UNIVERSITY OF SOUTHAMPTON

FACULTY OF MEDICINE, HEALTH AND LIFE SCIENCES

School of Psychology

Evaluation of a Website Designed to Encourage Older People to Undertake Balance Training for the Prevention of Falls

by

Samuel Robert Nyman

Thesis for the degree of Doctor of Philosophy

September 2007

UNIVERSITY OF SOUTHAMPTON

ABSTRACT

FACULTY OF MEDICINE, HEALTH AND LIFE SCIENCES

SCHOOL OF PSYCHOLOGY

Doctor of Philosophy

EVALUATION OF A WEBSITE DESIGNED TO ENCOURAGE OLDER PEOPLE TO UNDERTAKE BALANCE TRAINING FOR THE PREVENTION OF FALLS

by Samuel Robert Nyman

Falls are common and represent a major cause of severe injury and death among older people. Effective interventions to prevent falls have been developed, in particular 'balance training' - activities that enhance balance, coordination, and lower-leg muscle strength. However, older people's uptake of falls prevention interventions can be low, and so older people require advice to help motivate them to undertake balance training. Tailoring, the method of making advice personally relevant to individuals, has been successfully used with other health behaviours to make advice more persuasive. The Internet lends itself to tailoring health advice, as it can reach a wide audience and present personally relevant advice to users through interactive websites.

This thesis evaluated the use of tailoring in falls prevention. A website was created that presented tailored advice intended to encourage older adults to undertake balance training. Theory and research guided the selection of factors chosen to tailor the advice and to evaluate its efficacy. From interviews with older people and health and social care providers, views towards the website suggested that the website was usable and acceptable. In a randomised controlled evaluation comparing the tailored advice with a generic equivalent, questionnaire scores indicated that after receiving the tailored advice, older people reported that the advice was more personally relevant, and reported greater confidence and intention to undertake balance training. Completing an action plan also increased older people's confidence to undertake balance training.

Based on the feedback from participants derived from the two qualitative studies and the limitations identified from the quantitative study, a revised version of the website was created and re-tested. In a partial replication study, the tailored advice was reported by older people as more personally relevant and good for them to do, and creating an action plan increased their confidence to undertake balance training, although the effects of the intervention on intentions were weaker than in the first study, and did not quite reach significance. Nevertheless, the effect of tailoring on personal relevance and intention, and the effect of an action plan on confidence were significant in a meta-analysis of the two quantitative studies. Whilst not conclusive, this research suggests that a website providing tailored advice to encourage older people to undertake balance training may be usable and acceptable, and lead to greater intention and confidence to undertake balance training.

LIST OF CONTENTS

List of Figures

List of Tables

Acknowledgements

Lucy Yardley has fulfilled her role as supervisor with great patience and commitment, and has helped me develop my academic skills to complete this task. Chas Skinner was my advisor for the majority of my PhD study, who was a great support to me. I appreciate Rona Moss-Morris for becoming my advisor in the last year of my studies. I would also like to thank my colleagues in the School of Psychology for making my study a pleasant experience. Sharing an office has enabled me to learn a great deal from others, and so particular thanks to those in Chamberlain road and room 3095 (Karen, Harriet, Nicola, Kasia, Emily, Sarah, Nina, Aziz, Imogen, Flis, Maggie, and Michelle, etc.).

Outside of the school a number of people have made this research possible. Besides the Economic and Social Research Council for funding this project, Mario Mohammed and James Durrant at RioMed developed the balance training website free of charge. Pamela Holmes and Cheryl Blake at Help the Aged commented on and advertised the website, and members of the Prevention of Falls Network Europe (ProFaNE) checked the safety and appropriateness of the website advice. I am also indebted to those who assisted me in recruiting older people, including: Romola Bucks and Katie Meadmore for access to their research database; RioMed and Help the Aged for access to their distribution lists; the managers of social clubs, computer classes and computer suites; organisers of University of the Third Age meetings; health professionals; website hosts; and friends and family, in particular Angela Blackburn (my mother-in-law), for enthusiastically advertising the website to friends and family. Thanks also to Cathy Daykin at Southampton City Council for access to sheltered housing wardens and assistant wardens. Thanks also to all of those who freely gave their time to participate in my studies.

I am indebted to my wife Louise for all her patience, encouragement, and support throughout the last four years, and for giving me the joy of a daughter (Roxanna) in my final year of study. Lastly, I thank Jesus for the life I am blessed with, for a reason to get up in the morning, for skills and motivation, for peace, security, and joy that transcends circumstances, and the strength to face challenges and accomplish.

CHAPTER ONE
THE RATIONALE FOR ADVISING OLDER PEOPLE TO UNDERTAKE BALANCE TRAINING

1.1 Aims of this Chapter

The research presented in this thesis is the evaluation of an advice intervention delivered on the Internet, to help motivate older people to undertake balance training for preventing falls. The balance training website is described in detail in Chapter 3, and empirical studies that evaluated its usability, acceptability, and efficacy are presented in Chapters 4 to 7 and discussed in Chapter 8. The relevant literature has been reviewed in the first two chapters. Chapter 2 provides the rationale for tailoring the balance training advice, along with the theoretical and empirical support for this approach.

This first chapter provides the rationale for the approach adopted in this research in four sections. The first section provides the rationale for promoting balance training to older people. This includes a discussion of the prevalence and severity of falls in older people, and how interventions have been successfully designed to prevent falls, but that older people need encouraging to undertake these interventions. It will be argued that balance training is a particularly important intervention to be promoted. The second section will provide the rationale for using the Internet to communicate balance training advice. This will include a discussion on the use of computers and the Internet by older people, a discussion of computer-based approaches to delivering health interventions, and the advantages and disadvantages of using the Internet in psychological research. The third section will provide the rationale for combining quantitative and qualitative methods in evaluating the balance training website. Before concluding, the fourth and final section will present an overview of the content of the remaining chapters of this thesis.

1.2 The Rationale for Presenting Balance Training Advice to Prevent Falls

1.2.1 The Prevalence and Severity of Falls

A fall is "an unexpected event in which the participants come to rest on the ground, floor, or lower level" (Lamb, Jørstad-Stein, Hauer, & Becker, 2005, p. 1619). The majority of falls by community-dwelling elderly persons occur during relatively non-hazardous activity such as walking, changing position, or performing basic activities of daily living (Tinetti, 1997). Among adults aged 65 and over, 30% dwelling in the community and over 50% of those living in institutions fall each year (Tinetti & Speechley, 1989; Tinetti, Speechley, & Ginter, 1988). In addition, 50% of older adults who fall do so repeatedly (Tinetti & Speechley, 1989). This is because once an older person has suffered a fall they are at an increased risk of falls, with the greater number of falls, the greater the risk (Tinetti et al., 1988). Indeed, a 'post-fall syndrome' has been identified, where impaired balance leads a person to fall, which further impairs their balance, increasing their risk of future falls (Murphy & Isaacs, 1982).

Whilst falls are prevalent among older people, what has attracted researchers and policy makers' attention is the severe consequences of falls for older people. The consequences concern the older person's physical health, their psychological well-being, and the associated economical cost to the National Health Service and Personal Social Services.

Physical. Falls represent a major cause of severe injury and death among older adults. In the UK, the biggest cause of accidents is falls, representing 40% of injuries and 46% of fatalities (Department of Trade & Industry [DTI], 1998). In 2002, for the UK it was estimated that hospitals dealt with 604,566 falls by adults aged 65 and above (The Royal Society for the Prevention of Accidents, 2007), which currently equates to approximately 6.23% of those aged 65 and above (National Statistics, 2007). In 2003, the UK hip fracture rate was 721 per 100,000 for the population aged 60 and above, and 2,300 per 100,000 for the population aged 80 and above (Prevention of Falls Network Europe [ProFaNE], 2006a). From 1992 to 2003 there was a recorded increase in hip fractures. The hip fracture rate per 100,000 has increased since 1992 by 197 for the population aged 60 and above, and 498 for the population aged 80 and above (ProFaNE, 2006a). Whilst hip fracture rates would be expected to rise with the UK population becoming older (DTI, 1998), along with the global population (United Nations, 2002), fall-related injuries are increasing at a faster rate than can be explained by this shift in demography (Skelton & Todd, 2004).

Younger generations fall but suffer fewer injuries: adults aged below 65 constitute 81% of accidental falls that result in minor injury; however, adults aged 65 and above constitute 80% of accidental falls that result in death (DTI, 1998). Older people suffer fall related injuries more than younger generations because of age-related declines in physiology (e.g. slowed reactions to keep themselves upright) and a higher prevalence of chronic illnesses (e.g. osteoporosis) (Rubenstein, 2006). Approximately 30-50% of falls by older people result in minor injuries such as bruises, lacerations, and abrasions; 20% require medical attention; and 5% result in hip fracture or serious soft-tissue damage for those aged 65 and above, which rises to 10% in those aged 75 and above (Gillespie et al., 2003; Rubenstein, 2006; Tinetti, 1997; Tinetti & Speechley, 1989). Of those that suffer a hip fracture, 18% die, and those that survive spend on average 20 days in hospital (Todd et al., 1995). Once out of hospital, only 27% of survivors return to their pre-fracture level of functioning within 90 days, and 42% become more dependent on institutional and community care (Laxton et al., 1997). Hence, of those dwelling in the community before suffering a hip fracture, 35% do not return home within 90 days, as 10% move to a nursing home, 11% are still in hospital, and 14% die (Laxton et al., 1997).

Psychological. Even though approximately 90-95% of falls do not result in significant injury (hip fracture or serious soft-tissue damage), fear of falling and the associated activity restriction that follows leads to a reduction in quality of life (Tinetti & Speechley, 1989). Fear of falling was conceptualised as "a lasting concern about falling that leads to an individual avoiding activities that he/she remains capable of performing" (Tinetti & Powell, 1993, p. 36). It is related to a new fall-related concept of self-efficacy: "the degree of confidence a person has in performing common activities of daily living without falling" (Lamb et al., 2005, p. 1620). Suffering a fall is not essential to the development of fear of falling, although a falls history heightens the anxiety (Tinetti & Powell, 1993). Fear of falling has been correlated with balance and gait disorders, and diminished levels of self-reported quality of life, independence, activity, and social life (Lachman et al., 1998; Vellas, Cayla, Bocquet, de Pemille, & Albareole, 1987; Vellas, Wayne, Romero, Baumgartner, & Garry, 1997).

In the community dwelling, prevalence rates of fear of falls have varied from 20-85%, and associated avoidance activity from 15-55% in older people (Zijlstra et al., 2007). This large variance in prevalence rates may reflect differences in measurement of fear of falling and variations in the use of these measures (Jørstad, Hauer, Becker, & Lamb, 2005). From a recent survey of 4,031 older people dwelling in the community in the Netherlands, fear of falling was reported by 54.3%, and associated activity avoidance was reported by 37.9% of those reporting a fear of falls. Fear of falling was correlated with being older, female, worsened general perceived health, and previous falls (Zijlstra et al., 2007). A previous study found that 17% of community-dwelling older people in the USA worried about falling daily or weekly, and that fear of falling was higher than other fears such as of being robbed in the street, forgetting an appointment, financial problems, experiencing a serious health problem, and losing a cherished item (Howland, Peterson, Levin, & Fried, 1993). Indeed, having a fall and suffering a hip fracture is believed by some older people to remove their ability to live independently and socialise (Furstenberg, 1986; Thomas, 1997).

Economic. In 1999, UK Accident and Emergency departments had to deal with almost 650,000 instances of people over 60 who had suffered a fall, of which over 200,000 resulted in hospital admissions (Scuffham, Chaplin, & Legood, 2003). The economic cost of treating these older people who had fallen was estimated at almost £1 billion: 59% incurred by National Health Service (NHS) and the remainder by Personal Social Services for long term care (Scuffham et al., 2003).

Thus, preventing falls in older people will not only prevent the older person from suffering physically and psychologically, but will alleviate the NHS and Personal Social Services from caring for older people who have fallen. The prevention of falls in older adults has now become a key aim for improving the nation's health (Department of Health [DoH], 2001; Secretary of State for Health, 1999).

1.2.2 The Prevention of Falls

Research has found that falls are caused by an array of factors and that an accumulation of risk factors leads to an increased risk of falls (Skelton & Todd, 2004; Tinetti et al., 1988; Tinetti, Williams, & Mayewski, 1986). Interventionists can use one of two strategies to prevent falls: either target older people who are most at risk of a fall, to try to prevent them from falling or from further falls; or, target the older population at large, and try to lower the older population's risk of a fall (Skelton & Todd, 2005). These two strategies of preventing falls are not in competition with each other (Skelton & Todd, 2005), and have been recommended in recent reviews (Chang et al., 2004; DoH, 2002; Gillespie et al., 2003). This thesis pertains to the approach of preventing falls at the population-level, among community-dwelling older people who have not been identified as at risk of a fall.

Falls prevention interventions at the population level have been reviewed by McClure and colleagues (McClure et al., 2005). They identified five studies that assessed the effect of a multi-pronged falls prevention intervention on the community. The methodological quality of the studies and the outcomes targeted were mixed. McClure et al. found that all five studies reported a significant decrease or downward trend in fall-related injuries among older people after the intervention. However, the studies were limited in that they did not test the completeness and reliability of the administrative databases used, and information was lacking on how the interventions were delivered, which may have been informative concerning the barriers and facilitators to implementing falls prevention interventions.

Falls prevention interventions at the individual level have also been reviewed. A recent meta-analysis of randomised controlled trials (RCTs) found that the number of older people who fell and the monthly rate of falling was significantly reduced by falls prevention programmes (relative risk [RR] = 0.89), as was the number of falls per person (RR = 0.77) (RAND, 2003). Due to the many risks of falls identified, multi-factorial interventions (interventions targeting more than one behaviour) have been found to be most effective (Chang et al., 2004; Feder, Cryer, Donovan, & Carter, 2000; RAND, 2003; Scott, 2007; Skelton & Todd, 2005). Multi-factorial interventions can entail the distribution of questionnaires to identify those at risk of a fall, medical examinations for those at risk of a fall, and then interventions in response to the results of the examinations (RAND, 2003).

However, in delivering multi-factorial interventions it is unknown which aspect(s) are most effective in reducing falls (Cumming et al., 1999; Kannus & Khan, 2001). In addition, multi-factorial interventions are intensive, and so cannot be recommended for all older people because of their high cost. Thus, physical activity is recommended for all older people to prevent falls because it is the most effective single intervention (Chang et al., 2004; Gillespie et al., 2003; Marks, Allegrante, MacKenzie, & Lane, 2003; Scott, 2007). A recent meta-analysis found that physical activity interventions reduced the risk of falls by 12% and the number of falls by 19% (RAND, 2003). Balance training in particular has been recommended, because it has been found to be the most effective form of physical activity to prevent falls (American Geriatrics Society [AGS], British Geriatrics Society [BGS], & American Academy of Orthopaedic Surgeons [AAOS] Panel on Falls Prevention, 2001; Rubenstein, Kenny, Eccles, Martin, & Tinetti, 2003; Skelton & Todd, 2004).

1.2.2.1 Balance training.

Maintaining balance depends on the integration of cognitive processing, muscular activity, and sensory input – including input from the vestibular, visual, and proprioceptive (awareness of position of the body and limbs) systems (Downton, 1992; Judge, 2003; Kellogg International Work Group on the prevention of falls by the elderly, 1987; Kenny, 2005; Rubenstein, 2006). Impaired cognition and muscle weakness are associated with increased falls risk (Lord, Sherrington, & Menz, 2001; Marks et al., 2003; Skelton & Todd, 2004; Tinetti, 1997); with muscle weakness increasing falls risk five-fold (Yoshida, 2007). Nearly every clinical measure of sensory input is impaired in advanced age: touch / pressure sensation on the sole of the foot, joint position sense, visual acuity, visual edge detection, and vestibular input (Judge, 2003). Deficits in muscle strength and sensory input are manifested by the strong link between falls and advancing age (Campbell et al., 1990; Prudham & Evans, 1981), and between falls and impairments in gait and mobility, ability to stand up, and ability with transfers (e.g. in and out of the bath) (Lord et al., 2001; Rubenstein, 2006).

The term 'balance training' in this thesis refers to physical activities that both improve balance and increase muscle strength, as both aspects are required to help prevent falls. Balance training helps with correction of displacement (strengthens muscles and improves balance, co-ordination, and reactions), and perceptions of displacement (increases range of motion in the ankle, reduces arthritis, and increases sensation) (Skelton, 2001). Effective interventions to reduce falls include home-based individually tailored, professionally prescribed balance training to increase dynamic balance, muscle strength, and walking; and group programmes based on Tai Chi exercises or dynamic balance, strength training, and floor coping strategies (Gillespie et al., 2003; Rose, 2007; Scott, 2007; Skelton & Todd, 2004). Tai Chi may be particularly effective because it uses three-dimensional continuous, controlled, repetitive movements, along with changes in head and eye position and weight transference (Skelton & Dinan, 1999). However, further research is required to determine the optimum type, intensity, duration, and frequency of balance training and its cost effectiveness (Scott, 2007).

Five reviews of physical activity interventions have provided support for the promotion of physical activity and balance training to prevent falls. First, in the USA, a collection of eight independent clinical trials was conducted known as the Frailty and Injuries: Cooperative Studies of Intervention Techniques (FICSIT) trials (Province et al., 1995). From a meta-analysis of these trials (Province et al., 1995), it was found that assignment to an intervention that included physical activity was linked with a significant reduction in falls (incidence ratio [IR] = .90), and assignment to an intervention that included balance training was linked with a larger significant reduction in falls (IR = .83).

Second, Gardner and colleagues' review of 12 RCTs found mixed results (Gardner, Robertson, & Campbell, 2000). Five of the 12 studies were successful in preventing falls, as they used strength and balance retraining, endurance training, and Tai Chi. The seven studies that were unsuccessful in preventing falls were limited by an inadequate intensity of balance training, inadequate statistical power, and low participant adherence (Gardner et al., 2000).

Third, Chang and colleagues' meta-analysis of 40 RCTs found that balance training was able to reduce the risk of falls by 14%, but no significant effect was found on the monthly rate of falling (Chang et al., 2004). A meta-regression also did not identify significant differences between the different types of balance training (balance, endurance, flexibility, strength) on reducing the risk of falls.

Fourth, Gillespie and colleagues' review of 62 RCTs found balance training to be effective in preventing falls, in particular home-based tailored activities (RR = .80) and group-based Tai Chi (RR = .51) (Gillespie et al., 2003). Fifth, a World Health Organisation report that reviewed various falls prevention interventions found similar results to the above review by Gillespie et al. (Skelton & Todd, 2004). From reviewing 14 balance training interventions, Skelton and Todd found evidence to support the promotion of balance training, in particular home-based tailored activities and group-based Tai Chi. They noted that the most effective interventions used a targeted sample, and a multi-faceted and tailored approach.

Thus, the five reviews have found balance training to be effective in preventing falls, however, uptake by older people needs to be encouraged, so that they will engage in falls prevention interventions such as balance training.

1.2.3 Uptake of Falls Prevention

Even the most well-crafted falls prevention interventions are worthless if older people do not to participate in them (Dracup & Meleis, 1982). Non-uptake and non-adherence is costly, not only in the inefficient waste of resources, but also in the treatment of patients due to the consequences of not adhering (falls) (Kyngas, Duffy, & Kroll, 2000). Indeed, Stoop, van't Riet, and Berg (2004) have illustrated with two interventions that computer-based health interventions can fail because the target group does not access them. Therefore, how falls prevention messages are communicated warrants attention (Simpson, Harrington, & Marsh, 1998; Simpson, Marsh, & Harrington, 1998). Whilst older adults respond as much as younger generations to health interventions (Anderson, Ory, Cohen, & McBride, 2000; Carter, Elward, Malmgren, Martin, & Larson, 1991; Ley, 1988), some falls prevention interventions have as many as a third of older people declining participation (RAND, 2003), and a response rate as low as 10% (Day et al., 2002). Adherence rates also range from as high as 84% to less than half (44%) at two years post-baseline (Campbell, Robertson, Gardner, Norton, & Buchner, 1999; Day et al., 2002; RAND, 2003). Only two fifths of older people who have had a fall or nearly fallen contact the NHS services for assistance (Stoddart, Sharp, Harvey, & Whitley, 2002), and only five older people a week are attending falls clinics led by consultant physicians - representing just 3% of fallers in the average sized primary care trust (Royal College of Physicians, 2006).

In contrast, once older people have decided to do physical activity, research has found encouraging results on adherence rates. Once older people have joined a class in the community, over the first three years they attend on average 68% of sessions (Ecclestone, Myers, & Paterson, 1998). Adherence rates to physical activity within RCTs are similar, with an average of 63% under intention to treat analysis (including participants who dropped out before post-intervention data collection) (Martin & Sinden, 2001). Thus, uptake of falls prevention needs to be encouraged if older people are to benefit from such effective interventions, yet when older people have decided that they will undertake balance training, there is evidence to suggest that up to two thirds may maintain this commitment.

Summary. Falls are common in older people and have severe consequences. To prevent falls, in addition to the promotion of multi-factorial interventions to identify and treat older people at risk of a fall, balance training is recommended for all older people. However, more work is required to encourage older people to take up balance training. This thesis presents the evaluation of an advice intervention delivered on the Internet, to help motivate older people to undertake balance training for preventing falls. Before presenting the rationale for the methodology used to evaluate the website intervention and the outline of the chapters to follow in this thesis, the following section provides the rationale for using the Internet to communicate balance training advice.

1.3 The Rationale for using the Internet to Communicate Balance Training Advice

It is assumed that the reader is familiar with the Internet, because it is the fastest growing means of communication that connects computers across the globe (Anthony, 1995). As the World Wide Web is the standard means of presenting information on the Internet, it will be assumed that this is the means that older users are connecting to online resources (Anthony, 1996). The reader is referred elsewhere for explanations and use of the Internet and the World Wide Web (e.g. Anthony, 1995, 1996).

This section will begin by explaining the benefits of using the Internet to communicate tailored advice. This will be followed by a discussion of older people's use of computers and the Internet. Health interventions delivered online will then be reviewed, with a focus on interventions targeting older people. Lastly, the advantages and disadvantages of using the Internet to carry out psychological research will be described.

Using the Internet to communicate advice. It appears that some health professionals have underestimated the benefits and overestimated the risks of using the Internet to communicate advice (Ferguson & Frydman, 2004). There is great potential in using the Internet to communicate health advice (Eakin, Brady, & Lusk, 2001; Skinner, Siegfried, Kegler, & Strecher, 1993). In advising the public on health matters, the Internet has benefits for both the user and the interventionist. For the user, Internet advice can be available 24 hours a day all year round, can provide a large volume of information, immediate feedback and reinforcement, social support via email or discussion forums, and links for further information (Brug, Oenema, & Campbell, 2003; Lewis, 1999; Stoop, van't Riet, & Berg, 2004). The Internet can also present interactive advice, so that users can select what information they want learn, and it can present advice in the form of simulations, games, graphics, animations, videos, and audio files (Street Jr. & Rimal, 1997). For the interventionist, the Internet is a cost-effective means of distributing information to a wide audience (Street Jr. & Rimal, 1997). Once the advice is on a website, it can be easily kept up to date, whereas paper formats would need re-printing (de Vries & Brug, 1999; Dijkstra & de Vries, 1999; Eakin et al., 2001; Street Jr. & Rimal, 1997).

Whilst there are these benefits for both the user and the interventionist, the current research provides balance training advice to *older people* on the Internet. This raises the question of whether older people use the internet.

1.3.1 Older People and the Internet

This section will describe how older people can learn to use computers, their motivation to do so, and the benefits it has for them. It will then describe older people's use of the Internet, use of online health information, and consider why more older people are not online.

Learning, motivation to learn, and benefits. There is a stereotype that older people have technophobia and are resistant to change (Sixsmith & Sixsmith, 1995), however, they can be taught how to use computers (Leaffer & Gonda, 2000; Nahm & Resnick, 2001). Compared to younger people, older people take longer to learn to use computers and the Internet, make more mistakes, and need more help and practice, yet they can be keen to learn (Charness & Czaja, 2005; Morrell, Mayhorn, & Bennett, 2002).

Research suggests that older people primarily start to use computers through the encouragement of relatives. Selwyn (2004) conducted a qualitative study in West of England and South Wales, where 35 adults aged 60 and above were interviewed about their use of computers. Selwyn found that older people's children were instrumental in encouraging them to become computer literate, and in providing them with a home computer and technical support. This mirrored findings from the USA, where many older people became Internet users from the encouragement of family members (Fox et al., 2001).

The Internet has benefits for older people as they can access advice themselves independently, achieve a sense of mastery in learning to use information technology - boosting their self-esteem and knowledge, and learn and have fun - improving life satisfaction and alleviating depression (McConatha, 2002; Nahm & Resnick, 2001). UK statistics show that 59% of over 50s believe the benefits of using a computer outweigh the running costs, and 55% believe using a computer has 'broadened their horizons' (ACRS, 2007). Indeed, American statistics show that 56% of older people who are online said it improved family connections through email (Fox et al., 2001).

Thus, older people can be eager and able to learn how to use computers and access the Internet, be encouraged to do so by their relatives, and benefit from this resource. However, a sufficient number of older people will need to be using the Internet to warrant an intervention that is delivered online.

Older people's use of the Internet. Although older people represent the smallest subgroup to be online, their numbers are increasing alongside the general population's increase in Internet usage. In February 2006, 67% of adults in Great Britain reported that they had ever used the Internet, 11% more than in February 2002 (National Statistics, 2006a). Similarly, of those aged 65 and above, 21% had ever accessed the Internet in February 2006, 9% more than in February 2002. Data from interviews conducted in January, February, and April 2006 showed that 60% of adults in the UK accessed the Internet in the previous three months, 15% of whom were aged 65 and above (National Statistics, 2006b). These figures are lower than Internet access rates reported in the USA, where 73% of the population report that they are online. For older Americans, in 2004 22% reported that they were online, but by 2006 this rose to 32% (Fox, 2004; Madden, 2006). Once online, American older adults are just as enthusiastic as younger cohorts in using the Internet and are as likely to go online on a typical day (Fox, 2004). Around 43% of older people use their home computer everyday and 24% a few times a week (Adler, 2002).

Thus, 15% of the UK population aged 65 and above are online (known as 'silver surfers'). More importantly, older people are increasingly accessing the Internet. Indeed, the pre-retirement cohort is said to be a 'silver tsunami' waiting to happen, whereby a large wave of online adults will suddenly enter retirement (Fox et al., 2001). Currently, 52% of adults aged 55-64 in the UK and 71% of Americans aged 50-64 are online (Madden, 2006; National Statistics, 2006b). Thus, in a decade the Internet will become an invaluable means of communicating advice to older people, and research conducted now could help health promoters be prepared to capitalise on this surge in Internet usage. In addition, if older people are not online, there is a strong chance that they will know of someone who is able to go online for them: in the UK, 56% of over 50s have access to a computer (ACRS, 2007), and in America, 60% of non-users know of places where they can get online, and 74% of non-users know family or friends who are online (Lenhart, 2003).

