sessions and assessments will be in the **Hall, [venue name]**.
If you have any queries or can't make one of the sessions, don't hesitate to contact me, my phone number is: 07847 812960

Liz Tunnicliffe
e.tunnicliffe@keele.ac.uk

Appendix 4.15

Invitation to participants 'thank you' events and update on research

Confidence in Movement with the Alexander Technique

Alexander Technique Research Project: [AT1 or AT2 Venue], 2015

Liz Tunnicliffe would like to invite ……………………….
to join her for tea on Day, Date & Time in the hall, [Venue], to thank you for participating in the Alexander Technique Research Project and to update you on her research findings.
Liz will contact you by phone before [date] to confirm you can attend.
Liz Tunnicliffe: 07847 812960

Image ©Accent-*Fotofolia.com*

Information for 'Thank you' and research update for AT1 & AT2 Groups, AT1 example.

Confidence in Movement
with the
Alexander Technique
AT1 Venue, 2015

First Group in the research project (other than small pilot group).

Very important for us as teachers in developing the course, so many thanks to the group, especially for those that participated in all the assessments as well as the course sessions.

For those who completed all assessments:

Practical: I can say that almost everyone's assessments showed an improvement at some point over the four occasions (not necessarily consistently).

Questionnaire: Likewise, almost all showed an increase in confidence to do things without falling, at some point over the four occasions (dress/undress; bath/shower; in/out of chair; up/down stairs; reaching above/below; up/down slope; out to social event).

As a whole group (median), results:

For the practical assessment, slight increase in score over the four occasions.

Questionnaire results *particularly interesting* for the whole group: concern about falling fell after doing the course and continued to decrease on the last assessment one month after the end of the course.

- From the assessment results and comments made at the focus group and in individual interviews it was evident that people had found the AT helpful, and for some it had made a difference to their activity levels, they were getting ‘out and about’ more.

- As a group, had a high level of motivation to learn something that could help them.

- As a group demonstrated that they could learn and apply the AT.

- Feedback was that people enjoyed learning together as a group.

Research continuation:

Second course with another group at AT Venue – had the sessions twice a week. Feedback also positive from that group.

Third course at [Pilot Venue], where participants had taken part in the pilot session. Also positive response.

Thank you again to everyone for taking part.

Any desire for ‘refresher’ session(s) for this group?

Demographics Questionnaire for Participants – Pilot Group
(also used for intervention groups)

Reference number of participant: P.

Introduction

Thank you for agreeing to participate in the pilot group for the course entitled 'Confidence in movement with the Alexander Technique'. As you know, this course is part of a research project and in order to correctly evaluate the results some information about you, as a pilot participant, is required. This will be kept in the strictest confidence, as explained in the Information sheet.

Please answer the following questions as accurately as you can:

My age is: [ ] years.

I am (please tick box): male [ ] female [ ]

Education:

At what age did you leave school? [ ] years.

Please list any qualifications that you have:

Health:
Do you have any medical conditions diagnosed?

No [ ] please go to next question

Yes – please state the number of medical conditions you are diagnosed with: [ ]

Do you take any prescription medications regularly?

No [ ] please go to next question

Yes – please state the **number** of prescription medications you take regularly [ ]

Appendix 4.17

How would you describe your own general health?

Please tick one box:

Taking into consideration my age, I would describe my overall general health as:

Poor [ ] Below Average [ ] Average [ ] Good [ ] Excellent [ ]

Getting around:

When I am moving around **indoors** I use the following aids (please tick all that you use):

None
Walking stick
Elbow crutch
Walking frame
Special walking frame (e.g. gutter frame)
Wheeled trolley
Wheelchair
Motorised scooter

When I am moving around **outdoors** I use the following aids (please tick all that you use):

None
Holding onto another person's arm
Walking stick
Elbow crutch
Walking frame (same as used indoors)
3-wheeled walker
4-wheeled walker with seat
Wheelchair
Motorised scooter
Car driver

Appendix 4.18

Information & Consent Forms (Pilot Group)

Information Sheet

Study Title: Alexander Technique: a means of overcoming 'fear of falling' in people aged 60 and over?

Aims of the Research
This research project aims to determine if instruction in the Alexander Technique improves balance and reduces fear of falling in people aged 60 and over.

Invitation
You are being invited to consider taking part in **two pilot sessions** for the research study: Alexander Technique: a means of overcoming 'fear of falling' in people aged 60 and over? Liz Tunnicliffe, a qualified teacher of the Alexander Technique and a PhD Research Student at Keele University, is undertaking this study.

Before you decide whether or not you wish to take part in the pilot sessions, it is important for you to understand why this research is being done and what taking part will involve. Please take time to read this information carefully and discuss it with friends and relatives if you wish. Ask Liz if there is anything that is unclear or if you would like more information.

Why have I been chosen?
You responded to the information about the sessions at [Venue Name].

Do I have to take part?
You are free to decide whether you wish to take part or not. If you do decide to take part you will be asked to sign two consent forms, one is for you to keep and the other is for the study records. You are free to withdraw from the pilot sessions at any time and without giving reasons.

What will happen if I take part?
You will attend two sessions. The first will be an individual timed appointment, the second session will be with four other volunteers. At the first session, you will be asked to complete a simple questionnaire about your confidence in carrying out daily activities without falling. You will also be asked to complete a balance confidence assessment. The second session will be a one-hour introductory session in the Alexander Technique for people aged 60 and over. Both sessions will be recorded with a video camera.

Both sessions will be held at [Venue Name]. The first will be on Thursday 4th December 2014 in the afternoon at a time to be confirmed, the second will be on Thursday 11th December from 2.00pm to 3.30pm.

If I take part, what do I have to do?
At the first session you will be asked to complete a short questionnaire and complete a balance confidence assessment. This involves doing a series of everyday activities such as standing up, walking, turning and sitting down.
The second session will consist of short talks and practical work, all of which will give an introduction to the Alexander Technique. The practical work will involve demonstrations, instructions and supervision of applying the principles of the Technique to everyday activities such as standing, walking and getting into and out of chairs. The object of the practical work is for you to learn how to go about everyday activities with less muscular effort, bringing about improvements in your balance and coordination. So, you will be listening to some very short talks and joining in with some practical sessions. You will only be asked to do what you are able and willing to do, as the emphasis will be on each person achieving their own potential, whatever their ability. There will be plenty of help as the group will have a maximum of five participants. You will have the opportunity to sit down whenever you need to. No special clothing or equipment is needed to take part. At the end of the hour the researcher will ask the group some questions about your opinion of the session.

Video recording: Both sessions will be recorded with a video camera so that the researcher can review whether she needs to make changes to how she organises future assessment and course sessions. The researcher and two of her colleagues will be the only people to view the video, which will be securely stored and destroyed after three years.

What are the benefits (if any) of taking part?

You will gain a brief introduction to the Alexander Technique.

The Alexander Technique involves learning how to go about your activities in a more efficient way, using less muscular effort. No matter what your age or level of mobility, by learning to give careful conscious attention to how you stand, step, walk, get into and out of chairs (to give just a few examples) it is possible to bring about beneficial change in the way you go about these activities.

You will be offered the opportunity to take part in a longer course on the Alexander Technique at a future date.

What are the risks (if any) of taking part?

There are no risks in taking part. You will be in a small group of a maximum of five people, so you will have plenty of instruction, support and advice for all practical work. Introductory courses in the Alexander Technique have been run by the Professional Association of Alexander Teachers for over 35 years. [Scheme Manager & Deputy] from [Venue] will also be on hand.

How will information about me be used?

Information about the assessments and course session, together with your comments about what you think of it, will be used by the researcher to help modify a longer introductory course in the Alexander Technique for people aged 60 and over. Any information or feedback you give will be anonymised so that you cannot be identified from it.

Who will have access to information about me?
The researcher will only keep information about you for the purposes of analysis and writing up of the study for her PhD thesis. It may also be used to write about the study in an

appropriate professional journal. All such reporting and statistical analysis will be done in such a way as to anonymise specific locations and individuals. The researcher and two of her colleagues will view the video recordings of the sessions only. They will be stored securely and destroyed after three years.

The researcher, Liz Tunnicliffe, has to work within the confines of current legislation over such matters as privacy and confidentiality, data protection and human rights and so offers of confidentiality may sometimes be overridden by law. For example in circumstances where she is made aware that you are being harmed by another person, or are at grave risk from mental ill health she must pass this information to people who can offer help and assistance.

- Data in paper form or on a data card for video recorder will be stored securely in a locked filing cabinet. Electronic data will be stored on a password-protected computer.
- All participants will be identified by code which will only be known to Liz Tunnicliffe as researcher.
- Data will be retained for three years.
- Study results may subsequently be used to identify further research projects about the Alexander Technique and people aged 60 years and over.
- Data will be disposed of securely and permanently: information in paper form will be shredded; electronic records on computer hard disc and video data card will be permanently deleted.

Who is organising the research?
This research is being organised by Liz Tunnicliffe, PhD research student.

What if there is a problem?

If you have a concern about any aspect of this study, you may wish to speak to the researcher, Liz Tunnicliffe, who will do her best to answer your questions. Contact Liz Tunnicliffe on 07847 812960 or email e.tunnicliffe@keele.ac.uk. Alternatively, if you do not wish to contact the researcher, you may contact Prof. Mo Ray on m.g.ray@keele.ac.uk, telephone number 01782 733757 or Dr Victoria Door on v.m.door@keele.ac.uk, telephone number 01782 733122.

If you remain unhappy about the research and/or wish to raise a complaint about any aspect of the way that you have been approached or treated during the course of the study please write to Nicola Leighton who is the University's contact for complaints regarding research at the following address:-

Nicola Leighton
Research Governance Officer
Research & Enterprise Services
Dorothy Hodgkin Building
Keele University
ST5 5BG
E-mail: n.leighton@uso.keele.ac.uk
Tel: 01782 733306

Keele University

Appendix 4.18

CONSENT FORM (Pilot Group)

Title of Project: Alexander Technique: a means of overcoming 'fear of falling' in people aged 60 and over?

Name and contact details of Principal Investigator:
Liz Tunnicliffe, c/o Prof. Mo Ray, Keele University, Keele, Staffs, ST5 5BG
Tel (Liz): 07847 812960; email: e.tunnicliffe@keele.ac.uk

Please tick box if you

agree with the statement

1	I confirm that I have read and understand the information sheet for the pilot sessions for the above study and have had the opportunity to ask questions.	☐
2	I understand that my participation is voluntary and that I am free to withdraw at any time.	☐
3	I agree to take part in two pilot sessions for the Alexander Technique study.	☐
4	I understand that any data collected about me during this study will be anonymised before it is submitted for publication.	☐
5	I agree to both of the sessions being video recorded.	☐
6	I agree to allow the dataset (information) collected to be used for future research projects.	☐
7	I agree to be contacted about possible participation in future research projects.	☐

______________________	______________________	______________________
Name of participant	Date	Signature
______________________	______________________	______________________
Researcher	Date	Signature

Appendix 4.18

CONSENT FORM (Pilot Group)
(for use of quotes)

Title of Project: Alexander Technique: a means of overcoming 'fear of falling' in people aged 60 and over?

Name and contact details of Principal Investigator:
Liz Tunnicliffe, c/o Prof. Mo Ray, Keele University, Keele, Staffs, ST5 5BG.
Tel (Liz): 07847 812960; Email: e.tunnicliffe@keele.ac.uk

Please tick box if you

agree with the statement

1 I agree for any quotes to be used ☐

2 I do not agree for any quotes to be used ☐

Name of participant	Date	Signature
Researcher	Date	Signature

Information Sheet and Consent Forms (Intervention Groups AT1 & AT2)

Keele University

Information Sheet

Study Title: Alexander Technique: a means of overcoming 'fear of falling' in people aged 60 and over?

Aims of the Research
This research project aims to determine if instruction in the Alexander Technique improves balance and reduces fear of falling in people aged 60 and over.

Invitation
You are being invited to consider taking part in the research study: Alexander Technique: a means of overcoming 'fear of falling' in people aged 60 and over? Liz Tunnicliffe, a qualified teacher of the Alexander Technique and a PhD Research Student at Keele University, is undertaking this study.

Before you decide whether or not you wish to take part, it is important for you to understand why this research is being done and what taking part will involve. Please take time to read this information carefully and discuss it with friends and relatives if you wish. Ask Liz if there is anything that is unclear or if you would like more information.

Why have I been chosen?
You were one of the first 15 people to respond to the information about the course, which was advertised at [(a) name of Extra Care sheltered housing scheme 1 or (b) name of Extra Care sheltered housing scheme 2] recently. [location (a) or (b) to be inserted]

Do I have to take part?
You are free to decide whether you wish to take part or not. If you do decide to take part you will be asked to sign two consent forms, one is for you to keep and the other is for the researcher's records. You are free to withdraw from the study at any time and without giving reasons.

What will happen if I take part?
You will be asked to attend an 8-session introductory course in the Alexander Technique to be held at [name of venue] on [day of the week, Group AT1] [days of the week, Group AT2] mornings/afternoons from xx.xx to xx.xx [start and end times] beginning on [date of first session]. These 8 sessions will not be recorded. The separate balance confidence assessments and Focus Group session will be recorded using a video recorder.

Appendix 4.19

If I take part, what do I have to do?

First of all, you will be asked to complete a simple questionnaire about your confidence in carrying out daily activities without falling. You will then complete a balance confidence assessment which will involve doing a series of everyday activities such as standing up, walking, turning and sitting down. You will be requested to complete the questionnaire and the balance confidence assessment three more times over the length of the study. After the end of the course there will be a group session (Focus Group) with other people who attend the course, in which you will be asked to give your comments about it.
Video Recording: Balance confidence assessments and the Focus Group will be recorded using a video recorder.

What are the benefits (if any) of taking part?
The Alexander Technique involves learning how to go about your activities in a more efficient way, using less muscular effort. No matter what your age or level of mobility, by learning to give careful conscious attention to how you stand, step, walk, get into and out of chairs (to give just a few examples) it is possible to bring about beneficial change in the way you go about these activities.

What are the risks (if any) of taking part?
There are no risks, as each person will be taught according to their own abilities and needs. There will be at least one teacher for every five participants so you will have plenty of instruction, support and advice for all practical work. The Professional Association of Alexander Teachers has run introductory courses in the Alexander Technique for over 35 years. Someone will be on hand should any participants need assistance, such as accompanying to the bathroom.

How will information about me be used?
The information you supply will be anonymised so that you cannot be identified from it. The information from the questionnaires and the balance confidence assessments will be compared over the course of the study. The purpose of this is to find out whether there is any change in your confidence shown by how you answer the questionnaires or how you go about completing the balance confidence assessments.

Who will have access to information about me?
The researcher will only keep information about you for the purposes of analysis and writing up of the study for her PhD thesis. It may also be used to write about the study in an appropriate professional journal. All such reporting and statistical analysis will be done in such a way as to anonymise specific locations and individuals. All assessments and the focus group will be video recorded. The researcher and two of her colleagues will view the video recordings of the sessions only. They will be stored securely and destroyed after three years.

For this study Liz has to work within the confines of current legislation over such matters as privacy and confidentiality, data protection and human rights and so offers of confidentiality may sometimes be overridden by law. For example in circumstances whereby she is made aware that you are being harmed by another person, or are at grave risk from mental ill health, she must pass this information to people who can offer help and assistance.

- Data in paper form or on a data card for video recorder will be stored securely in a locked filing cabinet. Electronic data will be stored on a password-protected computer.
- All participants will be identified by code, which will only be known to Liz Tunnicliffe as researcher.

Appendix 4.19

- Data will be retained for three years.
- Study results may subsequently be used to identify further research projects about the Alexander Technique and people aged 60 and over.

- Data will be disposed of securely and permanently: information in paper form will be shredded; electronic records on computer hard disc and video data card will be permanently deleted.

Who is organising the research?
This research is being organised by Liz Tunnicliffe, PhD research student.

What if there is a problem?

If you have a concern about any aspect of this study, you may wish to speak to the researcher, Liz Tunnicliffe, who will do her best to answer your questions. Contact Liz on 07847 812960 or email e.tunnicliffe@keele.ac.uk. Alternatively, if you do not wish to contact the researcher you may contact Prof. Mo Ray on m.g.ray@keele.ac.uk, telephone number 01782 733757 or Dr Victoria Door on v.m.door@keele.ac.uk, telephone number 01782 733122.

If you remain unhappy about the research and/or wish to raise a complaint about any aspect of the way that you have been approached or treated during the course of the study please write to Nicola Leighton who is the University's contact for complaints regarding research at the following address:-

Nicola Leighton
Research Governance Officer
Research & Enterprise Services
Dorothy Hodgkin Building
Keele University
ST5 5BG
E-mail: n.leighton@uso.keele.ac.uk
Tel: 01782 733306

Appendix 4.19

CONSENT FORM (Intervention Groups AT1 & AT2)

Title of Project: Alexander Technique: a means of overcoming 'fear of falling' in people aged 60 and over?

Name and contact details of Principal Investigator:
Liz Tunnicliffe, c/o Professor Mo Ray, Keele University, Keele, ST5 5BG
Tel (Liz): 07847 812960 or email e.tunnicliffe@keele.ac.uk

Please tick box if you

agree with the statement

1	I confirm that I have read and understand the information sheet for the above study and have had the opportunity to ask questions.	☐
2	I understand that my participation is voluntary and that I am free to withdraw at any time.	☐
3	I agree to take part in this study.	☐
4	I understand that data collected about me during this study will be anonymised before it is submitted for publication.	☐
5	I agree to the balance confidence assessments being video recorded.	☐
6	I agree to the focus group being video recorded.	☐
7	I agree to allow the dataset collected to be used for future research projects.	☐
8	I agree to be contacted about possible participation in future research projects.	☐

Name of participant	Date	Signature
Researcher	Date	Signature

Appendix 4.19

CONSENT FORM (Intervention Groups)

(for use of quotes)

Title of Project: Alexander Technique: a means of overcoming 'fear of falling' in people aged 60 and over?

Name and contact details of Principal Investigator:
Liz Tunnicliffe, c/o Professor Mo Ray, Keele University, Keele, ST5 5BG
Tel (Liz): 07847 812960 or email e.tunnicliffe@keele.ac.uk

Please tick box if you

agree with the statement

1 I agree for any quotes to be used ☐

2 I do not agree for any quotes to be used ☐

Name of participant	Date	Signature
Researcher	Date	Signature

Appendix 4.20

AT Intervention, outline of course – original plan:

Research Study - Alexander Technique: a means of overcoming 'fear of falling' in people aged 60 and over?

Alexander Technique: Course for people aged 60 and over*

8-session course, each session 1 ¼ hours in total (1 hour of tuition).
AT1: One session per week
AT2: Two sessions per week

Participants: 15 or more participants in both Groups: AT1 and AT2

Teachers: Alexander Teachers in ratio of one per five participants e.g. 3 teachers if 15 participants.

Structure of sessions:
15 minutes allowance in each session for arrival, welcome, housekeeping, departure etc. The first session will also include group setting of 'ground rules'.

Tuition of 60 minutes, as follows:

Practical:	10 mins
Talk (part 1):	5 mins
Practical:	10 mins
Talk (part 2):	5 mins
Practical:	10 mins
Talk (part 3):	5 mins
Practical	15 mins

Notes:

1. All demonstrations and practical work will be done in small groups of up to five participants and one Alexander Teacher.
2. There will be provision of chairs to enable sitting between practical work, as required by each participant in the smaller groups, as well as chairs in place for talks for the whole group.
3. In all demonstrations and practical work use of a walking stick or walking frame will be taken into account as required.
4. This outline is provisional and may be adapted following the pilot session.

*This course is adapted from the Professional Association of Alexander Teachers (PAAT) Introductory Course, www.paat.org.uk.

Appendix 4.20

Provisional Outline of Course (see note 4 above):

Session One

Introduction to course, ‘ground-rules’ including confidentiality, housekeeping: up to 15 mins

Activity	**Time**
Practical: In groups of up to five participants, demonstration and supervision of standing (side-by-side stance).	10 mins
Talk – Introduction to the Alexander Technique (part 1)	5 mins
Practical: Demonstration/revision and supervision of standing introducing fore-and-aft stance.	10 mins
Talk – Introduction to the Alexander Technique (part 2)	5 mins
Practical: Demonstration and supervision of stepping to the side (a) to increase distance between heels, (b) to decrease distance between heels.	10 mins
Talk – Introduction to Alexander Technique (part 3)	5 mins
Practical: Demonstration and supervision of taking a step forward and revision of stepping in and out to the side, if time.	15 mins

Session Two

Practical: Revision of standing (side-by-side and fore-and aft stance).	10 mins
Talk: Habit (1)	5 mins
Practical: Revision of stepping including demonstration of stepping backwards, supervision of stepping in all directions.	10 mins
Talk: Habit (2)	5 mins
Practical: Demonstration and supervision of walking – starting with feet side-by-side.	10 mins
Talk: Habit (3)	5 mins
Practical: Stepping – all together – different directions (in small groups)	15 mins

Session Three

Practical: Demonstration and supervision of getting into a chair	10 mins
Talk: End-Gaining/Means Whereby (1)	5 mins
Practical: Revision of walking including changing direction to walk around objects	10 mins
Talk: End-Gaining/Means Whereby (2)	5 mins
Practical: Demonstration and supervision of getting out of a chair; Setting ‘chair game’	10 mins
Talk: End-Gaining/Means Whereby (3)	5 mins
Practical: Revision of standing then stepping – all together – different directions (in small groups)	15 mins

Appendix 4.20

Session Four

Ask for feedback on ‘chair game’ results;	10 mins

Practical: Demonstration and supervision of stepping up/down onto low step	
Talk: Inhibition (1)	5 mins
Practical: Revision of getting into a chair	10 mins
Talk: Inhibition (2)	5 mins
Practical: Revision of getting out of a chair	10 mins
Talk: Inhibition (3)	5 mins
Practical: Revision of walking including changing direction	15 mins

Session Five

Practical: Demonstration and supervision of sitting in a chair	10 mins
Talk: Direction (1)	5 mins
Practical: Demonstration and supervision of lowering the height while standing (variable distance)	10 mins
Talk: Direction (2)	5 mins
Practical: Demonstration and supervision of lowering the height while standing including reaching	10 mins
Talk: Direction (3)	5 mins
Practical: Demonstration and supervision of walking up/down steps/stairs (short flight) if participants are able (and possible at venue) or revise stepping up/down a half-step or revise taking a step in different directions	15 mins

Session Six

Practical: Hands – demonstration and supervision of letting hands 'undo' by resting them on a flat surface.	10 mins
Talk: Sensory appreciation (1)	5 mins
Practical: Demonstration and supervision of: making contact with & picking up small objects, e.g. book, cup, packet, small bottle or container.	10 mins
Talk: Sensory appreciation (2)	5 mins
Practical: Revision of sitting in a chair	10 mins
Talk: Sensory appreciation (3)	5 mins
Practical: Demonstration and supervision of: making contact with and picking up heavier objects e.g. kettle, saucepan, shopping bag	15 mins

Appendix 4.20

Session Seven

Practical session: Revision of lowering the height while standing	10 mins
Talk: Revision (1)	5 mins
Practical session: Demonstration and supervision of lowering the height to get down onto one or both knees (if able) or revise walking	10 mins
Talk: Revision (2)	5 mins

Practical session: Revision of getting into and out of a chair	10 mins
Talk: Revision (3)	5 mins
Practical session: Revision of stepping – all together – different directions (in small groups)	15 mins

Session Eight

Practical: Revision requests (to be agreed by participants in advance)	15 mins
Talk: Questions & Answers	5 mins
Practical: Revision requests (to be agreed by participants in advance)	15 mins
Talk: Questions & Answers	5 mins
Practical: Revision requests (to be agreed by participants in advance)	15 mins
Talk: Brief Summary of Course	5 mins

Appendix 4.21

AT Course session – example, pilot group

AT - Pilot Session

Activity	**Time**
Arrival, introduction to course, including 'ground rules' &'housekeeping'	10 mins
Practical: Demonstration and supervision of standing (feet side-by-side stance). Explain acting as mirrors for each other – ask for volunteer: Demo of standing: Gap between heels Angle of feet Poise of head Increased stability side-to-side Help each person with set-up in turn.	10 mins
Talk – Introduction to the Alexander Technique (part 1)	5 mins
Practical: Demonstration and supervision of standing continued (feet 'fore-and-aft' stance). Ask for volunteer: Recap standing as above: Gap between heels Angle of feet Poise of head Taking small step forward with one foot Increased stability front-to-back as well as side-to-side	10 mins
Talk – Introduction to the Alexander Technique (part 2)	5 mins
Practical: Demonstration and supervision of taking a step Ask for volunteer: Recap of standing with feet side-by-side Taking foot off floor to step Out to side to increase width of base; into centre to decrease width of base; taking a step forward; taking a step backwards	10 mins
Talk – Introduction to Alexander Technique (part 3)	5 mins
Practical: Demonstration and supervision of walking Ask for volunteer: Standing with feet side-by-side Intention – knowing where you want to get to Sending head forward (in same plane) Sending knees up to take series of steps. Use of frame/walking stick (for security but do not lean) Help each person	15 mins

Feedback from participants on the session - Questions	15 mins
Thank you and leaving	5 mins

Notes:

1. There will be provision of chairs to enable sitting between practical sessions, in addition to sitting during talks.
2. In all demonstrations and practical sessions use of a walking stick or walking frame will be taken into account as required.