Older people's use of online health information. Although the public are accessing the Internet, does this mean that they will access health information on the World Wide Web? American statistics suggest that searching for health information is the third most common activity online, and that 80% of Internet users have searched for a major health topic (Fox & Fallows, 2003). It appears that older people are no exception; they are becoming more proactive in finding out how they can keep healthy, and the Internet is an important resource for them (Wetle, 2002). Looking up health information is one of the most popular activities older people perform on the Internet (Leaffer & Gonda, 2000; Morrell et al., 2002). Fifty-three percent of older people go online for health and medical information (Fox et al., 2001). Information on exercise or fitness has been searched in the USA by 36% of online users, 13% of which were aged 65 and above (Fox, 2004). However, health information searches are not usually performed everyday and more than half of searches are on behalf of someone else (Fox, 2004).

Why more older people are not online. Part of the reason why the majority of older people are currently not online is that they simply are not interested, viewing computers as an optional hobby rather than a necessity (ACRS, 2007; Selwyn, 2004). Selwyn (2004) argued that services provided on computers and the Internet need to be more useful for older people to be interested in them. American statistics show that 80% of older people who are not online do not want to become Internet users (Fox, 2004; Lenhart, 2003). However, it is plausible that a number of older people would like but feel unable to access the Internet. Older people are less likely to be in contact with new technology: they live in homes with fewer technology products, they may not be able to afford a computer, worked in older industries, and may have been bypassed for occupational training opportunities (Charness & Czaja, 2005). Older people have reported fear of accessing Internet pornography or becoming a victim of Internet fraud, and the belief that the Internet is too complicated for them (ACRS, 2007; Lenhart, 2003). Those that want to go online report barriers of lack of experience with computers, lack of knowledge of the Internet, and lack of ability to access websites due to lower levels of visual acuity (Fox, 2004). Also, it is possible that of the 80% of older people who are not online and do not want to become Internet users (Fox, 2004; Lenhart, 2003), a large proportion may be ignorant of how the Internet could benefit them, and hence have no desire to become Internet users. This is supported by research that has shown that among the factors that would entice older people to go online is knowing that they could access health information, and knowing that they could communicate with friends and family (Adler, 2002).

Lastly, older people are more likely than younger generations to suffer from impairments that inhibit their ability to use a computer. If affordable, there are many computer accessories available for occupational therapists to provide older adults with cognitive and physical impairments to assist them in accessing computers. These accessories can assist with positioning people up to a workstation, inputting data, and improving the visibility of information on screen (O'Leary, Mann, & Perkash, 1991).

Summary. It is evident that older people are capable of using computers and accessing the Internet. This is confirmed by 15% of the UK's over 65s using the Internet. Accessing health information is a key online activity for older people, with American research suggesting that 53% of older adults access online health information. Thus, an online intervention targeting older people is warranted, because some older people do use the Internet - especially for accessing health information – and the Internet will become an invaluable means of communication once the pre-retirement cohort enters older adulthood in a decade's time. However, not all older people want to access the Internet, and there are barriers that inhibit those who do want to access the Internet. This means that at least until the 'silver tsunami' beaches, other strategies of communicating information are required alongside online interventions in targeting older people.

1.3.2 The Effectiveness of Computer-based Health Interventions

Researchers have been evaluating the assumption that interventions delivered via the Internet are equally or more effective than paper-based alternatives. Before the few studies that have targeted older people are reviewed, two reviews are summarised that concern the acceptability and effectiveness of interventions delivered online.

Reviews of acceptability and effectiveness. Lewis (1999) systematically reviewed computer-delivered interventions published from 1971 to 1998. Lewis reviewed 66 articles, 21 of which were research reports that presented health information online, via a CD-ROM (Compact Disc Read-Only-Memory), or interactive video. The interventions were predominantly delivered to adults, a third of which addressed diabetes management. Twenty-seven effect sizes were reported, of which 17 (63%) represented a significant change on the outcome measure when participating in a computer-based intervention. Ten studies found the interventions were popular and usable, five studies found the interventions to be comparable to traditional instruction methods (presumably written documents such as leaflets) in increasing knowledge and changing behaviour, whereas eight studies found the computer-based interventions to be better at increasing knowledge and changing behaviour. Lewis concluded that computer-based interventions are effective for behaviour change, but highlighted that further research is required, including studies using long-term follow-up periods.

More recently, Wantland and colleagues conducted a meta-analysis on quality studies published from 1996 to 2003, comparing online and paper-based interventions using a between-groups design (Wantland, Portillo, Holzemer, Slaughter, & McGhee, 2004). Wantland et al. identified 22 studies that were conducted in the USA, Japan, and across Europe. Five studies evaluated the acceptability of the intervention, and 17 evaluated the effect of the interventions on change outcomes. Of the five that evaluated the acceptability of the interventions, two found non-significant trends for participants favouring the paper-based intervention, whereas three studies found trends for participants favouring the online intervention, one of which was significant. Of the 17 studies that evaluated the effect of the interventions on change outcomes, 16 found improved knowledge or behaviour outcomes for the online interventions, six of which were significant. The effect sizes ranged from small to moderately large, and one study favoured the paper-based intervention but not significantly. There was no effect for length of the intervention on the effect sizes, and the average length of time participants spent on an online intervention was 19.3 minutes. Wantland et al. concluded that online interventions are advantageous, especially as they can tailor information to patients, which is required for chronic conditions.

In summary, from these two reviews, whilst the evidence was mixed for participants preferring computer-based interventions , a consistent trend was found for computer-based interventions to be more effective at changing behaviour over traditionally delivered interventions, which was significant a third (Wantland et al., 2004) to two-thirds (Lewis, 1999) of the time. On these grounds, it is warranted that the current research uses a computer-based health intervention to help encourage older people to undertake balance training for preventing falls.

1.3.2.1 Computer-based health interventions targeting older people

Researchers, predominantly residing in the USA, have evaluated computer-based health interventions targeting older people. Computer-based interventions have increased older people's health knowledge (Luker & Caress, 1992; Ogozalek, 1993), and class-based computer interventions have increased both older people's knowledge and adoption of healthy behaviours (Leirer, Morrow, Pariante, & Sheikh, 1988; Rippey et al., 1987). A further intervention showed promise in assisting older people to manage their chronic illness (Dang, Ma, Nedd, Aguilar, & Roos, 2006), but this did not use a conventional personal computer.

Although these studies showed high acceptability of computer-based interventions among older people, they did not provide convincing evidence for their effectiveness in changing older people's health behaviours. Only five previous studies of health behaviour change interventions targeting older people were identified from a literature search, and the studies were limited by the use of short-term follow-ups and omission of control groups. The class-based interventions would also have been more costly than interventions presented on a CD-ROM or on the Internet.

Previous computer-based health interventions targeting older people have shown promise. However, research will be required to evaluate a new intervention designed to encourage older people to undertake balance training for preventing falls. The new intervention will be need to be evaluated for its usability, acceptability, and efficacy.

1.3.3 The Use of the Internet in Psychological Research

Conducting psychological research on the Internet has both advantages and disadvantages. Reips (2000, 2002) has explained the advantages and disadvantages of conducting experiments on the Internet compared to traditional laboratory experiments, and these are summarised below. The advantages and disadvantages of online research are pertinent to the two quantitative studies presented in this thesis, as these studies present balance training advice and then collect questionnaire data, all of which is conducted on the Internet.

1.2.3.1 Advantages.

Reips (2000) listed nine benefits of using the Internet over traditional research methods. First, the Internet can obtain a larger sample size and hence increase statistical power. Second, a more heterogeneous sample can be obtained as participants who cannot visit the laboratory can be recruited. Third, external validity can be increased as participants access the study from where they usually access the Internet. Fourth, the study can be more ethical, as participants have greater control over whether or not to participate in the study (they are under no obligation as when visiting a laboratory). Fifth, the study can obtain data of a higher quality, as participants are only likely to be participating if they are motivated, rather than out of obligation. Sixth, recruitment can be more effective as participants are not restricted to access the study at a particular time or location, but can access the study when it is convenient for them, and more than one participant can take part simultaneously. Seventh, there can be less experimenter bias as the experimenter is not present with the participant. Eighth, there can be greater transparency in the research process, in that the experiment can be viewed online by other researchers, and web log analysis can allow for estimation of non-participation (those who visited the website but did not participate). Ninth, online studies can save time and money on recruitment (Kraut et al., 2004).

Reips (2002) listed further advantages to using the Internet. These included the greater ease in recruiting participants from wider geographical areas, such as comparing participants from different countries (Birnbaum, 2000; Eakin et al., 2001), and the ease in recruiting specific populations, for example, people with a certain health condition can be reached through advertising on a website devoted to providing information and support for this condition. There are other benefits of using the Internet in psychological research. Websites can be programmed so that all the questions are answered and answered correctly (e.g. within the categories or ranges provided), the order in which questions are answered can be dictated, and time on data entry is saved. With data automatically stored on a database, clerical error is also avoided as the data is already retrievable in the required format (Kraut et al., 2004).

Thus the Internet has several advantages for the researcher that assists with recruiting participants and making research more economical. Internal validity is also enhanced as experimenter bias is removed and unmotivated participants are likely to dropout out of online studies. However, there are also disadvantages to using the Internet in research.

1.2.3.2 Disadvantages.

Reips (2000) listed eight limitations of using the Internet compared to traditional research methods. First, there can be less control, as researchers do not know whether or not participants breach the experimental conditions, such as by taking part in the study more than once (Kraut et al., 2004). Although multiple participation is unlikely, there are avoidance and controlling techniques that can be used (Reips, 2002).

Second, researchers cannot be sure that participants are participating as intended, such as concentrating fully on the task and not having any distractions (Birnbaum, 2000). However, if participants are randomly assigned to experimental conditions, then these variances can be assumed to be equally prevalent across the conditions.

Third, as with other means of conducting research, there is the potential for self-selection bias, with only those who are motivated taking part in the study, and so the sample obtained is unlikely to be representative (Kraut et al., 2004).

Fourth, there are higher rates of participant dropout with online studies (Kraut et al., 2004). Researchers will need to check whether dropout rates are systematic, as if dropouts are higher from one study condition then this will bias the results (Reips, 2000). Dropout rates can be reduced by promising immediate feedback, providing financial incentives, personalising the interaction with the participant, and other techniques (Reips, 2002).

Fifth, there is more error variance in online studies due to variations in participants' computer speed and power and the browser they use, as this affects the speed and quality of what they view on screen (Dillman, 2000; Krantz & Dalal, 2000). To increase access to the study, researchers should work on the basis that users with old browsers and basic software can access the study (Baron & Siepmann, 2000; Reips, 2002).

Sixth, participants cannot ask the researcher questions for clarification, and so validity is threatened as participants may not understand the tasks that they are to perform. To counter this, researchers can conduct usability studies, and provide their contact details on the website for users to email with queries. Seventh, there are fewer Internet studies and so there is fewer data to compare to provide comparative evidence, but the number of studies is increasing. Eighth, Internet studies are not possible when participants are required to have physical measures taken from them (e.g. a scan), and participants are always recruited via a computer, and so all data is mediated via the Internet (Reips, 2000).

Other disadvantages are that the Internet population is constantly changing. This means that studies recruiting samples years apart may be less comparable than for other means of research (Birnbaum, 2000). In addition, although sample sizes can be increased using the Internet, this does not necessarily increase their generalisability to the general population (Dillman, 2000; Kraut et al., 2004). Probability sampling is not currently an option either, as there is no list of all email addresses to contact, and email addresses cannot be predicted because they do not follow a standard format (Dillman, 2000; Kraut et al., 2004).

Perhaps the greatest limitation of research conducted on the Internet is that it cannot be guaranteed that people are who they claim to be. There is the danger that a man aged 23 could take part in an online study that recruits only women aged 55 or above, by pretending that he fits the inclusion criteria. This problem extends further to the danger that people may answer dishonestly to questions and provide invalid data. Yet again, although in laboratory studies researchers will be able to visually confirm the age and gender of participants, they cannot guarantee the internal validity of participants' answers to questions.

The internal validity of Internet studies could be assessed by comparing results with theoretical expectations and with the results from similar laboratory studies (Krantz & Dalal, 2000). Some studies have been conducted that have found similar response rates to online and postal surveys, and similar findings of online and laboratory versions of a scale (Krantz & Dalal, 2000). However, the Internet is a communication medium and a variable in research itself (Krantz & Dalal, 2000). There is research to suggest that people behave differently online than when completing questionnaires or experiments at home or in the laboratory: people disclose more information about themselves online than they do by hand (Buchanan, 2002).

Demographic profile of Internet users. Finally, a disadvantage to Internet-based research is that there is a profile of the typical Internet user. This profile means that samples recruited online are unlikely to be representative of the general population. People are more likely to be online if they use technology (e.g. own a mobile phone), have regular social contact, and feel in charge of their life (Lenhart, 2003). As with younger generations, older people who use the Internet are more likely to be male, white, married, highly educated, living in an urban area, relatively younger, and on higher retirement incomes (Adler, 2002; Fox, 2004; Fox et al., 2001). The difference between those who are online and those who are not is referred to as the 'digital divide'.

This has a consequence for online research. The majority of participants recruited in online experiments have been white, mainly English speaking, North Americans (where most of the researchers have been dwelling), and aged between 26-35.2 years (Krantz & Dalal, 2000). Whilst this is a restricted sample and not generalisable to a national population, it is still more ecologically valid than traditional laboratory studies that only recruit psychology students (Krantz & Dalal, 2000). There are mixed reports on gender participation, which perhaps reflects the study topic and how participants were recruited (Krantz & Dalal, 2000). Internet use within the UK is still higher among men (65%) than women (55%), although older women are more likely than older men to search for health information (Fox et al., 2001; National Statistics, 2006b). Therefore, the Internet at present does not allow for representative samples, but the potential for this is increasing as the Internet becomes more widely used (Krantz & Dalal, 2000).

Thus, the Internet also has several disadvantages for the researcher, in that the researcher has less control over the conditions in which people participate, there are more dropouts and technical error variance, people may report differently online, and there is a demographic profile of Internet users that limits the generalisability of recruited samples.

Summary. The Internet has both advantages and disadvantages for psychological research. For validity, Internet studies can collect stronger internally and externally valid data, although there is reduced experimental control and increased technical error variance. For recruitment, Internet studies can be more efficient and economical, although the dropout rate is higher. The demographic profile is currently not ideal for recruiting older people, and it is necessary to assume that most people who take part in online research do so without malicious intent to provide invalid data. However, people may report more honestly online than they do on paper-based surveys, and recruitment of computer literate older people will be enhanced, as they will be more geographically dispersed. These strengths and weaknesses are to be considered when interpreting the results from the two quantitative studies presented in this thesis.

1.4 The Rationale for Combining Quantitative and Qualitative Methods

Whilst the empirical chapters to follow each present the rationale for the specific study design, methods of data collection, and data analysis techniques used, this section discusses the rationale across these studies, for combining quantitative and qualitative methods.

Quantitative and qualitative methodology stem from very different epistemological approaches, concerning how it is believed to best obtain knowledge of the world (Yardley & Bishop, 2007). Quantitative methodology is steeped in the positivist approach, of controlling environments to reliably observe events and to statistically analyse the data to avoid bias (Camic, Rhodes, & Yardley, 2003; Yardley & Bishop, 2007). In contrast, qualitative methodology is steeped in the constructivist approach that rejects the aim to be objective, because all people are situated within a sociocultural context, and therefore can never be truly objective (McGrath & Johnson, 2003). People are studied within their environment to capture data within these contexts, and qualitative researchers commonly do not ask participants closed questions, to avoid restricting the participant to answer in compliance with the researcher's views (McGrath & Johnson, 2003; Yardley & Bishop, 2007).

However, both quantitative and qualitative methodologies can be combined in a pragmatic approach that uses the best method to gather the data required to answer the research question. A compromise is made between positivism and constructivism: research is conducted within the sociocultural context for the benefits of constructivism, and is subject to empirical rigour for the benefits of positivism (Yardley & Bishop, 2007). Moreover, guidelines for upholding rigour using qualitative methods have been published (Mays & Pope, 1995; Yardley, 1997, 2000).

This pragmatic approach permits the researcher to benefit from both lines of enquiry. Quantitative methods are useful for gathering data that that is of sound internal validity, for hypothesis testing, and making causal inferences and generalisable conclusions. Qualitative methods are useful for gathering data that is of sound external validity, exploring experiences and concepts that the researcher is unable to predict, and variables that occur simultaneously (Camic et al., 2003; Yardley, 2000; Yardley & Bishop, 2007). Thus, the researcher can obtain data on both the magnitude of a phenomenon using quantitative methods, and its meaning using qualitative methods (Eisner, 2003). The researcher must however maintain integrity with the two different approaches, and avoid evaluating one approach with the same criteria as the other (Yardley, 2000; Yardley & Bishop, 2007).

In this research, two quantitative and two qualitative studies were conducted. Quantitative methods were used to measure the efficacy of the tailored balance training website. Participants were randomly assigned to one of two conditions in between-groups experiments; either tailored balance training advice, or a generic comparison version. Once participants had viewed the tailored or generic information they completed an online questionnaire measuring their attitudes toward the advice, and beliefs and intention towards undertake balance training. These studies tested two hypotheses. First, they tested whether participants receiving the tailored balance training advice would report more positive attitudes to the advice, and more positive beliefs and intention towards undertaking balance training. Second, the studies tested whether the participants receiving the tailored advice would report higher levels of confidence and intention to undertake balance training after completing an action plan. As argued above, quantitative research lends itself to the testing of hypotheses, using data from a relatively large sample of participants to generalise to a population. As a between groups experimental design was adopted, causal attributions could be inferred from the results.

To complement the two quantitative studies, two qualitative studies were conducted. Qualitative methods were used to capture older people and health and social care providers' views of the balance training website. Attention was paid to the website's usability and acceptability. Whereas the quantitative studies tested pre-defined hypotheses, the qualitative studies were exploratory. Whereas the quantitative studies obtained more general data from the participants, the qualitative studies obtained data that was contextually rich that could offer additional information about the meaning to the participant. As argued above, qualitative research lends itself to exploratory research questions and to obtaining contextually rich subjective data (Camic et al., 2003; Yardley, 2000). The qualitative studies would be useful in gaining feedback that would provide examples of how older people and health and social care providers experienced the website (Eisner, 2003). Taken together, the four studies provide both quantitative data for hypothesis testing and causal inference, and qualitative data for exploring experiences within their contexts.

1.5 Introduction to the Remaining Chapters

Before this first chapter is concluded, a description of what is to follow in the remaining seven chapters of this thesis is provided.

The second chapter provides the rationale for *tailoring* the advice to motivate older people to undertake balance training to prevent falls. Tailoring is defined and its role within health promotion is described, and the elaboration likelihood model is presented as an explanation for the persuasiveness of tailored messages. Previous tailored interventions are reviewed to provide empirical evidence for tailoring, as well as studies from the falls prevention literature that suggests there is a need for tailored advice to motivate older people to undertake balance training.

The third chapter provides a detailed description of the intervention developed for this research: the balance training website. A description and screen shot is provided for each webpage, along with the rationale for the selection of factors used to tailor the advice. The chapter closes with a discussion of the attitudes and beliefs concerning balance training that the tailored advice would be expected to influence, based on psychological theory.

Chapters 4 to 7 present four empirical studies conducted to evaluate the balance training website described in Chapter 3. The fourth chapter presents a qualitative study that evaluated the usability and acceptability of the website. Older people commented on the website in an interview, using both think aloud and semi-structured techniques.

The fifth chapter presents a quantitative study that evaluated the efficacy of the balance training website. From the tailored balance training advice, a non-tailored control group was created that presented all the advice. Using a between-groups design, older people accessed either the tailored or control version of the website advice, and completed an online questionnaire measuring attitudes towards the advice, and beliefs and intention towards undertaking balance training.

The sixth chapter presents a further study that evaluated the usability and acceptability of the balance training website, by obtaining the views of health and social care providers. This study comprised two parts. The first part entailed re-contacting the health and social care providers who helped recruit older people for the study reported in Chapter 5. They were invited to complete an online questionnaire and a telephone interview. The second part entailed interviewing sheltered housing wardens for their views of the website, because wardens work with older people representing a range of ages and mobility.

The seventh chapter presents a study that evaluated the efficacy of the revised balance training website. The data from the previous three empirical studies were used to improve the website. The website was re-launched and a quantitative study was conducted in partial replication of the study reported in Chapter 5. Using a between-groups design, older people accessed either a tailored or control version of the website's advice, and completed an online questionnaire measuring attitudes towards the advice, and beliefs and intention towards undertaking balance training.

The eighth and final chapter is a general discussion of the research. The implications of the empirical studies are presented, along with their methodological limitations, and suggestions for future research.

1.6 Conclusion

This thesis describes the evaluation of a website that presents older people with online tailored advice to encourage them to undertake balance training to prevent falls. This chapter presented the rationale for the approach adopted in this research. This chapter explained why balance training is to be promoted to older people, why the Internet was chosen as the medium to promote balance training, and why quantitative and qualitative methods were employed to evaluate the website. For promoting balance training, it was explained that falls are prevalent and have severe physical and psychological consequences for older people, and impose high economical costs to the NHS and Personal Social Services. Interventions have been successfully developed to prevent falls, in particular balance training; however, uptake by older people needs to be encouraged.

For using the Internet, an online intervention is conducive for providing tailored advice, and although currently 15% of older people are online, this number is projected to rise to over 50% in the next generation to enter retirement. Accessing health information is also a key online activity for older people, with American research suggesting that 53% of older adults access online health information. Previous reviews of computer-based health interventions suggest a trend for their positive effect on health outcomes. Computer-based health interventions that have targeted older people have shown high usability and acceptability, but further research is required with new interventions, and these interventions also need to be evaluated for their efficacy.

Promoting balance training on the Internet also has the advantages of more economical recruitment, and stronger internal and external validity. However, the disadvantages of Internet research are the reduced experimental control, higher dropout rate, and increased technical error variance. The demographic profile is currently not ideal for recruiting older people, however, people may report more honestly online, and recruitment of computer literate older people will be enhanced as they will be more geographically dispersed.

For combining quantitative and qualitative methods, a pragmatic approach has been argued as a sound means of benefiting from both of these methods. The qualitative studies will provide an in-depth analysis of older people and health and social care providers' experience of using the website, whereas the quantitative studies will provide experiments to test the tailored version of the advice with a generic comparison group. As the website uses tailoring as its main approach for making the advice persuasive for the older person, the following chapter is devoted to the rationale for tailoring the advice.

CHAPTER TWO
THE RATIONALE FOR TAILORING BALANCE TRAINING ADVICE

2.1 Aims of this Chapter

This chapter is arranged in three sections to meet two aims: to introduce the strategy of tailoring, and to provide the rationale for tailoring advice designed to motivate older people to undertake balance training. The first section provides a definition and description of tailoring, and its role within health promotion alongside other communication strategies. The elaboration likelihood model is then explored as an explanation as to why tailoring is an effective communication tool. The second section reviews the empirical evidence to support tailoring health and physical activity advice. The third section reviews the literature highlighting a need for tailoring messages that promotes balance training for the prevention of falls in older people.

2.2 An Introduction to Tailoring

Tailoring enables health promoters to present information that is more personally relevant to the individual to better serve the individual's needs (Rimal & Adkins, 2003). Tailoring is achieved by creating a database of messages on a health behaviour, obtaining information about an individual from a questionnaire, and matching the health messages to the individual based on the individual's responses to the questionnaire items. Although tailoring is a relatively new tool for health promoters, the strategy of adapting products and services to meet individuals' needs is not a new innovation. Tailoring has been used for many years not only by suit tailors, but also by other service providers from car salespersons to general practitioners (Kreuter, Strecher, & Glassman, 1999b).

Tailoring has become available in the late 20th century to health promoters because of recent developments in communication technology (Kreuter, Farrell, Olevitch, & Brennan, 2000a; Rimer, 1999). The public can be reached with tailored information in their hundreds with the use of computer programmes and in their thousands with the use of the Internet (Kreuter et al., 2000a).

Before a definition of tailoring is presented and the role of tailoring is compared with other strategies of health promotion, this section will begin by describing how tailoring is achieved. The description of how tailoring is achieved provides the reader with a useful basis for understanding how tailoring is defined.

2.2.1 How Tailoring is Achieved

Tailoring follows a clear framework that, with slight variations, follows a sequence of research, development, implementation, and evaluation (Brug et al., 2003; Dijkstra & de Vries, 1999; Kreuter et al., 2000a). Although this framework needs to be followed for other health promotion strategies, there are idiosyncrasies to tailoring.

2.2.1.1 Research

Research is particularly important for designing tailored interventions, as the information provided from research forms the basis for deciding which health messages are presented to the recipients of the intervention (de Vries & Brug, 1999; Kreuter et al., 2000a; Rakowski, 1999). Drawing on the theoretical and empirical literature, health promoters should research what variables predict change in the target behaviour, and the characteristics of the target population that may shape how these variables are used (Dijkstra & de Vries, 1999; Kreuter et al., 2000a; Rakowski, 1999).

2.2.1.2 Development

Once the health promoter is aware of what variables predict behaviour change, these variables will need to be prioritised according to which are the most important and easily changeable (Kreuter et al., 2000a). How the health advice is tailored according to these predictor variables will then need to be decided. Tailoring information can be achieved in various ways simultaneously. Information can be tailored according to message selection (presenting different combinations of messages), presentational style (using different writing tones, graphics, etc.), and feedback on health risk based on current behaviour (Bental, Cawsey, & Jones, 1999; de Vries & Brug, 1999; Dijkstra & de Vries, 1999). Feedback can take three forms: personal, in relation to a standard (e.g. government recommendations); normative, in relation to the user's population; or ipsative/iterative, in relation to the user's previous inputs (e.g. to mark progress) (de Vries & Brug, 1999; Dijkstra & de Vries, 1999).

At this stage, other decisions will include the most effective medium to deliver the health messages (e.g. in print, or on a computer screen via a programme or on the Internet), the desired outcomes of the intervention (e.g. raised awareness or recruitment onto an intervention), and the level of demand to be placed upon the participant (e.g. a longitudinal study or use of technology) (Kreuter et al., 2000a; Rakowski, 1999).

The health promoter will also develop the materials necessary for tailoring. The end product will be: questionnaires comprising closed-ended questions, to determine which health messages will be presented to the participant; a library storing all the messages that the health professional has written; computer programming rules (algorithms) to automate the matching of health messages to participants, according to participants' responses to the questionnaire items; and a medium for communicating the health messages (de Vries & Brug, 1999; Dijkstra & de Vries, 1999; Kreuter et al., 2000a).

2.2.1.3 Evaluation

Kreuter et al. (2000a) provided two useful sets of post-intervention evaluation criteria for tailored interventions, relating to the development and effectiveness of the intervention. An evaluation of the development of an intervention concerns issues such as the methods used to recruit participants and the usability of the questionnaire (Kreuter et al., 2000a). An evaluation of the effectiveness of an intervention concerns issues such as whether the tailored messages were perceived by participants as more personally relevant (whether the tailoring worked), and whether participants indicated they had changed or will change their health behaviour in response to participating in the intervention (Kreuter et al., 2000a).

2.2.2 A Definition of Tailoring

An awareness of how tailoring is achieved underpins understanding of Kreuter et al.'s (2000a) following definition: tailored health promotion materials are "any combination of information and behaviour change strategies intended to reach one specific person, based on characteristics that are unique to that person, related to the outcome of interest, and derived from an individual assessment" (p. 5). Before comparing tailoring with other health communication strategies, the term 'unique' used in Kreuter et al.'s (2000a) above definition needs clarification.

Tailored interventions cannot produce unique messages for individuals to the extent that a health professional can during interpersonal interaction. There may be questions the lay person has about the health behaviour that are not addressed in a tailored intervention, and can be asked when in dialogue with a health professional.

Interpersonal interaction also has the advantage of the availability of asking open-ended questions, using non-verbal communication, and immediately exchanging information between both parties. Thus, it has been said that tailored communications as "so-called 'interactive health communications' are in fact not truly interactive" (Orleans, 1999, p. 309). There is also the ethical issue that some health concerns are too serious and sensitive not to be discussed face-to-face with a health professional (e.g. when individuals have been diagnosed with cancer) (Orleans, 1999). Thus, the term 'unique' refers to the best selection of messages within the message library of an intervention, and this selection may be only subtly different from the other selections that are presented to other users.

2.2.3 The Niche for Tailoring

Although face-to-face consultations are necessary for serious and sensitive health issues, health professionals have limited time and resources for consultations and there are a limited number of health professionals available for consultations (Kreuter, Oswald, Bull, & Clark, 2000b; Kreuter et al., 1999b). In order to meet the health information needs of the public, documented health promotion materials are required to reach more people and at a lower cost than consultations (Oenema, Brug, & Lechner, 2001). The advantages of tailoring health promotion materials will now be described, while highlighting the relative weaknesses of generic, personalised, and targeted written materials.

2.2.3.1 Generic Communication

Tailoring can be placed as a contrasting pole to generic communication. Generic communication provides identical information to all recipients, targeting "everyone but ... no one in particular" (Dijkstra & de Vries, 1999, p. 193). Generic communication is relatively inexpensive and informative (Kreuter et al., 1999b; Strecher et al., 1994). However, if the target population is heterogeneous on the important variables that predict change in the health behaviour, then a generic approach will present paragraphs of redundant information to the reader. The reader is burdened with sifting through information to pick out the sections that are relevant to them (Kreuter et al., 2000a; Strecher et al., 1994), which can reduce their motivation to read it. Also, some information may be unsuitable and misleading for some individuals.

2.2.3.2 Personalisation

Personalisation entails inserting the recipient's name one or more times into the information presented (de Vries & Brug, 1999). Individuals are more likely to read materials that have their name printed on them, as they are more likely to believe the information was produced for them personally (Kreuter et al., 1999b). However, it is likely that this effect of personalisation will decrease, as people are receiving an increasing volume of personalised junk mail. People are likely to associate personalised messages with junk mail, and accurately perceive that personalised materials are not produced for them personally. In addition, although personalisation captures the reader's attention, it does not reduce the reader's burden of sifting through redundant information (Kreuter et al., 2000a), which can reduce its impact on the reader.

2.2.3.3 Targeting

Based on market segmentation, targeting categorises the target population into homogenous segments to present different information to each segment (Brug et al., 2003; Kreuter & Skinner, 2000; Slater, 1996; Slater & Flora, 1991). Similar to generic materials, the impact of targeted materials will be limited by the heterogeneity within each segment of the target population (Kreuter et al., 1999b). Also, health promoters using a targeted strategy commonly rely on demographic variables to segment the target population, and these do not always closely predict health behaviours (Slater & Flora, 1991). In contrast, tailoring is conducive for assessing individuals on psychological measures (e.g. according to a theoretical framework) that are believed to be of more relevance to health behaviour change (Brug et al., 2003; Kreuter et al., 2000a; Slater & Flora, 1991).

2.2.4 The Elaboration Likelihood Model (ELM)

Why should increasing personal relevance enhance the impact of health promotion materials? The elaboration likelihood model (ELM) (Petty & Cacioppo, 1981) has been advocated as one possible explanation as to why tailored materials have more impact on the reader than generic materials (Brug, Campbell, & van Assema, 1999; Brug et al., 2003; Bull, Kreuter, & Scharff, 1999b; Holt, Clark, Kreuter, & Scharff, 2000; Kreuter, Bull, Clark, & Oswald, 1999a; Kreuter & Holt, 2001; Kreuter et al., 1999b; Rimal & Adkins, 2003). The ELM is one dual-processing model among a range of models currently used (Chaiken & Trope, 1999). The ELM was chosen to explain why tailoring is an effective communication tool because it specifically addresses the manipulation of the personal relevance of messages presented to individuals, and therefore tailoring is specifically addressed by the ELM. Although the heuristic-systematic model (Chen & Chaiken, 1999) is very similar to the ELM, and has been argued to be superior theoretically, the ELM has received strong empirical support for its incorporation of a larger number of individual and situational variables, including the personal relevance of the message (Eagly & Chaiken, 1993).

2.2.4.1 Two Routes of Persuasion

In reviewing the array of previous persuasion theories, Petty and Cacioppo (1981) postulated that the theories could be encompassed by one dual-process theory and categorised into either the central or peripheral route. The central route entails persuasion by the content of the message - to convince with sound arguments. The peripheral route entails persuasion by the vehicle of the message - to convince with an appealing/emotive presentation of the message (Petty & Cacioppo, 1981, 1986; Petty, Cacioppo, Strathman, & Priester, 1994).

2.2.4.2 Central Processing Entails More Cognitive Effort

Individuals centrally processing messages use more cognitive effort as they scrutinise the arguments presented and create their own thoughts in response. Peripheral processing requires less cognitive effort, due to the reliance on faster processing using cues such as heuristics, emotion, and attractiveness of the source (the provider of the message) (Petty & Cacioppo, 1981, 1986; Petty et al., 1994). Because of the high level of cognitive effort entailed in central processing, the ELM postulates that individuals will only engage in central processing when they are both able and motivated to elaborate on the persuasion message. As individuals are bombarded daily with numerous messages, they are unable to spend their time centrally processing each message, nor would they be interested for messages they do not consider important, and so they default to peripheral processing (Petty & Cacioppo, 1981, 1986; Petty et al., 1994). A diagram of the ELM is presented in Figure 1.

The ELM has been used to categorise variables and explain their affect on individuals' ability and motivation to centrally process messages, and the subsequent impact on persuasion (Petty & Cacioppo, 1986; Petty et al., 1994). This chapter will

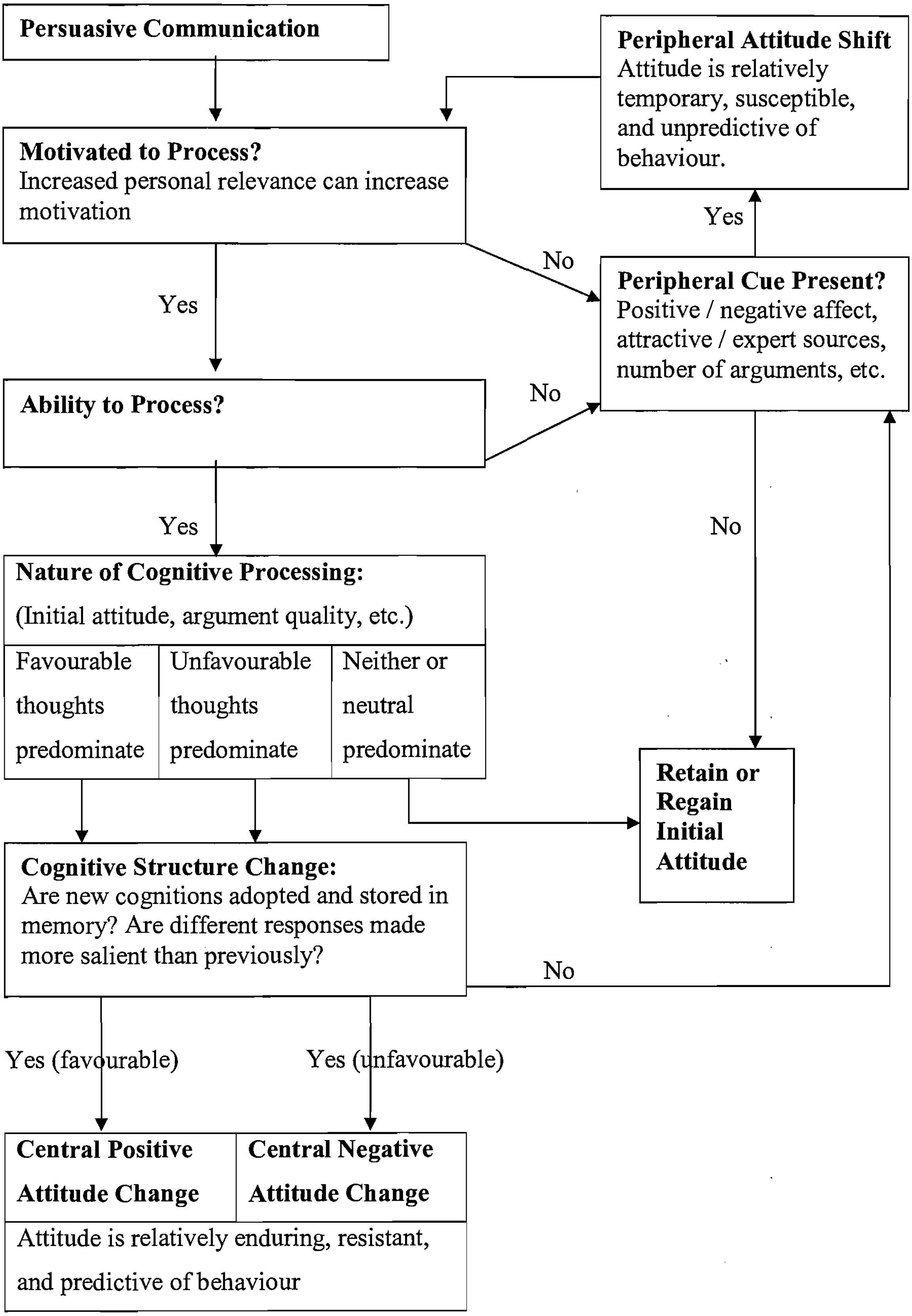


Figure 1. The elaboration likelihood model of persuasion (edited, from Petty et al., 1994, p. 119; Petty, Rucker, Bizer, & Cacioppo, 2004, p. 43).

only focus on the evidence relating to the personal relevance of a message to an individual.

2.2.4.3 Personal Relevance

Issues can be personally relevant to individuals in three ways: relevant to a topic that is of importance to them, relevant to a goal that they are working towards, or relevant to an issue that they believe they will be evaluated on by others (Johnson & Eagly, 1989). The more personally relevant a message, the more likely that it will be centrally processed (Chaiken, 1980; Petty & Cacioppo, 1979). Johnson and Eagly (1989) performed a meta-analysis on 35 studies investigating the effect of increasing personal involvement on the persuasiveness of messages. Despite Johnson and Eagly concluding that the ELM was unable to explain the findings, Petty and Cacioppo's reorganisation and interpretation of the same data found the meta-analysis to support the ELM: that increasing the personal relevance of a message leads to a greater likelihood that it will be centrally processed (Petty & Cacioppo, 1990).

Making a message more personally relevant to an individual has five effects. Individuals centrally processing messages: 1) attend more to the arguments of a message than the peripheral cues, 2) are better able to remember the message, 3) are more influenced by the message, 4) are influenced by the message for longer, and 5) are more likely to act in response to the persuasive message (Petty & Cacioppo, 1986; Petty et al., 1994). Four of these five effects are clearly advantageous (1, 3-5), and one has so far only been found to be neutral (2). These five effects will be elaborated in turn.

1) Individuals centrally processing messages attend more to the arguments of a message than the peripheral cues, as their greater involvement leads to greater scrutiny of the merits of the arguments (Chaiken, 1980; Petty, Cacioppo, & Schumann, 1983).

2) Individuals centrally processing messages are better able to remember the message (Petty et al., 1983). However, although attitudes that are important to an individual are more easily called to memory than less important ones (Krosnick, 1988), studies have found no significant correlation between recall or recognition of an argument and persuasion (Petty & Cacioppo, 1979; Petty et al., 1983). It is therefore unclear as to whether better memory of an argument predicts attitude change.

3) Individuals centrally processing messages are more influenced by the message. However, central processing does not necessarily lead to a more favourable

position toward the position advocated in the message. Individuals centrally processing a message will be more in favour of the arguments of a message consistent with their views, but will be more against the arguments of a message inconsistent with their views (Petty & Cacioppo, 1979). Petty and colleagues have also manipulated the quality of the arguments they have presented, by presenting individuals with arguments that are either 'weak' (based on opinions and quotations) or 'strong' (based on statistics). They found that personal relevance increased the influence of the messages: individuals receiving weak arguments disagreed more with the message, whereas individuals receiving strong arguments agreed more with the message (Petty & Cacioppo, 1979; Petty et al., 1983).

4) Individuals centrally processing messages are influenced by the message for longer. Up to 14 days post-intervention, individuals centrally processing a message continued to hold their new attitudes whereas individuals peripherally processing the message did not (Petty et al., 1985, cited in Petty & Cacioppo, 1986). Empirical evidence in relation to social learning theory (Bandura, 1977) also suggests that personal involvement leads to longer lasting attitudes. Social learning theory asserts that attitudes learnt through active participation are more durable and resistant to change than attitudes learnt vicariously (Bandura, 1977, 1982, 1997). Thus, the more personal engagement with an activity or message, the longer the attitude change will last (Bandura, Adams, & Beyer, 1977; Bandura, Blanchard, & Ritter, 1969; Bandura, Jeffery, & Gajdos, 1975; Wu & Shaffer, 1987).

5) Individuals centrally processing messages are more likely to act in response to the persuasive message (Krosnick, 1988; Sivacek & Crano, 1982). Indeed, Petty and colleagues found that when individuals were influenced by the peripheral cues of a message, they did not report any intention to buy the product the message was promoting. However, individuals who centrally processed the message reported intentions to buy the product the message was promoting, significantly more so when the message was personally relevant to them (Petty et al., 1983).

2.2.4.4 Criticisms of the ELM

The ELM has received abundant empirical support, mainly from the authors of the ELM, and is considered effective in explaining unexpected findings and generating future research (Areni & Lutz, 1988; Bohner & Schwarz, 2001; Eagly & Chaiken, 1993). Besides Petty and Cacioppo, other researchers have found results consistent with the ELM. For example, researchers have found that increasing involvement leads to central processing and that cues are of less importance in central processing (Chaiken, 1980); attitudes formed by direct experience are more resistant and lead to central processing of messages (Wu & Shaffer, 1987); and issues that are personally relevant to individuals are more consistent with their behaviour (Krosnick, 1988; Sivacek & Crano, 1982). However, the ELM has received criticisms. Whilst some of these criticisms were misunderstandings of the ELM that have been addressed by Petty and Wegener (1999), there are still two criticisms that have not been addressed.

First, the ELM is only descriptive inasmuch that it lacks explanatory and predictive power (Bohner & Schwarz, 2001; Eagly & Chaiken, 1993). In regard to explanatory power, as acknowledged by Petty and Cacioppo (1986), the ELM does not explain why some variables act as peripheral cues and why some do not. The ELM also does not explain why peripheral cues are relatively unimportant in high cognitive processing situations. Are the cues actively or unconsciously ignored? Or does central processing distract individuals from the impact of the cues (Eagly & Chaiken, 1993)? With regard to predictive power, it is difficult to predict how a certain variable within a certain persuasion context will act - it may act as a peripheral cue, as part of an argument, or influence the level of cognitive processing of the message (Bohner & Schwarz, 2001).

Second, the ELM has provided a misleading conception of argument strength. As identified by Areni and Lutz (1988), Petty and colleagues have conflated two aspects of arguments when discussing argument strength. Petty and colleagues have conceptualised argument strength in terms of the grounds of the evidence supporting an argument. Thus, a strong argument is convincing as it uses documented evidence (e.g. government statistics), whereas a weak argument is easily criticised as it uses anecdotal evidence (e.g. quotes and opinions) (e.g. Petty & Cacioppo, 1979; Petty et al., 1983). In manipulating the evidence base of arguments, Petty and colleagues believed they were creating logical and cogent arguments versus easily criticised arguments. However, as identified by Areni and Lutz (1988), Petty and colleagues only manipulated the desirability of an argument.

Using the theory of reasoned action (Fishbein & Ajzen, 1975), Areni and Lutz (1988) distinguished between argument strength and argument valence. Argument strength refers to the likelihood the recipient will believe the argument is true, whereas argument valence refers to the likelihood the recipient perceives that what is argued is desirable. Areni and Lutz stressed that argument strength according to Fishbein and Ajzen's (1975) conception is the variable that should be investigated, as this is the most likely issue facing health promoters. Health promoters will inevitably prioritise the features of their campaigns that will enhance adherence to their message, and so will need to find the best way to communicate these features (i.e. valence is fixed, but the aim is to increase argument strength) (Areni & Lutz, 1988). However, Areni and Lutz (1988) presented empirical data that suggested that in the previous studies of Petty and colleagues, the messages were only manipulated by argument valence, and not by argument strength. Thus, most studies manipulating argument strength have actually manipulated argument valence - a variable of less importance.

2.2.5 Summary

Tailoring is a communication tool relatively new to health promotion, emerging from advances in communication technology and the need to provide the public with documented health advice. Tailoring is more effective than generic, personalised, and targeted communication in meeting the information needs of individuals, because it presents them with the most relevant combination of messages within a message library. The ELM is a useful tool to explain why tailoring should be effective. Those setting out to persuade by tailored messages can assert that their persuasion messages are more likely to be centrally processed. Although central processing demands more cognitive effort, users of tailored information are more motivated to centrally process the information due to its personal relevance to them. Enticing users to centrally process health messages has four benefits for health promoters: individuals centrally processing messages attend more to the arguments of a message than the peripheral cues, are more influenced by the message, are influenced by the message for longer, and are more likely to act in response to the persuasive message (Petty & Cacioppo, 1986; Petty et al., 1994).

2.3 The Empirical Evidence for Tailoring Physical Activity Advice

This section reviews the evidence for the effectiveness of tailoring in two parts. The first part summarises the results from three general reviews of tailoring health advice. These reviews cover health behaviours such as mammograms, diet, smoking cessation, and physical activity. Since balance training is a form of physical activity, the second part reviews the literature that has evaluated the effectiveness of tailoring physical activity advice. This thesis makes a distinction between tailoring the presentation of advice (the messages advising participants to take up a health behaviour) and tailoring the recommended activities (the health behaviour). As this thesis concerns the tailoring of the presentation of advice to individuals, this section will only review such studies, and all subsequent references to tailoring concern tailoring the presentation of advice. Unless stated, within both parts of this section, the tailored studies were conducted in the USA targeting middle-aged adults, and when providing physical activity advice, presented the advice to reduce the risk of cardiovascular disease.

2.3.1 Three Reviews of Tailored Health Advice

The first review of tailored health advice was of 13 studies (Skinner, Campbell, Rimer, Curry, & Prochaska, 1999). Skinner et al. divided the review into studies that compared tailoring with health risk feedback or used tailoring as one of several interventions, and those that compared tailoring with a generic intervention. For the studies that compared tailoring to health risk feedback or as one of several interventions, three studies provided evidence for tailoring to have a significantly stronger effect on behaviour change. One study found non-significant behaviour change results, but used tailoring in conjunction with generic advice which may have diluted the effect of tailoring. One study also provided some evidence for tailoring to have a stronger effect on psychological outcomes related to behaviour change, including self-reports of the advice being read, remembered, relevant, credible, and intention to change behaviour. For the studies that compared tailoring with a generic group, five studies provided evidence for tailoring to have a significantly stronger effect on most behaviour change outcomes, and four on psychological outcomes related to behaviour change. Two studies found no significant difference between the tailored and generic groups, however, one study used advice that was insufficiently tailored, and the other attenuated the effect of tailoring by providing face to face consultations to both the tailored and generic groups.

Skinner et al. provided comprehensive detail of the studies reviewed and provided many suggestions for future research. However, the review was limited by the lack of rigour from some of the early tailoring studies, particularly the studies that found no significant behaviour change results for tailoring. Half of the review was also limited by studies not using a generic comparison group to determine whether their tailored interventions were superior, equivalent, or inferior in changing behaviour than a less resource-intensive generic intervention.

The second review was conducted by Revere and Dunbar (2001) of articles comparing personalised, targeted, and tailored interventions. Of the 23 studies using tailored interventions, 22 (96%) found tailoring to be more effective than generic advice in motivating uptake of health behaviours, although only 15 (68%) of these studies found significant results. Of these 15 studies, four found tailoring to be effective for some outcome measures, and four found tailoring to have a greater effect within a subsample. Four studies also reported tailoring to have a greater effect on psychological constructs related to behaviour change. The studies with non-significant differences between tailored and generic health advice were found to have four weaknesses, in that the advice presented was limited in content, not thoroughly tailored to the individual, not tailored according to psychological variables, and used very similar content for both the generic and tailored advice.

Revere and Dunbar's (2001) review was more thorough and systematic in searching for papers and only included studies meeting a certain quality threshold. However, because their review was not solely focused on evaluating tailored interventions, they provided less detail on studies than Skinner et al. (1999) and in some cases to an insufficient level for objective assessment. Tailoring was less rigorously defined, with the use of the stage of change model accepted as tailoring, and on two occasions personalisation was incorrectly classed as tailoring. The results of some studies were not reported quantitatively (e.g. "no real difference between groups") or appeared to be usability or qualitative studies. The non-significant results from two studies on some outcomes were also omitted (Campbell et al. 1994; Kreuter & Strecher, 1996).

The third and final review by Ryan and Lauver (2002) of 20 articles was different to the above two in that they split the outcome data into two categories: process (reception of health advice) and behavioural (uptake of health advice). For process outcomes, Ryan and Lauver came to the same conclusion as Skinner et al. (1999): tailored advice was significantly better received than generic advice. For behavioural outcomes, Ryan and Lauver came to a similar conclusion to Revere and Dunbar (2001): 10 (50%) of the studies reviewed found tailored advice to be significantly better than generic advice in motivating uptake of health behaviours. Another eight studies showed trends in favour of tailoring, however these were not significant. Ryan and Lauver noted that the effect sizes for tailoring were small, and may be related to the characteristics of the samples; many researchers may have diluted the effects of tailoring by recruiting participants who were already active in the same sample as sedentary participants. For seven of the studies that found significant differences, the significant effect for tailoring on behavioural outcomes was not found for all the behaviours (e.g. Brug, Steenhuis, van Assema, & de Vries, 1996; Kreuter & Strecher, 1996), and some studies only found significant results within subgroups of their samples (e.g. Skinner, Strecher, & Hospers, 1994; Strecher et al., 1994).

Ryan and Lauver's (2002) review was limited by the omission of a summary table of the studies reviewed, and the presentation of both Cohen's *d* and Pearson's *r* values for effect sizes rather than using either just *d* or *r*. Their search terms for papers was also not exhaustive. However, their review is the most useful of the three. They used a more thorough and methodological search for papers than Skinner et al. (1999), and had available 20 papers for review that compared tailored with generic interventions (and excluded those with a control group or alternative intervention). Ryan & Lauver were also more rigorous in defining tailoring and in reporting results than Revere and Dunbar (2001), and because their review was focused on tailoring, provided additional useful data such as the effect of tailoring on longer follow-ups.

Thus, from these three reviews of a variety of health interventions, tailoring is expected to increase the effectiveness of health promotion messages on process outcomes (i.e. messages are more likely to be seen as personally relevant, read, understood, agreed with, and remembered). Tailoring has only produced a significantly better effect on behavioural outcomes 50% of the time, although this may be explained by the methodological limitations of the studies that did not find significantly positive results for tailoring. Although tailoring has only generated small effect sizes, tailoring advice to motivate the older population to undertake balance training could be more effective than a generic version.

2.3.2 Evidence for Tailored Physical Activity Advice

From a review of 28 physical activity interventions using mass media, print media, and information technology, Marcus and colleagues recommended tailoring physical activity advice (Marcus, Owen, Forsyth, Cavill, & Fridinger, 1998). The empirical evidence for this recommendation is reviewed below. Previous researchers have used the term 'tailoring' to describe interventions that have used both minimal and extensive tailoring. Indeed, some researchers have stated that they have tailored information when in fact it was only targeted (see Kreuter & Skinner, 2000). Researchers have labelled targeted interventions as tailored because they have customised the advice according to the stage of change (transtheoretical) model. The stage of change model assumes that people progress linearly through five stages of intention to carry out a health behaviour: precomtemplation, contemplation, preparation, action, and maintenance (Prochaska, DiClemente, & Norcross, 1992). Thus, tailoring according to this model categorises individuals into one of five distinct stages. For this review, an intervention that only categorised people into distinct stages and used no other variables to customise the advice was regarded as targeted, and therefore excluded.

For this review of the evidence for the effectiveness of tailored advice on increasing uptake and adherence of physical activity, and on positively influencing psychological constructs related to physical activity, the search terms, "tailor*" and "physical activit* or exercis*", were applied to the titles of abstracts in the following electronic databases: ISI Web of Science (1970 - 11/03/2007), PsycINFO (1985 - 15/03/2007), Journals@ovid (<15/03/2007), Ovid MEDLINE ® (1950 - week 1, March 2007), EMBASE (1980 - week 10, March 2007), and CINAHL (1982 - Week 1, March 2007). Further papers were identified from review articles and the reference lists. Abstracts excluded from the review included newspaper articles, news items and letters to the editor, dissertation abstracts, papers describing an intervention without presenting data, those that tailored recommended physical activities and not physical activity advice, those that tailored using small group discussions and no written materials, those that tailored physical advice for specific patient populations and not the general community population (patients undergoing a kidney transplant, or suffering from incontinence, elevated blood pressure, or diabetes), and theoretical papers. The first version of this review was conducted in the summer of 2005, when there were no reviews of interventions tailoring physical activity advice. When this review was updated in March 2007, the review by Kroeze, Werkman, and Brug (2006) was identified, and so is referred to in interpreting the findings of this review. Twenty-six papers were included in the review, 17 that measured behaviour change, and nine that measured changes on physical activity-related psychological constructs.

2.3.2.1 The Impact of Tailoring on Physical Activity Behaviour

Kreuter and Strecher (1996) presented 1,317 adults with advice on increasing aerobic physical activity along with advice on nine other health behaviours. Participants either received a health risk appraisal, a health risk appraisal plus tailored advice, or were allocated to a non-intervention control group. Tailoring was carried out according to the participant's stage of change, reasons for wanting to undertake physical activity, self-efficacy, past attempts and failures to do physical activity, and perceived barriers and benefits of undertaking physical activity. Patients received feedback by post 2-4 weeks after baseline, but only received tailored advice if they both were at a health risk (e.g. sedentary) and wanted to change their behaviour for that health topic. There was a marginally significant result ($p = 0.106$) for physical activity, with 25% of patients receiving the tailored advice undertaking physical activity at 6 months post-intervention compared to 14% in the health risk appraisal and 14% in the control group. A significant positive result was found for two other health behaviours, but not the other four (data was only presented for seven of the health topics). Perhaps less positive results were found for tailoring in Kreuter and Strecher's study because they addressed ten health behaviours simultaneously. Participants may have been overwhelmed by the information and advice, or made small changes across the health behaviours that was not substantial enough to reach significance for an individual behaviour.