Demographics of pilot group **Appendix 5.0**

	No	Gender		AGE				Self-Perception of Health					Prescription Medications (Number) (Self-Report)				
		M	F	Mean μ	Range	Median	IQR	Poor	Below Ave	Ave	Good	Excellent	1	2	3	4	4+
PILOT GROUP:																	
ALL RECRUITS	5	3	2	79	15 (72-87)	79	11.5 (73.5-85)	0	1	2	2	0	0	0	0	1	4

	NO	AGE ON LEAVING SCHOOL (YEARS)					QUALIFICATIONS (ANY)		WALKING AIDS USED INDOORS (I) OUTDOORS (O)													
									None		Stick		3 or 4 WW		WWF		RT		Wheelchair + Helper		Scooter	
		14	**15**	**16**	**17**	**18**	**Y**	**N**	**I**	**O**	**I**	**O**	**I**	**O**	**I**	**O**	**I**	**O**	**I**	**O**	**I**	**O**
PILOT GROUP:																						
ALL RECRUITS	5	2	1	1	1	0	1	0	3	1	1	0	1	3	0	0	0	0	0	0	0	1

KEY:

I	Indoors (within apartment or Extra Care sheltered housing complex)
O	Outdoors (outside Extra Care housing complex)
3 or 4 WW:	3-wheeled or 4-wheeled ‘rollator’ walker (see Appendix 5.1)
WWF:	Wheeled walking frame (‘zimmer’ frame) (see Appendix 5.1)
RT	Rutland Trolley (see Appendix 5.1)
Wheelchair + Helper	Wheelchair pushed by a helper
Scooter	Motorised scooter

Summary: demographics of pilot group (with percentages)

Gender of participants: 2 Female; 3 male.

Age range: 72 – 87 years: mean age 79; median age 79.

Self-reported health (compared to average for age): average or above (*n*=4, 80%).

Number of medications: all (*n*=5, 100%) took four or more.

Age on leaving school: 14 years (*n*=2, 40%); Over 14 years (*n*=3, 60%).

Qualifications: *n*=1 (20%).

Use a walking aid indoors: *n*=2 (40%).

Use of a walking aid outdoors: *n*=4 (80%).

Appendix 5.1

Mobility aids used by participants:

Standard walking frames (wheeled or non-wheeled): commonly known as zimmer frames, for use indoors:

Three wheeled walkers (triangular, 'Delta' or 'tri-wheeler' frames): suitable for use outdoors:

Appendix 5.1

Four wheeled "rollator" walkers: due to size, most suitable for outside use.

'Rutland' trolley: household trolleys (not walking aids), designed for indoor use to enable items to be carried safely from room to room:

Reference: Disabled Living Foundation (DLF, 2020).
Images reproduced by permission of Procter Health Care Limited (procters.com, 2020).

Appendix 5.2

SPSS Output for:

Demographic comparison of AT1 & AT2 groups at baseline – use of mobility aid indoors
Fisher's Exact Test (2-sided)

```
CROSSTABS
  /TABLES=R.Group BY Mob.I
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT
  /COUNT ROUND CELL.
```

Crosstabs

[DataSet1] /Users/liztunnicliffe/Documents/SPSS Research Data/Liz Tunnicliffe AT Research Data August 2019 copy of Nov 2016.sav

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Research Group * Mobility aid Indoors	29	100.0%	0	0.0%	29	100.0%

Research Group * Mobility aid Indoors Crosstabulation

Count

		Mobility aid Indoors		
		No mobility aid indoors	Mobility aid used indoors	Total
Research Group	AT1 Group	4	9	13
	AT2 Group	12	4	16
Total		16	13	29

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.673[a]	1	.017		
Continuity Correction[b]	4.026	1	.045		
Likelihood Ratio	5.849	1	.016		
Fisher's Exact Test				.027	.022
Linear-by-Linear Association	5.478	1	.019		
N of Valid Cases	29				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.83.

b. Computed only for a 2x2 table

Appendix 5.3

SPSS Output for:
Demographic comparison of AT1 & AT2 groups at baseline – use of mobility aid outdoors
Fisher's Exact Test (2-sided)

```
CROSSTABS
  /TABLES=R.Group BY Mob.O
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT
  /COUNT ROUND CELL.
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Research Group * Mobility aid outdoors	29	100.0%	0	0.0%	29	100.0%

Research Group * Mobility aid outdoors Crosstabulation

Count

		Mobility aid outdoors		
		Mobility aid used outdoors	No mobility aid outdoors	Total
Research Group	AT1 Group	12	1	13
	AT2 Group	12	4	16
Total		24	5	29

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.506[a]	1	.220		
Continuity Correction[b]	.537	1	.464		
Likelihood Ratio	1.617	1	.204		
Fisher's Exact Test				.343	.236
Linear-by-Linear Association	1.454	1	.228		
N of Valid Cases	29				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 2.24.
b. Computed only for a 2x2 table

Appendix 5.4

SPSS Output for:
Demographic comparison of AT1 & AT2 groups at baseline – age (Mean)
***t*-test**

```
GET
  FILE='/Users/liztunnicliffe/Documents/SPSS Research Data/Research Data September 2016.sav'.
DATASET NAME DataSet1 WINDOW=FRONT.
T-TEST GROUPS=R.Group(1 2)
  /MISSING=ANALYSIS
  /VARIABLES=Age
  /CRITERIA=CI(.95).
```

T-Test

[DataSet1] /Users/liztunnicliffe/Documents/SPSS Research Data/Research Data September 2016.sav

Group Statistics

	Research Group	N	Mean	Std. Deviation	Std. Error Mean
Age (Years)	AT1 Group	13	83.15	8.620	2.391
	AT2 Group	16	79.94	5.698	1.424

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Differ-ence	Std. Error Differ-ence	Lower	Upper
Age (Years)	Equal variances assumed	.596	.447	1.205	27	.238	3.216	2.668	-2.258	8.691
	Equal variances not assumed			1.156	20.014	.261	3.216	2.783	-2.589	9.021

Appendix 5.5

SPSS Output for:
Demographic comparison of AT1 & AT2 groups at baseline – self-report health
Fisher's Exact Test (2-sided)

```
CROSSTABS
  /TABLES=R.Group BY Health_Sum
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT
  /COUNT ROUND CELL.
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Research Group * Health Summary	29	100.0%	0	0.0%	29	100.0%

Research Group * Health Summary Crosstabulation

Count

		Health Summary		Total
		Below Ave	Ave and above	
Research Group	AT1 Group	4	9	13
	AT2 Group	2	14	16
Total		6	23	29

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.459[a]	1	.227		
Continuity Correction[b]	.558	1	.455		
Likelihood Ratio	1.464	1	.226		
Fisher's Exact Test				.364	.228
Linear-by-Linear Association	1.409	1	.235		
N of Valid Cases	29				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 2.69.

b. Computed only for a 2x2 table

Appendix 5.6

SPSS Output for:

Demographic comparison of AT1 & AT2 groups at baseline – number of prescription medications

Fisher's Exact Test

```
GET
  FILE='/Users/liztunnicliffe/Documents/SPSS Research Data/Liz Tunnicliffe AT Research Data August 2019 copy of Nov 2016.sav'.
DATASET NAME DataSet1 WINDOW=FRONT.
CROSSTABS
  /TABLES=R.Group BY Meds
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT
  /COUNT ROUND CELL.
```

Crosstabs

[DataSet1] /Users/liztunnicliffe/Documents/SPSS Research Data/Liz Tunnicliffe AT Research Data August 2019 copy of Nov 2016.sav

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Research Group * No of Prescription Medications	29	100.0%	0	0.0%	29	100.0%

Research Group * No of Prescription Medications Crosstabulation

Count

		No of Prescription Medications		Total
		Three or Less	Four or more	
Research Group	AT1 Group	3	10	13
	AT2 Group	4	12	16
Total		7	22	29

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.014[a]	1	.904		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.015	1	.904		
Fisher's Exact Test				1.000	.626
Linear-by-Linear Association	.014	1	.906		
N of Valid Cases	29				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 3.14.

b. Computed only for a 2x2 table

Appendix 5.7

SPSS Output for:

Demographic comparison of AT1 & AT2 group at baseline – school leaving ages: 14 years or over 14 years
Fisher's Exact Test (2-sided)

```
CROSSTABS
  /TABLES=R.Group BY School Leaving Age
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT
  /COUNT ROUND CELL.
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Research Group * School Leaving Age	29	100.0%	0	0.0%	29	100.0%

Research Group * School Leaving Age Crosstabulation

Count

		School Leaving Age		Total
		14 years	over 14 years	
Research Group	AT1 Group	8	5	13
	AT2 Group	4	12	16
Total		12	17	29

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.948[a]	1	.047		
Continuity Correction[b]	2.585	1	.108		
Likelihood Ratio	4.018	1	.045		
Fisher's Exact Test				.067	.054
Linear-by-Linear Association	3.811	1	.051		
N of Valid Cases	29				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.38.

b. Computed only for a 2x2 table

Appendix 5.8

SPSS Output for:

Demographic comparison of AT1 & AT2 groups at baseline – qualifications (any)
Fisher's Exact Test (2-sided)

```
CROSSTABS
  /TABLES=R.Group BY Qual
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT
  /COUNT ROUND CELL.
```

Crosstabs
[DataSet1] /Users/liztunnicliffe/Documents/SPSS Research Data/Liz Tunnicliffe AT Research Data August 2019 copy of Nov 2016.sav

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Research Group * Qualifications	29	100.0%	0	0.0%	29	100.0%

Research Group * Qualifications Crosstabulation

Count

		Qualifications		Total
		Yes	No	
Research Group	AT1 Group	2	11	13
	AT2 Group	8	8	16
Total		10	19	29

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.804[a]	1	.051		
Continuity Correction[b]	2.426	1	.119		
Likelihood Ratio	4.020	1	.045		
Fisher's Exact Test				.114	.058
Linear-by-Linear Association	3.673	1	.055		
N of Valid Cases	29				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.48.

b. Computed only for a 2x2 table

Appendix 5.9

Summary of individual attendance at intervention and assessment sessions

AT1 Group:

Participant Code	No of Course Sessions attended (maximum of 8)	% of Course Sessions attended	No of assessments attended (maximum of 4)	Reason for withdrawal from study
AT1.27	6	75	3	Unable to attend assessment 4 (data excluded).
AT1.01	8	100	4	
AT1.07	6	75	4	
AT1.26	7	87.5	4	
AT1.45	4	50	2	Withdrew, health.
AT1.12	7	87.5	4	
AT1.38	4	50	3	Unable to attend assessment 3 (data excluded).
AT1.47	7	87.5	4	
AT1.02	6	75	4	
AT1.41	6	75	4	
AT1.40	0	0	1	Withdrew, health.
AT1.05	1	12.5	2	Withdrew, health.
AT1.55	8	100	4	

Code (AT1):
Course and/or assessments not completed, not included in final statistical analysis (*n*=5)
Completed course and all assessments, included in final statistical analysis (*n*=8)

AT2 Group:

Participant Code	No of Course Sessions attended (maximum of 8)	% of Course Sessions attended	No of assessments attended (maximum of 4)	Reason for withdrawal from study
AT2.401	7	87.5	4	
AT2.402	7	87.5	4	
AT2.203	5	62.5	4	
AT2.223	3	37.5	2	Unknown
AT2.308	8	100	4	
AT2.123	7	87.5	4	
AT2.316	3	37.5	2	Unknown
AT2.314	7	87.5	4	
AT2.225	6	75	4	
AT2.306	1	12.5	2	Unknown
AT2.01	8	100	4	
AT2.403	1	12.5	2	Withdrew, health
AT2.302	0	0	2	Unknown
AT2.204	3	37.5	2	Unknown
AT2.03	8	100	4	
AT2.111	3	37.5	2	Withdrew, health

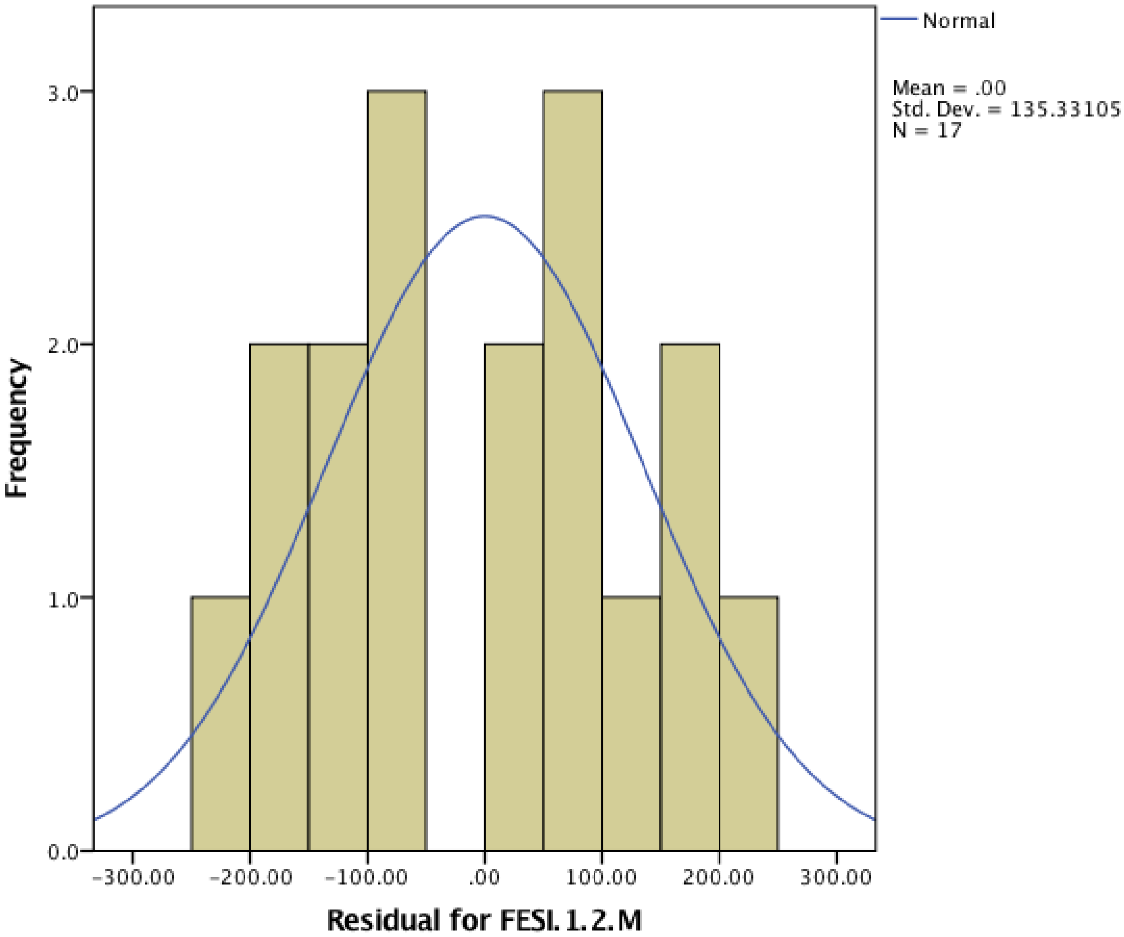
Code (AT2):
Course and/or assessments not completed, not included in final statistical analysis (*n*=7)
Completed course and all assessments, included in final statistical analysis (*n*=9)

Appendix 5.10

SPSS Output for:
Distribution of residuals histograms, FES-I and BCA.

```
* Chart Builder.
GGRAPH
  /GRAPHDATASET NAME="graphdataset" VARIABLES=RES_6 MISSING=LISTWISE REPORTMISSING=NO
  /GRAPHSPEC SOURCE=INLINE.
BEGIN GPL
  SOURCE: s=userSource(id("graphdataset"))
  DATA: RES_6=col(source(s), name("RES_6"))
  GUIDE: axis(dim(1), label("Residual for FESI.1.2.M"))
  GUIDE: axis(dim(2), label("Frequency"))
  ELEMENT: interval(position(summary.count(bin.rect(RES_6))), shape.interior(shape.square))
  ELEMENT: line(position(density.normal(RES_6)), color("Normal"))
END GPL.
```

GGraph



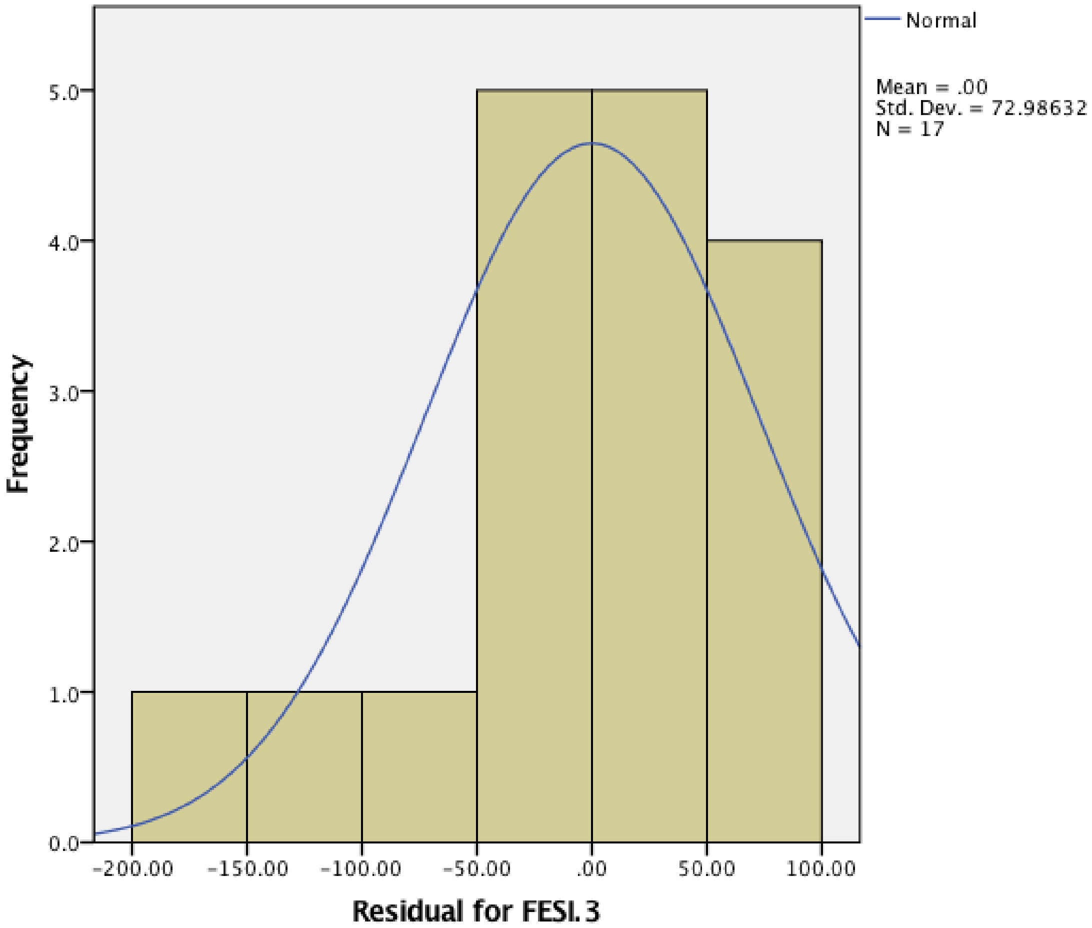

```
GET
  FILE='/Users/liztunnicliffe/Documents/SPSS Research Data/Liz Tunnicliffe AT Research Data November 2016.sav'.
DATASET NAME DataSet1 WINDOW=FRONT.
* Chart Builder.
```

Appendix 5.10

```
GGRAPH
  /GRAPHDATASET NAME="graphdataset" VARIABLES=RES_1 MISSING=LISTWISE
REPORTMISSING=NO
  /GRAPHSPEC SOURCE=INLINE.
BEGIN GPL
  SOURCE: s=userSource(id("graphdataset"))
  DATA: RES_1=col(source(s), name("RES_1"))
  GUIDE: axis(dim(1), label("Residual for FESI.3"))
  GUIDE: axis(dim(2), label("Frequency"))
  ELEMENT: interval(position(summary.count(bin.rect(RES_1))), shape.interior(shape.square))
  ELEMENT: line(position(density.normal(RES_1)), color("Normal"))
END GPL.
```

GGraph

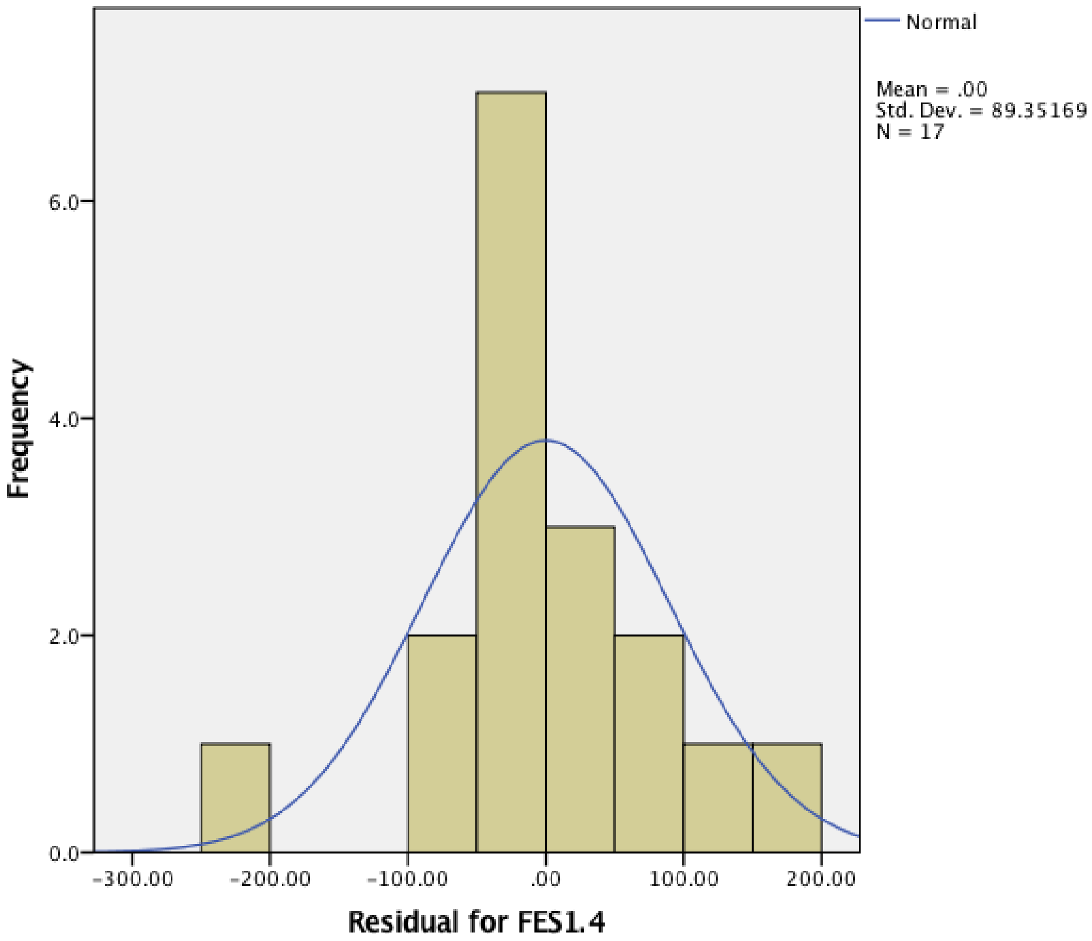
[DataSet1] /Users/liztunnicliffe/Documents/SPSS Research Data/Liz Tunnicliffe AT Research Data November 2016.sav