Cardinal and Sachs (1996) presented healthy women with one of two types of tailored physical activity advice or feedback on current health (control group). The tailored advice either suggested the participant engage in physical activity during their daily routine (lifestyle physical activity, discussed in Chapter 3), such as climbing stairs instead of taking a lift, or more rigidly introduce physical activity into their weekly routine (structured physical activity), such as visiting a gym on set times of the week. They found that at 1 month post-intervention, compared to the control group, the tailored lifestyle advice led to significantly higher levels of physical activity, but the tailored structured advice did not. The lifestyle physical activity advice group was expected to increase their physical activity more as the tailoring could be more easily customised to the individual's lifestyle. However, as it was a female sample the findings may not generalise to men, and there was only a 31% recruitment rate into the study suggesting the intervention may not appeal to everyone.

Another study found positive results for tailoring physical activity advice, but only within a subgroup of the sample. Jarvis and colleagues presented adults aged 60 and above with an automated telephone system for them to access weekly (Jarvis, Friedman, Heeren, & Cullinane, 1997). The advice was tailored according to stage of change and goal-setting. At 3 months post-baseline, tailored advice was significantly more effective at increasing physical activity behaviour than a control group, but only with participants who were the most sedentary at baseline. Perhaps Jarvis et al. may have found better results for tailoring if they had tailored according to the adults' preferred activity instead of advising participants to walk more.

Marcus and colleagues provided participants with either generic advice or tailored printed advice plus computer-based feedback on current level of activity (Bock, Marcus, & Pinto, 2001; Marcus et al., 1998). Advice was delivered at baseline, 2, 3, and 6 months. They found that tailoring advice led to significantly larger increases in physical activity behaviour at 3, 6, and 12 months compared to generic advice. However, it is unclear whether the effects of tailoring were due to stage-of-change-matched self-help manuals, computer generated tailored advice, tailored feedback, or their combination.

Bull, et al. (1999b) found partial support for tailoring physical activity advice when they compared advice that was tailored and personalised, to generic and personalised, generic but not personalised, and a control group. Each form of advice was identical in style of presentation and delivered after verbal advice from the general practitioner was provided. The tailored version was customised according to stage of change, goal setting, motives and perceived barriers to reaching their goal, and preferred activity. At 3 months post-intervention, all the groups increased to a similar extent in participating in sports, strengthening exercises, dancing, and aerobic exercise. However, the tailored group increased physical activity to a significantly greater extent at home (whilst caring for children, gardening, and performing household chores and repairs) and where tailoring would be expected to be most effective: the participants' preferred activities. However, Bull et al. excluded 70% of their sample due to health problems, the outcome measure did not include all appropriate physical activities (a limited set of leisure activities and activities of daily living, and no occupational activities), and the measure was not validated. In addition, the verbal advice provided by the general practitioner to all groups before the materials were sent may have attenuated the effect of tailoring.

Bull and colleagues published a similar study the same year comparing generic advice with advice tailored on social cognitive and stage of change variables, addressing barriers to and benefits of physical activity, self-efficacy, definitions of physical activity, and preferred activity (Bull, Jamrozik, & Blanksby, 1999a). They found no significant difference in behavioural outcomes up to 12 months post-intervention. Bull et al. suggested their tailored intervention did not tailor to participants enough as the materials were only two A4 pages including graphics, and that over a third of participants in the tailored group selected options similar to the advice given to the generic group.

Kreuter, Oswald, Bull, and Clark (2000b) presented 198 overweight adults, who were mainly women, with weight loss advice that was either tailored or generic. The advice concerned both dietary and physical activity behaviours. Tailoring was carried out according to goal seeking, perceived barriers, habits and routines, individual or social learning, the source of the advice, and self-efficacy. They also analysed how well the generic advice matched the participant's advice needs by chance. For this they created a variable categorising the participants into generic conditions that had a good, moderate, or poor fit with the generic advice. Kreuter et al. found that the tailored and good-fitting generic advice led to significantly greater intention to change behaviour, but only the good-fitting generic advice group had increased exercise behaviour at 1 month post-intervention. Kreuter et al. concluded that generic materials will by chance only be effective one third of the time, whereas tailored advice will more likely be effective. However, the sample were mainly white women motivated to lose weight, and so the findings may not generalise to other adult populations, those less motivated to lose weight, or those with different or no health problems.

Wylie-Rosett and colleagues recruited 588 adults from a health maintenance organisation and its surrounding area (Wylie-Rosett et al., 2001). They compared the effectiveness of a workbook, with the workbook plus kiosk-based tailored advice, and the workbook plus the tailored advice plus personal consultations. The advice combined dietary and physical activity behaviours. The tailoring was carried out according to the stage of change model, goal setting, and lifestyle and behavioural modifications. Both the tailored advice delivered by the kiosk and consultations were multiple sessions. At 12 months post-baseline, they found that each intervention group reported an increase in walking time and the number of blocks walked per day. Each group reduced in weight, but significantly more so for the most intensive intervention group (workbook, kiosk, and consultations) compared to the workbook only group. In a multiple regression, higher computer use was the most predictive of weight loss, and correlated with weight loss was an increase in the average time spent walking. Wylie-Rosett et al. concluded that the computer-tailored advice with or without the interpersonal consultations significantly added to the intervention of using a workbook. However, this study was limited by the absence of a control or generic group for comparison.

Campbell et al. (2002) conducted a multiple health intervention with women at nine blue-collar worksites. They compared the effect of providing tailored magazines and social support from the participants' colleagues who were trained for the study against a control group, who received only the tailored materials 6 months post-baseline. Tailoring was carried out according to demographics, health concerns and priorities, current level of activity, and community-specific resource information. At 6 months post-intervention, the women in the tailored group were doing significantly more physical activity that enhanced strength and flexibility, and at 18 months post-intervention the tailored group were doing significantly more physical activity that enhanced stretching and flexibility than the control group. Campbell et al. noted that these strength, stretching, and flexibility exercises help alleviate stress and help with musculoskeletal and arthritic conditions - both of which were commonly reported in their sample. This would explain the increase in these three physical activities, and the non-significant results for the other eight specific physical activities measured, including walking, swimming, and aerobic dance. Campbell et al. acknowledged a limitation of their study was that their control group received the tailored messages at 6 months, and so at 18 months post-baseline, the effect of tailoring may have been underestimated in this study. It is also unknown how well the tailored materials would have compared to a generic comparison.

Blalock et al. (2002) recruited 547 women aged 40-56 to a study using a 2x2 design that sought to prevent osteoporosis by increasing calcium intake and weight-bearing physical activity. The study investigated the effectiveness of tailored advice over generic advice, and a community-based intervention over a control group. They used Weinstein's (1988) precaution adoption process model (PAPM), a model similar to the stage of change model, which further subdivides the precontemplation group into: never heard of the health risk, heard of it but never thought about changing behaviour, and decided against changing behaviour. Thus the model has seven instead of five stages of change. Tailored advice was delivered via two packets of written materials and a telephone counselling session. The first set of tailoring was carried out according to their current level of physical activity, whether they thought their current level of activity was sufficient, and their stage of change according to the PAPM. Three weeks post-baseline they received their first set of printed advice, and if they were below sufficient levels of physical activity, the participants were given telephone-based advice on goal-setting, behavioural contracting, barriers, and relapse prevention. The second printed advice contained information on the goals set, the contract set, and tips for overcoming barriers identified. The generic group received two packets of written materials but no telephone counselling, and the second packet contained a blank behavioural contract. There was no significant difference between the tailored and generic groups or the community-based and non-community-based groups on weight-bearing physical activity (activity for the purpose of exercising) at 3, 6, and 12 months post-baseline. The sample was not representative of the population as few participants were in the earlier stages of change, although perhaps this would have led to a bias in favour of the intervention.

Keele-Smith and Leon (2003) randomly assigned participants to physical activity advice that was generic or tailored according to how the participant enjoyed physical activity. Enjoyment was categorised as to whether the individual enjoyed exercising or achieving exercise goals, and whether they enjoyed competitive or non-competitive exercise. At 5 weeks post-intervention, only 3% of the sample dropped out and there was a significant difference between the tailored and generic advice groups: the tailored group increased their physical activity behaviour and the generic group decreased. As noted in the commentary by Aaronson (2003), 69 participants (mostly in the control group) were already exercising at recommended levels at baseline, and so Keele-Smith and Leon may have underestimated the effect of their tailoring. However, as noted in the commentary by Allan (2003), as the tailored group also received weekly educational sessions, it is unclear what contribution this additional education and support provided.

Campbell et al. (2004) designed an intervention to improve the diet, physical activity, and screening behaviours of African Americans for the prevention of colorectal cancer. They randomly assigned 12 rural churches to one of four conditions: tailored newsletters plus targeted videos, lay health advisor interpersonal consultations, both the newsletters and consultations, or a control group. Tailoring was carried out according to the stage of change model, beliefs, knowledge, barriers, motivators, and cultural and spiritual factors. The theories used were the transtheoretical, social cognitive, health belief, and social support models. The lay health advisors encouraged social networking and support from activities. The intervention was delivered at 2, 4, 6, and 9 months post-baseline measures. Data was available for 587 participants at the one year follow-up. There was no significant difference between the groups on total physical activity undertaken, but the tailored group was participating in significantly more recreational physical activity. Campbell et al. noted that recreational activity would have been more volitional than the other behaviours of housework, childcare, home repairs, yard work / gardening, and occupational physical activity. Although Bull et al. found tailoring to have a positive effect on similar home-based behaviours, they did not include in their measure the variable that was likely to be under least volitional control: occupational physical activity (Bull et al., 1999b). Campbell et al.'s tailored intervention was combined with targeted videos, and so it is unknown what additional benefit these videos brought to the tailored intervention. Also, the tailoring was carried out according to baseline measures, and so would have been less sensitive than immediate advice, as advice on physical activity was delivered 4 months post-baseline.

In Belgium, Vandelanotte and colleagues recruited half of their sample from sedentary adults, and another half from participants who were already active (Vandelanotte, De Bourdeaudhuij, Sallis, Spittaels, & Brug, 2005). They tailored the content and language of the advice according to the stage of change model, and the content was further tailored according to the theory of planned behaviour (TPB), including feedback about intentions, attitudes, self-efficacy, social support, knowledge, and perceived benefits and barriers to behaviour change. Compared to a control group, Vandelanotte et al. presented tailored physical activity advice either immediately or 3 months after baseline. At 6 months post-baseline, both tailored advice groups increased physical activity significantly more than the control group. A limitation of Vandelanotte et al.'s study was that since they tailored their advice by both content and language, it is unknown what additional contribution tailoring by language provided.

Hageman and colleagues randomised 31 women aged 50-69 years to receive either a generic or tailored online newsletter (Hageman, Noble Walker, & Pullen, 2005). A further newsletter was provided at 1 and 2 months with a follow up at 3 months. Tailoring was carried out according to level of self-reported activity, perceived benefits and barriers of activity, self-efficacy, and initial goals for activity. At 3 months, both groups improved in flexibility, but did not significantly increase their level of activity. Hageman et al. believed the lack of increase in time spent on physical activity was because they conducted their study at a hot and humid time of year. Hageman et al. also found a discrepancy in their measures within the comparison group, with objective tests for body fat showing improvement but cardiorespiratory fitness (VO_2max) reduced, which they believed was due to a lack of recall of time spent in physical activity. Their sample was also female and of a limited age range (50-69), and so their findings may not generalise to men or to women of different age groups.

In Belgium, Spittaels and De Bourdeaudhuij (2006) recruited visitors to a university hospital to access a tailored website. The website was tailored according to feedback on their current activity compared to government recommendations, stage of change (by content and language), and the TPB. Additional links provided information such as goal setting. After 2 months the participants were interviewed by phone on their use of the website and any subsequent behaviour change. Spittaels and De Bourdeaudhuij found that of the 43 participants, 74% rated the advice as stimulating but only 23% reported that they had made behavioural changes. This study was also limited by the absence of a control or generic comparison group.

Williams et al. (2006) compared the impact of presenting individuals with tailored physical activity advice with the impact of baseline perceived enjoyment of physical activity. Enjoyment was considered as an outcome expectancy, i.e. whether the individual anticipated enjoying the physical activity or not (Bandura, 1997). Mainly women from the community were recruited, and randomised to one of two conditions: printed or telephone delivered tailored advice, or a control group that received information on wellness. Tailoring was based on the stage of change and social cognitive theories, to increase brisk walking in the participants' lifestyles. Each group received advice 14 times, 11 of which were within the first 6 months of the study. At 6 months post-intervention, there was a significant interaction between intervention group and physical activity enjoyment: those who anticipated enjoying physical activity at baseline and were in the tailored group were the most active, whereas those that did not anticipate enjoyment and were in the control group were the least active. Thus, they found that perceived enjoyment moderated the effect of their tailored intervention. Tailoring advice according to physical activities participants wish to undertake for enjoyment should then be an effective means of tailoring. Williams et al.'s sample was mainly healthy Caucasian women motivated to take part in the study, and so their findings may not generalise as well to men, those with health problems, or less motivated to exercise. In addition, they measured outcome expectancy, but not other variables from social cognitive theory such as self-efficacy, which may have provided an important finding.

Hurling et al. (2007) randomised 77 adults (two thirds women) to either receive online tailored physical activity advice or verbal advice on recommended physical activity levels (control group). After 3 weeks of collecting baseline measures, for 9 weeks, the tailored group received tailored advice on their current level of activity, perceived barriers to carrying out physical activity, and completed a plan to carry out physical activity, with the option of mobile phone text message or email reminders.

Data was collected by self-report and an accelerometer worn on participants' wrists. At 9 weeks, Hurling et al. found that there was no significant difference between the two groups on reported total physical activity, but the tailored group had increased their leisure time physical activity significantly more than the control group. The accelerometer data corroborated this finding, with the tailored group performing more moderate physical activity across the 9 weeks, with an average of 19.7 minutes more per day. The tailored group also had a significant reduction in body fat. Thus, Hurling et al. found evidence in support of online tailored physical activity advice. However, they did not use a generic group for comparison, and as their tailored version used a number of factors, it is unclear which components of the intervention were most effective (e.g. whether the text reminders were useful).

From the above 17 studies that employed tailoring to customise the physical activity advice to the participants, 9 (53%) provided significantly positive results for tailoring physical activity advice to increase physical activity behaviour over a generic or control group. Short-term positive effects were found, although one study found positive effects in behaviour change up to 18 months post-intervention (Campbell et al., 2002). Moderately positive results for tailoring were found for three (18%) further studies: Jarvis et al. (1997) found positive results, but only with those most sedentary at baseline; Spittaels and De Bourdeaudhuij (2006) found positive results for tailoring, although no control group was used and only 23% of those receiving the tailored advice made behavioural changes; and Williams et al. (2006) found that perceived enjoyment moderated the effect of their tailored intervention. Tailoring was found to be no different to generic advice or a control group in five (29%) studies (Blalock et al., 2002; Bull et al., 1999a; Hageman et al., 2005), although one of these studies found marginal results in favour of tailoring (Kreuter & Strecher, 1996), and one found significant results for generic advice that was a good-fit to the participant by chance (Kreuter et al., 2000b).

In summary, tailored research has predominantly been conducted with white middle-aged Americans, and further research is required with other populations. Within this limited generaliseability, two thirds of studies have found a positive trend for tailored physical activity advice to be effective in motivating physical activity behaviour. A limitation across some of the studies was the absence of generic advice comparison groups, and researchers often added other aspects to their interventions, which made it unclear what aspects of their interventions were most important.

The above review found markedly different findings than Kroeze et al.'s (2006) review of the effectiveness of computer generated tailored advice on increasing uptake and adherence to physical activity. The two reviews are divergent for two reasons. First, the above review included nine tailored studies that Kroeze et al. did not include in their review, five of which were published after their inclusion date of September 2004 (Campbell et al., 2002; Cardinal & Sachs, 1996; Hageman et al., 2005; Hurling et al., 2007; Jarvis et al., 1997; Keele-Smith & Leon, 2003; Spittaels & De Bourdeaudhuij, 2006; Vandelanotte et al., 2005; Williams et al., 2006). The other four studies were likely to have been excluded because they used an automated telephone system to communicate the advice and not written text (Jarvis et al., 1997), used the stage of change model as part of their tailoring, which may have been interpreted as targeting and not tailoring (Cardinal & Sachs, 1996), and incorporated interpersonal counselling with the intervention (Keele-Smith & Leon, 2003) or control group (Campbell et al., 2002). Of the nine studies not included in Kroeze et al.'s review, 4/9 found significant positive results for tailoring. 4/9 found moderately positive results, and 1/9 found no significant positive results for tailoring on increasing physical activity behaviour. Thus, the tailored studies that were not included in Kroeze et al.'s review mainly found a positive trend for tailoring physical activity advice.

Second, there was some disagreement in the interpretation of the studies reviewed by Kroeze et al. and in the above review. There was no difference for the short-term effects (0-3 months). However, for medium-term effects (3-6 months), the above review found no evidence that Vandelanotte et al.'s (2005) control group increased physical activity to a similar extent to the tailored intervention groups, rather the tailored groups were found to increase physical activity to a significantly greater extent. Also, a study reported by Kroeze et al. to not be positive appeared to show positive results: Bull et al. (1999b) found at 3 months post-intervention that although all the groups increased to a similar extent in participating in sports, strengthening exercises, dancing, and aerobic exercise, the tailored group increased physical activity at home and for the participants' preferred activities. Thus, this study found arguably positive results since increases in activity were observed for activities where tailoring would be expected to be most effective.

For long-term effects (>6 months), two studies that were reported by Kroeze et al. to not be positive were found to have marginally positive effects for tailoring on increasing physical activity (Kreuter & Strecher, 1996; Wylie-Rosett et al., 2001). In addition, Kreuter and Strecher's intervention addressed nine health behaviours, which may have diluted the effect of tailoring on physical activity, while Wylie-Rosett et al. found that their tailored intervention was the most effective, and significantly increased the persuasiveness of their workbook intervention. For the study by Campbell et al. (2004), whilst Kroeze et al. reported that this study found no positive results for tailoring on total physical activity, they did not report that recreational physical activity was significantly increased in the tailored group. As Campbell et al. noted in their discussion, their measure of total physical activity was less likely to be influenced by tailoring, as activities under less volitional control were included (housework, childcare, home repairs, yard work / gardening, and occupational physical activity). In conclusion, the above review would have found 1/3 positive results for tailoring on short-term effects (as Kroeze et al. concluded), 3/5 positive results for tailoring on medium-term effects (and not 2/5), and 3/6 significant or marginally significant positive results for tailoring on long-term effects (and not 1/6).

2.3.2.2 The Impact of Tailoring on Physical Activity-related Psychological Constructs

Nine interventions were identified that used tailoring beyond simply categorising individuals into a stage of change. Cardinal and Sachs (1995) also reported psychological outcome measures from their tailored intervention described above, that presented participants with either tailored lifestyle or structured physical activity advice, or tailored feedback on current health (control group). They found that at 1 and 7 months post-intervention, each group ascended the stage of change model at a similar rate, with no significant between groups differences. However, Cardinal and Sachs acknowledged that their small sample size may have led to low power to detect between group differences.

Bull et al. also reported process outcomes from their two studies reported above. At 1 and 3 months post-intervention, compared to a generic group, they found no differences between groups at one month on recall, interest, reading, keeping the materials, giving the pamphlet to someone else, or how much the materials 'applied specifically' to them (Bull et al., 1999a, 1999b). Bull et al. suggested that their non-significant findings were because their tailored intervention did not tailor enough to participants as the materials were only two A4 pages, including graphics.

Kreuter et al. (1999a) also reported further results from their study reviewed above (Bull et al., 2001; Kreuter et al., 2000b). They presented 198 overweight adults with weight loss advice that was either tailored or generic. They found that those who received the tailored advice listed more positive thoughts reflecting elaboration on the advice, personal connection with the advice, personal assessment, and intention to make behavioural changes than participants in either of the other two conditions. However, they did not find significantly greater reports of self-efficacy in the tailored group, although their categorisation of reports may have been overly restrictive and masked an effect. In addition, as noted above, the sample were mainly white women motivated to lose weight, and so their findings may not be generaliseable to other demographic groups and those less motivated to lose weight.

Kreuter et al. (2000b) reported further data from the same study. They divided the generic group into three categories according to how well by chance the advice matched participants' needs (good, moderate, or poor-fitting). They found that the tailored advice was reported to be more attractive and generated more positive self-assessment thoughts than the other three generic groups. The tailored group and good-fitting generic advice groups generated more moderate positive personal connections with the advice, and were more likely to report that the advice was attention-grabbing and likeable than the other two generic groups. Also, the tailored, good- and moderate-fitting generic groups all generated more positive thoughts than the poor-fitting generic group. However, the good-fitting generic group were more likely to report that the advice was informative and useful than the tailored group. On the whole, the tailored and good-fitting generic groups produced the most positive results on the psychological variables.

Bull et al. (2001) reported further data from the same study. They found the tailored advice to generate greater attention to and re-reading of the advice, and greater intention to show others. Although tailoring was not significantly associated with other variables including intentions to make behavioural changes and to try the suggested advice, perceiving the advice as applying to them personally was perhaps another measure of tailoring. Reports of the advice to be more applicable to the participant were significantly associated with the advice being liked, easily understood, learning new information, attitude change, and remembering the concepts of the advice. Bull et al. concluded that behaviour change was more likely for those who received the tailored advice and for those who reported higher levels of self-efficacy. However, tailoring appeared to be more effective for those with a lower BMI and not a higher BMI, and so may be less effective for those with more weight to lose.

Calfas et al. (2002) provided patients in primary care with an assessment and requested they develop an action plan to do more physical activity. Calfas et al. then randomly assigned patients to one of four advice conditions: bimonthly tailored advice by post, every 6 weeks tailored advice by telephone and post, weekly tailored advice by telephone and post; or a control group. Tailoring was carried out according to current activity level, goal setting, two specific behaviours, social support, and barriers. At 4 months post-baseline, there was no significant difference between the different follow-up groups in movements on the stage of change model for either moderate or vigorous activity. However, the participants who set themselves a goal to increase their physical activity were significantly more likely to ascend a stage of the stage of change model to perform physical activity, a finding that relates to research on 'implementation intentions' (Gollwitzer, 1999) that will be discussed Chapter 3. However, these participants who improved more were also exercising less at baseline, and because of this may have been more motivated to increase their physical activity levels. Calfas et al.'s study was also limited by a lack of a generic or non-intervention control group for comparison.

The online tailored intervention described above by researchers in Belgium (Vandelanotte et al., 2005) was also evaluated on psychological constructs related to physical activity (Vandelanotte & De Bourdeaudhuij, 2003). One hundred and ninety-two middle aged participants were sent a CD-ROM to access a computer programme and an evaluation questionnaire to complete whilst accessing the intervention. Tailoring was according to the stage of change model (both content and language), TPB, and an action plan. Sixty-eight percent rated the advice positively, however, only 43% said they intended to follow the advice, and the action plan was not deemed useful. They also found significant differences within the sample. Respondents were more likely to intend to use the advice if they were in a higher stage of change, and those with more computer experience found the intervention more usable, who were more likely to be male and aged below 40 years, more educated, and not in the lowest stage of change. Thus, generally this study found positive results for the intervention's usability and acceptability, although less than half the participants intended to follow the advice and it was less useful for those who are less motivated to exercise and less familiar with computers. The study was also limited by the absence of a generic comparison group.

A trial by Hageman et al. (2005) described above, entailed providing older people with either a generic or tailored online newsletter giving advice at baseline, and again at 1 and 2 months. At 3 months post-baseline, both groups reported a reduction in perceived barriers. In addition, self-efficacy was enhanced in the generic group but reduced in the tailored group. Hageman et al. believed that the tailored version did not enhance self-efficacy because it only addressed the three worst situations for performing physical activity, and not a range of challenging situations as addressed in the generic version. As noted above, Hageman et al. used a female sample of a limited age range (50-69), and so their findings may not generalise to men or to women of other age groups.

Hurling and colleagues compared two versions of a physical activity website with a control condition (Hurling, Fairley, & Dias, 2006). Seventy-five participants (71% women) were randomly assigned to one of three conditions. For 10 weeks, the interactive website group received tailored advice on their current level of activity, perceived barriers to carrying out physical activity, and completed a plan to carry out physical activity, with the option of mobile phone text message or email reminders. The other groups either received no advice or had 10 weeks access to a static version of the website which gave generic advice and plotted their physical activity level. At 10 weeks, both website groups had a significantly greater reduction in the belief that exercise is too boring compared to the control group. Expectation to exercise more in the following week, satisfaction with motivation to exercise, and satisfaction with fitness all increased within the tailored group significantly more than the other two groups. Satisfaction with fitness was greater within the tailored group if they had accessed the website more times. At 7 months, the tailored group retained significantly higher ratings of satisfaction with motivation to exercise compared to the control group, and stated they were exercising more then than at baseline compared to the control group. However, Hurling et al.'s measures were not validated or theoretically-based, and so it is unclear whether an increase in these variables also equates to an increase in physical activity.

In another study by Hurling et al. (2007), they randomised 77 adults to receive online tailored advice or a control condition. After 9 weeks of access to the website, the tailored group reported significantly higher ratings on the following: perceived behavioural control and intention to exercise, satisfaction with fitness, well-being, internal and external locus of control to exercise, and greater interest in using the website. In contrast to Hurling et al.'s earlier study reported above, the variables measured in this study were based on theory (TPB and locus of control), and so would be predicted to equate with higher levels of physical activity. However, this study did not use a generic comparison group, and so it is unclear whether a generic version of the website would produce similar results to the tailored group.

From the above nine tailored interventions, five (56%) of the studies have provided support for the impact of tailored advice on physical activity-related psychological constructs. A study found positive results for tailored advice to be more attractive, attention-grabbing, likeable, and generated more positive thought processing about the advice (Bull et al., 2001; Kreuter et al., 1999a, 2000b). Another study only found positive effects when combined with goal seeking behaviour, but there was no comparison group (Calfas et al., 2002). Another study found general support for online tailored advice, in that it was usable and acceptable, although less than half of the participants intended to follow the advice (Vandelanotte & De Bourdeaudhuij, 2003). Two further studies found positive results for a tailored website. One study found the tailored version to be better than a generic version in increasing expectation to exercise and satisfaction with motivation and fitness (Hurling et al., 2006), and another found that compared to a control group, the tailored group increased perceived behavioural control, intention, and both internal and external locus of control to exercise (Hurling et al., 2007). However, four (44%) studies have not found positive results for tailoring. Three studies did not find significant results (Bull et al., 1999a; 1999b; Cardinal & Sachs, 1995), although two of the interventions may not have been sufficiently tailored to make a significant change on the outcome measures. Another study found that self-efficacy was enhanced in the generic group but not the tailored group, although the authors believed their tailored advice could have been tailored more positively (Hageman et al., 2005). Thus, further research is required to determine the impact of tailoring on physical activity-related psychological constructs.

2.3.3 Summary

From three reviews of health promotion, it is evident that there is great potential in tailoring to improve the reception of a variety of health advice, and in addition its uptake in approximately 50% of cases. Future research should identify within which contexts tailoring works best. From the review of previous research into the effectiveness of tailoring physical activity advice, 71% of the studies found a positive trend (53% significantly positive results and 18% moderately positive results) for tailoring to be effective in motivating uptake of physical activity behaviour. However, this literature is limited by weaknesses in the design of tailored advice and lack of adequate comparison groups. Future research can address these weaknesses to lead to stronger conclusions, and to ascertain more confidently the impact of tailoring on physical activity-related psychological constructs.

2.4 Tailoring Balance Training Advice

Whilst tailoring the *activities* included in interventions has been recommended for balance training to prevent falls in older adults (AGS et al., 2001; Feder et al., 2000; Gardner, Buchner, Robertson, & Campbell, 2001; Gillespie et al., 2003), to date, only one team of researchers has evaluated an intervention that tailors the *presentation of advice* to motivate older people to prevent falls (not exclusively advice on balance training). The literature that suggests the presentation of advice to motivate older people to undertake balance training should be tailored is reviewed in this section. This section begins by presenting research that shows the criteria required for the ideal conditions of tailoring health advice to be met, and then reviews balance training research that has highlighted the need for tailoring.

2.4.1 Ideal Conditions for Tailoring

As tailoring materials demands more time, effort, and cost to create than generic materials, tailoring should only be used in contexts where it will be most effective.

There are two criteria required for the ideal conditions to tailor health promotion (Kreuter et al., 1999b). The first criterion is that the variables that predict behaviour change in the target behaviour are complex. The second criterion is that the target population is heterogeneous.

2.4.1.1 Balance Training – Prediction of Behaviour Change is Complex

Uptake of physical activity has been shown to be complex, as it is dependent on the characteristics of the individual, the environment, the behaviour(s) promoted, and the dynamic influence of these on each other (Buckworth & Dishman, 2002). The variables that predict uptake of physical activity are likely to be interrelated with other variables, and their effect will differ over time and the aging of the person (Buckworth & Dishman, 2002). Variables that predict uptake of physical activity include demographics, psychological factors, activity preference, the environment, programme factors, and perceived barriers and incentives for undertaking physical activity (e.g. Booth, Bauman, Owen, & Gore, 1997; Booth, Owen, Bauman, Clavisi, & Leslie, 2000; Buckworth & Dishman, 2002; Caserta & Gillett, 1998; King et al., 1992, 2000; Massie & Shephard, 1971; Shephard, 1994). It is then likely that balance training, being a form of physical activity, will be a complex behaviour for the prediction of uptake. Thus, the first criterion for the ideal conditions of tailoring is met in promoting balance training to older people, as the variables that predict behaviour change in the target behaviour are complex.

2.4.1.2 The UK Older Adult Population

In general, as people age they become more at risk of contracting one or more chronic illnesses (Hart, 1990; Hoffman, Rice, & Sung, 1996). Consequently, chronological age is the criterion used to include people in studies concerning older age. When a person reaches retirement age they will start to be included in research, as around then senescence begins - the breakdown of the maintenance function of the body - and declines in biological and psychological functioning become apparent (Seifert, Hoffnung, & Hoffnung, 1997; Stuart-Hamilton, 1991). In order to segment the older adult population into more meaningful categories, authors have distinguished between ‘young’, ‘middle’, and ‘old’ older adults. Young older adults are deemed to be aged 65-74 years, and are generally free from physical limitations; middle older adults are aged 75-84 years, and many have some physical limitations; whilst old older adults are aged

85 years and above, and are often dependent on carers for everyday tasks (Shephard, 1994, 1997; Wells, 1992).

However, people actually deteriorate at very different rates as they advance in age. By old age the variance in health and balance ability becomes larger than any younger generation (Brody, Brock, & Williams, 1987; Day, 1985; Schaie, 1988; Shephard, 1997). Indeed, chronological age - how old a person is - will tell the researcher little about what the person is like (Ward, 1984). A woman of 65 years of age may have balance difficulties and be unable to walk unaided, whereas another woman of 90 years of age may run in the London marathon, as did Jenny Wood Allen in 2002 (Guinness World Records, n.d.). Indeed, it has been suggested that perceived age (how old a person feels) be measured alongside chronological age, as perceived age is a better predictor of an older person's health, independence, engagement in social activities, self-efficacy, and quality of life (Bowling, See-Tai, Ebrahim, Gabriel, & Solanki, 2005). Thus, the second criterion for the ideal conditions for tailoring, that the target population is heterogeneous, is met in promoting balance training to older people, as older adults are heterogeneous in balance ability.

2.4.2 Balance Training Research

Only one previous website has been designed to provide older people with tailored falls prevention advice. Before a study that has evaluated this previous website is summarised, falls prevention research is presented that has highlighted the need to tailor balance training advice.

2.4.2.1 The Need for Tailoring

Yardley and Todd's (2005) study effectively highlights the need to tailor balance training advice and so is described in detail. Yardley and Todd (2005) conducted both a qualitative and quantitative study with older adults dwelling in the community and sheltered housing [independent flats with an alarm system to alert the emergency help of a warden, and availability of care ranging from a monthly visit by a warden to communal facilities and 24-hour care (Southampton City Council [SCC], 2002)]. Yardley and Todd's qualitative study consisted of focus groups and semi-structured interviews with 66 older adults, to ask their views on a variety of messages about falls prevention. Two points are relevant from their thematic analysis. First, it was noted that some of the older adults rejected the falls prevention advice if it was not feasible within their lifestyle or entailed an activity that was not appealing to them. Second, some of the older adults recognised the need to present falls prevention advice to others frailer and older than them, but to them the advice was patronising and irrelevant. This finding was evident despite the sample including old and frail people who had previously fallen. From these two points it is clear that a different version of falls prevention advice is required that is more appropriate and acceptable to older adults.

In presenting generic falls prevention advice, the health promoter is faced with a dilemma; to promote balance training in a manner that is appropriate and not patronising to older people who regard themselves as at low risk of falling, but to also provide balance training advice that is not risky for older people who have poorer balance. A solution would be to tailor balance training advice according to older adults' self-perceived balance ability. This would provide the best match of balance training advice to the older person's current identity regarding health and balance ability. The limitation in this solution is that although older people's health beliefs have been found to moderately correlate with their objectively measured health (Hart, 1990), an older person's perceived balance ability may not necessarily match their actual ability and falls risk. However, tailoring to the older person's self-perceived balance ability should be more acceptable to older adults, as conflicts commonly arise when individuals disagree not with the content, but with the identity or role put forward within arguments (Danziger, 1976; Kingston, 2000).

Yardley and Todd's (2005) quantitative study consisted of structured interviews and postal questionnaires sent to 715 older adults, partly to investigate which beliefs influence older adults' intention to take up balance training. Yardley and Todd found that the most significant positive predictor of intention to carry out balance training was that the advice was 'suitable for someone like them'. This effect predicted more of the variance than two other significant positive predictors of intention to carry out balance training: being younger and female. Part of Yardley and Todd's conclusions was that falls prevention advice should be made "with suggestions for how the advice can be made to suit different lifestyles and preferences" (2005, p. 27). Thus, there is a need to tailor balance training advice.

2.4.2.2 Previously Developed Tailored Online Falls Prevention Advice

In the Netherlands, Alpay and Ezendam et al. have developed online falls prevention advice (Alpay et al., 2004; Ezendam, Alpay, Rövekamp, & Toussaint, 2005). Their advice concerned suitable sports activities, home safety, and walking aids, and was designed for older people at risk of a fall, targeting them directly and indirectly through their carers and healthcare professionals. Alpay and Ezendam et al. stated that they tailored falls prevention advice, but their interactive approach does not meet the definition of tailoring provided earlier (Kreuter et al., 2000a). Alpay and Ezendam et al. presented users with a selection of 20 narrative case scenarios to identify with, labelling the cases by age, gender, main health problem, and preferred solution. Each case provided a description of a problem and solution, and options to find out more information. Whilst their approach provided interactivity, they merely presented the individual with a list of information to choose from. Their customising does not meet the criteria for tailoring, of presenting information to individuals based on unique characteristics that are derived from individual assessment (Kreuter et al., 2000a). The user selects the best scenario, which still may not be personally relevant to them.

Ezendam et al. evaluated their website by inviting older adults, carers, and health professionals to undertake four problem-solving scenarios, and provide feedback on the website through questionnaires, and interviews (carers and healthcare professionals) and focus groups (older adults). The carers and healthcare professionals were more positive about the idea of using cases than the older adults. The carers found the text too long, and the healthcare professionals found a poor match between their queries and the answers in the cases. The older adults also found the information too long and too specific to the scenario. The healthcare professionals were positive about searching for cases, whereas the carers and older adults found searching for cases more difficult. The older adults found the website well structured and readable, but some reported that the advice would be suitable for someone else more at risk of a fall, and not themselves. Lastly, a third of participants were unable to find a scenario they could identify with, suggesting that the customisation was not effective for these participants (Ezendam et al., 2005). It is likely that the presentation of the advice in a list of scenarios led to the participants' inability to find a scenario to identify with, which would have been avoided if a tailored approach was used (that meets the above definition of tailoring).

Since their initial evaluation, Alpay et al. have revised the SeniorGezond website to be designed for the wider older adult population (Alpay et al., 2007). It uses an interactive design, allowing the user to navigate the website using a keyword search (based on Sutcliffe and Ennis's cognitive theory), site map, index, and information trees. The website provides information on the causes of falls, possible solutions, additional information about products and services to supplement the information on solutions, and contact details for products, services, and insurance information. There is also information on practical problems with everyday living such as fear of falling and difficulties rising from a chair, and a health appraisal questionnaire to guide users to the relevant sections of the website. Besides using the health questionnaire, the advice is targeted using Weinstein's (1988) precaution adoption process model (PAPM). Alpay et al. examined the data of 214 web log files to analyse visitors' activity on the website. They found that progressively fewer users accessed the information as they progressed through the sections from generic to specific: causes of falls, solutions, products and services, and supportive facts (contact details). They found the keyword facility was the most frequently used tool, that information regarding hazard reduction in and around the home was popular, and that more information regarding fear of falls and osteoporosis was accessed by those using the health appraisal questionnaire. However, whilst the website provides different pathways for locating the advice, it still does not tailor the advice. In addition, the website has yet to be tested against a generic version, and so it is unknown whether the interactive features of the website are more efficacious than a generic / less interactive version of the same advice.

The website described above that has previously developed falls prevention advice was not originally developed for the general older adult population, but for use with older adults at risk of a fall. It is important to reach the general older adult population with an inexpensive tailored promotion of balance training, and in order to maximise uptake among older people who may not consider themselves at risk of falling, the benefits of balance training should be emphasised more than the avoidance of falls (Ballinger & Clemson, 2006; Yardley et al., 2006, 2007a; Yardley & Todd, 2005). This manipulation of message framing is based on prospect theory, that identical decisions presented differently can influence people to make different decisions (Tversky & Kahneman, 1981). In the context of preventive health behaviours, adopting risk avoidance behaviours are influenced more by loss messages: those that emphasise the risks of not performing the advised behaviour. In contrast, adopting relatively safe and predictable behaviours are influenced more by gain messages: messages that emphasise the benefits of performing the behaviour (Rothman & Salovey, 1997). The theory of message framing has been supported by empirical studies showing that gain-framed messages are more persuasive in encouraging the adoption of relatively safe and predictable behaviours such as physical activity (Rothman & Salovey, 1997). As a positive frame is favourable when promoting physical activity, it is likely that a positive frame is also favourable when promoting balance training.

In regards to falls prevention, Yardley and Todd (2005) presented older people with balance training advice, and then measured what variables predict older people's intention to perform balance training. They found that greater intention to perform balance training was significantly associated with greater belief that balance training would be suitable for someone like themselves; that other people would think that they should perform balance training; and that balance training is enjoyable, would improve functioning, and not be harmful. The perceived risks and consequences of falls and the presence of risk factors such as illness or unsteadiness were not significantly associated with intention to perform balance training. Thus, Yardley and colleagues have recommended that balance training advice should be gain-framed, stressing the benefits of balance training, rather than loss-framed, stressing the risks of falls (Yardley et al., 2006; Yardley & Todd, 2005). Indeed, older people do not wish to consider themselves at risk of a fall (Braun, 1998; Cameron & Quine, 1994; Health Education Board for Scotland [HEBS], 2001; Simpson & Mandelstam, 1995; Yardley & Todd, 2005). The denial of falls risk has even been found among those with increased risk due to poor mobility, advanced age, or a previous fall (Yardley et al., 2006). In addition, although chronic illnesses are common among older adults (Hart, 1990), only a minority of them rate their health as poor (Sidell, 1997), as older people appear eager to convey that they are healthy, independent, and not at risk of a fall (Ballinger & Payne, 2000, 2002; Simpson, Darwin, & Marsh, 2003). The desire of older people to portray their balance as good is likely to stem from the stigma attached to be being labelled 'a faller', with connotations such as being frail, dependent, and possibly having a drink problem (HEBS, 2001). Hence, older people are likely to respond to falls prevention messages that are consistent with an older person's positive self-identity, of maintaining independence and taking control of their health (Ballinger & Clemson, 2006; Yardley et al., 2007a).

It may also be useful to tailor according to psychological factors. Along with stressing the benefits of undertaking balance training (and not the risk of falls), tailoring the presentation of balance training advice according to psychological factors, such as self-perception of balance ability and preferred balance training activities, could lead to greater uptake of the advice (Danziger, 1976; Kingston, 2000). The website developed for the current research to provide tailored balance training promotion is consistent with recent recommendations. Based on the falls literature, ProFaNE have published recommendations for promoting the engagement of older people in preventive health care (Yardley et al., 2007a). Among their recommendations were the use of tailoring, validated methods of raising older people's awareness of the benefits of balance training (tailoring according to psychological theory and evidence), stressing the benefits of the interventions, and encouraging older people to be active in their health-management (providing older people with choice).

2.4.3 Summary

The last section of this chapter presented previous research that supports three points. First, the two ideal conditions for tailoring balance training advice are met: the variables that predict behaviour change in balance training are complex, and that the older population is heterogeneous. Second, there is a need to tailor the presentation of advice to older people to encourage them to undertake balance training for the prevention of falls. Third, a previous research team has made their online falls prevention advice interactive by presenting a list of narrative case scenarios. Whilst the original version was only designed for older adults at risk of a fall, it has since been revised to target the wider community population of older people. However, a tailored design was not used, and its efficacy has yet to be tested against a generic comparison.

2.5 Conclusion

This chapter aimed to introduce the strategy of tailoring and provided the rationale for tailoring the presentation of advice to motivate older people to undertake balance training for preventing falls. The chapter was divided into three sections. The first section presented tailoring as a communication strategy that is more effective than generic, personalised, or targeted communication. Then, the ELM was presented as a theory to explain why tailoring leads to more effective communication. The second section presented reviews of tailored health advice, showing that tailoring improves the reception of health advice, and in addition, increases uptake in 50% of cases. The physical activity studies reviewed showed that tailored advice increased physical activity behaviour two thirds of the time, and that further research is required into the impact of tailoring on physical activity-related psychological constructs. The third and final section presented previous research indicating that the ideal conditions for tailoring balance training have been met, and that there is a need for tailored advice to motivate older people to undertake balance training to prevent them from falling. Only one research team has previously presented interactive online falls prevention advice for older people at risk of a fall. A new intervention is required that tailors advice, for community-dwelling older people, promoting the benefits of balance training rather than focusing on the avoidance of falls, and needs to be compared against a generic equivalent. Chapter 3 describes such an intervention designed as part of this research, and the theoretical and empirical basis for how it was designed.

CHAPTER THREE
THE DEVELOPMENT OF THE BALANCE TRAINING WEBSITE

3.1 Aims of this Chapter

This chapter draws on the evidence presented in the previous two chapters. Chapter 1 described the need for interventions to encourage older people to participate in balance training to prevent them from falls, and Chapter 2 explained how tailoring can be an effective tool for communicating and increasing uptake of health messages. This chapter describes the balance training website developed for this research, that provided tailored advice to increase older people's motivation for undertaking balance training. The aims of this chapter are to describe in detail the website developed for this research, explain the rationale for the advice presented, and the selection of factors used to tailor the balance training advice. This chapter is divided into three sections. The first section presents the novelty, target audience, and structure of the website; the second section describes each webpage and the rationale for each feature; and the third section presents the attitudes and beliefs concerning balance training that the tailored advice would be expected to influence.

3.2 Introduction to the Balance Training Website

Before each webpage is described in detail, the website is introduced by describing its novelty, target audience, structure, and development.

3.2.1 Novelty

This website intervention is novel within falls prevention research in three ways: first, because it uses a tailored design; second, because it presents the advice on the internet; and third, because it uses positive framing. First, whilst falls prevention information has been previously published for older people (e.g. DTI, 2001), and tailored advice has been developed for other behaviours including physical activity (see Chapter 2), this is the first intervention to use a tailored design (as defined by Kreuter et al., 2000a) in presenting community-dwelling older people with advice to help motivate them to undertake balance training for the prevention of falls. Second, whilst health advice has been presented on the Internet previously (e.g. Hurling et al., 2006), its use in health promotion research with the older population is relatively novel. As argued in

Chapter 1, presenting information online, as well as recruiting participants online has several benefits. Third, whilst previous falls prevention information has often adopted a negative framing approach that has not been well received by some older people (Yardley & Todd, 2005, see Chapter 2), this intervention is relatively novel in using positive framing, i.e. stressing how balance training can enhance their balance, and thereby maintain activity, confidence, independence, and quality of life, rather than stressing the risk of falling for undertaking balance training.

These three novel features of the website intervention make a contribution both clinically and theoretically. Clinically, it provides a resource to help motivate older people to adopt balance training, either directly or indirectly through those in contact with them (relatives, carers, etc). Theoretically, it synthesises the literature on falls prevention and tailoring, and empirical studies were conducted to test the efficacy of tailoring and the utility of the variables chosen to tailor the balance training advice.

3.2.2 Target Audience

The website principally targeted healthy adults aged 60-75 years dwelling in the community, and using the internet was believed to be an effective way of communicating to this subpopulation (see Chapter 1). The website was targeted principally to younger (aged 60-75 years) and fitter older adults in the community, as there is already an initiative in place for those aged 75 years and above. Since 1990, in Britain, all those aged 75 years and above receive an annual health check (DoH, 1989). It has been recommended that a falls risk assessment forms part of this health check (HEBS, 2003; Swift, 2001), in line with the objective to identify and provide services for those most at risk of falling (AGS et al., 2001; DoH, 2001; National Institute for Clinical Excellence [NICE], 2004). It would not be cost-effective to use such an intensive intervention with older people aged 60-75, nevertheless, an intervention with this age group is required for two reasons. First, a less intensive intervention would help younger and fitter older people prevent falls at their current age and mobility, as a study found that a fifth of younger and fitter older people fall and are significantly more likely to suffer a serious injury as a result of their fall (Speechley & Tinetti, 1991). Second, falls prevention for younger and fitter older people would help them continue to prevent falls when they become more at risk of a fall, as past physical activity is a positive predictor of adopting physical activity (Buckworth & Dishman, 2002; Culos-Reed, Rejeski, McAuley, Ockene, & Roter, 2000; King et al., 1992; Shephard, 1994).

3.2.3 Structure

The website was accessible on the world-wide web at www.balancetraining.org.uk (now no longer available, as it has been replaced by the revised version described in Chapter 7). The website presented balance training advice on webpages that advanced sequentially, so that each user advanced through the website in the same way and in the correct sequence. The website had a simple template, with an option to increase or decrease the size of the text on screen. Few photographs were used, as besides increasing download time, it would have been more challenging to programme photos to appear on the tailored webpages, as the photos would also have needed to be tailored to illustrate the tailored advice. Each webpage contained a hyperlink at the bottom that once clicked advanced the user onto the next webpage. This hyperlink doubled as the means by which data entered on that webpage was recorded onto a database linked to the website. Participants' data were automatically recorded onto a Microsoft Office Excel 2003 spreadsheet, which was available online to the researcher and password-protected.

For comparison, a generic version of the advice was designed as well as the tailored version. The generic version was used as a control group in a between groups study described in Chapter 5. The user was randomly assigned to either the tailored or generic group at the end of the second webpage, and this is described in detail when describing the second webpage. Apart from the manipulation of presenting either tailored or generic versions of the advice, the webpages were similar in content and identical in presentation format. The generic advice was created by piecing together all the different segments of the tailored advice. The sequence of webpages for both the tailored and generic groups is presented in Figure 2.

Four factors were used to tailor the advice to users: self-perceived balance ability (to tailor to the individual's perceived needs, capabilities, and self-image), health conditions known to be associated with falls risk, preferred physical activities, and an action plan. The webpages were similar in text length, although the text was spread over 11 webpages for the tailored group and eight webpages for the generic group. Whilst the generic version of the advice presented the user with one set of advice, the tailored

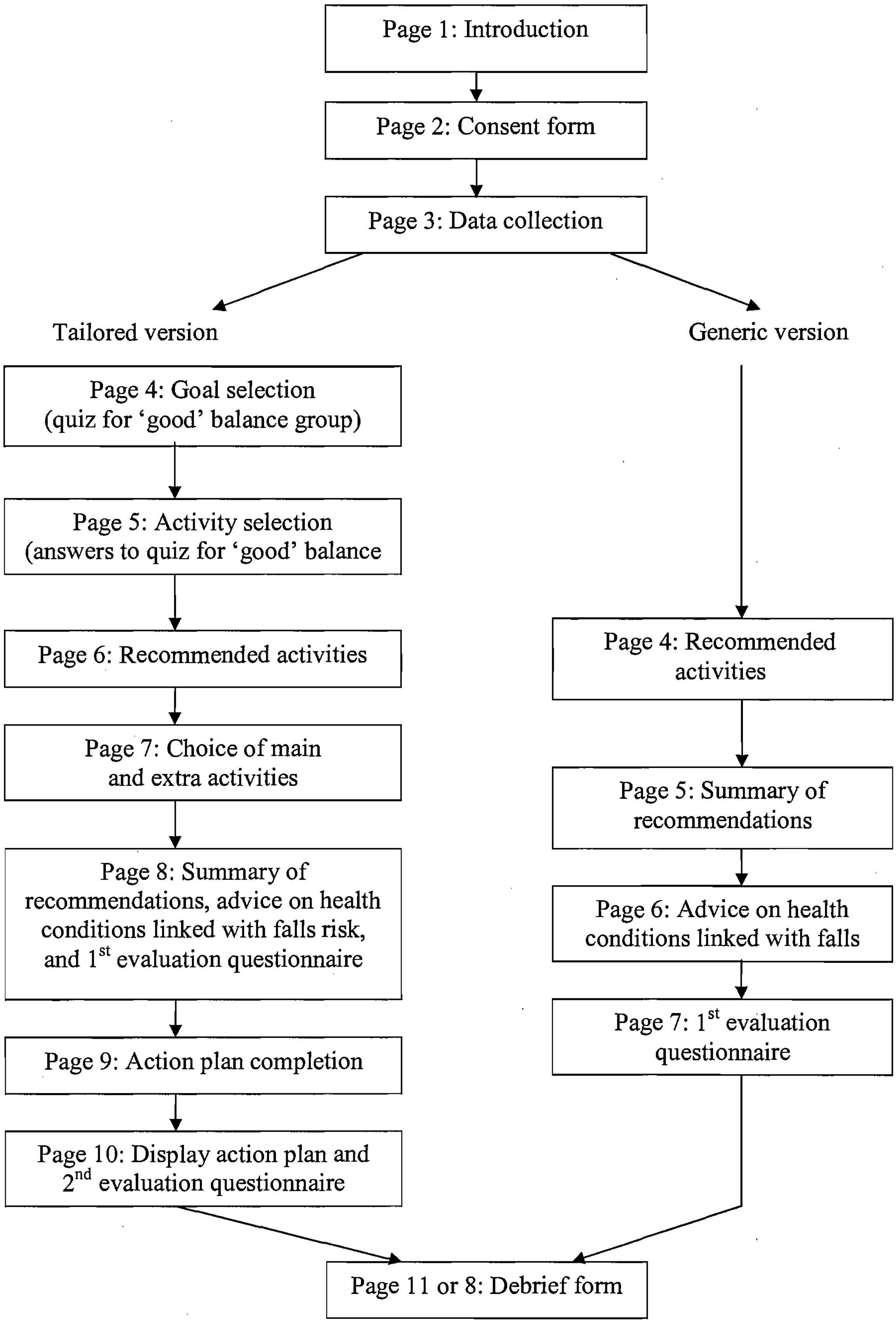


Figure 2. Sequence of webpages for the tailored and generic versions of the advice.

version was able to present the user with 22-26 different sets of advice across three self-rated balance groups (described below under webpage three). The total number of possible tailored advice sets was 71, equating to 1,201 possible advice combinations.

The first three webpages had a readability score of 70.6. From webpage four onwards, the following readability scores were obtained for the self-rated balance groups: good balance = 62.1, quite good balance = 62.9, and having some problems = 63.3. The mean readability score for all the webpages (1-11) across the three self-rated balance groups was 64.7. These readability scores indicated that the tailored advice webpages were of standard readability, and equivalent to the language used in a reader's digest (Flesch, 1948). A standard level of readability is believed to be understood by 70% of the British population (Payne, Large, Jarrett, & Turner, 2000) and most Internet users, as Internet users are above average in education level (Fox, 2004).

3.2.4 Development

The name of a website and its domain name (website address) are important (Bradley, 2002), because these not only catch the audience's attention, but communicate the topic of the website (Sellers, 1997). The choice of a suitable name for the balance training website (which was called www.balancetraining.org.uk) was a challenging decision. The website concerns physical activities that help prevent falls. However, studies have shown that older people distance themselves from the discourse of falls (Braun, 1998; Cameron & Quine, 1994; HEBS, 2001; Simpson & Mandelstam, 1995; Yardley & Todd, 2005), and so they would be unlikely to browse and search for websites concerning falls prevention. The approach taken in this research was to avoid a discourse on falls and promote a discourse on balance training. Whilst (strength and) balance training is a term widely used in the falls literature, it is not in the general public, and so will not be found by those searching for websites on falls prevention. To then make the balance training website readily located by older people, the website will need to be linked to as many reputable and relevant websites possible. This will both raise the profile of the website, and increase its ranking on search engines when users search using terms such as 'balance training' (e.g. if they have heard of the website but do not know the exact address) (Bradley, 2002). The balance training website is currently an external link on Help the Aged's website under their falls prevention section, and the government's website (www.direct.gov.uk) in their over 50s section under ‘keeping mobile and preventing falls’. More work would be needed to link the website to health sections of popular websites such as the British Broadcasting Corporation (www.bbc.co.uk/health/), websites specifically for older people, falls prevention websites for those searching for falls prevention websites, and for it to be promoted by people that care and work with older people. Press releases and advertising would also raise the profile of the website (including a link to the website from the University of Southampton’s website), although this would be more expensive.

Although the website was designed by the researcher and his supervisor, RioMed, a UK IT company that works to improve the quality of health care for patients, performed all the programming of the balance training website. This relationship was struck through the manager of RioMed approaching the researcher’s supervisor a few months before this research was to begin. In exchange for using the website for advertising the work of RioMed, RioMed provided the programming necessary for this research free of charge.