```
* Chart Builder.
GGRAPH
  /GRAPHDATASET NAME="graphdataset" VARIABLES=RES_2 MISSING=LISTWISE
REPORTMISSING=NO
  /GRAPHSPEC SOURCE=INLINE.
BEGIN GPL
  SOURCE: s=userSource(id("graphdataset"))
  DATA: RES_2=col(source(s), name("RES_2"))
  GUIDE: axis(dim(1), label("Residual for FES1.4"))
  GUIDE: axis(dim(2), label("Frequency"))
```

```
  ELEMENT: interval(position(summary.count(bin.rect(RES_2))), shape.interior(shape.square))
  ELEMENT: line(position(density.normal(RES_2)), color("Normal"))
END GPL.
```

GGraph




```
* Chart Builder.
GGRAPH
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REPORTMISSING=NO
  /GRAPHSPEC SOURCE=INLINE.
BEGIN GPL
  SOURCE: s=userSource(id("graphdataset"))
  DATA: RES_3=col(source(s), name("RES_3"))
  GUIDE: axis(dim(1), label("Residual for BCA.1.2.M"))
  GUIDE: axis(dim(2), label("Frequency"))
  ELEMENT: interval(position(summary.count(bin.rect(RES_3))), shape.interior(shape.square))
  ELEMENT: line(position(density.normal(RES_3)), color("Normal"))
END GPL.
```
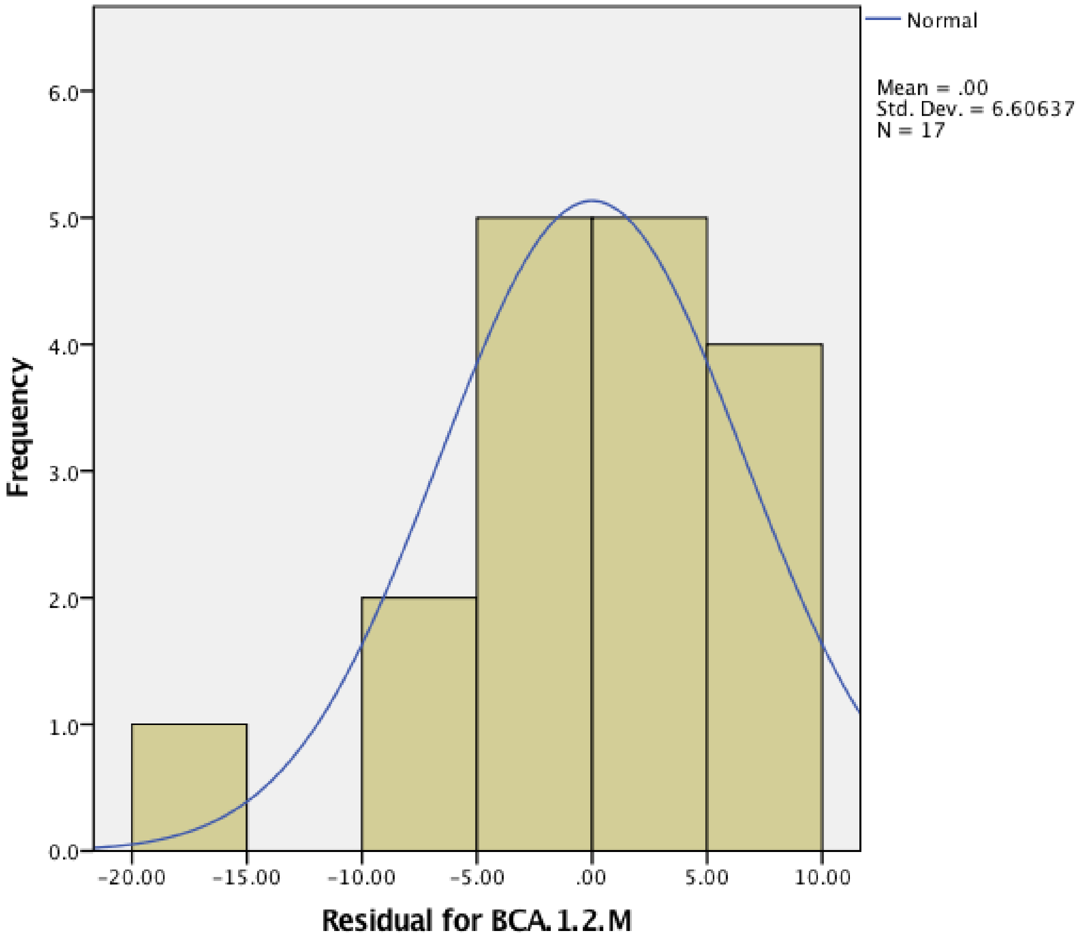

GGraph

Appendix 5.10




```
* Chart Builder.
GGRAPH
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REPORTMISSING=NO
  /GRAPHSPEC SOURCE=INLINE.
BEGIN GPL
  SOURCE: s=userSource(id("graphdataset"))
  DATA: RES_4=col(source(s), name("RES_4"))
  GUIDE: axis(dim(1), label("Residual for BCA.3"))
  GUIDE: axis(dim(2), label("Frequency"))
  ELEMENT: interval(position(summary.count(bin.rect(RES_4))), shape.interior(shape.square))
  ELEMENT: line(position(density.normal(RES_4)), color("Normal"))
END GPL.
```
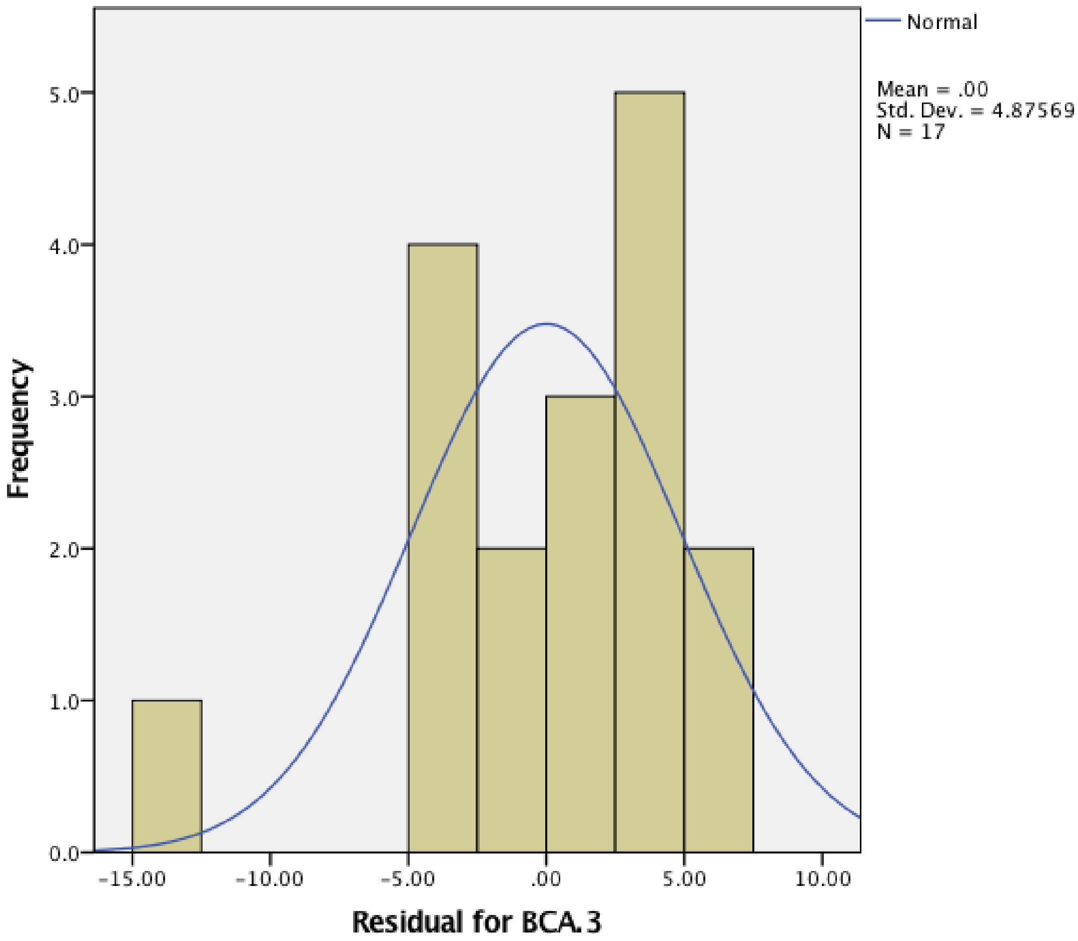

GGraph

Appendix 5.10




```
* Chart Builder.
GGRAPH
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REPORTMISSING=NO
  /GRAPHSPEC SOURCE=INLINE.
BEGIN GPL
  SOURCE: s=userSource(id("graphdataset"))
  DATA: RES_5=col(source(s), name("RES_5"))
  GUIDE: axis(dim(1), label("Residual for BCA.4"))
  GUIDE: axis(dim(2), label("Frequency"))
  ELEMENT: interval(position(summary.count(bin.rect(RES_5))), shape.interior(shape.square))
  ELEMENT: line(position(density.normal(RES_5)), color("Normal"))
END GPL.
```
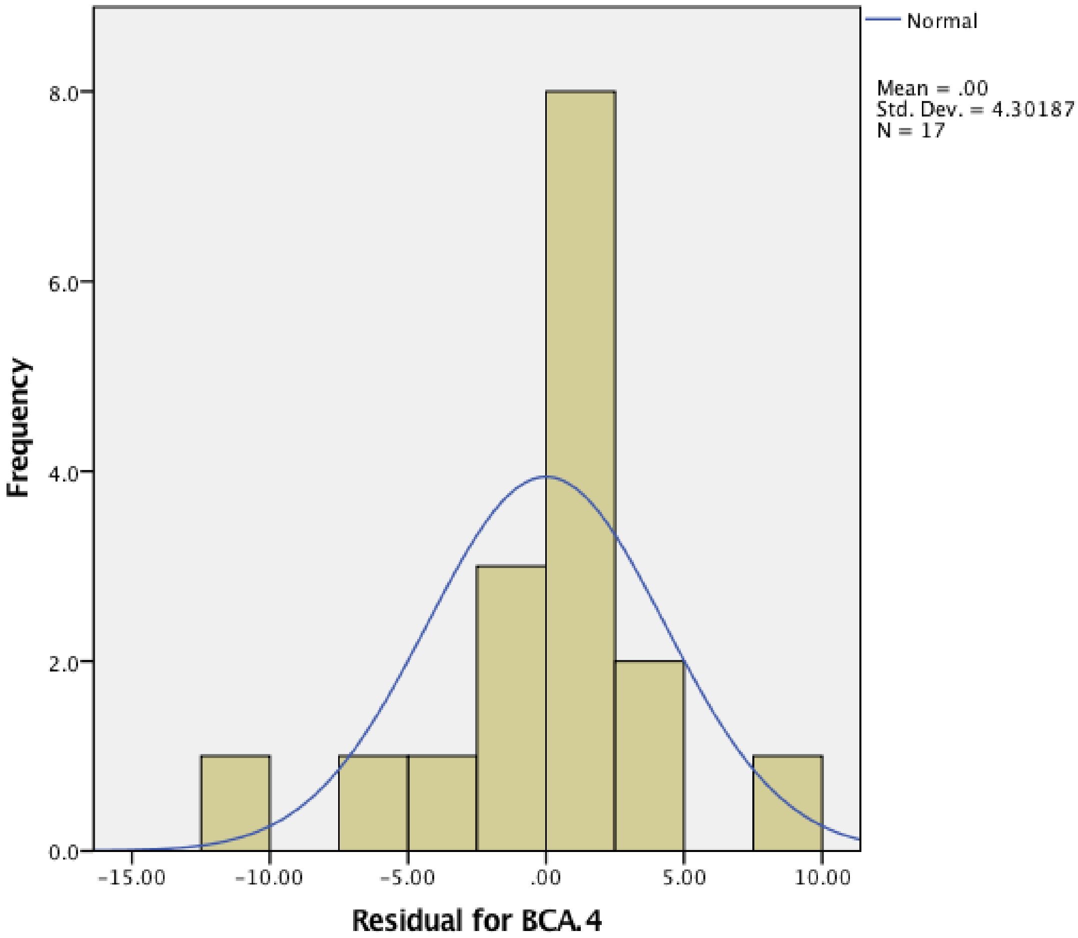

GGraph

Appendix 5.10



Appendix 5.11

SPSS Output for:
Control Period, Balance Confidence Assessment (BCA) Scores, *t*-test and eta squared calculation

```
T-TEST PAIRS=BCA.2 WITH BCA.1 (PAIRED)
  /CRITERIA=CI(.9500)
  /MISSING=ANALYSIS.
```

***t*-test**

[DataSet1] /Users/liztunnicliffe/Documents/SPSS Research Data/Liz Tunnicliffe AT Research Data August 2019 copy of Nov 2016.sav

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	BCA Ass 2	35.768	28	5.6001	1.0583
	BCA Ass 1	34.643	28	6.2329	1.1779

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	BCA Ass 2 & BCA Ass 1	28	.874	.000

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference: Lower	95% Confidence Interval of the Difference: Upper			
Pair 1	BCA Ass 2 - BCA Ass 1	1.1250	3.0357	.5737	-.0521	2.3021	1.961	27	.060

Appendix 5.11

Calculation for eta squared statistic:

$$\text{Eta squared} = \frac{t^2}{t^2 + (N - 1)}$$

Pallant (2016:253)

Calculation for eta squared statistic for BCA for control period:

$$\text{Eta squared} = \frac{1.961^2}{1.961^2 + (28 - 1)}$$

$$\text{Eta squared} = \frac{3.846}{3.846 + 27}$$

$$\text{Eta squared} = \frac{3.846}{30.846}$$

$$\text{Eta squared} = 0.125$$

Moderate effect size according to Cohen (1988) cited in Pallant (2016)

Appendix 5.12

SPSS Output for:
Control period *t*-test for FES-I (short, VAS) scores for all participants and calculation of eta squared statistic

T-TEST PAIRS=FESI.1 WITH FESI.2 (PAIRED)
 /CRITERIA=CI(.9500)
 /MISSING=ANALYSIS.

***t*-test**

[DataSet1] /Users/liztunnicliffe/Documents/SPSS Research Data/Liz Tunnicliffe AT Research Data August 2019 copy of Nov 2016.sav

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	FES-I Ass 1	291.07	28	140.846	26.617
	FES-I Ass 2	289.82	28	138.404	26.156

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	FES-I Ass 1 & FES-I Ass 2	28	.731	.000

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	95% Confidence Interval of the Difference Upper			
Pair 1	FES-I Ass 1 - FES-I Ass 2	1.250	102.380	19.348	-38.449	40.949	.065	27	.949

Appendix 5.12

Calculation of eta squared statistic:

$$\text{Eta squared} = \frac{t^2}{t^2 + (N - 1)}$$

Pallant (2016:253)

Calculation of eta squared statistic for FES-I for control period:

$$\text{Eta squared} = \frac{0.065^2}{0.065^2 + (28 - 1)}$$

$$\text{Eta squared} = \frac{0.004}{0.004 + 27}$$

$$\text{Eta squared} = \frac{0.004}{27.004}$$

$$\text{Eta squared} = 0.00$$

Appendix 5.13

SPSS Output for:

Control Period, BCA Wilcoxon Signed Rank Tests for AT1 Group, AT2 Group and combined AT1 and AT2 Group

```
GET
  FILE='/Users/liztunnicliffe/Documents/SPSS Research Data/Research Data September 2016.sav'.
DATASET NAME DataSet1 WINDOW=FRONT.
DATASET ACTIVATE DataSet1.

SAVE OUTFILE='/Users/liztunnicliffe/Documents/SPSS Research Data/Research Data September 2016.sav'
  /COMPRESSED.
DATASET ACTIVATE DataSet1.

SAVE OUTFILE='/Users/liztunnicliffe/Documents/SPSS Research Data/Research Data September 2016.sav'
  /COMPRESSED.
SPLIT FILE OFF.
SORT CASES  BY R.Group.
SPLIT FILE SEPARATE BY R.Group.
*Nonparametric Tests: Related Samples.
NPTESTS
  /RELATED TEST(BCA.1 BCA.2) WILCOXON
  /MISSING SCOPE=ANALYSIS USERMISSING=EXCLUDE
  /CRITERIA ALPHA=0.05  CILEVEL=95.
```

Nonparametric Tests

[DataSet1] /Users/liztunnicliffe/Documents/SPSS Research Data/Research Data September 2016.sav

Research Group = AT1 Group

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between BCA Ass 1 and BCA Ass 2 equals 0.	Related-Samples Wilcoxon Signed Rank Test	.077	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Appendix 5.13

Research Group = AT2 Group

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between BCA Ass 1 and BCA Ass 2 equals 0.	Related-Samples Wilcoxon Signed Rank Test	.400	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

```
*Nonparametric Tests: Related Samples.
NPTESTS
  /RELATED TEST(BCA.1 BCA.2) WILCOXON
  /MISSING SCOPE=ANALYSIS USERMISSING=EXCLUDE
  /CRITERIA ALPHA=0.05  CILEVEL=95.
```

Nonparametric Tests

AT1 & AT2 Groups

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between BCA Ass 1 and BCA Ass 2 equals 0.	Related-Samples Wilcoxon Signed Rank Test	.065	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

APPENDIX 5.14

SPSS Output for:

Control Period, FES-I Wilcoxon Signed Rank Tests for AT1 Group, AT2 Group and combined AT1 and AT2 Group

```
GET
  FILE='/Users/liztunnicliffe/Documents/SPSS Research Data/Research Data September 2016.sav'.
DATASET NAME DataSet1 WINDOW=FRONT.
DATASET ACTIVATE DataSet1.

SAVE OUTFILE='/Users/liztunnicliffe/Documents/SPSS Research Data/Research Data September 2016.sav'
  /COMPRESSED.
SORT CASES  BY R.Group.
SPLIT FILE SEPARATE BY R.Group.
*Nonparametric Tests: Related Samples.
NPTESTS
  /RELATED TEST(FESI.1 FESI.2) WILCOXON
  /MISSING SCOPE=ANALYSIS USERMISSING=EXCLUDE
  /CRITERIA ALPHA=0.05  CILEVEL=95.
```

Nonparametric Tests

[DataSet1] /Users/liztunnicliffe/Documents/SPSS Research Data/Research Data September 2016.sav

Research Group = AT1 Group

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between FES-I Ass 1 and FES-I Ass 2 equals 0.	Related-Samples Wilcoxon Signed Rank Test	.583	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Appendix 5.14

Research Group = AT2 Group

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between FES-I Ass 1 and FES-I Ass 2 equals 0.	Related-Samples Wilcoxon Signed Rank Test	.570	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

GET
  FILE='/Users/liztunnicliffe/Documents/SPSS Research Data/Liz Tunnicliffe AT Research Data November 2016.sav'.
DATASET NAME DataSet1 WINDOW=FRONT.
SPLIT FILE OFF.
DATASET ACTIVATE DataSet1.
SAVE OUTFILE='/Users/liztunnicliffe/Documents/SPSS Research Data/Liz Tunnicliffe AT Research '+
    'Data November 2016.sav'
  /COMPRESSED.
*Nonparametric Tests: Related Samples.
NPTESTS
  /RELATED TEST(FESI.1 FESI.2) WILCOXON
  /MISSING SCOPE=ANALYSIS USERMISSING=EXCLUDE
  /CRITERIA ALPHA=0.05 CILEVEL=95.

Nonparametric Tests

[DataSet1] /Users/liztunnicliffe/Documents/SPSS Research Data/Liz Tunnicliffe AT Research Data November 2016.sav

AT1 & AT2 Groups

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between FES-I Ass 1 and FES-I Ass 2 equals 0.	Related-Samples Wilcoxon Signed Rank Test	.962	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

APPENDIX 5.15

SPSS Output for:
Intervention Period, BCA Scores, parametric test: analysis of variance (ANOVA)

```
GLM BCA.3 BCA.4 BY R.Group WITH BCA.1.2.M
  /WSFACTOR=time 2 Polynomial
  /METHOD=SSTYPE(3)
  /PLOT=PROFILE(time*R.Group)
  /EMMEANS=TABLES(R.Group) WITH(BCA.1.2.M=MEAN)
  /EMMEANS=TABLES(R.Group*time) WITH(BCA.1.2.M=MEAN)
  /PRINT=HOMOGENEITY
  /PRINT=DESCRIPTIVE ETASQ
  /CRITERIA=ALPHA(.05)
  /WSDESIGN=time
  /DESIGN=BCA.1.2.M R.Group.
```

General Linear Model

Within-Subjects Factors

Measure: MEASURE_1

time	Dependent Variable
1	BCA.3
2	BCA.4

Between-Subjects Factors

		Value Label	N
Research Group	1	AT1 Group	8
	2	AT2 Group	9

Descriptive Statistics

	Research Group	Mean	Std. Deviation	N
BCA Ass 3	AT1 Group	32.813	3.2617	8
	AT2 Group	38.889	6.1835	9
	Total	36.029	5.7919	17
BCA Ass 4	AT1 Group	35.375	4.1812	8
	AT2 Group	39.056	4.6600	9
	Total	37.324	4.7002	17

APPENDIX 5.15

Multivariate Tests[a]							
Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
time	Pillai's Trace	.129	2.079[b]	1.000	14.000	.171	.129
	Wilks' Lambda	.871	2.079[b]	1.000	14.000	.171	.129
	Hotelling's Trace	.149	2.079[b]	1.000	14.000	.171	.129
	Roy's Largest Root	.149	2.079[b]	1.000	14.000	.171	.129
time * BCA.1.2.M	Pillai's Trace	.069	1.032[b]	1.000	14.000	.327	.069
	Wilks' Lambda	.931	1.032[b]	1.000	14.000	.327	.069
	Hotelling's Trace	.074	1.032[b]	1.000	14.000	.327	.069
	Roy's Largest Root	.074	1.032[b]	1.000	14.000	.327	.069
time * R.Group	Pillai's Trace	.189	3.264[b]	1.000	14.000	.092	.189
	Wilks' Lambda	.811	3.264[b]	1.000	14.000	.092	.189
	Hotelling's Trace	.233	3.264[b]	1.000	14.000	.092	.189
	Roy's Largest Root	.233	3.264[b]	1.000	14.000	.092	.189

a. Design: Intercept + BCA.1.2.M + R.Group
Within Subjects Design: time

b. Exact statistic

Mauchly's Test of Sphericity[a]							
Measure: MEASURE_1							
					Epsilon[b]		
Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Greenhouse-Geisser	Huynh-Feldt	Lower-bound
time	1.000	.000	0	.	1.000	1.000	1.000

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept + BCA.1.2.M + R.Group
Within Subjects Design: time

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

APPENDIX 5.15

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
time	Sphericity Assumed	5.341	1	5.341	2.079	.171	.129
	Greenhouse-Geisser	5.341	1.000	5.341	2.079	.171	.129
	Huynh-Feldt	5.341	1.000	5.341	2.079	.171	.129
	Lower-bound	5.341	1.000	5.341	2.079	.171	.129
time * BCA.1.2.M	Sphericity Assumed	2.650	1	2.650	1.032	.327	.069
	Greenhouse-Geisser	2.650	1.000	2.650	1.032	.327	.069
	Huynh-Feldt	2.650	1.000	2.650	1.032	.327	.069
	Lower-bound	2.650	1.000	2.650	1.032	.327	.069
time * R.Group	Sphericity Assumed	8.383	1	8.383	3.264	.092	.189
	Greenhouse-Geisser	8.383	1.000	8.383	3.264	.092	.189
	Huynh-Feldt	8.383	1.000	8.383	3.264	.092	.189
	Lower-bound	8.383	1.000	8.383	3.264	.092	.189
Error(time)	Sphericity Assumed	35.960	14	2.569			
	Greenhouse-Geisser	35.960	14.000	2.569			
	Huynh-Feldt	35.960	14.000	2.569			
	Lower-bound	35.960	14.000	2.569			

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	time	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
time	Linear	5.341	1	5.341	2.079	.171	.129
time * BCA.1.2.M	Linear	2.650	1	2.650	1.032	.327	.069
time * R.Group	Linear	8.383	1	8.383	3.264	.092	.189

Error(time)	Linear	35.960	14	2.569			

APPENDIX 5.15

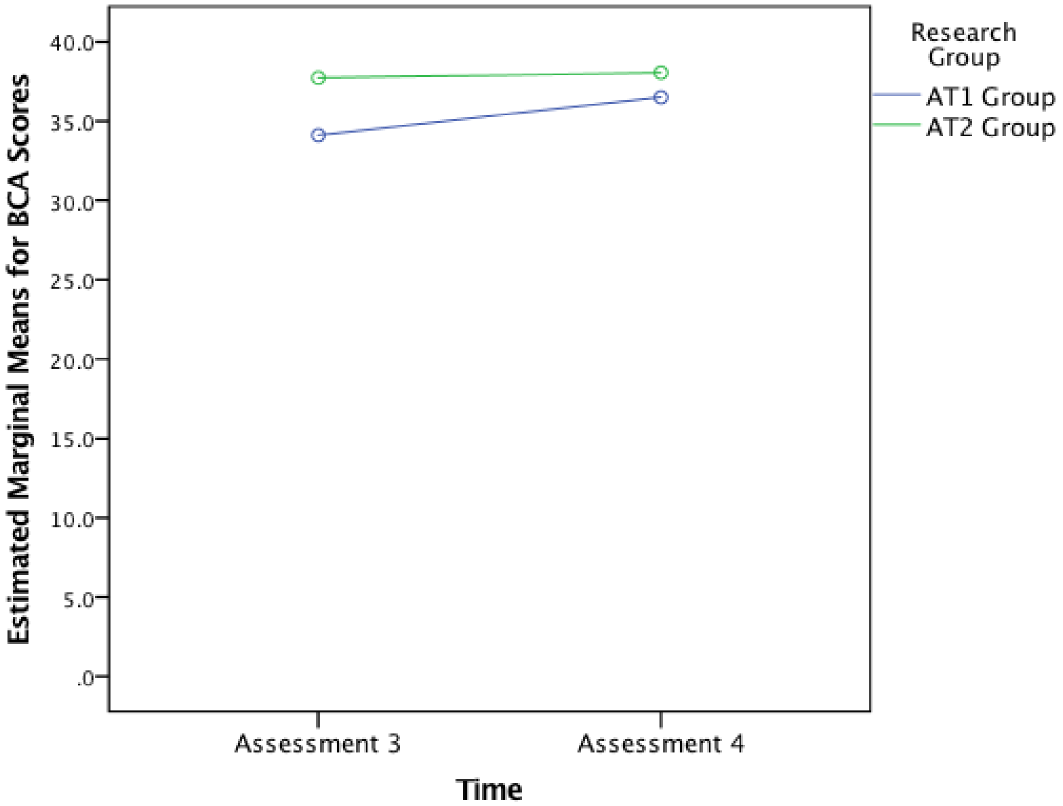
Tests of Between-Subjects Effects						
Measure: MEASURE_1						
Transformed Variable: Average						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	234.014	1	234.014	30.912	.000	.688
BCA.1.2.M	531.862	1	531.862	70.257	.000	.834
R.Group	52.072	1	52.072	6.878	.020	.329
Error	105.983	14	7.570			

Estimated Marginal Means

1. Research Group				
Measure: MEASURE_1				
			95% Confidence Interval	
Research Group	Mean	Std. Error	Lower Bound	Upper Bound
AT1 Group	35.310[a]	.703	33.802	36.818
AT2 Group	37.891[a]	.661	36.473	39.309
a. Covariates appearing in the model are evaluated at the following values: Mean of Ass.1 & Ass.2 = 35.4706.				

2. Research Group * time					
Measure: MEASURE_1					
				95% Confidence Interval	
Research Group	time	Mean	Std. Error	Lower Bound	Upper Bound
AT1 Group	1	34.114[a]	.839	32.314	35.915
	2	36.505[a]	.787	34.818	38.193
AT2 Group	1	37.732[a]	.790	36.038	39.425
	2	38.051[a]	.740	36.464	39.638
a. Covariates appearing in the model are evaluated at the following values: Mean of Ass.1 & Ass.2 = 35.4706.					

Profile Plots




```
GLM BCA.1.2.M BCA.3 BCA.4
  /WSFACTOR=time 3 Polynomial
  /METHOD=SSTYPE(3)
  /PLOT=PROFILE(time)
  /EMMEANS=TABLES(time)
  /PRINT=DESCRIPTIVE ETASQ
  /CRITERIA=ALPHA(.05)
  /WSDESIGN=time.
```

General Linear Model

Within-Subjects Factors	
Measure: MEASURE_1	
time	Dependent Variable
1	BCA.1.2.M
2	BCA.3
3	BCA.4

Descriptive Statistics			
	Mean	Std. Deviation	N
Mean of Ass.1 & Ass.2	35.4706	6.87834	17
BCA Ass 3	36.029	5.7919	17
BCA Ass 4	37.324	4.7002	17

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
time	Pillai's Trace	.292	3.094[b]	2.000	15.000	.075	.292
	Wilks' Lambda	.708	3.094[b]	2.000	15.000	.075	.292
	Hotelling's Trace	.413	3.094[b]	2.000	15.000	.075	.292
	Roy's Largest Root	.413	3.094[b]	2.000	15.000	.075	.292

a. Design: Intercept
 Within Subjects Design: time

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser	Huynh-Feldt	Lower-bound
time	.869	2.101	2	.350	.884	.986	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept
Within Subjects Design: time

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
time	Sphericity Assumed	30.716	2	15.358	3.108	.058	.163
	Greenhouse-Geisser	30.716	1.769	17.365	3.108	.066	.163
	Huynh-Feldt	30.716	1.972	15.572	3.108	.059	.163
	Lower-bound	30.716	1.000	30.716	3.108	.097	.163
Error (time)	Sphericity Assumed	158.118	32	4.941			
	Greenhouse-Geisser	158.118	28.302	5.587			
	Huynh-Feldt	158.118	31.560	5.010			
	Lower-bound	158.118	16.000	9.882			

APPENDIX 5.15

Tests of Within-Subjects Contrasts							
Measure: MEASURE_1							
Source	time	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
time	Linear	29.184	1	29.184	4.829	.043	.232
	Quadratic	1.532	1	1.532	.399	.537	.024
Error(time)	Linear	96.691	16	6.043			
	Quadratic	61.426	16	3.839			

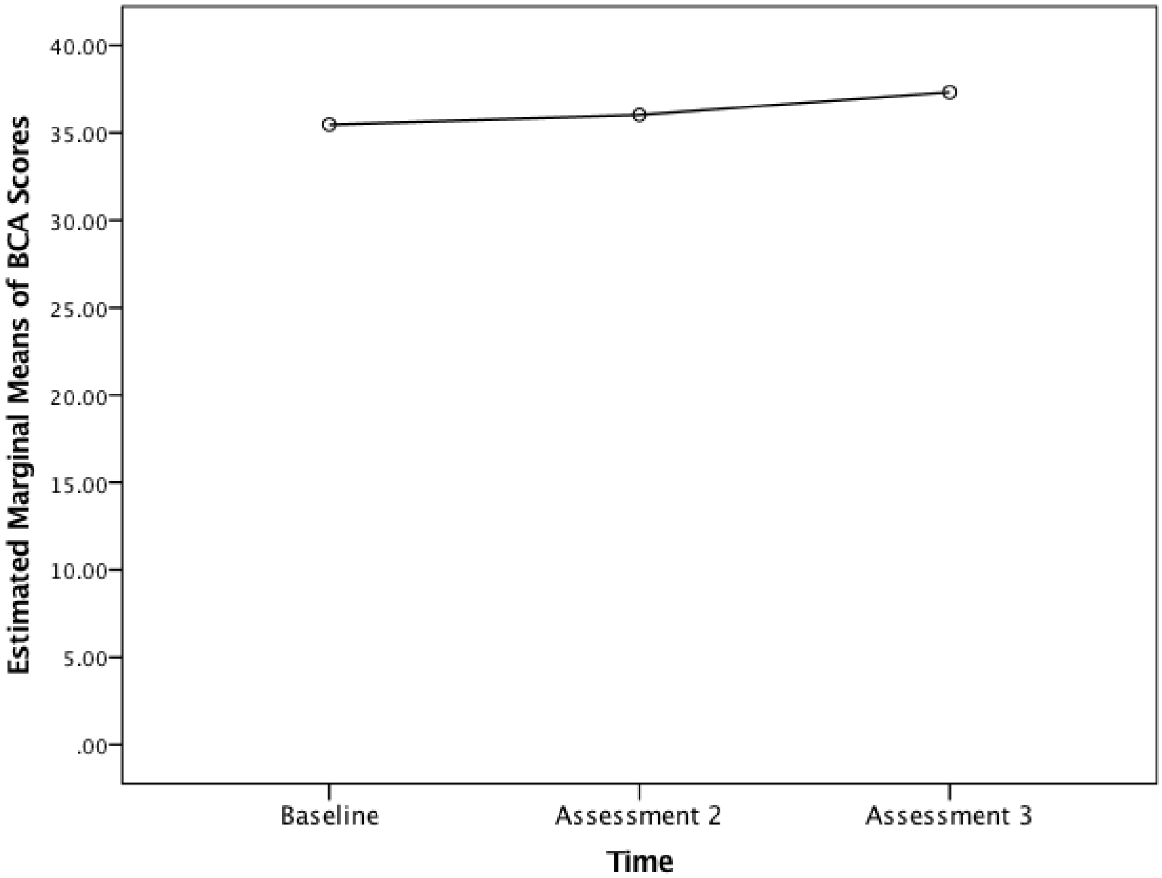
Tests of Between-Subjects Effects						
Measure: MEASURE_1						
Transformed Variable: Average						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	67107.843	1	67107.843	721.069	.000	.978
Error	1489.074	16	93.067			

Estimated Marginal Means

time				
Measure: MEASURE_1				
			95% Confidence Interval	
time	Mean	Std. Error	Lower Bound	Upper Bound
1	35.471	1.668	31.934	39.007
2	36.029	1.405	33.051	39.007
3	37.324	1.140	34.907	39.740

APPENDIX 5.15

Profile Plots



APPENDIX 5.15a

SPSS Output for:
Intervention Period, BCA Scores, parametric test: analysis of variance (ANOVA) including Levene's Test

```
GLM BCA.3 BCA.4 BY R.Group WITH BCA.1.2.M
  /WSFACTOR=Time 2 Polynomial
  /METHOD=SSTYPE(3)
  /PLOT=PROFILE(Time*R.Group)
  /EMMEANS=TABLES(OVERALL) WITH(BCA.1.2.M=MEAN)
  /EMMEANS=TABLES(R.Group) WITH(BCA.1.2.M=MEAN)
  /PRINT=DESCRIPTIVE ETASQ HOMOGENEITY
  /CRITERIA=ALPHA(.05)
  /DESIGN= R.Group BCA.1.2.M.
```

General Linear Model

Within-Subjects Factors

Measure: MEASURE_1

Time	Dependent Variable
1	BCA.3
2	BCA.4

Between-Subjects Factors

		Value Label	N
Research Group	1	AT1 Group	8
	2	AT2 Group	9

Descriptive Statistics

	Research Group	Mean	Std. Deviation	N
BCA Ass 3	AT1 Group	32.813	3.2617	8
	AT2 Group	38.889	6.1835	9
	Total	36.029	5.7919	17
BCA Ass 4	AT1 Group	35.375	4.1812	8
	AT2 Group	39.056	4.6600	9
	Total	37.324	4.7002	17

APPENDIX 5.15a

Box's Test of Equality of Covariance Matrices[a]	
Box's M	8.021
F	2.285
df1	3
df2	92294.873
Sig.	.077
Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.	
a. Design: Intercept + R.Group + BCA.1.2.M Within Subjects Design: Time	

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Time	Pillai's Trace	.129	2.079[b]	1.000	14.000	.171	.129
	Wilks' Lambda	.871	2.079[b]	1.000	14.000	.171	.129
	Hotelling's Trace	.149	2.079[b]	1.000	14.000	.171	.129
	Roy's Largest Root	.149	2.079[b]	1.000	14.000	.171	.129
Time * R.Group	Pillai's Trace	.189	3.264[b]	1.000	14.000	.092	.189
	Wilks' Lambda	.811	3.264[b]	1.000	14.000	.092	.189
	Hotelling's Trace	.233	3.264[b]	1.000	14.000	.092	.189
	Roy's Largest Root	.233	3.264[b]	1.000	14.000	.092	.189
Time * BCA.1.2.M	Pillai's Trace	.069	1.032[b]	1.000	14.000	.327	.069
	Wilks' Lambda	.931	1.032[b]	1.000	14.000	.327	.069
	Hotelling's Trace	.074	1.032[b]	1.000	14.000	.327	.069
	Roy's Largest Root	.074	1.032[b]	1.000	14.000	.327	.069

a. Design: Intercept + R.Group + BCA.1.2.M
Within Subjects Design: Time

b. Exact statistic

APPENDIX 5.15a

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Time	1.000	.000	0	.	1.000	1.000	1.000

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept + R.Group + BCA.1.2.M
Within Subjects Design: Time

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Sphericity Assumed	5.341	1	5.341	2.079	.171	.129
	Greenhouse-Geisser	5.341	1.000	5.341	2.079	.171	.129
	Huynh-Feldt	5.341	1.000	5.341	2.079	.171	.129
	Lower-bound	5.341	1.000	5.341	2.079	.171	.129
Time * R.Group	Sphericity Assumed	8.383	1	8.383	3.264	.092	.189
	Greenhouse-Geisser	8.383	1.000	8.383	3.264	.092	.189
	Huynh-Feldt	8.383	1.000	8.383	3.264	.092	.189
	Lower-bound	8.383	1.000	8.383	3.264	.092	.189
Time * BCA.1.2.M	Sphericity Assumed	2.650	1	2.650	1.032	.327	.069
	Greenhouse-Geisser	2.650	1.000	2.650	1.032	.327	.069
	Huynh-Feldt	2.650	1.000	2.650	1.032	.327	.069
	Lower-bound	2.650	1.000	2.650	1.032	.327	.069
Error(Time)	Sphericity Assumed	35.960	14	2.569			
	Greenhouse-Geisser	35.960	14.000	2.569			
	Huynh-Feldt	35.960	14.000	2.569			

	Lower-bound	35.960	14.000	2.569			

APPENDIX 5.15a

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Time	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Linear	5.341	1	5.341	2.079	.171	.129
Time * R.Group	Linear	8.383	1	8.383	3.264	.092	.189
Time * BCA.1.2.M	Linear	2.650	1	2.650	1.032	.327	.069
Error(Time)	Linear	35.960	14	2.569			

Levene's Test of Equality of Error Variances[a]

	F	df1	df2	Sig.
BCA Ass 3	4.645	1	15	.048
BCA Ass 4	1.741	1	15	.207

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + R.Group + BCA.1.2.M
Within Subjects Design: Time

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	234.014	1	234.014	30.912	.000	.688
R.Group	52.072	1	52.072	6.878	.020	.329
BCA.1.2.M	531.862	1	531.862	70.257	.000	.834
Error	105.983	14	7.570			

Estimated Marginal Means

1. Grand Mean

Measure: MEASURE_1

Mean	Std. Error	95% Confidence Interval	
		Lower Bound	Upper Bound
36.601[a]	.473	35.587	37.614

a. Covariates appearing in the model are evaluated at the following values: Mean of Ass.1 & Ass.2 = 35.4706.

APPENDIX 5.15a

2. Research Group

Measure: MEASURE_1

Research Group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
AT1 Group	35.310[a]	.703	33.802	36.818
AT2 Group	37.891[a]	.661	36.473	39.309

a. Covariates appearing in the model are evaluated at the following values: Mean of Ass.1 & Ass.2 = 35.4706.

SPSS Output for:
BCA Scores, Intervention Period, Non-parametric Friedman Test

```
NPAR TESTS
 /FRIEDMAN=BCA.1.2.M BCA.3 BCA.4
 /STATISTICS QUARTILES
 /MISSING LISTWISE.
```

NPar Tests

Descriptive Statistics

	N	Percentiles 25th	Percentiles 50th (Median)	Percentiles 75th
Mean of Ass.1 & Ass.2	17	32.1250	36.2500	40.2500
BCA Ass 3	17	30.750	36.000	41.500
BCA Ass 4	17	34.250	37.000	41.000

Friedman Test

Ranks

	Mean Rank
Mean of Ass.1 & Ass.2	1.79
BCA Ass 3	1.71
BCA Ass 4	2.50

Test Statistics[a]

N	17
Chi-Square	7.065
df	2
Asymp. Sig.	.029

a. Friedman Test

Appendix 5.16a

SPSS Output for:
BCA Scores, Intervention Period, Non-parametric Friedman Test: post-hoc pairwise comparisons

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
BCA Ass 3-Mean of Ass.1 & Ass.2	.088	.343	.257	.797	1.000
BCA Ass 3-BCA Ass 4	-.794	.343	-2.315	.021	.062
Mean of Ass.1 & Ass.2-BCA Ass 4	-.706	.343	-2.058	.040	.119

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.
Significance values have been adjusted by the Bonferroni correction for multiple tests.

Appendix 5.17

SPSS Output for:
Intervention period FES-I (short, VAS) scores, parametric test: analysis of variance (ANOVA)

```
GLM FESI.3 FES1.4 BY R.Group WITH FESI.1.2.M
  /WSFACTOR=time 2 Polynomial
  /METHOD=SSTYPE(3)
  /PLOT=PROFILE(time*R.Group)
  /EMMEANS=TABLES(R.Group) WITH(FESI.1.2.M=MEAN)
  /EMMEANS=TABLES(R.Group*time) WITH(FESI.1.2.M=MEAN)
  /PRINT=HOMOGENEITY
  /PRINT=DESCRIPTIVE ETASQ
  /CRITERIA=ALPHA(.05)
  /WSDESIGN=time
  /DESIGN=FESI.1.2.M R.Group.
```

General Linear Model

Within-Subjects Factors

Measure: MEASURE_1

time	Dependent Variable
1	FESI.3
2	FES1.4

Between-Subjects Factors

		Value Label	N
Research Group	1	AT1 Group	8
	2	AT2 Group	9

Descriptive Statistics

	Research Group	Mean	Std. Deviation	N
FES-I Ass 3	AT1 Group	271.13	78.793	8
	AT2 Group	267.22	178.963	9
	Total	269.06	136.872	17
FES-I Ass 4	AT1 Group	268.50	123.593	8
	AT2 Group	263.78	182.346	9
	Total	266.00	152.688	17

Appendix 5.17

Multivariate Tests[a]							
Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
time	Pillai's Trace	.021	.295[b]	1.000	14.000	.595	.021
	Wilks' Lambda	.979	.295[b]	1.000	14.000	.595	.021
	Hotelling's Trace	.021	.295[b]	1.000	14.000	.595	.021
	Roy's Largest Root	.021	.295[b]	1.000	14.000	.595	.021
time * FESI.1.2.M	Pillai's Trace	.020	.283[b]	1.000	14.000	.603	.020
	Wilks' Lambda	.980	.283[b]	1.000	14.000	.603	.020
	Hotelling's Trace	.020	.283[b]	1.000	14.000	.603	.020
	Roy's Largest Root	.020	.283[b]	1.000	14.000	.603	.020
time * R.Group	Pillai's Trace	.001	.008[b]	1.000	14.000	.931	.001
	Wilks' Lambda	.999	.008[b]	1.000	14.000	.931	.001
	Hotelling's Trace	.001	.008[b]	1.000	14.000	.931	.001
	Roy's Largest Root	.001	.008[b]	1.000	14.000	.931	.001

b. Design: Intercept + FESI.1.2.M + R.Group
Within Subjects Design: time

b. Exact statistic

Mauchly's Test of Sphericity[a]							
Measure: MEASURE_1							
					Epsilon[b]		
Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Greenhouse-Geisser	Huynh-Feldt	Lower-bound
time	1.000	.000	0	.	1.000	1.000	1.000

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

b. Design: Intercept + FESI.1.2.M + R.Group
Within Subjects Design: time

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Appendix 5.17

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
time	Sphericity Assumed	1093.891	1	1093.891	.295	.595	.021
	Greenhouse-Geisser	1093.891	1.000	1093.891	.295	.595	.021
	Huynh-Feldt	1093.891	1.000	1093.891	.295	.595	.021
	Lower-bound	1093.891	1.000	1093.891	.295	.595	.021
time * FESI.1.2.M	Sphericity Assumed	1047.486	1	1047.486	.283	.603	.020
	Greenhouse-Geisser	1047.486	1.000	1047.486	.283	.603	.020
	Huynh-Feldt	1047.486	1.000	1047.486	.283	.603	.020
	Lower-bound	1047.486	1.000	1047.486	.283	.603	.020
time * R.Group	Sphericity Assumed	28.989	1	28.989	.008	.931	.001
	Greenhouse-Geisser	28.989	1.000	28.989	.008	.931	.001
	Huynh-Feldt	28.989	1.000	28.989	.008	.931	.001
	Lower-bound	28.989	1.000	28.989	.008	.931	.001
Error(time)	Sphericity Assumed	51843.563	14	3703.112			
	Greenhouse-Geisser	51843.563	14.000	3703.112			
	Huynh-Feldt	51843.563	14.000	3703.112			
	Lower-bound	51843.563	14.000	3703.112			

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	time	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
time	Linear	1093.891	1	1093.891	.295	.595	.021
time * FESI.1.2.M	Linear	1047.486	1	1047.486	.283	.603	.020
time * R.Group	Linear	28.989	1	28.989	.008	.931	.001
Error(time)	Linear	51843.563	14	3703.112			

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	2358.398	1	2358.398	.193	.667	.014
FESI.1.2.M	448922.687	1	448922.687	36.799	.000	.724
R.Group	15214.505	1	15214.505	1.247	.283	.082
Error	170792.251	14	12199.447			

Appendix 5.17

Estimated Marginal Means

1. Research Group

Measure: MEASURE_1

Research Group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
AT1 Group	244.618[a]	27.923	184.728	304.508
AT2 Group	287.895[a]	26.294	231.500	344.290

a. Covariates appearing in the model are evaluated at the following values: Mean of Ass.1 & Ass.2 = 281.59.

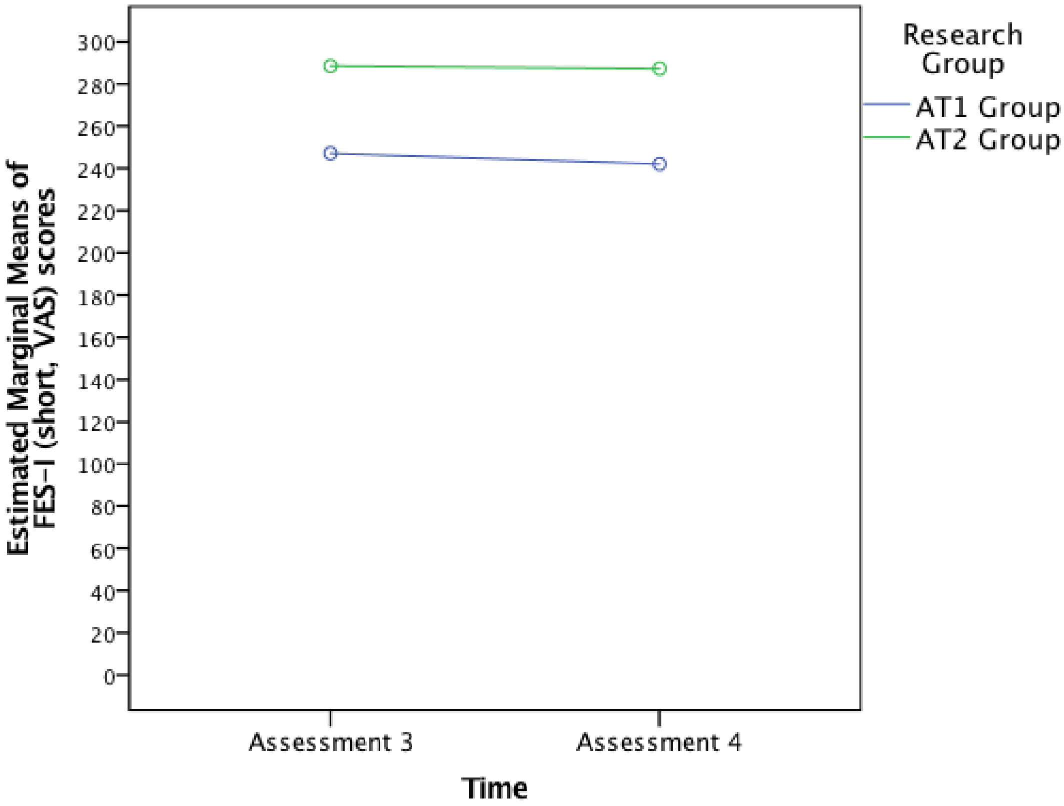
2. Research Group * time

Measure: MEASURE_1

Research Group	time	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
AT1 Group	1	247.147[a]	29.665	183.523	310.772
	2	242.088[a]	33.953	169.267	314.910
AT2 Group	1	288.536[a]	27.934	228.623	348.448
	2	287.255[a]	31.972	218.683	355.827

a. Covariates appearing in the model are evaluated at the following values: Mean of Ass.1 & Ass.2 = 281.59.

Profile plots