The researcher’s supervisor wrote the advice on carrying out balance training using existing falls prevention materials identified by the researcher. The researcher’s supervisor designed balance training advice to be tailored according to self-rated balance and health conditions. The researcher then designed the balance training advice to be tailored according to users’ preferred activities and the construction of an action plan. The researcher then designed the generic advice with his supervisor. The advice was written and sent to the website programmer in word files for publication. Once the programmer had developed a first draft of the website, the researcher tested it by checking that all the tailoring worked and that participant data was recorded. The researcher then provided RioMed with a list of corrections that they addressed, and the researcher re-tested the website. This process was undertaken several times until no further corrections were identified.

Because the website programming was conducted externally by RioMed, the researcher had less control over the design of the website than if the website was designed by the researcher or internally by a colleague. RioMed own the rights to the website and all the programming data. In addition to RioMed’s contribution, Help the Aged, a high-profile UK charity for older people, provided additional presentation advice and promoted the balance training website on their website. Also, the safety and appropriateness of the advice was checked by members of ProFaNE.

This chapter provides a description of each webpage and the rationale for the factors used to tailor the balance training advice. The researcher's contribution to the development of the website was on how the website content was tailored, and the evaluation of the website's usability, acceptability, and efficacy in relation to psychological theory and methods. Detail is not provided on the rationale for the content of the advice, as this was written by the researcher's supervisor in consultation with other experts in falls prevention. The content was crafted based on the falls literature and non-academic websites and leaflets developed to advise older people on falls prevention.

3.3 Description of and Rationale for the Webpages

This section is divided into two parts. The first part will describe the tailored webpages, and the second part will describe the generic webpages. A screen print of each webpage will be presented to provide the reader with an impression of the appearance of the webpages.

3.3.1 Tailored Webpages

3.3.1.1 Webpage one.

A screen print of the first webpage is presented in Figure 3. The first webpage served as an introduction to the website. It introduced users to the concept of balance training by addressing three questions: 'Why do I need to improve my balance?', 'What is balance training?', and 'Who can benefit from balance training?' Balance training was presented in a positive frame throughout the website, based on message framing theory and falls prevention research described in Chapter 2.

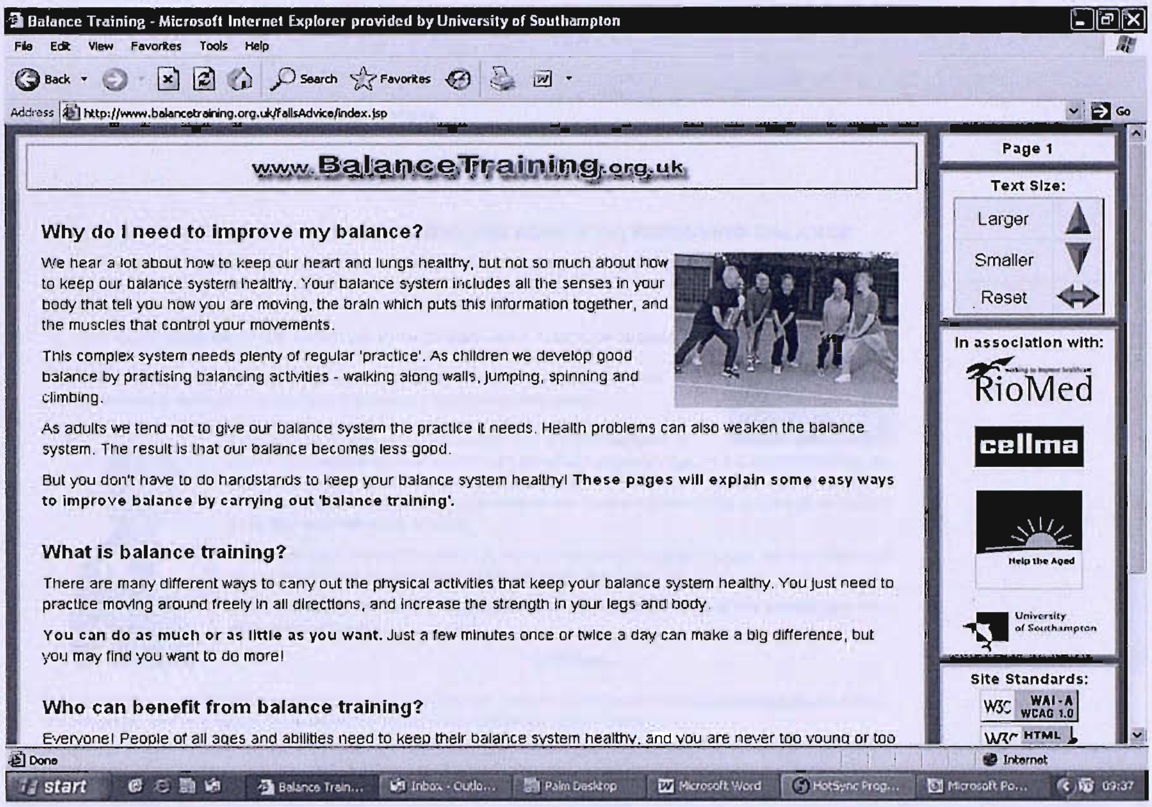


Figure 3. *Screen print of the first webpage.*

3.3.1.2 Webpage two.

A screen print of the second webpage is presented in Figure 4. To comply with ethical requirements when recruiting participants for research (British Psychological Society [BPS], 2006), the second webpage presented participants with an information and consent form. It explained to the user that they are invited to participate in a research study, and that they were about to receive one of two forms of advice (tailored or generic). The webpage also informed the user that at the end of the website they would be provided with a free advice pack to download. Similar to the physical activity directory created by Miller and Miller (2003), the advice pack contained contact details of various organisations that could facilitate the participant in adopting balance training. These organisations could help the participant find a class near to them, find out more information on an activity, or more information on health in later life or falls prevention. The user was reminded of the advice pack in subsequent webpages, and it served as an incentive for the participant to reach the end of the website.

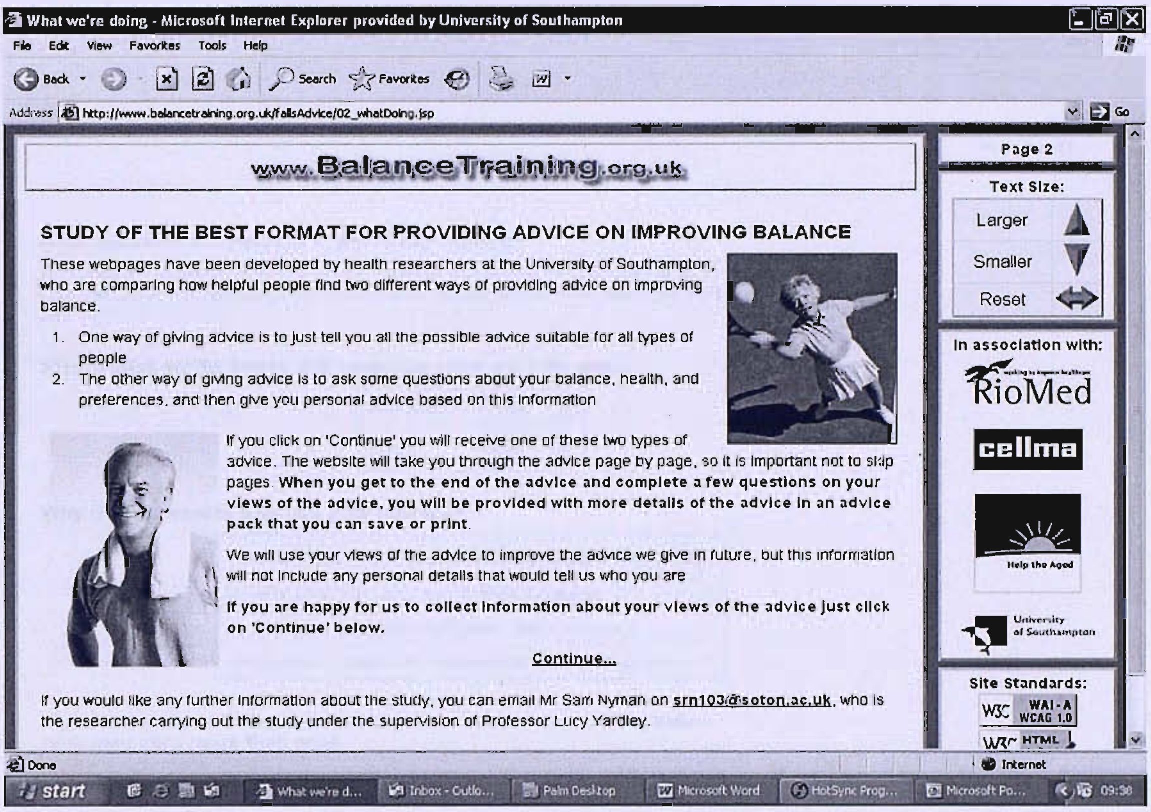


Figure 4. Screen print of the second webpage.

Users provided consent for participating in the study by clicking on the 'submit' button that advanced them to the next webpage. Once the participant clicked to consent to take part in the study, they were randomly assigned to either the tailored or generic version of the balance training advice. Randomisation was achieved by recording the time when the participant clicked on the submit button to advance to the next webpage; depending on whether the modulus of time (the number left over when divided two) ended with a whole number or 0.5, the participant was directed to either the tailored or generic webpages respectively.

3.3.1.3 Webpage three.

A screen print of the third webpage is presented in Figure 5. The third webpage collected data from the participant, including their year of birth, gender, self-rated balance, and health conditions known to increase the risk of falls. Age and gender were collected to provide demographic data of the participants. Self-rated balance and health conditions known to increase the risk of falls were used to tailor balance training advice.

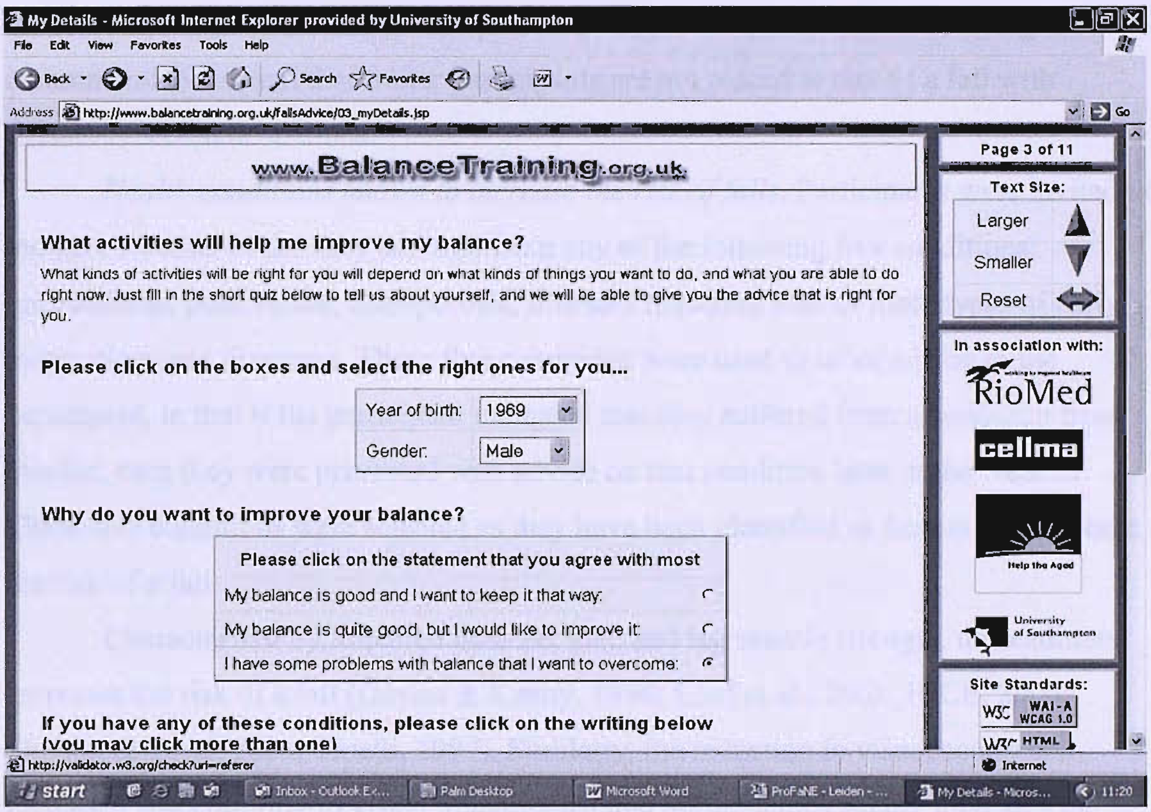


Figure 5. Screen print of the third webpage.

Self-rated balance. Participants were provided with three options to rate their current balance: 'my balance is good and I want to keep it that way'; 'my balance is quite good, but I would like to improve it'; and 'I have some problems with balance that I want to overcome'. This item was used to capture participants' perceived needs, capabilities, and self-image relating to balance ability. Thus, this item was concerned with the participant's perception and not their actual balance ability. Although the website did not use an objective measure of balance ability, a modest relationship was assumed between the participants' self-rated balance ability and their actual ability (Hart, 1990). This was so that the advice could be tailored to the level of intensity of balance training that the participant believed was appropriate for them to perform. Based on the response to this question, the participant was categorised as either having balance that was 'good', 'quite good', or 'having some problems'. The advice throughout the remaining webpages was tailored to these three categories. As discussed in Chapter 2, older people are heterogeneous in health and balance ability, and therefore tailoring according to the balance ability of the individual is important in advising on balance training, so that fitter participants are not patronised with undemanding recommendations, and that frailer participants are not placed at risk of a fall with strenuous recommendations.

Health conditions known to increase the risk of falls. Participants were invited to indicate whether or not they suffered from any of the following five conditions: unsteadiness, poor vision, osteoporosis, illnesses requiring four or more types of daily medication, and dizziness. These five conditions were used to tailor advice to the participant, in that if the participant indicated that they suffered from a condition from this list, then they were presented with advice on that condition later in the website. These five conditions were selected as they have been identified as factors that increase the risk of a fall.

Characterised by impaired balance, gait, and leg muscle strength, unsteadiness increases the risk of a fall (Davies & Kenny, 1996; Lord et al., 2001; NICE, 2004; Skelton & Todd, 2004; Tinetti, 1997). Similarly, the reduction in visual acuity and increased susceptibility to visual impairments that accompanies ageing increases the risk of a fall (Davies & Kenny, 1996; Lord et al., 2001; NICE, 2004; Skelton & Todd, 2004). This finding is more recent, as a previous review only found visual impairments to increase the risk of falls in nursing home populations, and not community populations (Tinetti, 1997).

Osteoporosis has been defined as "a progressive systemic skeletal disease characterised by low bone mass and microarchitectural deterioration of bone tissue, with a consequent increase in bone fragility and susceptibility to fracture" (Royal College of Physicians & Bone and Tooth Society of Great Britain, 2000, p. 1). Osteoporosis increases with age, is more common in women, and commonly leads to hip fractures in older people as a result of a fall (Compston & Rosen, 2004; Cooper, 1996). Although osteoporosis does not predispose an individual to suffer a fall, it predisposes them to sustain a bone fracture as a result of fall (Compston & Rosen, 2004; Cooper, 1996; Cryer & Patel, 2001; Royal College of Physicians & Bone and Tooth Society of Great Britain, 2000). Thus, the treatment of osteoporosis should be combined with falls prevention (Cryer & Patel, 2001; HEBS, 2003).

In general, as people age they take more types of daily medication which results in poly-pharmacy (multiple prescriptions), because they are more at risk of contracting chronic illnesses (Hart, 1990; Hoffman et al., 1996). A side-effect of this is that if the older adult takes four or more types of daily medication it impairs their alertness and balance (Lord et al., 2001), and thereby increases their risk of a fall (Lord et al., 2001; NICE, 2004; Skelton & Todd, 2004; Tinetti, 1997). Strategies to replace daily medications include therapy for psychological conditions and behavioural strategies for insomnia (Lord et al., 2001).

Dizziness is common in older people and has been identified as a risk factor for falls (Luxon, 1984; Pothula, Chew, Lesser, & Sharma, 2004; Speechley & Tinetti, 1991; Tinetti, 1997; Yardley, 1994). Dizziness occurs for a variety of reasons, such as a sudden drop in blood pressure, medication use, vestibular (balance sense) dysfunction, or as a result of other health conditions (Yardley, 1994). To cover the spectrum of causes for dizziness, this item on the webpage was divided into five sub-items, that concerned dizziness experienced most of the time, unexpectedly, when getting up quickly, rolling over in bed, and when shaking or nodding the head quickly several times.

3.3.1.4 Webpage four.

A screen print of the fourth webpage is presented in Figure 6. The fourth webpage asked the participant to provide a goal that they wanted to achieve from undertaking balance training. To facilitate them identifying a goal, participants were provided with a list of suggestions: '[to] improve health and fitness', 'move more freely', 'be more independent', 'do more vigorous activity (e.g. cycling, dancing, or sport)', 'get out more', or 'improve confidence in balance'. Participants were then asked to type their own goal into a free-text box.

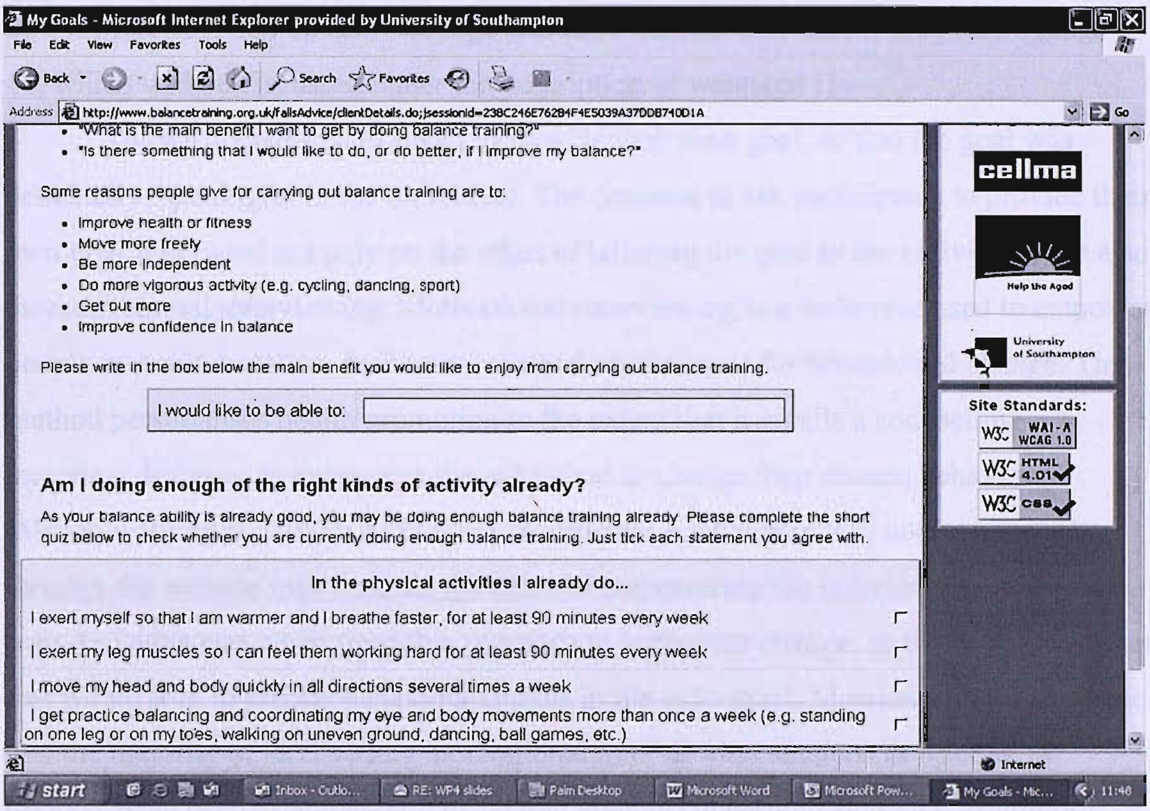


Figure 6. Screen print of the fourth tailored webpage.

Participants were asked to select a goal to achieve from undertaking balance training on the basis of goal theory (Locke & Latham, 1990). Goal theory assumes that often human behaviour is directed by conscious goals. Goals are specific and personal to the individual, and are driven by broader underlying motives and needs (Locke & Latham, 1990). The importance of formulating personal goals has been experimentally tested, by comparing the task performance of participants asked vaguely to 'do their best' with participants asked to create their own goals or follow specific and challenging goals. In a generalisable review of 393 studies, Locke and Latham (1990) found that 91% of studies showed greater task performance when striving towards a specific and challenging goal.

The tailored webpage asked participants to specify a goal that would be rewarding to them for carrying out balance training, whether this was the ability to do something they could not have done before performing balance training, or simply improving mobility or confidence in their balance. The goal that the participant typed into the free-text box on this webpage was inserted into their action plan on webpage 10, which will be discussed under the description of webpage 10.

The participants were asked to provide their own goal, so that the goal was personally meaningful to the individual. The decision to ask participants to provide their own goal was based not only on the ethos of tailoring the goal to the individual, but also on motivational interviewing. Motivational interviewing is a technique used to empower people in a collaborative, facilitative method of treatment for behavioural change. This method personalises health promotion to the extent that it entails a counselling interview designed to encourage the individual to change their chosen behaviours (Miller & Rollnick, 2002). Although a therapeutic relationship will not be initiated through the website intervention, the ethos of empowering the individual to make their own decisions was taken from this approach to behaviour change, as it was believed that this would lead to greater behaviour change in the individual. Meta-analyses have found that the majority of RCTs using motivational interviewing sessions as brief as 15 minutes have been effective with behaviour change concerning alcohol consumption, drug use, diet, and physical activity, but not with smoking or HIV-risk behaviours (Burke, Arkowitz, & Menchola, 2003; Rubak, Sandbœk, Lauritzen, & Christensen, 2005).

The fourth webpage also contained a quiz for participants who had self-rated their balance as 'good and I want to keep it that way'. These participants were asked to rate their current level of activity to measure whether they were currently performing the frequency, intensity, and duration of balance training required to improve their balance. It was assumed that participants who self-rated their balance as only quite good or as having some problems were unlikely to be currently performing the intensity and volume of balance training required to improve their balance. The quiz comprised four statements for the participant to select if they were in agreement. The four statements were: "I exert myself so that I am warmer and I breathe faster, for at least 90 minutes every week"; "I exert my leg muscles so I can feel them working hard for at least 90 minutes every week"; "I move my head and body quickly in all directions several times a week"; and "I get practice balancing and coordinating my eye and body movements more than once a week (e.g. standing on one leg or on my toes, walking on uneven ground, dancing, ball games, etc.)". These four statements assessed whether the participant was performing balance training to at least a moderate intensity for at least 90 minutes a week, including activities that provide practice in head movements and balancing. The participant received tailored feedback on their answers to the quiz on the subsequent webpage.

The quiz for the good balance group was included in order to provide tailored feedback on their current level of activity. It was assumed that those who had self-rated their balance as good may have held a false belief that they were already currently performing enough activities for the intensity and volume to improve their balance, and so did not perceive that they could benefit from the advice in the website. This assumption was based on previous research that has identified an optimistic bias (Weinstein, 1980), whereby participants falsely believe that they are not as vulnerable to health risks as others. This optimistic bias also applies to physical activity, where people incorrectly perceive that they are performing a sufficient volume of moderate physical activity to gain the morbidity reducing health benefits (DoH, 2004). The quiz served to provide feedback to the participant to dispel any false beliefs of the frequency, intensity, and duration of balance training required to improve balance.

3.3.1.5 Webpage five.

A screen print of the fifth webpage is presented in Figure 7. As described above, the fifth webpage presented the good balance group with tailored feedback on their current level of activity. The feedback provided positive reinforcement for activity already undertaken, but highlighted and justified any need for additional activities. The fifth webpage then asked participants to select which setting for balance training activities they would prefer. The good and quite good balance groups were given the options of balance training at home, outside the home, or in a class. Participants who rated their balance as having problems were given two options, of balance training either at home or a combined option of outside / in a class. The group with balance problems were only given two options as there were fewer activities recommended to perform in a class. Participants' could select one or more options, and their choice determined what recommended activities for balance training they would view on the following webpage.

Asking participants to select the type of setting in which they would prefer to undertake balance training was based on the literature that has investigated activity preferences and incentives for older people to undertake physical activity. For activity preferences, researchers have obtained self-reports from older adults to find what activities they are currently performing. Such reports have found that the main physical activities older adults engage in are those in and around their home, such as housework, gardening, and walking (Arcury, Quandt, & Bell, 2001; Canada Fitness Survey, 1983; King et al., 2000; King, Rejeski, & Buchner, 1998; Shephard, 1994; Skelton, Young, Walker, & Hoinville, 1999; Stones, 2003), although older adults rarely walk at the intensity required to gain the health benefits of physical activity (Skelton et al., 1999). However, older adults also participate in sports, the most popular ones being 'exercises', cycling, social dancing, jogging, and swimming (Canada Fitness Survey, 1983; Skelton et al., 1999; Stones, 2003).

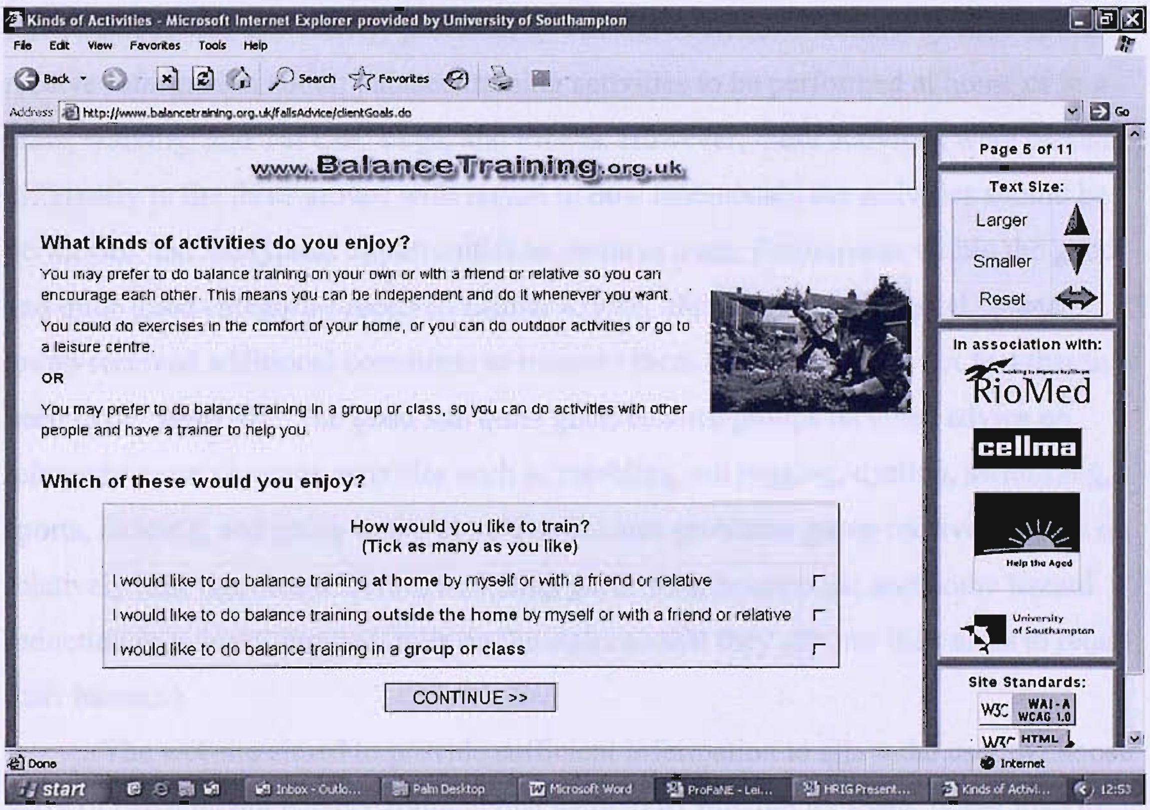


Figure 7. Screen print of the fifth tailored webpage.

Tailoring the activity preference to the individual was also based on research into the incentives that older people cite as their reasons for engaging in physical activity. Similar to younger generations, older people mainly exercise to have fun and to socialise (Caserta & Gillett, 1998; Massie & Shephard, 1971; Rose, 2007; Stead, Wimbush, Eadie, & Teer, 1997; Wankel, 1993). Other incentives to do physical activity are to maintain psychological well-being, feel good, attain goals, look younger, fill recreation time, and for curiosity (Canada Fitness Survey, 1983; Goldberg & Shephard, 1982; Shephard, 1994; Stead et al., 1997). Thus, the advice was tailored to the preferred setting for carrying out balance training so that participants could select the activities that they enjoy the most, because enjoyment is a key facilitator of adherence to physical activity (Wankel, 1993).

3.3.1.6 Webpage six.

A screen print of the sixth webpage is presented in Figure 8. The sixth webpage presented the participant with information about a range of recommended activities, tailored to their selection on the previous webpages (i.e. recommendations according to self-rated balance and activity preference). All three self-rated balance groups could receive information about: balance training activities to be performed at home or in a class; walking; and Tai Chi, Yoga, and Pilates. However, these activities were presented differently to the three groups with regard to how strenuously the activities should be performed and the typical opportunities to perform them. Participants within the good and quite good categories received similar advice, although the quite good balance group received additional comments to reassure them that they should not feel that they need to be 'super-fit'. The good and quite good balance groups received advice on relatively more vigorous activities such as rambling and jogging, cycling, swimming, sports, dancing, and going to the gym. The balance problems group received advice on relatively less vigorous activities including gardening, housework, and home hazard reduction (e.g. installing grab rails on the stairs so that they can use their arms to retain their balance).

The website aimed to provide sufficient information to allow the user to choose ways of carrying out balance training that were most suitable for them, rather than to prescribe an exercise routine, based on the literature on lifestyle exercise. Lifestyle exercise can be defined as "the daily accumulation of at least 30 minutes of self-selected activities, which includes all leisure, occupational, or household activities that are at least moderate to vigorous in their intensity and could be planned or unplanned activities that are part of everyday life" (Dunn, Andersen, & Jakicic, 1999, p. 399).

Notably, lifestyle physical activities are self-selected by the participant, they can be unplanned, and they can include short bouts of exercise as well as longer continuous bouts (Dunn et al., 1999). Dunn et al. reviewed 14 studies assessing the effectiveness of lifestyle exercise programmes compared to structured exercise programmes. The reviewers concluded that lifestyle interventions are more effective in encouraging children and adults to exercise, as lifestyle exercise provides the same cardio-respiratory fitness benefits as structured exercise, but participants adhere more to lifestyle exercise than structured programmes (Dunn et al., 1999).

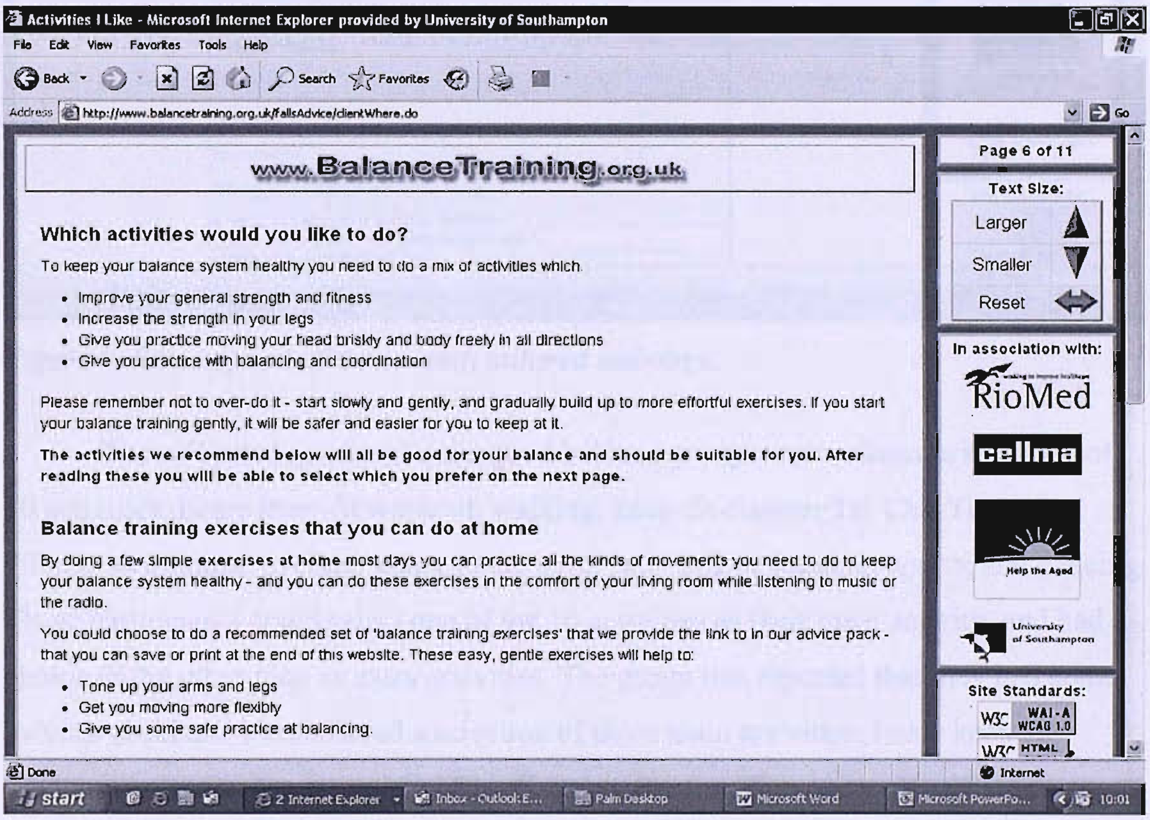


Figure 8. Screen print of the sixth tailored webpage.

3.3.1.7 Webpage seven.

A screen print of the seventh webpage is presented in Figure 9. The seventh webpage asked participants to choose which of the recommended activities would be their main balance training activity, and if they desired, what would be their extra balance training activities. Participants were required to choose one main activity, but were allowed to select as many of the extra activities listed as they wished.

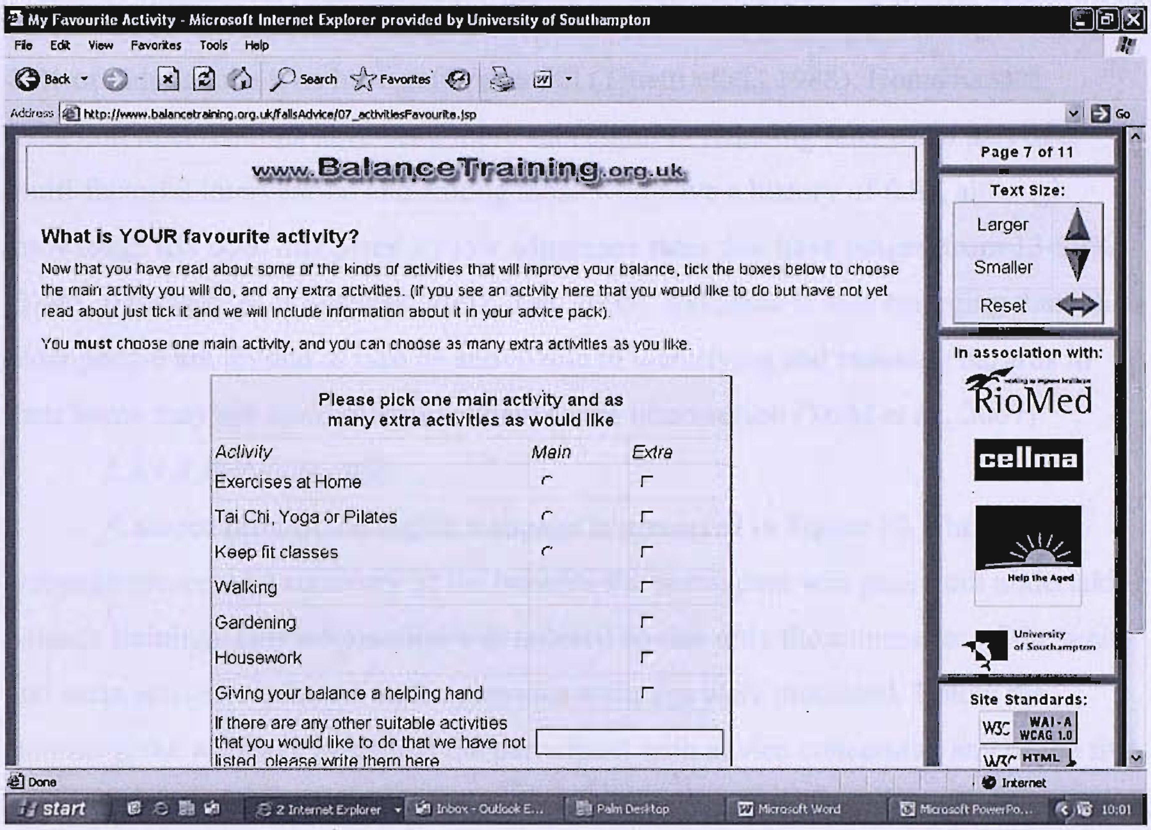


Figure 9. Screen print of the seventh tailored webpage.

The self-rated good and quite good balance groups were offered a selection of 10 activities: home keep-fit workout; walking; keep-fit classes; Tai Chi, Yoga, or Pilates; swimming; cycling; going to the gym; rambling or jogging; sports; and dancing. These participants could select one of the 10 activities as their main activity, and had a choice of the other nine as extra activities. The group that reported that they had some balance problems were offered a selection of three main activities: home keep-fit workout; keep-fit classes; and Tai Chi, Yoga, or Pilates. They were also offered a selection of six extra activities: two of the three main activities not selected, walking, housework, gardening, and 'giving your balance a helping hand' (making home modifications to avoid difficult balancing situations). For the group that reported some balance problems, the selection of activities was more restricted to omit the vigorous activities, and four activities were only available to be selected as extra activities, as they were not strenuous enough to provide the intensity required to improve balance. The extra activity of giving a helping hand was included, as although there is debate over the utility of reducing hazards around the home as a means of preventing falls

(Connell, 1996; Gill, 1999), an environmental risk factor can be reported by as many as 44% of older adults who have suffered a fall (Tinetti et al., 1988). Home hazard reduction interventions have been more successful in reducing falls when part of a multi-factorial intervention and among those who have a history of falls, although knowledge has been hampered by low adherence rates that have ranged from 13-90% (Todd, Ballinger, & Whitehead, 2007; Tse, 2005). Evidence is also emerging that when older people are invited to take an active role in identifying and reducing hazards in their home they are more likely to adhere to the intervention (Todd et al., 2007).

3.3.1.8 Webpage eight.

A screen print of the eighth webpage is presented in Figure 10. The eighth webpage presented a summary of the benefits the participant will gain from undertaking balance training. This information was tailored so that only the summaries of the main and extra activities selected on the previous webpage were presented. Below the summary, the webpage presented the participant with advice concerning any of the five health conditions known to increase the risk of falls that they selected on webpage three (unsteadiness, poor vision, osteoporosis, illnesses requiring four or more types of daily medication, and dizziness).

The eighth webpage then presented a questionnaire for the participant to complete. The questionnaire asked the participant to rate their agreement with statements concerning attitudes towards the advice, and beliefs and intention towards adopting the recommended activities. These measures were used in a between-groups comparison with the responses from the participants viewing the generic version of the advice, to assess the efficacy of tailoring. The questionnaire is described in detail in Chapter 5, which reports the results of the between-groups study.

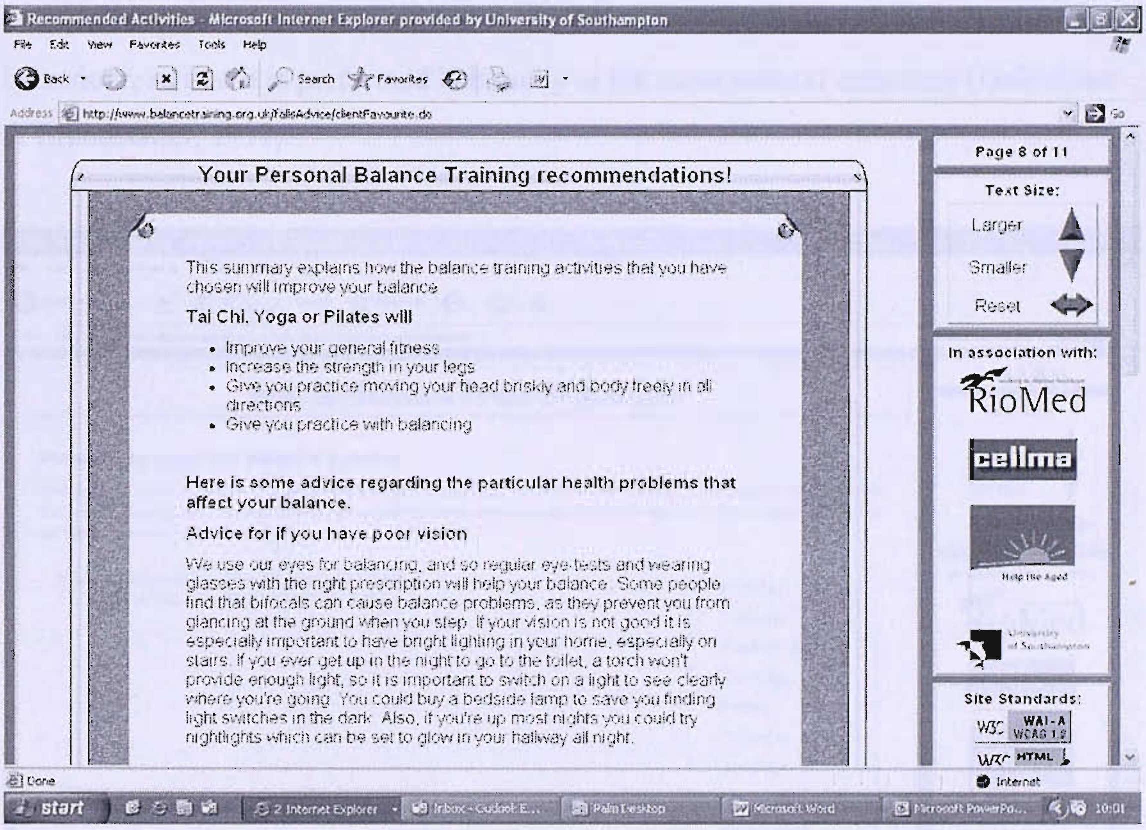


Figure 10. Screen print of the eighth tailored webpage.

3.3.1.9 Webpage nine.

A screen print of the ninth webpage is presented in Figure 11. The ninth webpage asked participants to create an *action plan*. The action plan entailed stating both their implementation intentions and who will act as their social support for the plan. Implementations intentions are the specific details of when, where, and how an individual is going to engage in an activity that will lead them to achieve their goal (Gollwitzer, 1999). Gollwitzer and Brandstätter (1997) have demonstrated how implementation intentions increase attainment of a difficult goal, such as writing a report, or seizing opportunities to express an opinion counter to one they are receiving. Health researchers have also used implementation intentions to help individuals attain their goals. Orbell and Sheeran (2002) have demonstrated that implementation intentions can be successfully used in conjunction with other social cognition models such as the theory of planned behaviour. Their illustration included three studies that clearly showed that implementation intentions increased adherence in addition to baseline intentions (Orbell & Sheeran, 2002). Implementation intentions do not alter intention to perform a behaviour, but increase recall of the intention, and automatise the behaviour, so that it is performed habitually in the same context each time (Gollwitzer & Brandstätter, 1997).

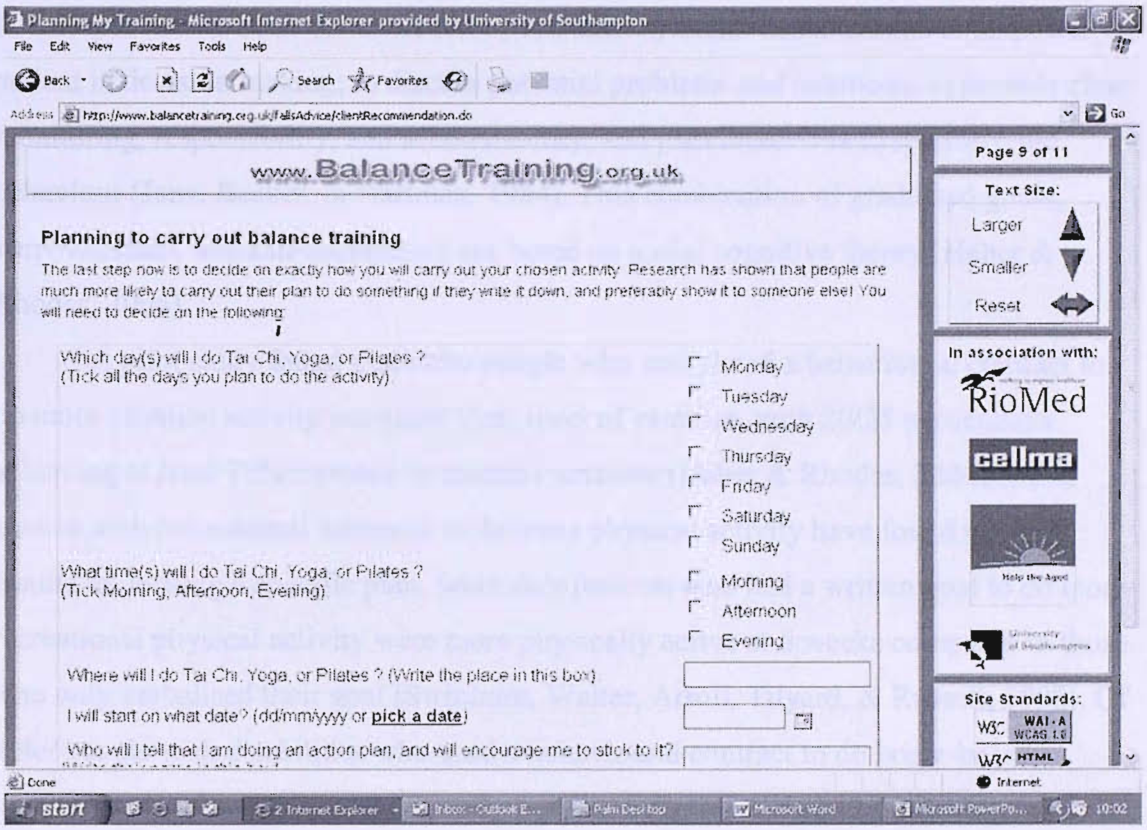


Figure 11. Screen print of the ninth tailored webpage.

In addition to the benefits of writing a specific plan for behaviour as outlined by research on implementation intentions, a specific plan can also enhance self-efficacy to perform a task. Individuals are more motivated to achieve difficult specific tasks than when simply asked to "do their best" (Locke & Latham, 1990). A clear plan increases clarity and so enhances self-efficacy because the activity becomes structured, can include incentives, and allows their activity to be easily evaluated, with the potential to provide clear positive feedback. Breaking a task down into subgoals allows for more positive feedback, rather than having to wait until a more challenging task is completed (Bandura, 1997; Locke & Latham, 1990). Writing a plan is part of helping the individual prepare for performing the behaviour, by predicting problems and how to solve them (Kanfer & Gaelick, 1986).

Making a clear plan is similar to writing out a behavioural / contingency contract. A behavioural contract clearly shows what has been agreed and progress can be evaluated, with outlines for the specific actions the participant is to take, the criteria for achievement, and the positive and negative consequences of the behaviour (Kanfer & Gaelick, 1986). Such contracts have been used in health consultations to empower the patient in decision making; to discuss potential problems and solutions; to provide clear monitoring, responsibility, and accountability; and plan incentives to reinforce the behaviour (Janz, Becker, & Hartman, 1984). This combination of graduated goals, empowerment, and self-monitoring are based on social cognitive theory (Haber & Rhodes, 2004).

A pilot study found that older people who completed a behavioural contract to do more physical activity increased their level of exercise, with 20/25 participants achieving at least 75% increase in exercise sessions (Haber & Rhodes, 2004). Other studies with behavioural contracts to do more physical activity have found positive results for writing a specific plan. Sedentary patients who had a written goal to do more recreational physical activity were more physically active at 6 weeks compared to those who only verbalised their goal (Swinburn, Walter, Arroll, Tilyard, & Russell, 1998). Of older people with disabilities who used a behavioural contract to do home-based resistance exercise training, at 6 months post-intervention 89% had adhered to the exercise sessions and had more health benefits than a control group (Jette et al., 1999).

For the balance training website, to facilitate participants to act on their intention of carrying out balance training, this webpage required participants to specify the details of performing their main balance training activity (the main activity they selected on webpage seven). This included: when they will perform their main activity in terms of day(s) and time(s) (morning, afternoon, or evening), the location, and what date they will start their balance training. The participant selected a day and time from a list of checkboxes; they typed in the free-text box the location for their balance training; and for the date they will start their balance training, they either typed in the date or selected a date from a pop-up calendar.

The website also asks participants to state who will act as their social support to encourage them to carry out their action plan. The inclusion of social support in the action plan was based on the exercise literature that has identified a supportive other as a significant facilitator to performing physical activity (Buckworth & Dishman, 2002; Franklin, 1988; McAuley, Jerome, Elavsky, Marquez, & Ramsey, 2003; Wankel, 1993). A partner, friend, or family member are particularly strong sources of social support that predict physical activity (Buckworth & Dishman, 2002; Paxton, Browning, & O'Connell, 1997; Sallis, Hovell, Hofstetter, & Barrington, 1992; Shephard, 1994; Stones, 2003). If a partner, friend, or relative exercises they act as a positive role model (Booth et al., 2000; King et al., 1992), and comradeship can be developed in class- or group-based activities (Buckworth & Dishman, 2002; Wankel, 1993).

3.3.1.10 Webpage ten.

A screen print of the tenth webpage is presented in Figure 12. The tenth webpage presented the participant with their personal action plan. Their personal plan was a paragraph crafted from the components of their inputs from the previous page (action plan) and webpage four (goal to achieve from performing balance training). The paragraph read as follows:

> I plan to do [main activity] to improve my balance so that I can [goal]. I will do this at [location] on [day(s)] in the [morning / afternoon / evening]. I will start on [date] and get support from [name of supportive person].

The website advised the participant to print or copy their action plan. The webpage then asked the participant to complete a two-item questionnaire, which asked the participant to rate their agreement with statements concerning their confidence and intention to follow their action plan. This questionnaire was used to compare participants' confidence and intention to performing their personal action plan with their confidence and intention to perform the previously presented recommended activities (as assessed on the questionnaire on webpage eight). This was to be analysed using a repeated measures design within the tailored group, and is discussed in detail in Chapter 5.

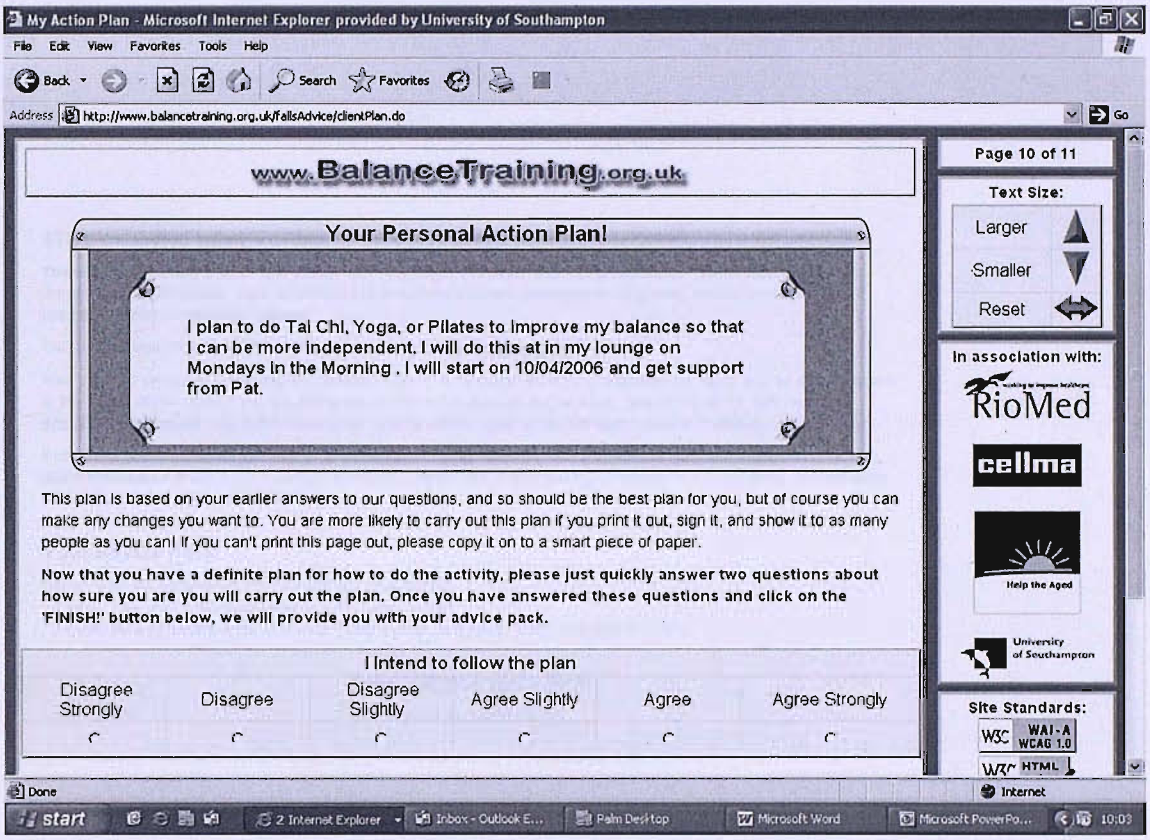


Figure 12. Screen print of the tenth tailored webpage.

3.3.1.11 Webpage eleven.

A screen print of the eleventh webpage is presented in Figure 13. To comply with ethical requirements when recruiting participants for research (BPS, 2006), the eleventh and final webpage presented the participant with a debrief form, reiterating the purpose of the study and how their data would be used. The webpage then gave the participant the opportunity to download the advice pack. The website concluded by providing a link to Help the Aged's falls prevention webpage, if the participant wished to find out more information about falls prevention.