```
GLM FESI.1.2.M FESI.3 FES1.4
  /WSFACTOR=time 3 Polynomial
  /METHOD=SSTYPE(3)
  /PLOT=PROFILE(time)
  /EMMEANS=TABLES(time)
  /PRINT=DESCRIPTIVE ETASQ
  /CRITERIA=ALPHA(.05)
  /WSDESIGN=time.
```

General Linear Model

Within-Subjects Factors

Measure: MEASURE_1

time	Dependent Variable
1	FESI.1.2.M
2	FESI.3
3	FES1.4

Appendix 5.17

Descriptive Statistics			
	Mean	Std. Deviation	N
Mean of Ass.1 & Ass.2	281.59	138.192	17
FES-I Ass 3	269.06	136.872	17
FES-I Ass 4	266.00	152.688	17

Multivariate Tests[a]							
Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
time	Pillai's Trace	.033	.253[b]	2.000	15.000	.780	.033
	Wilks' Lambda	.967	.253[b]	2.000	15.000	.780	.033
	Hotelling's Trace	.034	.253[b]	2.000	15.000	.780	.033
	Roy's Largest Root	.034	.253[b]	2.000	15.000	.780	.033

a. Design: Intercept
Within Subjects Design: time

b. Exact statistic

Mauchly's Test of Sphericity[a]							
Measure: MEASURE_1							
					Epsilon[b]		
Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Greenhouse-Geisser	Huynh-Feldt	Lower-bound
time	.973	.404	2	.817	.974	1.000	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept
Within Subjects Design: time

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
time	Sphericity Assumed	2319.569	2	1159.784	.309	.736	.019
	Greenhouse-Geisser	2319.569	1.948	1190.586	.309	.730	.019
	Huynh-Feldt	2319.569	2.000	1159.784	.309	.736	.019
	Lower-bound	2319.569	1.000	2319.569	.309	.586	.019
Error(time)	Sphericity Assumed	119941.765	32	3748.180			
	Greenhouse-Geisser	119941.765	31.172	3847.724			
	Huynh-Feldt	119941.765	32.000	3748.180			
	Lower-bound	119941.765	16.000	7496.360			

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	time	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
time	Linear	2065.441	1	2065.441	.477	.500	.029
	Quadratic	254.127	1	254.127	.080	.780	.005
Error(time)	Linear	69346.059	16	4334.129			
	Quadratic	50595.706	16	3162.232			

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	3779170.373	1	3779170.373	70.443	.000	.815
Error	858377.294	16	53648.581			

Estimated Marginal Means

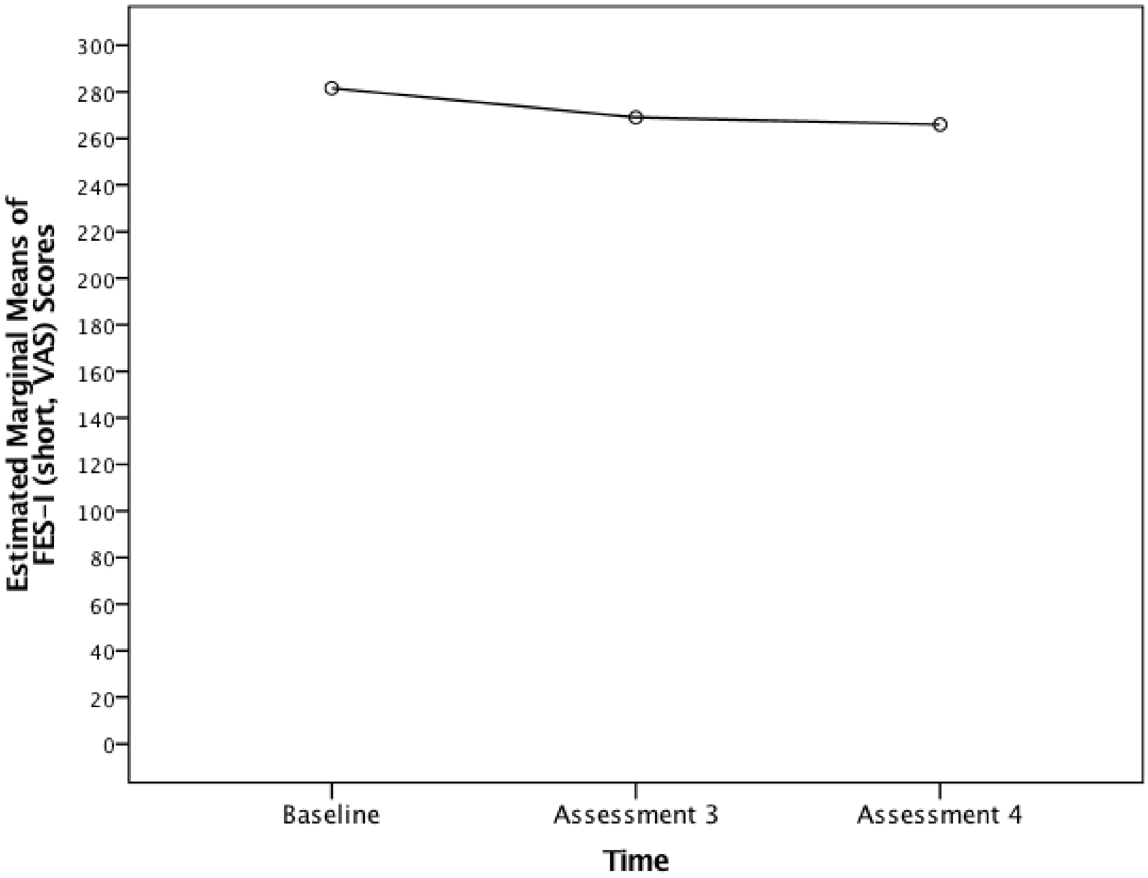
time

Measure: MEASURE_1

time	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	281.588	33.517	210.536	352.640
2	269.059	33.196	198.686	339.432
3	266.000	37.032	187.495	344.505

Appendix 5.17

Profile Plots



APPENDIX 5.17a

SPSS Output for:
Intervention Period, FES-I Scores, parametric test: analysis of variance (ANOVA) including Levene's Test

```
GLM FESI.3 FES1.4 BY R.Group WITH FESI.1.2.M
  /WSFACTOR=Time 2 Polynomial
  /METHOD=SSTYPE(3)
  /PLOT=PROFILE(Time*R.Group)
  /EMMEANS=TABLES(Time) WITH(FESI.1.2.M=MEAN)
  /EMMEANS=TABLES(R.Group) WITH(FESI.1.2.M=MEAN)
  /PRINT=DESCRIPTIVE ETASQ HOMOGENEITY
  /CRITERIA=ALPHA(.05)
  /WSDESIGN= Time
  /DESIGN= R.Group FESI.1.2.M.
```

General Linear Model

[DataSet1] /Users/liztunnicliffe/Documents/SPSS Research Data/Liz Tunnicliffe AT Research Data August 2019 copy of Nov 2016.sav

Within-Subjects Factors

Measure: MEASURE_1

Time	Dependent Variable
1	FESI.3
2	FES1.4

Between-Subjects Factors

		Value Label	N
Research Group	1	AT1 Group	8
	2	AT2 Group	9

Descriptive Statistics

	Research Group	Mean	Std. Deviation	N
FES-I Ass 3	AT1 Group	271.13	78.793	8
	AT2 Group	267.22	178.963	9
	Total	269.06	136.872	17
FES-I Ass 4	AT1 Group	268.50	123.593	8
	AT2 Group	263.78	182.346	9
	Total	266.00	152.688	17

Appendix 5.17a

Box's Test of Equality of Covariance Matrices[a]	
Box's M	4.767
F	1.358
df1	3
df2	92294.873
Sig.	.254
Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.	
a. Design: Intercept + R.Group + FESI.1.2.M Within Subjects Design: Time	

Multivariate Tests[a]							
Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Time	Pillai's Trace	.021	.295[b]	1.000	14.000	.595	.021
	Wilks' Lambda	.979	.295[b]	1.000	14.000	.595	.021
	Hotelling's Trace	.021	.295[b]	1.000	14.000	.595	.021
	Roy's Largest Root	.021	.295[b]	1.000	14.000	.595	.021
Time * R.Group	Pillai's Trace	.001	.008[b]	1.000	14.000	.931	.001
	Wilks' Lambda	.999	.008[b]	1.000	14.000	.931	.001
	Hotelling's Trace	.001	.008[b]	1.000	14.000	.931	.001
	Roy's Largest Root	.001	.008[b]	1.000	14.000	.931	.001
Time * FESI.1.2.M	Pillai's Trace	.020	.283[b]	1.000	14.000	.603	.020
	Wilks' Lambda	.980	.283[b]	1.000	14.000	.603	.020
	Hotelling's Trace	.020	.283[b]	1.000	14.000	.603	.020
	Roy's Largest Root	.020	.283[b]	1.000	14.000	.603	.020
a. Design: Intercept + R.Group + FESI.1.2.M Within Subjects Design: Time							
b. Exact statistic							

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Time	1.000	.000	0	.	1.000	1.000	1.000

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept + R.Group + FESI.1.2.M
Within Subjects Design: Time

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Sphericity Assumed	1093.891	1	1093.891	.295	.595	.021
	Greenhouse-Geisser	1093.891	1.000	1093.891	.295	.595	.021
	Huynh-Feldt	1093.891	1.000	1093.891	.295	.595	.021
	Lower-bound	1093.891	1.000	1093.891	.295	.595	.021
Time * R.Group	Sphericity Assumed	28.989	1	28.989	.008	.931	.001
	Greenhouse-Geisser	28.989	1.000	28.989	.008	.931	.001
	Huynh-Feldt	28.989	1.000	28.989	.008	.931	.001
	Lower-bound	28.989	1.000	28.989	.008	.931	.001
Time * FESI.1.2.M	Sphericity Assumed	1047.486	1	1047.486	.283	.603	.020
	Greenhouse-Geisser	1047.486	1.000	1047.486	.283	.603	.020
	Huynh-Feldt	1047.486	1.000	1047.486	.283	.603	.020
	Lower-bound	1047.486	1.000	1047.486	.283	.603	.020
Error(Time)	Sphericity Assumed	51843.563	14	3703.112			
	Greenhouse-Geisser	51843.563	14.000	3703.112			
	Huynh-Feldt	51843.563	14.000	3703.112			
	Lower-bound	51843.563	14.000	3703.112			

Tests of Within-Subjects Contrasts							
Measure: MEASURE_1							
Source	Time	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Linear	1093.891	1	1093.891	.295	.595	.021
Time * R.Group	Linear	28.989	1	28.989	.008	.931	.001
Time * FESI.1.2.M	Linear	1047.486	1	1047.486	.283	.603	.020
Error(Time)	Linear	51843.563	14	3703.112			

Levene's Test of Equality of Error Variances[a]				
	F	df1	df2	Sig.
FES-I Ass 3	.803	1	15	.384
FES-I Ass 4	3.478	1	15	.082
Tests the null hypothesis that the error variance of the dependent variable is equal across groups.				
a. Design: Intercept + R.Group + FESI.1.2.M Within Subjects Design: Time				

Tests of Between-Subjects Effects						
Measure: MEASURE_1						
Transformed Variable: Average						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	2358.398	1	2358.398	.193	.667	.014
R.Group	15214.505	1	15214.505	1.247	.283	.082
FESI.1.2.M	448922.687	1	448922.687	36.799	.000	.724
Error	170792.251	14	12199.447			

Estimated Marginal Means

1. Time				
Measure: MEASURE_1				
Time	Mean	Std. Error	95% Confidence Interval Lower Bound	Upper Bound
1	267.842[a]	20.160	224.603	311.080
2	264.672[a]	23.074	215.183	314.160
a. Covariates appearing in the model are evaluated at the following values: Mean of Ass.1 & Ass.2 = 281.59.				

Appendix 5.17a

2. Research Group				
Measure: MEASURE_1				
Research Group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
AT1 Group	244.618[a]	27.923	184.728	304.508
AT2 Group	287.895[a]	26.294	231.500	344.290

a. Covariates appearing in the model are evaluated at the following values: Mean of Ass.1 & Ass.2 = 281.59.

Appendix 5.18

SPSS Output for:
FES-I Scores, Intervention Period
Non-Parametric Friedman Test

```
NPAR TESTS
  /FRIEDMAN=FESI.1.2.M FESI.3 FES1.4
  /STATISTICS QUARTILES
  /MISSING LISTWISE.
```

NPar Tests

Descriptive Statistics

		Percentiles		
	N	25th	50th (Median)	75th
Mean of Ass.1 & Ass.2	17	154.00	318.00	393.00
FES-I Ass 3	17	146.50	240.00	359.00
FES-I Ass 4	17	133.50	243.00	395.00

Friedman Test

Ranks

	Mean Rank
Mean of Ass.1 & Ass.2	2.00
FES-I Ass 3	2.18
FES-I Ass 4	1.82

Test Statistics[a]

N	17
Chi-Square	1.059
df	2
Asymp. Sig.	.589

a. Friedman Test

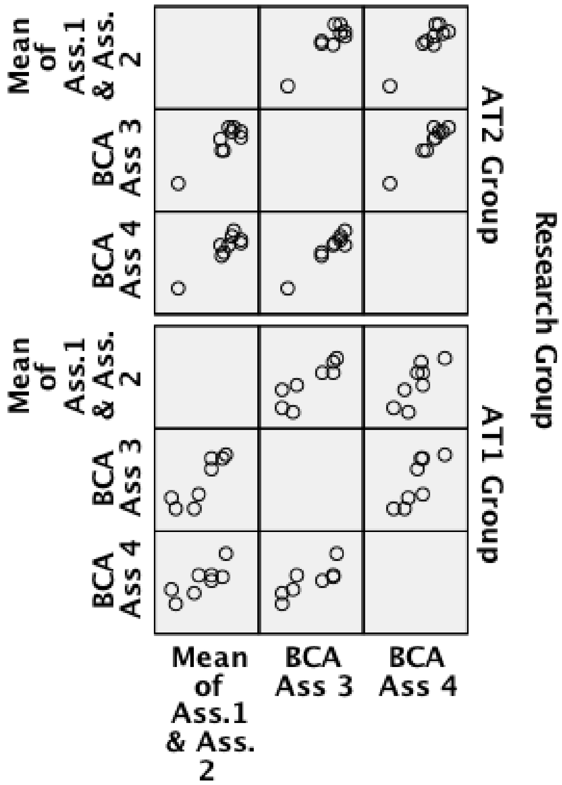
SPSS Output for:

Examining assumptions for ANOVA with covariate – check for linearity of the relationship between the covariate and the dependent variable – BCA

```
GRAPH
  /SCATTERPLOT(MATRIX)=BCA.1.2.M BCA.3 BCA.4
  /PANEL ROWVAR=R.Group ROWOP=CROSS
  /MISSING=LISTWISE.
```

Graph

[DataSet1] /Users/liztunnicliffe/Documents/SPSS Research Data/Liz Tunnicliffe AT Research Data August 2019 copy of Nov 2016.sav



Appendix 5.20

SPSS Output for:

Examining assumptions for ANOVA with covariate – check for homogeneity of regression slopes – BCA (by testing whether there is an interaction between the independent variable (research group) and the covariate (BCA.1.2.M scores)

```
GLM BCA.3 BCA.4 BY R.Group WITH BCA.1.2.M
  /WSFACTOR=Time 2 Polynomial
  /METHOD=SSTYPE(3)
  /CRITERIA=ALPHA(.05)
  /DESIGN= R.Group BCA.1.2.M BCA.1.2.M*R.Group.
```

General Linear Model

Within-Subjects Factors

Measure: MEASURE_1

Time	Dependent Variable
1	BCA.3
2	BCA.4

Between-Subjects Factors

		Value Label	N
Research Group	1	AT1 Group	8
	2	AT2 Group	9

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
Time	Pillai's Trace	.061	.847[b]	1.000	13.000	.374
	Wilks' Lambda	.939	.847[b]	1.000	13.000	.374
	Hotelling's Trace	.065	.847[b]	1.000	13.000	.374
	Roy's Largest Root	.065	.847[b]	1.000	13.000	.374
Time * R.Group	Pillai's Trace	.093	1.326[b]	1.000	13.000	.270
	Wilks' Lambda	.907	1.326[b]	1.000	13.000	.270
	Hotelling's Trace	.102	1.326[b]	1.000	13.000	.270
	Roy's Largest Root	.102	1.326[b]	1.000	13.000	.270
Time * BCA.1.2.M	Pillai's Trace	.012	.162[b]	1.000	13.000	.694
	Wilks' Lambda	.988	.162[b]	1.000	13.000	.694
	Hotelling's Trace	.012	.162[b]	1.000	13.000	.694
	Roy's Largest Root	.012	.162[b]	1.000	13.000	.694
Time * R.Group * BCA.1.2.M	Pillai's Trace	.149	2.268[b]	1.000	13.000	.156
	Wilks' Lambda	.851	2.268[b]	1.000	13.000	.156
	Hotelling's Trace	.174	2.268[b]	1.000	13.000	.156
	Roy's Largest Root	.174	2.268[b]	1.000	13.000	.156

a. Design: Intercept + R.Group + BCA.1.2.M + R.Group * BCA.1.2.M
Within Subjects Design: Time

b. Exact statistic

Appendix 5.20

Mauchly's Test of Sphericity[a]							
Measure: MEASURE_1							
					Epsilon[b]		
Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Time	1.000	.000	0	.	1.000	1.000	1.000

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept + R.Group + BCA.1.2.M + R.Group * BCA.1.2.M
Within Subjects Design: Time

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Time	Sphericity Assumed	1.995	1	1.995	.847	.374
	Greenhouse-Geisser	1.995	1.000	1.995	.847	.374
	Huynh-Feldt	1.995	1.000	1.995	.847	.374
	Lower-bound	1.995	1.000	1.995	.847	.374
Time * R.Group	Sphericity Assumed	3.123	1	3.123	1.326	.270
	Greenhouse-Geisser	3.123	1.000	3.123	1.326	.270
	Huynh-Feldt	3.123	1.000	3.123	1.326	.270
	Lower-bound	3.123	1.000	3.123	1.326	.270
Time * BCA.1.2.M	Sphericity Assumed	.382	1	.382	.162	.694
	Greenhouse-Geisser	.382	1.000	.382	.162	.694
	Huynh-Feldt	.382	1.000	.382	.162	.694
	Lower-bound	.382	1.000	.382	.162	.694
Time * R.Group * BCA.1.2.M	Sphericity Assumed	5.341	1	5.341	2.268	.156
	Greenhouse-Geisser	5.341	1.000	5.341	2.268	.156
	Huynh-Feldt	5.341	1.000	5.341	2.268	.156
	Lower-bound	5.341	1.000	5.341	2.268	.156
Error(Time)	Sphericity Assumed	30.619	13	2.355		
	Greenhouse-Geisser	30.619	13.000	2.355		
	Huynh-Feldt	30.619	13.000	2.355		
	Lower-bound	30.619	13.000	2.355		

Tests of Within-Subjects Contrasts						
Measure: MEASURE_1						
Source	Time	Type III Sum of Squares	df	Mean Square	F	Sig.
Time	Linear	1.995	1	1.995	.847	.374
Time * R.Group	Linear	3.123	1	3.123	1.326	.270
Time * BCA.1.2.M	Linear	.382	1	.382	.162	.694
Time * R.Group * BCA.1.2.M	Linear	5.341	1	5.341	2.268	.156
Error(Time)	Linear	30.619	13	2.355		

Tests of Between-Subjects Effects					
Measure: MEASURE_1					
Transformed Variable: Average					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	220.570	1	220.570	27.474	.000
R.Group	.000	1	.000	.000	.996
BCA.1.2.M	433.265	1	433.265	53.968	.000
R.Group * BCA.1.2.M	1.617	1	1.617	.201	.661
Error	104.367	13	8.028		

Appendix 5.21

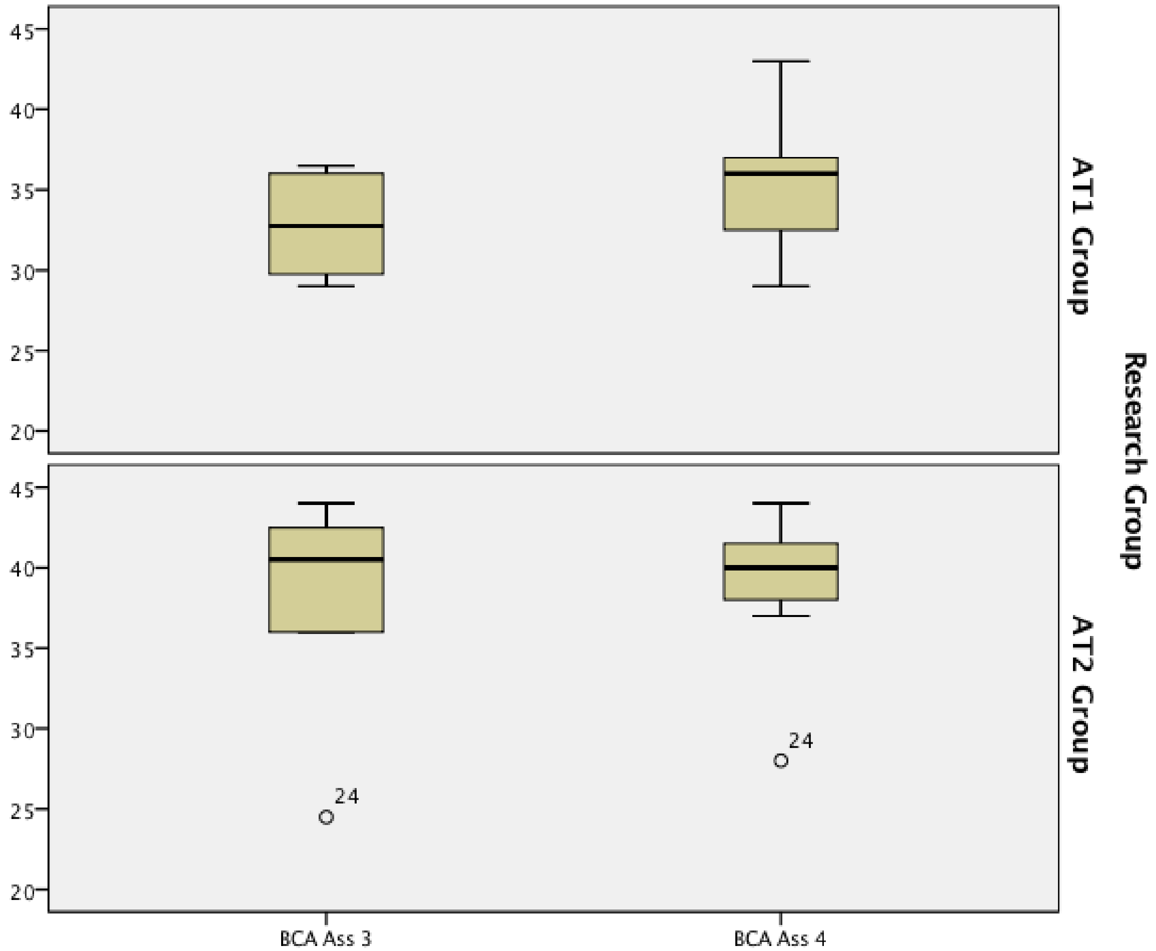
SPSS Output for:
Examining assumptions for ANOVA with covariate – check for outliers - BCA

```
EXAMINE VARIABLES=BCA.3 BCA.4
 /COMPARE VARIABLE
 /PLOT=BOXPLOT
 /STATISTICS=NONE
 /NOTOTAL
 /PANEL ROWVAR=R.Group ROWOP=CROSS
 /MISSING=LISTWISE.
```

Explore

Case Processing Summary

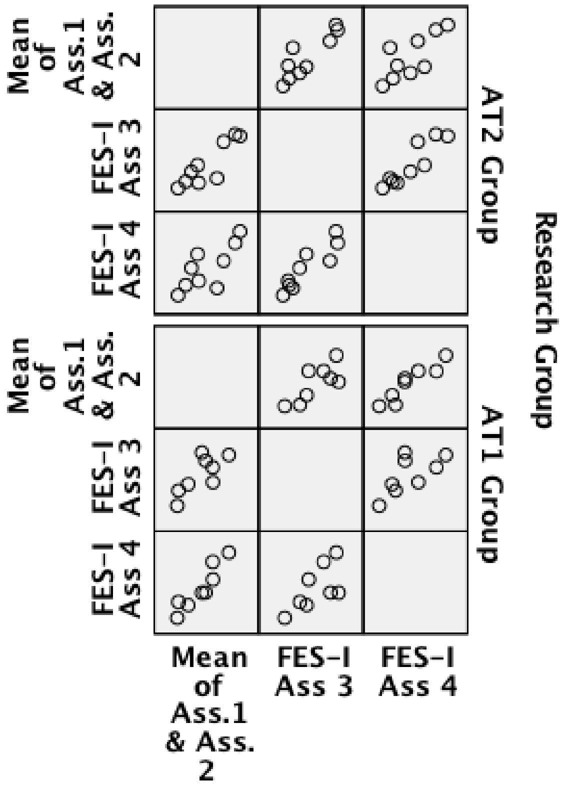
	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
BCA Ass 3	17	58.6%	12	41.4%	29	100.0%
BCA Ass 4	17	58.6%	12	41.4%	29	100.0%



SPSS Output for:
Examining assumptions for ANOVA with covariate – check for linearity of the relationship between the covariate and the dependent variable – FES-I

```
GRAPH
  /SCATTERPLOT(MATRIX)=FESI.1.2.M FESI.3 FES1.4
  /PANEL ROWVAR=R.Group ROWOP=CROSS
  /MISSING=LISTWISE.
```

Graph



SPSS Output for:
Examining assumptions for ANOVA with covariate – check for homogeneity of regression slopes – FES-I (by testing whether there is an interaction between the independent variable (research group) and the covariate (FESI.1.2.M scores)

```
GLM FESI.3 FES1.4 BY R.Group WITH FESI.1.2.M
 /WSFACTOR=Time 2 Polynomial
 /METHOD=SSTYPE(3)
 /CRITERIA=ALPHA(.05)
 /DESIGN= R.Group FESI.1.2.M FESI.1.2.M*R.Group.
```

General Linear Model

Within-Subjects Factors

Measure: MEASURE_1

Time	Dependent Variable
1	FESI.3
2	FES1.4

Between-Subjects Factors

		Value Label	N
Research Group	1	AT1 Group	8
	2	AT2 Group	9

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
Time	Pillai's Trace	.090	1.288[b]	1.000	13.000	.277
	Wilks' Lambda	.910	1.288[b]	1.000	13.000	.277
	Hotelling's Trace	.099	1.288[b]	1.000	13.000	.277
	Roy's Largest Root	.099	1.288[b]	1.000	13.000	.277
Time * R.Group	Pillai's Trace	.181	2.879[b]	1.000	13.000	.114
	Wilks' Lambda	.819	2.879[b]	1.000	13.000	.114
	Hotelling's Trace	.221	2.879[b]	1.000	13.000	.114
	Roy's Largest Root	.221	2.879[b]	1.000	13.000	.114
Time * FESI.1.2.M	Pillai's Trace	.075	1.060[b]	1.000	13.000	.322
	Wilks' Lambda	.925	1.060[b]	1.000	13.000	.322
	Hotelling's Trace	.082	1.060[b]	1.000	13.000	.322
	Roy's Largest Root	.082	1.060[b]	1.000	13.000	.322
Time * R.Group * FESI.1.2.M	Pillai's Trace	.202	3.297[b]	1.000	13.000	.093
	Wilks' Lambda	.798	3.297[b]	1.000	13.000	.093
	Hotelling's Trace	.254	3.297[b]	1.000	13.000	.093
	Roy's Largest Root	.254	3.297[b]	1.000	13.000	.093

a. Design: Intercept + R.Group + FESI.1.2.M + R.Group * FESI.1.2.M
 Within Subjects Design: Time

b. Exact statistic

Appendix 5.23

Mauchly's Test of Sphericity[a]							
Measure: MEASURE_1							
					Epsilon[b]		
Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Time	1.000	.000	0	.	1.000	1.000	1.000
Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.							
3181. Design: Intercept + R.Group + FESI.1.2.M + R.Group * FESI.1.2.M Within Subjects Design: Time							
b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.							

Tests of Within-Subjects Effects						
Measure: MEASURE_1						
Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Time	Sphericity Assumed	4097.845	1	4097.845	1.288	.277
	Greenhouse-Geisser	4097.845	1.000	4097.845	1.288	.277
	Huynh-Feldt	4097.845	1.000	4097.845	1.288	.277
	Lower-bound	4097.845	1.000	4097.845	1.288	.277
Time * R.Group	Sphericity Assumed	9160.132	1	9160.132	2.879	.114
	Greenhouse-Geisser	9160.132	1.000	9160.132	2.879	.114
	Huynh-Feldt	9160.132	1.000	9160.132	2.879	.114
	Lower-bound	9160.132	1.000	9160.132	2.879	.114
Time * FESI.1.2.M	Sphericity Assumed	3373.000	1	3373.000	1.060	.322
	Greenhouse-Geisser	3373.000	1.000	3373.000	1.060	.322
	Huynh-Feldt	3373.000	1.000	3373.000	1.060	.322
	Lower-bound	3373.000	1.000	3373.000	1.060	.322
Time * R.Group * FESI.1.2.M	Sphericity Assumed	10487.601	1	10487.601	3.297	.093
	Greenhouse-Geisser	10487.601	1.000	10487.601	3.297	.093
	Huynh-Feldt	10487.601	1.000	10487.601	3.297	.093
	Lower-bound	10487.601	1.000	10487.601	3.297	.093
Error(Time)	Sphericity Assumed	41355.961	13	3181.228		
	Greenhouse-Geisser	41355.961	13.000	3181.228		
	Huynh-Feldt	41355.961	13.000	3181.228		
	Lower-bound	41355.961	13.000	3181.228		

Appendix 5.23

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Time	Type III Sum of Squares	df	Mean Square	F	Sig.
Time	Linear	4097.845	1	4097.845	1.288	.277
Time * R.Group	Linear	9160.132	1	9160.132	2.879	.114
Time * FESI.1.2.M	Linear	3373.000	1	3373.000	1.060	.322
Time * R.Group * FESI.1.2.M	Linear	10487.601	1	10487.601	3.297	.093
Error(Time)	Linear	41355.961	13	3181.228		

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	6080.555	1	6080.555	.492	.496
R.Group	1695.836	1	1695.836	.137	.717
FESI.1.2.M	384812.824	1	384812.824	31.118	.000
R.Group * FESI.1.2.M	10032.557	1	10032.557	.811	.384
Error	160759.694	13	12366.130		

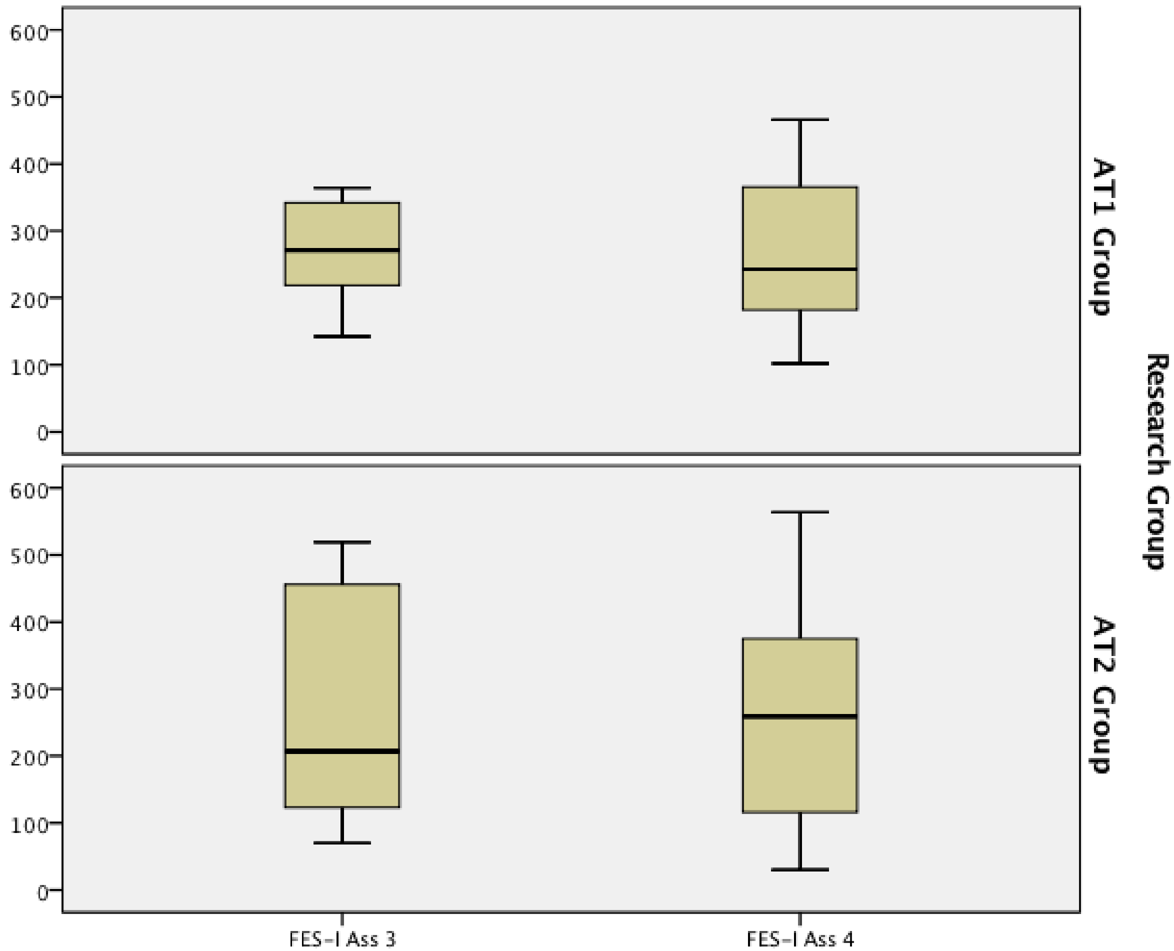
Appendix 5.24

SPSS Output for:
Examining assumptions for ANOVA with covariate – check for outliers – FES-I

```
EXAMINE VARIABLES=FESI.3 FES1.4
 /COMPARE VARIABLE
 /PLOT=BOXPLOT
 /STATISTICS=NONE
 /NOTOTAL
 /PANEL ROWVAR=R.Group ROWOP=CROSS
 /MISSING=LISTWISE.
```

Explore

Case Processing Summary						
	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
FES-I Ass 3	17	58.6%	12	41.4%	29	100.0%
FES-I Ass 4	17	58.6%	12	41.4%	29	100.0%



APPENDIX 5.25

SPSS Output for:
Intervention Period, BCA Scores, parametric test: analysis of variance (ANOVA) Comparison of AT1 and AT2 Groups post-intervention while controlling for use of mobility aid indoors with baseline scores used as a covariate.

```
GET
  FILE='/Users/liztunnicliffe/Documents/SPSS Research Data/Liz Tunnicliffe AT Research Data
August 2019 copy of Nov 2016.sav'.
DATASET NAME DataSet1 WINDOW=FRONT.
GLM BCA.3 BCA.4 BY R.Group Mob.I WITH BCA.1.2.M
  /WSFACTOR=Time 2 Polynomial
  /METHOD=SSTYPE(3)
  /PLOT=PROFILE(Time*R.Group)
  /EMMEANS=TABLES(OVERALL) WITH(BCA.1.2.M=MEAN)
  /EMMEANS=TABLES(Time) WITH(BCA.1.2.M=MEAN)COMPARE ADJ(BONFERRONI)
  /EMMEANS=TABLES(R.Group) WITH(BCA.1.2.M=MEAN)COMPARE ADJ(BONFERRONI)
  /EMMEANS=TABLES(Mob.I) WITH(BCA.1.2.M=MEAN)COMPARE ADJ(BONFERRONI)
  /PRINT=DESCRIPTIVE ETASQ HOMOGENEITY
  /CRITERIA=ALPHA(.05)
  /WSDESIGN= Time
  /DESIGN= R.Group Mob.I BCA.1.2.M.
```

General Linear Model

[DataSet1] /Users/liztunnicliffe/Documents/SPSS Research Data/Liz Tunnicliffe AT Research Data August 2019 copy of Nov 2016.sav

Within-Subjects Factors

Measure: MEASURE_1

Time	Dependent Variable
1	BCA.3
2	BCA.4

Between-Subjects Factors

		Value Label	N
Research Group	1	AT1 Group	8
	2	AT2 Group	9
Mobility aid Indoors	7	No mobility aid indoors	9
	8	Mobility aid used indoors	8

Descriptive Statistics					
	Research Group	Mobility aid Indoors	Mean	Std. Deviation	N
BCA Ass 3	AT1 Group	No mobility aid indoors	36.250	.3536	2
		Mobility aid used indoors	31.667	2.9269	6
		Total	32.813	3.2617	8
	AT2 Group	No mobility aid indoors	41.357	2.8242	7
		Mobility aid used indoors	30.250	8.1317	2
		Total	38.889	6.1835	9
	Total	No mobility aid indoors	40.222	3.3271	9
		Mobility aid used indoors	31.313	3.9994	8
		Total	36.029	5.7919	17
BCA Ass 4	AT1 Group	No mobility aid indoors	40.000	4.2426	2
		Mobility aid used indoors	33.833	3.0768	6
		Total	35.375	4.1812	8
	AT2 Group	No mobility aid indoors	40.929	1.9457	7
		Mobility aid used indoors	32.500	6.3640	2
		Total	39.056	4.6600	9
	Total	No mobility aid indoors	40.722	2.2928	9
		Mobility aid used indoors	33.500	3.5956	8
		Total	37.324	4.7002	17

Box's Test of Equality of Covariance Matrices[a]	
Box's M	1.945
F	.519
df1	3
df2	433459.460
Sig.	.669

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

a. Design: Intercept + R.Group + Mob.I + BCA.1.2.M
 Within Subjects Design: Time

APPENDIX 5.25

Multivariate Tests[a]							
Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Time	Pillai's Trace	.106	1.534[b]	1.000	13.000	.237	.106
	Wilks' Lambda	.894	1.534[b]	1.000	13.000	.237	.106
	Hotelling's Trace	.118	1.534[b]	1.000	13.000	.237	.106
	Roy's Largest Root	.118	1.534[b]	1.000	13.000	.237	.106
Time * R.Group	Pillai's Trace	.174	2.733[b]	1.000	13.000	.122	.174
	Wilks' Lambda	.826	2.733[b]	1.000	13.000	.122	.174
	Hotelling's Trace	.210	2.733[b]	1.000	13.000	.122	.174
	Roy's Largest Root	.210	2.733[b]	1.000	13.000	.122	.174
Time * Mob.I	Pillai's Trace	.005	.064[b]	1.000	13.000	.804	.005
	Wilks' Lambda	.995	.064[b]	1.000	13.000	.804	.005
	Hotelling's Trace	.005	.064[b]	1.000	13.000	.804	.005
	Roy's Largest Root	.005	.064[b]	1.000	13.000	.804	.005
Time * BCA.1.2.M	Pillai's Trace	.060	.836[b]	1.000	13.000	.377	.060
	Wilks' Lambda	.940	.836[b]	1.000	13.000	.377	.060
	Hotelling's Trace	.064	.836[b]	1.000	13.000	.377	.060
	Roy's Largest Root	.064	.836[b]	1.000	13.000	.377	.060

a. Design: Intercept + R.Group + Mob.I + BCA.1.2.M
Within Subjects Design: Time

b. Exact statistic

Mauchly's Test of Sphericity[a]							
Measure: MEASURE_1							
					Epsilon[b]		
Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Time	1.000	.000	0	.	1.000	1.000	1.000

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.
a. Design: Intercept + R.Group + Mob.I + BCA.1.2.M Within Subjects Design: Time
b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Sphericity Assumed	4.222	1	4.222	1.534	.237	.106
	Greenhouse-Geisser	4.222	1.000	4.222	1.534	.237	.106
	Huynh-Feldt	4.222	1.000	4.222	1.534	.237	.106
	Lower-bound	4.222	1.000	4.222	1.534	.237	.106
Time * R.Group	Sphericity Assumed	7.524	1	7.524	2.733	.122	.174
	Greenhouse-Geisser	7.524	1.000	7.524	2.733	.122	.174
	Huynh-Feldt	7.524	1.000	7.524	2.733	.122	.174
	Lower-bound	7.524	1.000	7.524	2.733	.122	.174
Time * Mob.I	Sphericity Assumed	.176	1	.176	.064	.804	.005
	Greenhouse-Geisser	.176	1.000	.176	.064	.804	.005
	Huynh-Feldt	.176	1.000	.176	.064	.804	.005
	Lower-bound	.176	1.000	.176	.064	.804	.005
Time * BCA.1.2.M	Sphericity Assumed	2.301	1	2.301	.836	.377	.060
	Greenhouse-Geisser	2.301	1.000	2.301	.836	.377	.060
	Huynh-Feldt	2.301	1.000	2.301	.836	.377	.060
	Lower-bound	2.301	1.000	2.301	.836	.377	.060
Error(Time)	Sphericity Assumed	35.783	13	2.753			
	Greenhouse-Geisser	35.783	13.000	2.753			
	Huynh-Feldt	35.783	13.000	2.753			
	Lower-bound	35.783	13.000	2.753			

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Time	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Linear	4.222	1	4.222	1.534	.237	.106
Time * R.Group	Linear	7.524	1	7.524	2.733	.122	.174
Time * Mob.I	Linear	.176	1	.176	.064	.804	.005
Time * BCA.1.2.M	Linear	2.301	1	2.301	.836	.377	.060
Error(Time)	Linear	35.783	13	2.753			

Levene's Test of Equality of Error Variances[a]

	F	df1	df2	Sig.
BCA Ass 3	1.325	3	13	.309
BCA Ass 4	1.535	3	13	.252

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + R.Group + Mob.I + BCA.1.2.M
Within Subjects Design: Time

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	229.180	1	229.180	37.787	.000	.744
R.Group	14.749	1	14.749	2.432	.143	.158
Mob.I	27.138	1	27.138	4.474	.054	.256
BCA.1.2.M	204.966	1	204.966	33.795	.000	.722
Error	78.845	13	6.065			

Estimated Marginal Means

1. Grand Mean			
Measure: MEASURE_1			
		95% Confidence Interval	
Mean	Std. Error	Lower Bound	Upper Bound
36.550[a]	.424	35.634	37.465
a. Covariates appearing in the model are evaluated at the following values: Mean of Ass.1 & Ass.2 = 35.4706.			

2. Time

Estimates				
Measure: MEASURE_1				
			95% Confidence Interval	
Time	Mean	Std. Error	Lower Bound	Upper Bound
1	35.876[a]	.540	34.709	37.044
2	37.223[a]	.480	36.186	38.260
a. Covariates appearing in the model are evaluated at the following values: Mean of Ass.1 & Ass.2 = 35.4706.				

Pairwise Comparisons						
Measure: MEASURE_1						
					95% Confidence Interval for Difference[b]	
(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	Sig.[b]	Lower Bound	Upper Bound
1	2	-1.347*	.571	.035	-2.581	-.113
2	1	1.347*	.571	.035	.113	2.581
Based on estimated marginal means						
*. The mean difference is significant at the .05 level.						
b. Adjustment for multiple comparisons: Bonferroni.						

Multivariate Tests						
	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Pillai's trace	.300	5.562[a]	1.000	13.000	.035	.300
Wilks' lambda	.700	5.562[a]	1.000	13.000	.035	.300
Hotelling's trace	.428	5.562[a]	1.000	13.000	.035	.300
Roy's largest root	.428	5.562[a]	1.000	13.000	.035	.300

Each F tests the multivariate effect of Time. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

3. Research Group

Estimates				
Measure: MEASURE_1				
			95% Confidence Interval	
Research Group	Mean	Std. Error	Lower Bound	Upper Bound
AT1 Group	35.767[a]	.665	34.330	37.204
AT2 Group	37.332[a]	.648	35.932	38.732

a. Covariates appearing in the model are evaluated at the following values: Mean of Ass.1 & Ass.2 = 35.4706.

Pairwise Comparisons						
Measure: MEASURE_1						
					95% Confidence Interval for Difference[a]	
(I) Research Group	(J) Research Group	Mean Difference (I-J)	Std. Error	Sig.[a]	Lower Bound	Upper Bound
AT1 Group	AT2 Group	-1.565	1.004	.143	-3.733	.603
AT2 Group	AT1 Group	1.565	1.004	.143	-.603	3.733

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

Univariate Tests						
Measure: MEASURE_1						
	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Contrast	7.374	1	7.374	2.432	.143	.158
Error	39.423	13	3.033			
The F tests the effect of Research Group. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.						

4. Mobility aid Indoors

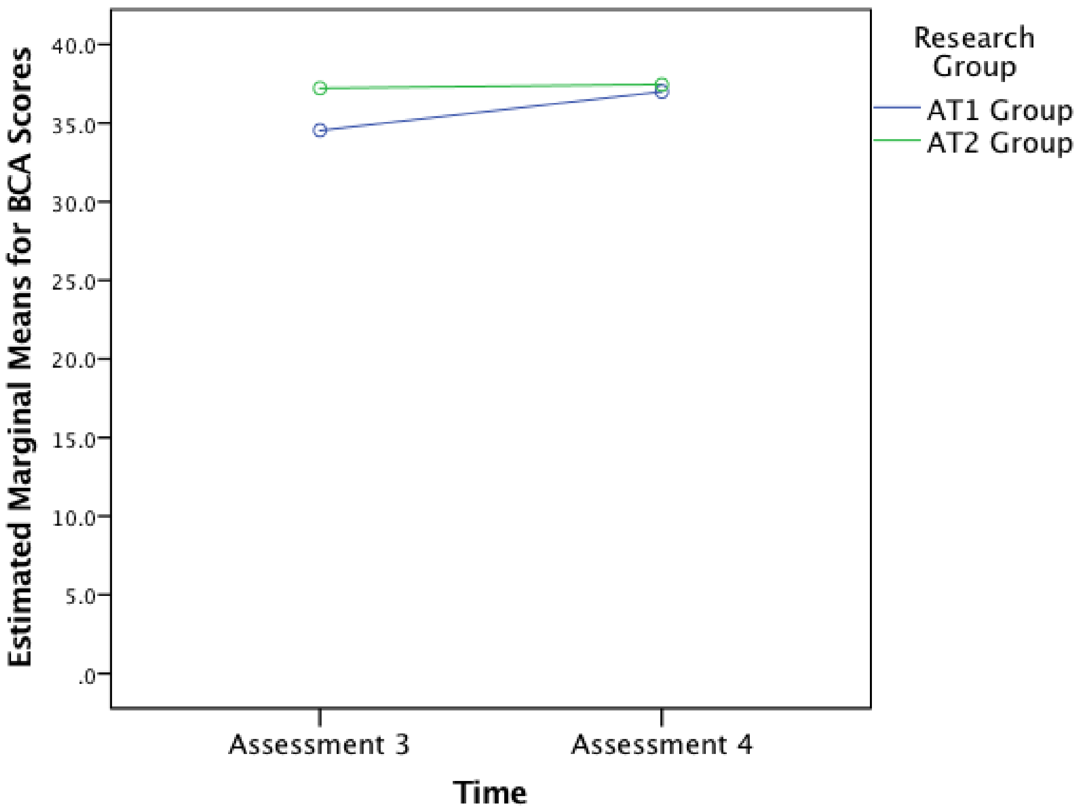
Estimates				
Measure: MEASURE_1				
			95% Confidence Interval	
Mobility aid Indoors	Mean	Std. Error	Lower Bound	Upper Bound
No mobility aid indoors	37.925[a]	.756	36.292	39.558
Mobility aid used indoors	35.174[a]	.796	33.454	36.894
a. Covariates appearing in the model are evaluated at the following values: Mean of Ass.1 & Ass.2 = 35.4706.				

Pairwise Comparisons						
Measure: MEASURE_1						
					95% Confidence Interval for Difference[a]	
(I) Mobility aid Indoors	(J) Mobility aid Indoors	Mean Difference (I-J)	Std. Error	Sig.[a]	Lower Bound	Upper Bound
No mobility aid indoors	Mobility aid used indoors	2.751	1.301	.054	-.059	5.561
Mobility aid used indoors	No mobility aid indoors	-2.751	1.301	.054	-5.561	.059
Based on estimated marginal means						
a. Adjustment for multiple comparisons: Bonferroni.						

Univariate Tests						
Measure: MEASURE_1						
	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Contrast	13.569	1	13.569	4.474	.054	.256
Error	39.423	13	3.033			

The F tests the effect of Mobility aid Indoors. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.

Profile Plots



APPENDIX 5.26

SPSS Output for:
Intervention Period, FES-I Scores, parametric test: analysis of variance (ANOVA) Comparison of AT1 and AT2 Groups post-intervention while controlling for use of mobility aid indoors with baseline scores used as a covariate.

```
GLM FESI.3 FES1.4 BY R.Group Mob.I WITH FESI.1.2.M
  /WSFACTOR=Time 2 Polynomial
  /METHOD=SSTYPE(3)
  /PLOT=PROFILE(Time*R.Group)
  /EMMEANS=TABLES(OVERALL) WITH(FESI.1.2.M=MEAN)
  /EMMEANS=TABLES(Time) WITH(FESI.1.2.M=MEAN)COMPARE ADJ(BONFERRONI)
  /EMMEANS=TABLES(R.Group) WITH(FESI.1.2.M=MEAN)COMPARE ADJ(BONFERRONI)
  /EMMEANS=TABLES(Mob.I) WITH(FESI.1.2.M=MEAN)COMPARE ADJ(BONFERRONI)
  /PRINT=DESCRIPTIVE ETASQ HOMOGENEITY
  /CRITERIA=ALPHA(.05)
  /WSDESIGN= Time
  /DESIGN= R.Group Mob.I FESI.1.2.M.
```

General Linear Model

[DataSet1] /Users/liztunnicliffe/Documents/SPSS Research Data/Liz Tunnicliffe AT Research Data August 2019 copy of Nov 2016.sav

Within-Subjects Factors

Measure: MEASURE_1

Time	Dependent Variable
1	FESI.3
2	FES1.4

Between-Subjects Factors

		Value Label	N
Research Group	1	AT1 Group	8
	2	AT2 Group	9
Mobility aid Indoors	7	No mobility aid indoors	9
	8	Mobility aid used indoors	8

Descriptive Statistics					
	Research Group	Mobility aid Indoors	Mean	Std. Deviation	N
FES-I Ass 3	AT1 Group	No mobility aid indoors	285.00	63.640	2
		Mobility aid used indoors	266.50	88.199	6
		Total	271.13	78.793	8
	AT2 Group	No mobility aid indoors	256.86	185.439	7
		Mobility aid used indoors	303.50	215.668	2
		Total	267.22	178.963	9
	Total	No mobility aid indoors	263.11	162.637	9
		Mobility aid used indoors	275.75	111.779	8
		Total	269.06	136.872	17
FES-I Ass 4	AT1 Group	No mobility aid indoors	279.50	51.619	2
		Mobility aid used indoors	264.83	144.180	6
		Total	268.50	123.593	8
	AT2 Group	No mobility aid indoors	280.43	196.427	7
		Mobility aid used indoors	205.50	160.513	2
		Total	263.78	182.346	9
	Total	No mobility aid indoors	280.22	171.088	9
		Mobility aid used indoors	250.00	138.865	8
		Total	266.00	152.688	17

Box's Test of Equality of Covariance Matrices[a]	
Box's M	4.086
F	1.091
df1	3
df2	433459.460
Sig.	.351

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

a. Design: Intercept + R.Group + Mob.I + FESI.1.2.M
Within Subjects Design: Time

APPENDIX 5.26

Multivariate Tests[a]							
Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Time	Pillai's Trace	.031	.417[b]	1.000	13.000	.530	.031
	Wilks' Lambda	.969	.417[b]	1.000	13.000	.530	.031
	Hotelling's Trace	.032	.417[b]	1.000	13.000	.530	.031
	Roy's Largest Root	.032	.417[b]	1.000	13.000	.530	.031
Time * R.Group	Pillai's Trace	.025	.337[b]	1.000	13.000	.572	.025
	Wilks' Lambda	.975	.337[b]	1.000	13.000	.572	.025
	Hotelling's Trace	.026	.337[b]	1.000	13.000	.572	.025
	Roy's Largest Root	.026	.337[b]	1.000	13.000	.572	.025
Time * Mob.I	Pillai's Trace	.112	1.648[b]	1.000	13.000	.222	.112
	Wilks' Lambda	.888	1.648[b]	1.000	13.000	.222	.112
	Hotelling's Trace	.127	1.648[b]	1.000	13.000	.222	.112
	Roy's Largest Root	.127	1.648[b]	1.000	13.000	.222	.112
Time * FESI.1.2.M	Pillai's Trace	.029	.389[b]	1.000	13.000	.543	.029
	Wilks' Lambda	.971	.389[b]	1.000	13.000	.543	.029
	Hotelling's Trace	.030	.389[b]	1.000	13.000	.543	.029
	Roy's Largest Root	.030	.389[b]	1.000	13.000	.543	.029

a. Design: Intercept + R.Group + Mob.I + FESI.1.2.M
Within Subjects Design: Time

b. Exact statistic

Mauchly's Test of Sphericity[a]							
Measure: MEASURE_1							
					Epsilon[b]		
Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Time	1.000	.000	0	.	1.000	1.000	1.000

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.
a. Design: Intercept + R.Group + Mob.I + FESI.1.2.M Within Subjects Design: Time
b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Sphericity Assumed	1475.581	1	1475.581	.417	.530	.031
	Greenhouse-Geisser	1475.581	1.000	1475.581	.417	.530	.031
	Huynh-Feldt	1475.581	1.000	1475.581	.417	.530	.031
	Lower-bound	1475.581	1.000	1475.581	.417	.530	.031
Time * R.Group	Sphericity Assumed	1191.585	1	1191.585	.337	.572	.025
	Greenhouse-Geisser	1191.585	1.000	1191.585	.337	.572	.025
	Huynh-Feldt	1191.585	1.000	1191.585	.337	.572	.025
	Lower-bound	1191.585	1.000	1191.585	.337	.572	.025
Time * Mob.I	Sphericity Assumed	5832.268	1	5832.268	1.648	.222	.112
	Greenhouse-Geisser	5832.268	1.000	5832.268	1.648	.222	.112
	Huynh-Feldt	5832.268	1.000	5832.268	1.648	.222	.112
	Lower-bound	5832.268	1.000	5832.268	1.648	.222	.112
Time * FESI.1.2.M	Sphericity Assumed	1378.087	1	1378.087	.389	.543	.029
	Greenhouse-Geisser	1378.087	1.000	1378.087	.389	.543	.029
	Huynh-Feldt	1378.087	1.000	1378.087	.389	.543	.029
	Lower-bound	1378.087	1.000	1378.087	.389	.543	.029
Error(Time)	Sphericity Assumed	46011.294	13	3539.330			
	Greenhouse-Geisser	46011.294	13.000	3539.330			
	Huynh-Feldt	46011.294	13.000	3539.330			
	Lower-bound	46011.294	13.000	3539.330			

APPENDIX 5.26

Tests of Within-Subjects Contrasts							
Measure: MEASURE_1							
Source	Time	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Linear	1475.581	1	1475.581	.417	.530	.031
Time * R.Group	Linear	1191.585	1	1191.585	.337	.572	.025
Time * Mob.I	Linear	5832.268	1	5832.268	1.648	.222	.112
Time * FESI.1.2.M	Linear	1378.087	1	1378.087	.389	.543	.029
Error(Time)	Linear	46011.294	13	3539.330			

Levene's Test of Equality of Error Variances[a]				
	F	df1	df2	Sig.
FES-I Ass 3	3.047	3	13	.067
FES-I Ass 4	.887	3	13	.474

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + R.Group + Mob.I + FESI.1.2.M
Within Subjects Design: Time

Tests of Between-Subjects Effects						
Measure: MEASURE_1						
Transformed Variable: Average						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	1826.053	1	1826.053	.144	.710	.011
R.Group	4187.261	1	4187.261	.331	.575	.025
Mob.I	6462.881	1	6462.881	.511	.487	.038
FESI.1.2.M	453947.357	1	453947.357	35.912	.000	.734
Error	164329.370	13	12640.721			

APPENDIX 5.26

Estimated Marginal Means

1. Grand Mean			
Measure: MEASURE_1			
		95% Confidence Interval	
Mean	Std. Error	Lower Bound	Upper Bound
265.793[a]	19.327	224.039	307.548
a. Covariates appearing in the model are evaluated at the following values: Mean of Ass.1 & Ass.2 = 281.59.			

2. Time

Estimates				
Measure: MEASURE_1				
			95% Confidence Interval	
Time	Mean	Std. Error	Lower Bound	Upper Bound
1	267.818[a]	20.932	222.598	313.039
2	263.768[a]	22.763	214.592	312.944
a. Covariates appearing in the model are evaluated at the following values: Mean of Ass.1 & Ass.2 = 281.59.				

Pairwise Comparisons						
Measure: MEASURE_1						
					95% Confidence Interval for Difference[a]	
(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	Sig.[a]	Lower Bound	Upper Bound
1	2	4.050	20.454	.846	-40.138	48.238
2	1	-4.050	20.454	.846	-48.238	40.138
Based on estimated marginal means						
a. Adjustment for multiple comparisons: Bonferroni.						

Multivariate Tests						
	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Pillai's trace	.003	.039[a]	1.000	13.000	.846	.003
Wilks' lambda	.997	.039[a]	1.000	13.000	.846	.003
Hotelling's trace	.003	.039[a]	1.000	13.000	.846	.003
Roy's largest root	.003	.039[a]	1.000	13.000	.846	.003
Each F tests the multivariate effect of Time. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.						
a. Exact statistic						

APPENDIX 5.26

3. Research Group

Estimates				
Measure: MEASURE_1				
			95% Confidence Interval	
Research Group	Mean	Std. Error	Lower Bound	Upper Bound
AT1 Group	252.573[a]	30.524	186.631	318.515
AT2 Group	279.014[a]	29.507	215.268	342.760
a. Covariates appearing in the model are evaluated at the following values: Mean of Ass.1 & Ass.2 = 281.59.				

Pairwise Comparisons						
Measure: MEASURE_1						
					95% Confidence Interval for Difference[a]	
(I) Research Group	(J) Research Group	Mean Difference (I-J)	Std. Error	Sig.[a]	Lower Bound	Upper Bound
AT1 Group	AT2 Group	-26.441	45.940	.575	-125.689	72.807
AT2 Group	AT1 Group	26.441	45.940	.575	-72.807	125.689
Based on estimated marginal means						
a. Adjustment for multiple comparisons: Bonferroni.						

Univariate Tests						
Measure: MEASURE_1						
	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Contrast	2093.630	1	2093.630	.331	.575	.025
Error	82164.685	13	6320.360			
The F tests the effect of Research Group. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.						

4. Mobility aid Indoors

Estimates

Measure: MEASURE_1

Mobility aid Indoors	Mean	Std. Error	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
No mobility aid indoors	282.086[a]	29.381	218.613	345.559
Mobility aid used indoors	249.501[a]	30.369	183.893	315.109

a. Covariates appearing in the model are evaluated at the following values: Mean of Ass.1 & Ass.2 = 281.59.

Pairwise Comparisons

Measure: MEASURE_1

(I) Mobility aid Indoors	(J) Mobility aid Indoors	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a] Lower Bound	95% Confidence Interval for Difference[a] Upper Bound
No mobility aid indoors	Mobility aid used indoors	32.585	45.572	.487	-65.866	131.036
Mobility aid used indoors	No mobility aid indoors	-32.585	45.572	.487	-131.036	65.866

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

Univariate Tests

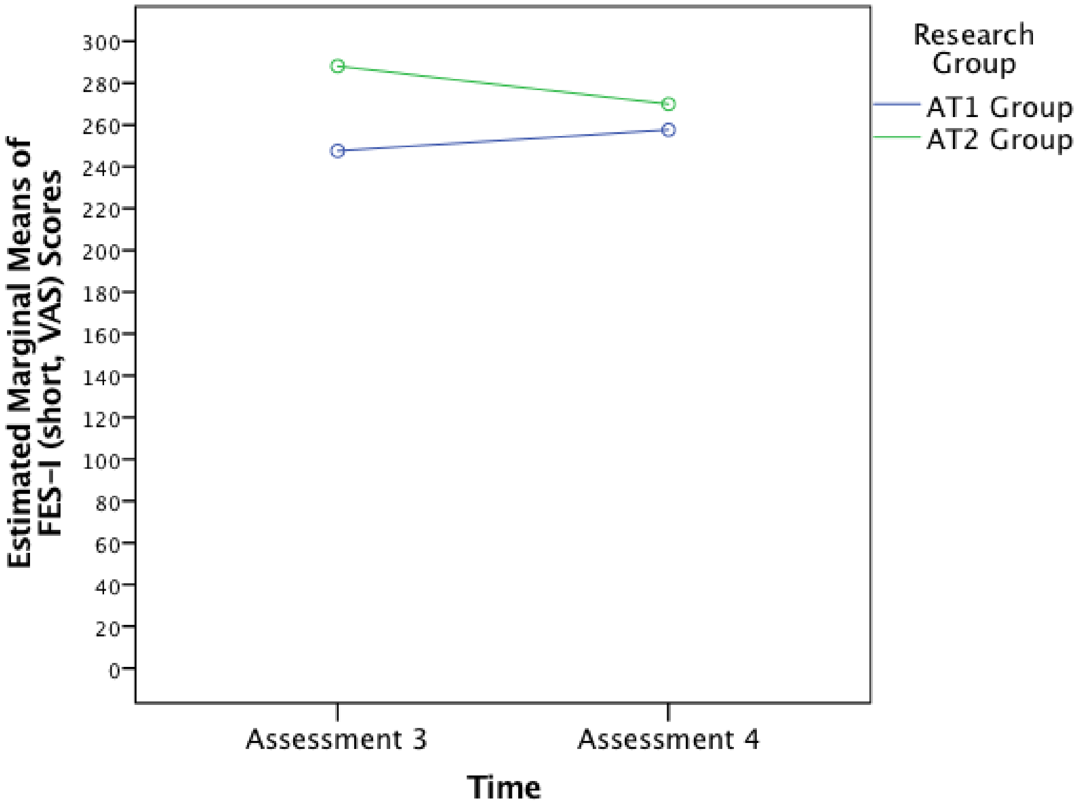
Measure: MEASURE_1

	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Contrast	3231.440	1	3231.440	.511	.487	.038
Error	82164.685	13	6320.360			

The F tests the effect of Mobility aid Indoors. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.

APPENDIX 5.26

Profile Plots



Appendix 5.27

Research Groups: AT1 & AT2 - Focus Group Schedule

1. About the Alexander Technique

1.1 From your experience on the course what do you think about the Alexander Technique?

1.2 Have you applied what you have learned on the course in your daily life?

1.2.1 If yes:
- What have you found most useful?
- What have you found least useful?
- Do you think that learning AT has had any effect on your confidence to carry out daily activities?

1.2.2 If no, is there a reason or reason(s) why you haven't applied it?
- Forgot?
- Too much to remember?
- Any other reason(s)?

2. About the Course

2.1 What do you think about the number of sessions?
2.2 What do you think about the frequency of sessions (once a week)?
2.3 What do you think about the length of each session?
2.4 Could the course be improved?
- Talks
- Practicals
    - Are there any other activities which you think should have been included on the course?
    - Are there any activities you think could have been left out?
- Number of teachers/amount of individual help received

Focus Groups to be video recorded (including audio).

Appendix 5.28

Interview Schedule – with Scheme Manager, AT1 Venue

Knowing each of the participants on the AT course well, what comments could you make from your observations and/or discussions with residents or their families and friends of the impact of doing the course, in terms of:

- Changes in balance/movement confidence?

- Did you observe any changes in participation in events/activities/trips out etc?

- Would you attribute any changes to the AT course?

With the exception of medical reasons, the drop-off rate was low and attendance remained good throughout. How does that compare with other activities/courses at [name of AT1 venue] from your experience?

Thank you very much for agreeing to be interviewed.

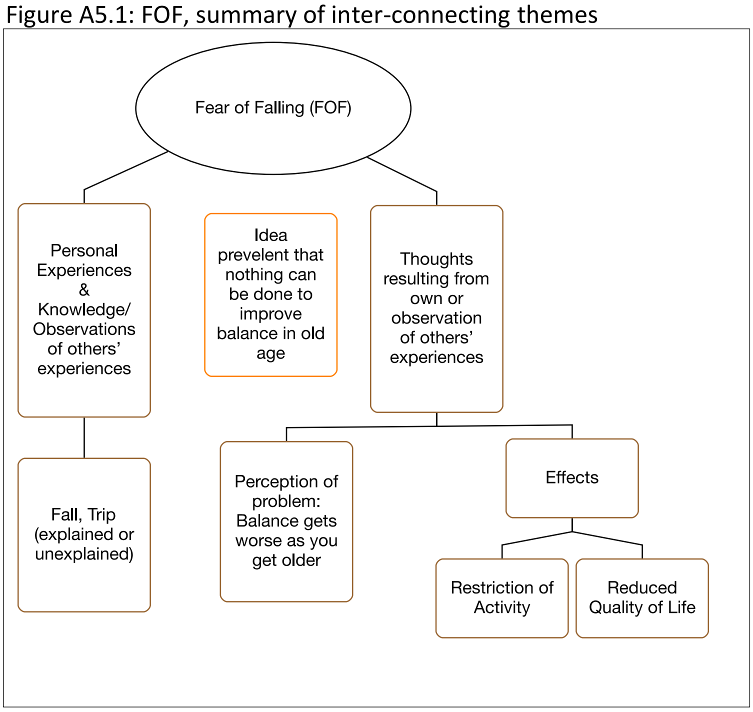
QUALITATIVE DATA ANALYSIS – SUMMARY DIAGRAMS & QUOTATIONS

These summary diagrams emerged from analysis of the data and were compiled using NVivo Software.

FOF, background to the research study

Themes relating to FOF emerged from the qualitative data and confirmed its prevalence amongst the participants in the study. These inter-connecting themes are shown in figure A5.1.

Figure A5.1: FOF, summary of inter-connecting themes



FOF, sample of comments by participants

Personal experience of falls:

AT2.FG:

'… No, since I've had those two falls my confidence has gone, it's gone a bit … I was in [town] *on Sunday when I came to the spot where I fell' (Mo).*

'Where you'd fallen before?' (Mabel).

'I really went all 'you know' [gesture of uncertainty] *but I didn't go up that kerb again I walked a bit further … I can't be quite as confident wandering round like I normally do in lots of places, I think, oh no, I won't go that far' (Mo).*

'… when you came to the spot and you went all 'you know', could you tell what was happening there with the thought of, you know, this is where … (researcher).

'Oh yes, I just went a bit, 'I don't want to go up that curb, I'll go round' (Mo).

'Would you say you were 'tensing up' a bit?' (researcher).

'Yes, definitely, my shoulders were "up here" ' (Mo).

and

'I'm very frightened of tripping once you've had a couple of broken wrists, elbows, and things, ankles ...' (Beverley.AT2.FG).

Observed effects of a fall on others' lives:

'I've seen one or two in here as have broken bones, and then you're stuck aren't you' (Kate.AT1.Int).

Some resignation about falls:

'… as I said, if I do fall I can't get up again I have to have assistance' (Geoffrey.AT1.Int).

and

AT1.Int:

'You haven't had a fall since?' (researcher).

'One or two, but I've known I was going to fall. You know, I knew the reason I was falling. It's when you don't know isn't it' (Ena.AT1.Int).

Comments about balance:

'It's your balance, sometimes I'm all over the place' (Kate.AT1.FG).

'It is all balance I think mostly, isn't it, do you think so? Your balance, is that the worst thing?' (Kate.AT1.FG).

'I wonder why? Everyone I talk to are the same. I wonder why that is when you get older? Must be something that's worn out or something ...' (Kate.AT1.Int).

AT1.Int:

'You see, you lose your balance, that's the trouble' (Ena).

'Mmm' (researcher).

'We all say the same, as you're getting older, you are always frightened of falling' (Ena).

Restriction of own activity:

' … I can't be quite as confident wandering round like I normally do in lots of places, I think, oh no, I won't go that far' (Mo.AT2.FG).

AT1.Int:

'I used to go shopping you see, we have a bus here, and I used to go shopping every fortnight, but I've never dared to go since [discharge from hospital] *because, the steps that go up to it aren't attached to the bus' (Ena).*

'Right, yes' (Researcher).

'And of course, getting down, oh it frightens me to death' (Ena).

'Yes' (Researcher).

'People say, we won't let you fall, but you feel as if you're falling all the time ... I'm not moaning, it could be worse (laughs)' (Ena).

Outcomes of the intervention

A structure emerged from the data themes regarding outcomes of the intervention, shown in Figure A5.2 (p431).

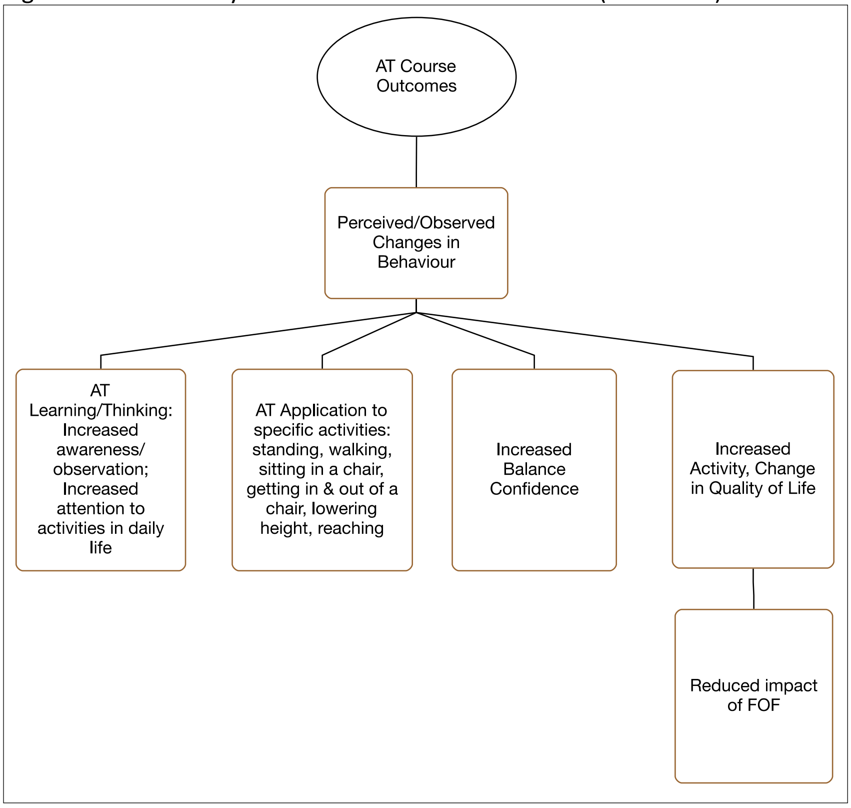
Outcomes of the intervention: sample of comments by participants

AT learning and thinking - Increased conscious awareness of activities in daily life:

'I'm ... more aware … of different things … and looking where I'm going when I'm out, like you said. You know, because I used to have a terrible habit of, my eyes were anywhere but where I was going. I mean you've got to, sort of, see ahead of you but … I didn't sort of look where my feet were going' (Kate.AT1.Int).

'And as you say, the awareness, where am I now, where do I want to be now, and think about it instead of just doing it' (Phyllis.AT2.FG).

Figure A5.2: summary of outcomes of the intervention (AT course)



Thinking about balance and movement outside of the course sessions:

> *'You have to stop and think about it. See, you don't always think about things do you and sometimes it pulls you up, quite sharp and you have to think what you're doing' (Ena.AT1.Int).*

> *'I think we are actually all thinking a lot more of what we are doing really. I feel that is one of the biggest things ... ' (Mabel.AT2.FG).*

> *'I certainly don't, think about how you walk normally do you? You just do it' (Phyllis.AT2.FG).*

'It's thinking first isn't it – you've made us think, I think that's the main thing' (Beverley.AT2.FG).

A decline in habitual 'rushing' was associated with AT learning by one participant in particular:

'Yes, yes, I don't rush. For one thing I can't really rush but on the other hand I do take my time because I think well I'm not really in a big hurry, what am I rushing for? If I get to the bus station … it is a nuisance, but if the bus has gone, then in about ten minutes there's going to be another one. So, yes, going across the road here. We go out here and at one time I used to think, I'd better get across here, but now I don't I just wait until the road's clear. That's another thing I have to think about because I've got to get across the road in time. I stop and think about the traffic and I take my time going across the road. If I've missed the bus, I've missed it, but there will be another one. So, I think it's stopped me rushing' (Mabel.AT2.Int).

AT application to specific activities:

Application of AT learning in the following activities were most frequently reported as being particularly useful: standing, walking, getting in and out of chairs, lowering height and reaching:

Getting in and out of a chair:

'For getting up and out of the chair that helped didn't it' (May.AT1.FG).

'I think getting up off your chair and all those sorts of things ...' (Ena.AT1.FG).

'Like when you are getting out of a chair, thinking about it, you know' (Amy.AT2.FG).

Sitting in a chair:

'I mean this is the thing, with sitting in the chairs, I mean if I sit in a chair when I go for my lunch and that, I always make sure I sit back in the chair, instead of slouched, you know, and I used to wonder why my back aches' (Kate.AT1.Int).

'Well I've had a bad back this last three weeks, very bad, very bad and it's helped me it's helped me to sit properly with my back flat on the chair and its helped me to get up, it hasn't hurt to do that, to get up, now if I got up how I used to get up it does' (Rita.AT2.FG).

Standing:

'And, standing, I used to always stand on this toe when standing at the bus stop because it hurt so much but now I've found that if I do it with this leg when I'm standing and put that in it's much better just standing ...' (Mo.AT2.FG).

'I know the standing part does help' (Mabel.AT2.Int).

Walking:

'Mine was my walking really and the two falls I had not long ago. So, I do watch in front of me now, you know, that sort of thing, then put my head up, but I do scan in front of me now, you know' (Mo.AT2.FG).

'It's given me confidence as I could walk all round there on my own' (Jane.AT1.FG).

'It's still there, I always try to walk straight and I try not to lean over when I'm walking because I think that is going to be permanent for me if I started that' (Glenda.AT2.Int).

Lowering height:

' ... from the chair and from getting up, you think about how you go down before you get up again, a back to front way of thinking I know but ... I do plan my moves better shall I say' (Beverley.AT2.FG).

'Bending the knees … yes, when I'm picking something up I'm doing that (demonstrates)' (Vera.AT2.FG).

Reaching:

AT1.FG:

'Well, the one about the wardrobe because I nearly had that on top of me. I took that in, I took that in' (Jean).

' … about reaching?' (Researcher).

'Yes, yes ... because you don't realise you've got that space in-between you and you're pulling and it comes with you ... ' (Jean).

Increased balance confidence. Participants reported increased confidence in practical activities of daily life:

AT1.Int:

'I mean I've been going out with me daughter this last 2 or 3 months and I've really enjoyed it' (Jean).

'Yes, oh great' (researcher).

'In truth, it's given me a bit more confidence' (Jean).

'Confidence, oh good' (researcher).

'Yes' (Jean).

'Yes, and has your daughter noticed that do you think?' (researcher).

'Well, she says she thought I was walking a bit better. I wasn't so nervous holding on, you know' (Jean).

'Yes' (researcher).

'I've got it [confidence] *a bit now, you know' (Jean).*

'That's good, isn't it' (researcher).

'Yes, yes' (Jean).

'And you put that down to the course?' (researcher).

'Well I do, yes, because beforehand I was very nervous, very nervous. I used to think, if I'd got to go somewhere the next day, I'd be in bed all night thinking: I've got to do that tomorrow, how am I going to do this, you know' (Jean).

and (later in interview):

'I'm a lot better than what I was – not so afraid' (Jean).

'That's' (Researcher).

'Oh, I was so afraid' (Jean).

'Yes, yes' (Researcher).

'Am I ever going to walk again … my daughter used to say to me "mother, you're not going in a wheelchair. I'm not pushing you round in a wheelchair". And I used to think to myself, "what am I going to do? I'll have to push myself" (laughs). And then you have to think, well they don't want to have you being pushed round in a wheelchair' (Jean).

AT2.FG:

'Do you think the things you've learned have helped at all with that [confidence]?' (researcher).

'Yes, I do' (Jenny).

'You do Jenny?' (researcher).

'It's nice that isn't it' (Mabel).

'So, it's helped your confidence has it Jenny?' (researcher).

'Yes, yes I do' (Jenny).

The housing scheme manager (SM) at the AT1 venue reported observations of increased confidence, particularly in getting out of chairs and walking:

' ... and the difference in them all actually when you watch them when they come down. Because they used to really struggle and it would take us all a lot of effort just to get them just to standing, whereas now, they sort of sit and have this look on their faces as if they're concentrating and then they're up, they're up on their feet without any of that struggling' (SM.AT1.Int).

Increased activity and change in quality of life:

Some participants reported increased activity outside of their own apartment or the housing complex. This was particularly noticed by the SM for participants who had previously been observed to be restricting their activity:

SM.AT1.Int:

'I've noticed Kate a lot more. She was really struggling, but no, she's been down here on a daily basis and she goes out with her daughter and things. Usually, or before, what used to happen is, she'd meet her daughter and her daughter would go out and get whatever it was she needed and she'd wait for her to come back, whereas now, she seems to go with her. And she's been going out also for tea with, I think it's her granddaughter, on a weekly basis. So, she's got a much more active life now, definitely' (SM).

SM.AT1.Int:

'Ena had lost a lot of confidence because she'd been in hospital for a long time and we were quite worried about her because she'd always been very active and then she was in hospital and she wouldn't come out of her flat. But, she's back to her old self now. She takes her time, but she is back down. She comes down for lunch and down for coffee morning. So, it's nice to have Ena back, we were quite concerned about Ena. I didn't think she'd stick at it' (SM).

'Didn't you?' (researcher).

'Because she hadn't been coming down at all, but she has and it's been brilliant. And it's nice for Ena and Kate as well because they're friends. Nice for them to have done it together' (SM).

A member of the AT2 group began walking unaccompanied to the course sessions. This was observed and remarked upon by fellow participants, and noted by the researcher:

'Jenny, whose daughter had accompanied her to the session on Tuesday, appeared at the door and said she had walked along [with her walking aid] to the session without her daughter. This was a major breakthrough for her as evidenced by the reaction of the other people in the group' (Researcher, reflections: AT2.Course Session 2).

'Jenny walked along independently again as daughter hadn't arrived. Seems to be enjoying coming' (Researcher, reflections: AT2.Course Session 5).

Reduced impact of FOF

FOF was acknowledged by participants in both research groups. Its ***impact*** on daily life appeared diminished for some participants when applying AT learning.

SM.AT1.Int:

' ... you were quite surprised?' (researcher).

'Definitely, yes. I mean I had heard of the Alexander Techniques (sic), particularly when I used to work in Leeds. It was quite a big thing up there but I didn't really know

what it was and I didn't know how it could affect older people ... but yes, I've seen such a vast difference. Jean, she's just happier. Now she can get up and things she doesn't come in and moan, she comes in with a particular task that she needs help with. She's more constructive. So whether it's changed her and made her feel more positive I don't know. Maybe that's why her daughter is spending more time. So, it can change things dramatically can't it, just by their feeling a little bit more able' (SM).

'The fact that you can be a little bit more independent, you haven't got ... the thing that came out of talking to Jean was fear' (researcher).

'Yes' (SM).

'That's how fearful she'd been before, of doing anything' (researcher).

'Yes, they are all very fearful' (SM).

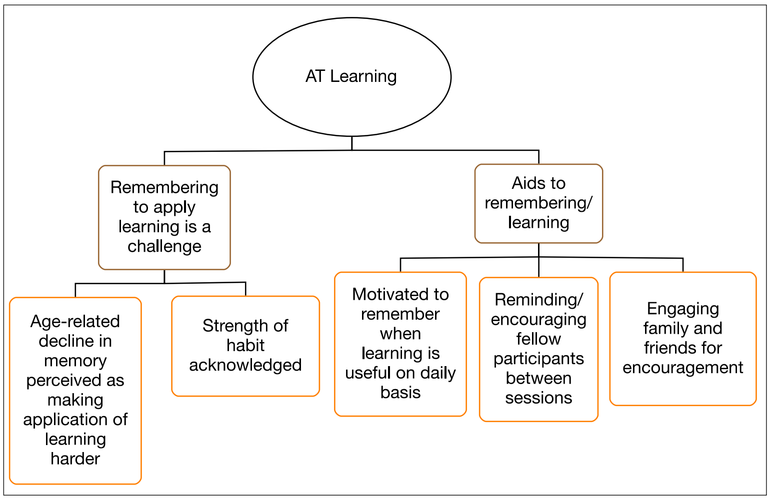
'It does seem that that has gone down, reduced, with Jean and that's maybe why she's …' (researcher).

'I'd say that's the same with them all, especially living somewhere like this, they see residents fall and they see how long they are in hospital and see them trying to recover and I think that scares a lot of them, which it would. So, it does stop them doing things. So, something like this has been brilliant' (SM).

Experience of learning AT

Comments from participants about their AT learning experience are summarised in Figure A5.3 (p440).

Figure A5.3: summary of participants' feedback on learning AT



Experience of learning AT: sample of comments by participants

The challenge of remembering:

There was some acknowledgement that a challenge of applying AT learning in-between course sessions was remembering to do so:

'If you follow it, but it's remembering to follow it, isn't it' (Kate.AT1.FG).

'It's keeping it up isn't it, you've got to remember all the time haven't you' (Ena.AT1.FG).

Strength of habit:

Some participants acknowledged that the strength of previously ingrained habit meant that remembering to apply learning was not always easy. However, this was experienced as possible with continued renewal of intention to do so.

> *'It's just a habit you get into isn't it' (May.AT1.FG).*

> *'When you've done something for years ...' (Kate.AT1.FG).*

> *'To start off with I had to stop and think, I shouldn't have done that, I should have done it the other way. You know, because you're so used to doing things the one way' (Kate.AT1.Int).*

Age-related decline in memory was mentioned by one participant as adding to difficulty remembering:

> *'Well, yes, really, because our memories are going a bit you know …' (Jean, AT1.FG).*

Motivated by wanting to learn AT:

AT procedures found helpful were reported, by the same participant, to increase motivation and aid memory to apply learning:

' … we had the sessions once a week … did that seem the right distance apart for you? Was it easy to remember things between the sessions?' (Researcher).

'No, I could remember them a bit more, you know, a bit more, but, er, it's because it's things that you want to know' (Jean.AT1.Int).

Encouraging each other:

Encouragement of fellow-participants, and engaging family and friends in their own learning was used by some as a strategy to aid application outside course sessions:

'Yes ... Jean keeps onto us, you know Jean don't you … she keeps saying "1,2,3, up" (laughs). She's enjoyed it, really enjoyed it' (Ena.AT1.Int).

'My grandchildren do it with me now' (Rita.AT2.FG).

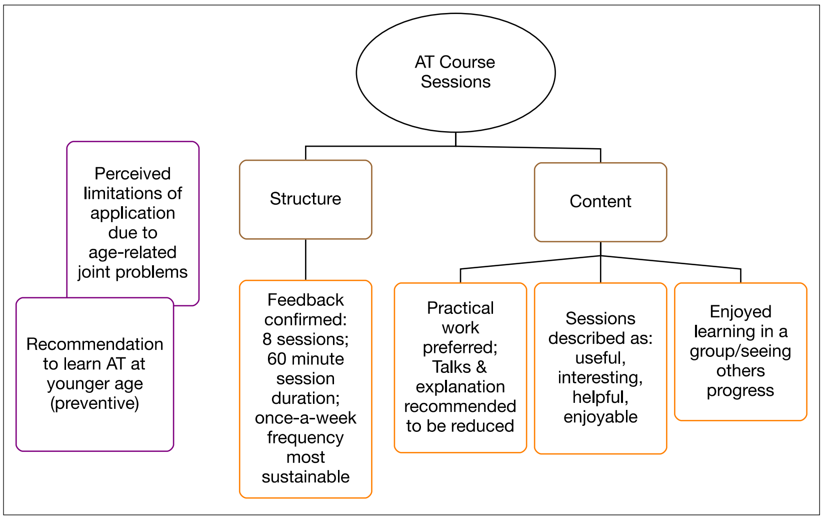
'Yes, I remember walking down the corridor one day and I'd been telling […] out of the office about it and she said "pick your feet up!" (laughs) and I said I wish I'd never told you now, or something like that because I'd told her what we'd done!' (Mabel.AT2.FG).

'I think that is the other thing you have taught us, you tend to observe other people because we've been taught to observe one another in the class. Not disrespectfully but to see how they do things you know' (Mabel.AT2.FG).

The AT course (intervention)

Comments by the participants are summarised in Figure A5.4.

Figure A5.4: Summary of participants' feedback on AT course sessions (the intervention)



The AT course (intervention): sample of comments by participants

Number of sessions

Eight sessions were regarded by most people as an appropriate length for the course.

Attending twice a week was a significant commitment for members of the AT2 group:

> *'I think the number of sessions was absolutely fine, eight sessions, it soon went really didn't it for us, I mean I think I went to all of them excepting this last time, I couldn't make it. I think it went really good' (Glenda.AT2.Int).*

> *'No, I think had enough after eight, at that particular time. Whether we'd have had another go after but when we'd had eight, I thought that was quite a lot, and to come twice a week and to have 8 was getting, you know. 'Cus, living in here it is quite*

hectic most of the time, there's always something one way or the other'

(Mabel.AT2.FG).

AT1.FG:

'So, what did you think about the number of sessions because we had eight didn't we. Eight Fridays. Do you think that was um about right, not enough, too many? What did you think about that?' (Researcher).

'Probably too many' (May).

'*It's keeping it up isn't it' (Kate).*

'Too many? Any ... other thoughts?' (Researcher).

'It was alright' (Ena).

'Alright, yes. It's just remembering to do the things' (Kate).

'I think about right, but if there were any more sessions I'd like to come.'

(Geoffrey.AT1.Int).

Frequency of sessions

Advantages and disadvantages were apparent for both frequencies.

Once-a-week (AT1 group):

'Well, it's a long while between each session ... wasn't it really ... it would have been better having them a bit closer together … well Friday morning's alright but it's a

long while in-between. You've forgotten by the time you come the next time' (May.AT1.FG).

'And did you think once a week was about right?' (Researcher).

'About right, yes' (Geoffrey.AT1.Int).

AT1.Int.Jane:

'And was once a week about the right spacing for them? Because, um, you know we could have had, say, twice a week just for 4 weeks but we did it once a week for 8 weeks' (Researcher).

'*That was alright with having those other exercises and that' (Jane).*

'Yes' (Researcher).

'With various things that we've got you know' (Jane).

Twice-a-week (AT2 group):

'Beverley and I found twice a week quite a lot to fit in' (Phyllis.AT2.FG).

'Quite good. I think it was easier to remember' (Vera.AT2.FG).

Length of sessions

Sessions of 60 minutes were thought appropriate overall, with some acknowledgement of it being relatively short:

'Yes, just about right, yes, I think everything's about an hour' (Jane.AT1.Int).

'It takes that long to get through everything, doesn't it, to give us all individual attention. That was alright, yes, we all had individual turns. The time was alright' (*Ena.AT1.Int).*

'Well, if you haven't got an hour you haven't got much time have you, let's face it, when you're in a group of people and you're all doing it and everybody is going to have a turn, you don't have a great deal of time if you don't have an hour have you' (Glenda.AT2.Int).

'We couldn't have done it in less, because we always seemed to have a little bit of a rush at the last few minutes' (Beverley.AT2.FG).

Practical content appreciated

Practical content of the sessions was appreciated more than explanatory talks by the majority of participants:

'I did a bit of talking, and then we did a bit of practical' (Researcher).

'Oh yes, very good it was, yes' (Kate.AT1.Int).

'And, did it help to have the explanations?' (Researcher).

'Yes, I mean and also, doing things. If you'd sat there explaining and went over an hour, you don't take it in, especially at our age' (Kate.AT1.Int).

'Well, I think it was er, you know, alright. I will admit, I told the others and they said it's a lot of talk, like, you know. I said well I suppose they have to explain to us, all about pretty much. They did say that, you know. Well you've got to explain haven't you, really, what it was all about …' (Jane.AT1.Int).

'I did find some of it boring. Some of the chat, the bits you read out to us, some of it was a bit complicated for us. And I mean it was too much to take in, a page or two pages. Little things popped out but, I did, I'm sorry but I did find some of it ... yes, a bit repetitive' (Mo.AT2.FG).

'No, you could never talk too much, it's nice to learn things' (Jean.AT1.Int).

Group learning enjoyed

Participants appeared to enjoy learning in a group and watching others progress:

AT2.FG:

'There were ones that stuck in your memory more where you had actually done something, but it was all so nice, to see other people making advances, you know' (Phyllis).

'So, you enjoyed working as a group and seeing each other improve?' (Researcher).

'Knowing that other people were finding it useful as well' (Phyllis).

'Yes' (Researcher).

'And I mean if they look silly and you look silly it didn't really matter' (laughter) (Mabel).

'I thought Jenny did exceptionally well. That older lady. I thought she really tried didn't she and you could see her listening to you what you were saying, you know' (Mabel.AT2.Int).

AT2.FG:

'So, do you think about it [AT] when you are in your flat then when you are walking around in your flat?' (Researcher).

'Yes, I do' (Jenny.)

'Yes, and to see you walking obviously here, by yourself' (Researcher).

'Yes' (acknowledgement by others in group).

'Which she didn't do at first did she' (Mo).

AT2.Int:

'And what did you think about the way we worked in groups and observing each other?' (Researcher).

'Oh, good, that was very good, yes, I did, and I do think the other people in the group as well, give them perhaps a little bit of confidence to do things that they wouldn't do' (Glenda).

'Yes, it seemed, people seemed to like the observing of each other … ' (Researcher).

'I think you try that little bit harder, actually … ' (Glenda).

'Yes, and also recognising that everyone has got slightly different difficulties' (Researcher).

'That's right' (Glenda).

'But supporting each other so, just comments, it was all very supportive' (Researcher).

'It didn't matter if they laughed because, you know, everybody was taking it in good part really' (Glenda).

Positive feedback about the course

General feedback about the course was positive:

'I found it very interesting. I think it's very helpful' (Geoffrey.AT1.FG).

'I enjoyed it' (Jean.AT1.Int).

'I can remember when I first enrolled … I was actually saying I don't think I need to do this but I'm coming to keep Phyllis company. You see, it's your own perception. I think sometimes you can approach things with a closed mind and think what have you got to teach me, like teaching your grandmother to suck eggs and all those sorts of things, but I think it has made us open our minds, this has. Because you're never too old to learn no matter what anybody says (laughter in group)' (Beverley.AT2.FG).

Perception of some restrictions to AT application

Some participants commented that in their view, joint and/or balance problems were a limiting factor in enabling them to apply their AT learning:

Kate.AT1.Int:

'So, what do you think, in terms of the things we did, like when we looked at standing?' (Researcher).

'Yes' (Kate).

'And walking?' (Researcher).

'Yes, and I mean, I don't pick a lot of things up, but sometimes. I do try that to stand with your legs and bend me knees, I do try, to bend me knees, but I've had arthritis that bad ... (laughs) but er, yes, it comes easier, with practice, it's like everything, isn't it' (Kate).

'I don't think I've been a very good example to you because getting up and down is such a problem for me, I can't get up and down how you would like me to get up and down. And I have tried to walk lifting my feet up? But at times they do hurt and it's such an effort to walk I sometimes want to drag my feet' (Mabel.AT2.Int).

'Well, obviously I couldn't get on the floor like when you were showing us, no way on earth could I do that, get down on my knees or try to pick things up, no way' (Glenda.AT2.Int).

Recommendation to learn AT at an earlier age:

There was a general view that AT learning was helpful but would have been more advantageous if the opportunity had been available at an earlier age.

'Unfortunately, I think we were all rather set in our ways with what we do things. I think we've discussed this before really. Possibly if we'd have started doing it perhaps a lot earlier it would have perhaps helped us, you know, to help us in our later life really. I don't know if anybody else feels like that?' 'Yes' (agreement in group) *(Mabel.AT2.FG).*

'I think it's good but I do think with having such bad joints if I'd been shown it a little bit earlier I would have benefitted more by it. I do try you know when I'm getting up or that, so yes, I think it's very good but I do think it should be done perhaps when people are a little bit more healthy' (Glenda.AT2.Int).

AT1.SM.Int:

'Yes, that is one thing that has come out in this research is that some of the people have said if only we'd had this ten years ago' (Researcher).

'Yes, absolutely' (SM).

'You know, it would have helped longer term' (Researcher).

'Yes, I think it would be really good for some of our younger residents who refuse to admit they've got a problem at the moment "because they're not old enough" as far as they are concerned. They're in the approaching 70/75, but I can see that they are going to start to struggle and if they could learn it now, it would stop them having problems. But, it's getting through to the younger ones' (SM).

Sustained enthusiasm for attendance

The SM at the AT1 venue commented on sustained enthusiasm for the course by the participants:

AT1.SM.Int:

‘and attendance...how would you say that compares to other things that go on?’ (Researcher).

‘I would say it’s very good. Yes, because we’ve had things like the [name of course] which at first everybody absolutely loved. Now we have to virtually drag them to it. We have a class, [name of class] on a Friday which again, used to be packed, and they did perhaps 4, 5 weeks of it and now we again, have to drag them to it, so it’s good that they kept to it.

‘How many weeks was it?’ (SM).

‘It was eight’ (Researcher).

‘Eight, so that’s good’ (SM).

‘We originally recruited 13 and one dropped out before it started, so 12 started the course. Ten … did it, um, with missing a few and eight actually completed everything with all the assessments’ (Researcher).

‘That was really good’ (SM).

‘But I just wondered how it compared to, er, other things really?’ (Researcher).

‘That’s very good. Because I know when we first spoke about it, we thought people would just drop off and you’d end up with none, so that’s really good and for 8 weeks as well, that’s good going, it is. I know we had to go and remind them sometimes but they were always keen and ready to go’ (SM).

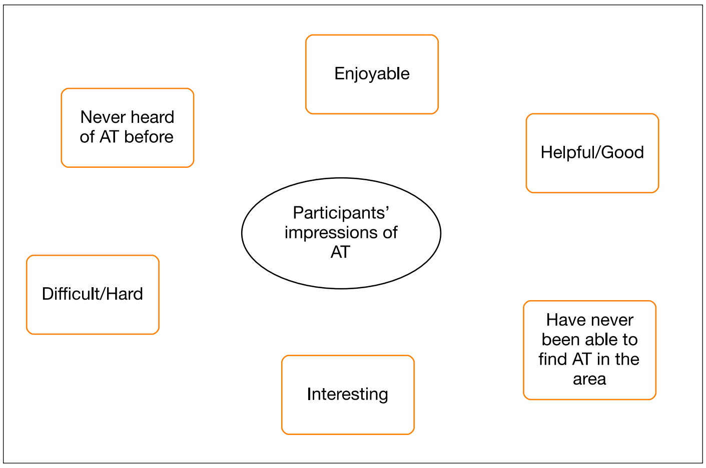
‘Once reminded, they would come wouldn’t they’ (Researcher).

‘They would, which is good. That is good, so they must have seen some benefit and must have been quite positive about it to do that’ (SM).

AT, participants' overall impressions

Participants overall comments about AT are summarised in diagram A5.5.

Figure A5.5: Summary of participants' overall impressions/thoughts about AT



AT, participants' overall impressions: sample of comments

AT was stated by some to be difficult:

AT1.FG:

'It's hard isn't it' (Kate).

'It was very difficult' (May).

'You thought it was difficult' (Researcher).

'I did' (May).

'Yes' (Researcher).

'I don't mean hard to do the … what is it? But, some of the moves I thought were a bit difficult' (May).

Some participants had not heard of AT prior to volunteering to participate in the research:

'I've never heard of it before' (Ena.AT1.FG).

'I thought it was a new thing, I'd never heard of it' (Mo.AT2.FG).

One participant had not been able to locate a teacher or courses previously:

'I've looked everywhere for courses on the Alexander Technique but there just aren't any round here' (Phyllis.AT2.FG).

Other comments:

'I enjoyed it' (Ena.AT1.Int).

'I think it's good. I'd never heard of it before, but I think it's good' (Jenny.AT2.FG).

'Well it's very helpful, you know, we've learned a lot from it' (Amy.AT2.FG).

'I've enjoyed it and found it very useful' (Beverley.AT2.FG).