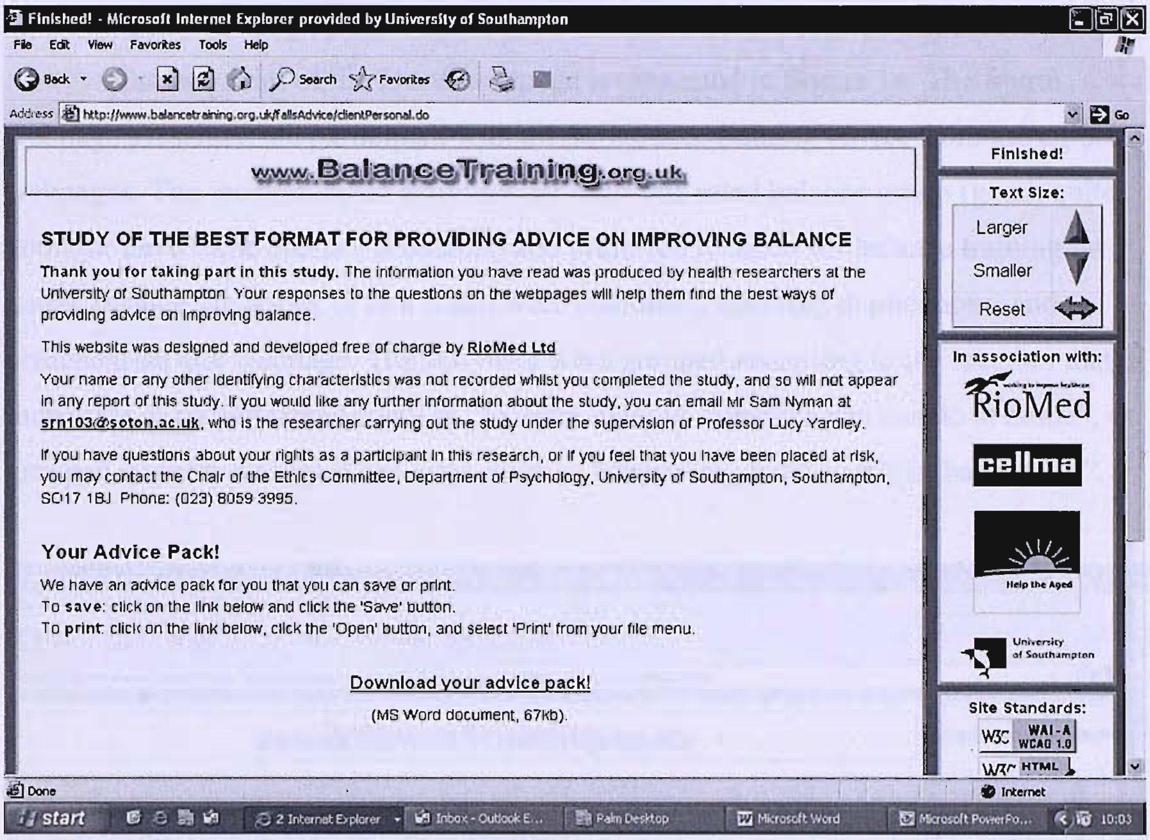


Figure 13. Screen print of the eleventh tailored webpage.

3.3.2 Generic Webpages

The first three webpages that participants accessed in the generic version of the balance training advice were identical to the tailored group webpages. Thus the generic group received identical webpages introducing balance training, providing a consent form, and collecting data from the participant. The eighth and final webpage that the generic group viewed was also identical to the final webpage that the tailored group viewed (webpage 11), that presented a debrief form to the participants. As tailoring was not used in the generic webpages, the following webpages were omitted from the generic advice: goal identification for undertaking balance training; quiz section on current level of activity for those that self-rated their balance as good; action plan completion, and action plan presentation with second questionnaire concerning beliefs and intention towards implementing an action plan. Though, the action plan completion, presentation, and evaluation questionnaire were only presented to the tailored group after data was collected from the first questionnaire used for the between-groups comparison.

3.3.2.1 Webpage four.

A screen print of the fourth webpage is presented in Figure 14. The fourth webpage presented the participant with all the balance training advice from the tailored webpages. The recommended activities for each self-rated balance group (good, quite good, or have some balance problems) and preferred location for balance training (at home, outside the home, or in a class) were combined, omitting duplications, and presented on one webpage. The activities were grouped according to the location that they were to be performed, such as "balance training exercises you can do at home", or grouped under meaningful headings, such as "improving balance whilst having fun".

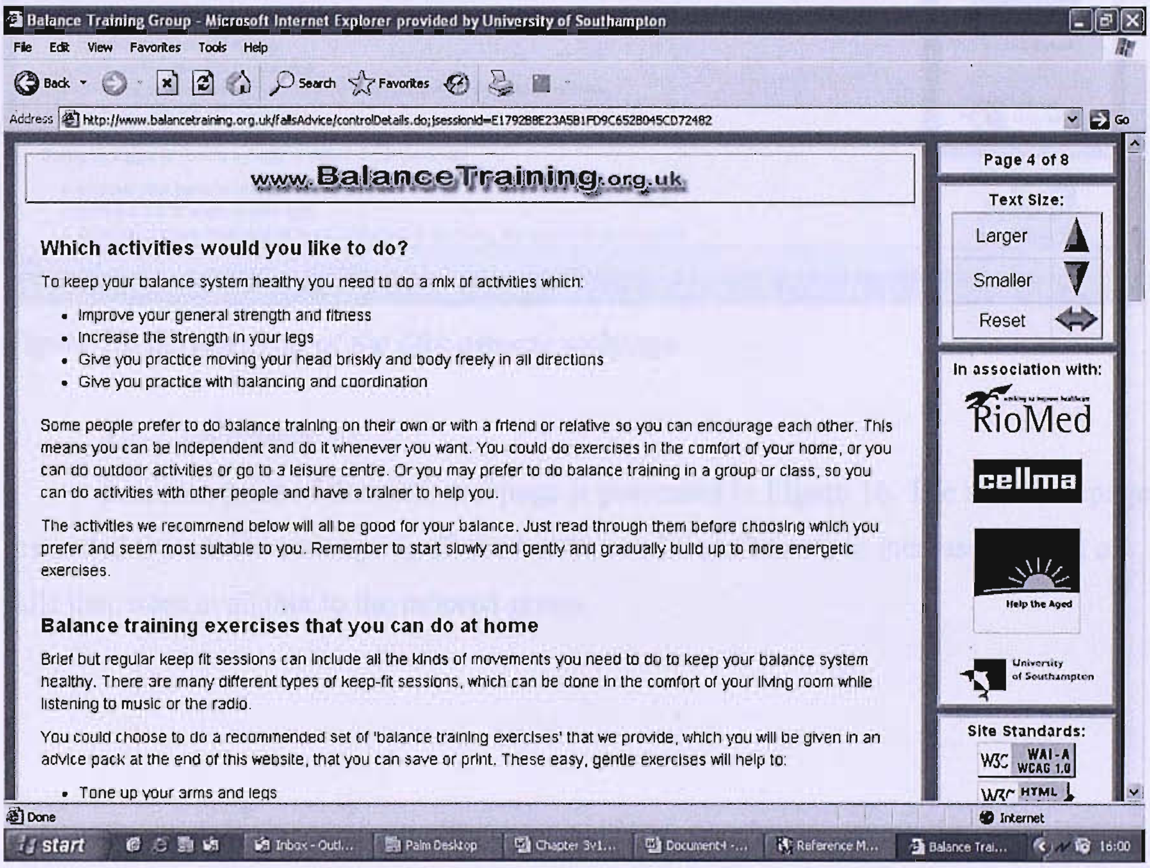


Figure 14. Screen print of the fourth generic webpage.

3.3.2.2 Webpage five.

A screen print of the fifth webpage is presented in Figure 15. The fifth webpage presented the participant with a summary of the benefits of all the recommended activities, for all the self-rated balance groups.

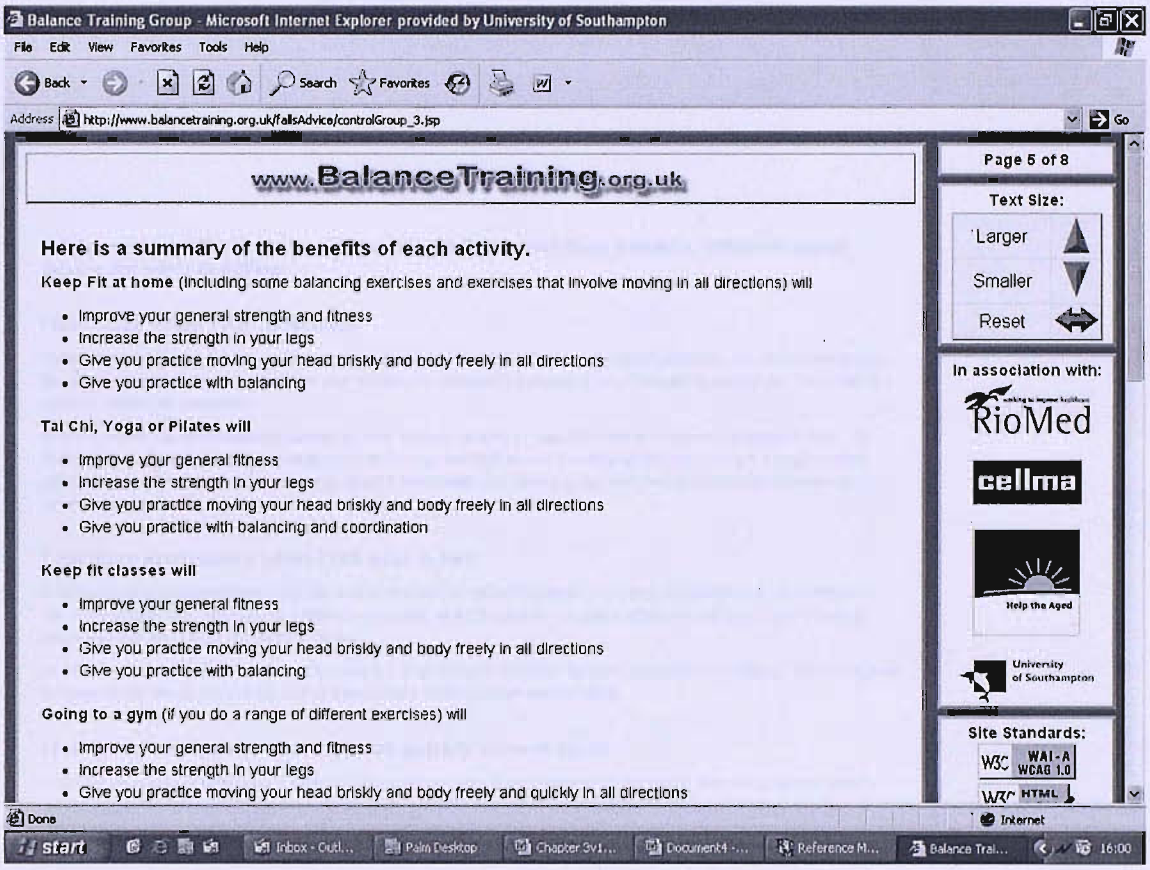


Figure 15. Screen print of the fifth generic webpage.

3.3.2.3 Webpage six.

A screen print of the sixth webpage is presented in Figure 16. The sixth webpage presented the advice concerning all the health conditions known to increase the risk of falls that were available to the tailored group.

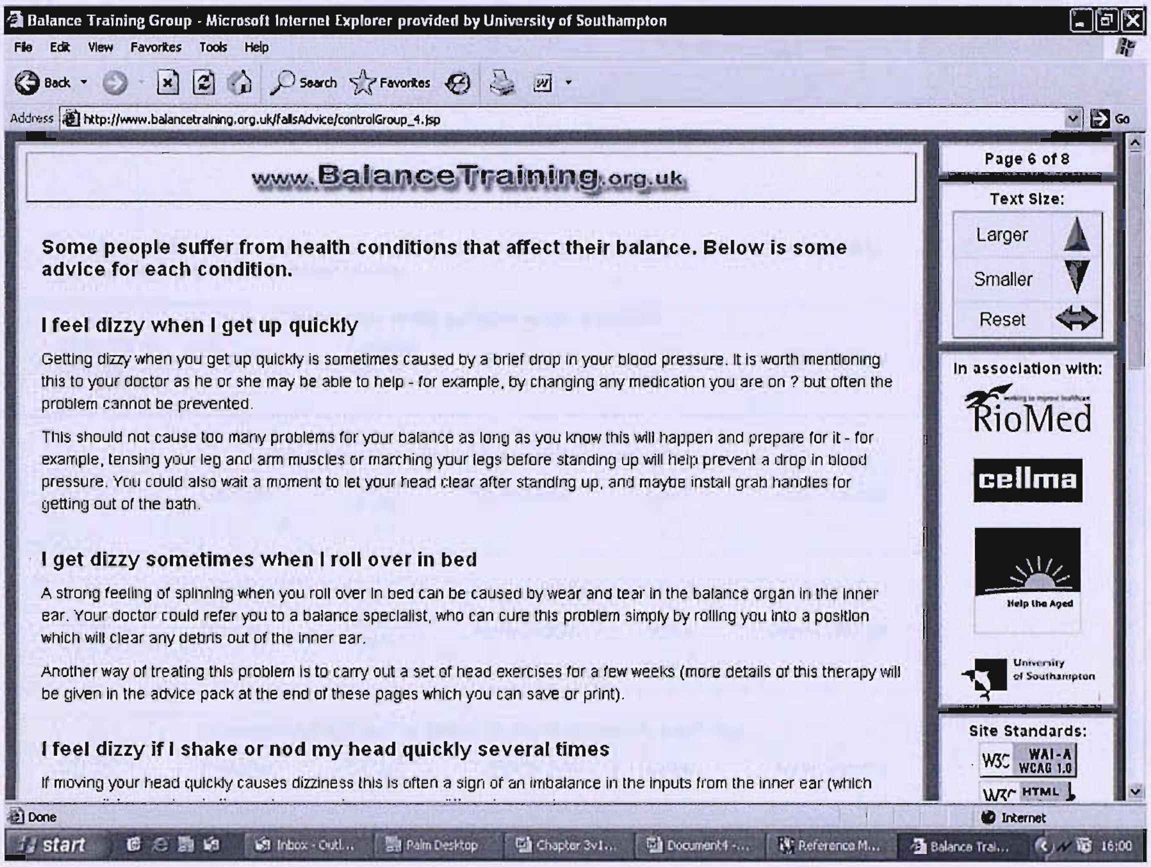


Figure 16. Screen print of the sixth generic webpage.

3.3.2.4 Webpage seven.

A screen print of the seventh webpage is presented in Figure 17. The seventh webpage presented an identical questionnaire to the one presented in the tailored version, that assessed attitudes towards the advice, and beliefs and intention towards adopting the recommended activities.

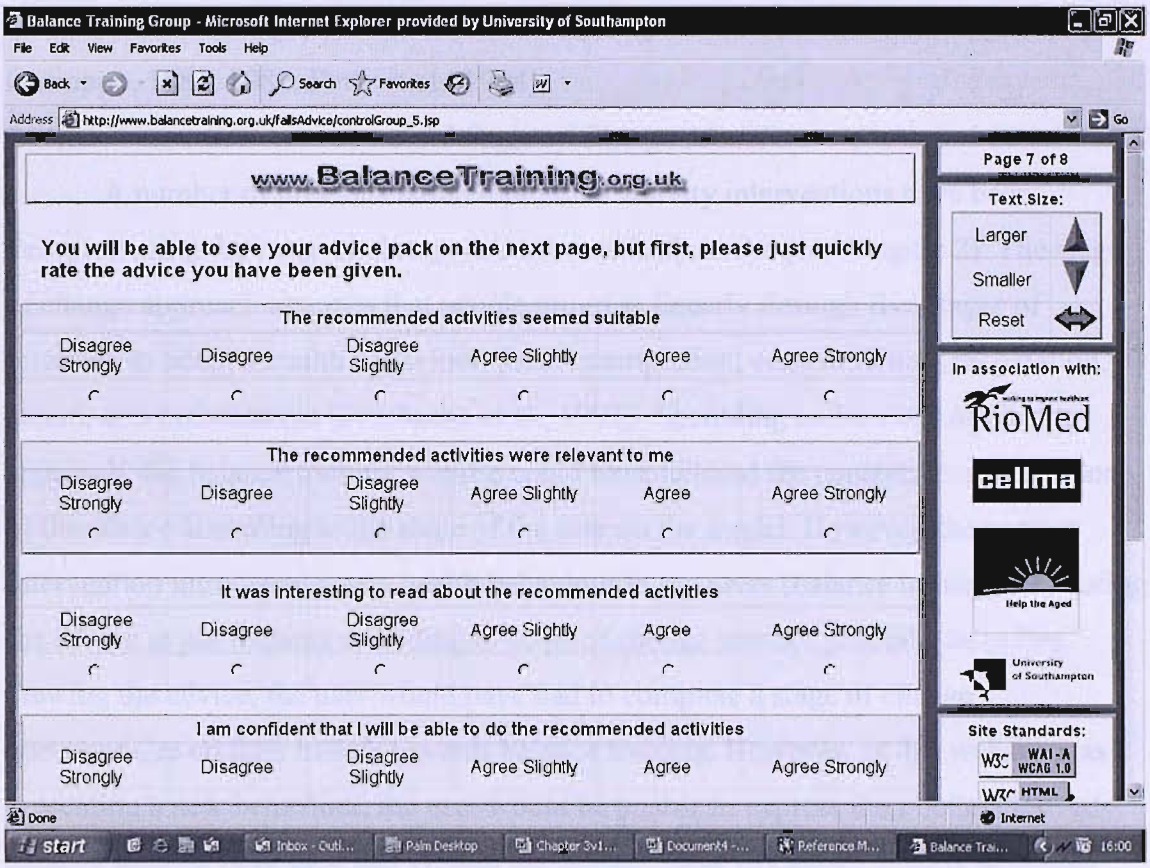


Figure 17. Screen print of the seventh generic webpage.

3.4 Predicted Changes in Attitudes and Beliefs

This section explains which attitudes and beliefs concerning balance training the tailored advice would be predicted to influence, providing a rationale for the choice of the dependent variables used for quantitative evaluation of the website (see Chapters 5 and 7). This section will discuss the elaboration likelihood model, the stage of change model, and social cognition models.

3.4.1 Elaboration Likelihood Model (ELM)

As detailed in Chapter 2, the ELM has been used to explain why tailoring should be a persuasive means of communicating health messages. From the ELM, it is expected that the tailored version of the balance training advice would increase participants' self-reported personal relevance of the advice. As detailed in Chapter 2, increasing the personal relevance of health advice increases the likelihood that individuals will centrally process the advice (which increases their engagement with the content of the message) and be more persuaded by the content of the message (Petty & Cacioppo, 1981, 1986; Petty et al., 1994).

3.4.2 Stage of Change Model

A number of previous tailored physical activity interventions have been designed using the stage of change (transtheoretical) model (see Chapter 2). The stage of change approach assumes that people progress linearly through five stages of intention to adopt a health behaviour: precomtemplation, contemplation, preparation, action, and maintenance (Prochaska et al., 1992). According to the stage of change approach, the balance training website could have tailored the content, length, and tone of the advice according to the stage of the user on the model. However, the current intervention introduced a new health behaviour to the users (balance training). Tailoring the advice to participants according to stage of change was not possible, as before viewing the advice, the user would have had to complete a stage of change questionnaire on their beliefs towards balance training. However, as this website was presenting a new behaviour, the user would be unable to express their beliefs towards balance training until they had viewed the advice. Stage of change models have also been criticised as theoretically weak (Bandura, 1998; Michie & Abraham, 2004; Ogden, 2000).

3.4.3 Social Cognition Models

There are a number of attitudes, beliefs, and intentions conceptualised by social cognition models that tailoring would be expected to influence. This section will briefly describe some of the most commonly used social cognition models. Social cognition models are models that concern individuals' reasoned decision making regarding whether or not to adopt or adhere to a behaviour, whilst considering the social and environmental context of these behaviours (Ogden, 2000). They regard information about the behaviour as a prerequisite for health behaviour change, which is necessary but insufficient. This section will present social cognition models that concern susceptibility to risk, social cognitive theory, and the theory of planned behaviour.

3.4.3.1 Susceptibility to risk.

Some social cognition models propose that an individual must perceive themselves as susceptible to risk in order for behaviour change to take place. These models emphasise that it is the individual's fear of illnesses and injuries that motivates them to change their behaviour. Thus, behaviour change is identified as an avoidance strategy (Ogden, 2000). Three commonly used social cognition models contain this risk component: the health belief model, protection motivation theory, and the health action process approach. All three models assert that people change their behaviour in part due to a 'threat appraisal', in that they perceive that they are both susceptible to morbidity and that the morbidity will be severe (Ogden, 2000). However, as described in Chapter 2, the behaviour promoted in the balance training website has been positively framed. The website emphasises the benefits of adopting balance training to enhance balance, and thereby maintain activity, confidence, independence, and quality of life. The discourse of falls risk has been identified as both stigmatising - and so older people distance themselves from this - and not predictive of uptake to balance training (HEBS, 2001; Yardley & Todd, 2005), and so its use has been largely avoided in the balance training website. Only one section presents falls prevention advice, which presents home hazard reduction advice to those who self-rate their balance as having some problems. Therefore, the attitudes and beliefs relating to these threat appraisal theories were not predicted to be changed from the website intervention.

3.4.3.2 Social cognitive theory.

Social cognitive theory asserts that there are five core determinants to behaviour change: knowledge, self-efficacy, outcome expectancy, goals, and factors that are perceived to either facilitate or impede the behaviour (Bandura, 2004). Figure 18 presents the social cognitive theory model. Self-efficacy is the fundamental construct to the theory, which is the extent to which an individual believes that they are able to carry out a behaviour. Outcome expectancy is the individual's belief that the change in behaviour will give rise to the desired result. Goals direct behaviour, which can be short- or long-term. Lastly, factors that are perceived to facilitate or impede the behaviour can take many forms, including financial cost, transport, social support, societal pressure, and the structure of health care, etc. (Bandura, 2004).

Social cognitive theory has received an abundance of empirical support concerning a variety of health behaviours (Bandura, 1997; Luszczynska & Schwarzer, 2005). As self-efficacy is the fundamental concept of the theory, this has received the most research attention, and has received strong support within the exercise literature. Adults and older adults with a high level of self-efficacy are consistently reported as more likely to be physically active (Brassington, Atienza, Perczek, DiLorenzo, & King, 2002; Buckworth & Dishman, 2002; King et al., 1992; McAuley et al., 2003; Paxton et al., 1997; Resnick, Palmer, Jenkins, & Spellbring, 2000; Rodgers & Brawley, 1993; Sallis et al., 1992). Self-efficacy is not only a predictor but also a consequence of activity, as experiences of exercise reinforce or inhibit future exercise behaviour by increasing or decreasing exercise self-efficacy (Buckworth & Dishman, 2002).

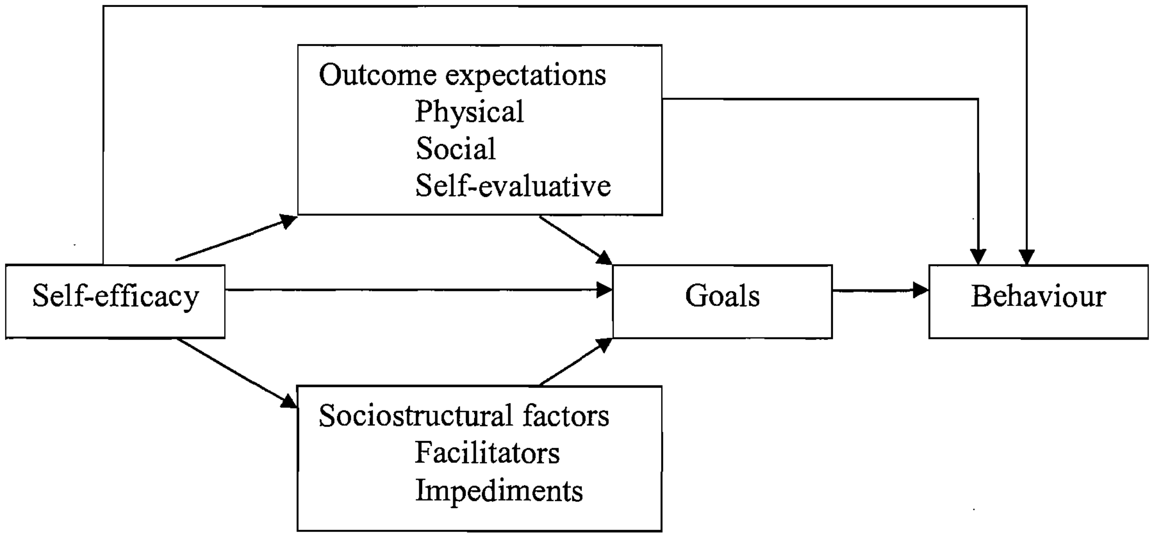


Figure 18. Social cognitive theory (Bandura, 2004, p. 146)

Previous activity may be associated with self-efficacy, as those who were active at a younger age are more likely to be active later in life (Buckworth & Dishman, 2002; Culos-Reed et al., 2000; King et al., 1992; Shephard, 1994). However, older adults have been reported to have less perceived control over the choice to be active than younger generations (Resnick et al., 2000; Shephard, 1994). Locus of control, a related construct, refers to whether people attribute the cause of events to internal (themselves) or external (beyond themselves) factors, and therefore the degree of influence they can exert on outcomes (Rotter, 1966). The finding that older adults report less perceived control over the choice to be active may be a reflection of their externalisation of locus of control. Locus of control is usually externalised by individuals who are disabled (Goldberg & Shephard, 1982), and disabilities are more common in the older generation (Hart, 1990; Hoffman et al., 1996).

Thus, self-efficacy has been identified as an important predictor of physical activity adoption, and so would be expected to be a similarly important predictor of the adoption of balance training in older people. Tailoring may increase self-efficacy in undertaking balance training because the individual is persuaded by arguments that are more personally relevant to them (see the ELM and central processing above). Alternatively or in addition, because the recommended activities in the tailored advice are more suitable to the individual, the individual may perceive greater self-efficacy in being able to perform those recommended activities.

3.4.3.3 Theory of planned behaviour (TPB).

The TPB expanded upon the theory of reasoned action (TRA) (Ajzen, 1988). The TPB asserts that behaviour change is exercised through intention: "Intentions are assumed to capture the motivational factors that influence a behavior; they are indications of how hard people are willing to try, of how much an effort they are planning to exert, in order to perform the behaviour" (Ajzen, 1991, p.181). As presented in Figure 19, intention is in turn predicted by attitudes toward the behaviour, subjective norms, and perceived behavioural control. Attitudes are predicted by perceptions of the likely outcomes of the behaviour (whether positive or negative), and how probable these outcomes are to occur. Subjective norms are predicted by expectations of the opinions of salient individuals or groups (approving or disapproving of the behaviour), and motivation to comply with these pressures. Perceived behavioural control is predicted by beliefs concerning facilitating or inhibiting factors for performing the behaviour (Ajzen, 1988). Although a co-author of the TRA has more recently integrated factors from other models into the TRA (Fishbein, 2000), the TPB is described because the new integrated model still asserts that intention predicts behaviour, and that intention is predicted by attitudes, subjective norm, and PBC. The other factors integrated into the model, in particular skill in performing behaviour and environmental constraints on performing behaviour, will not be influenced by the balance training advice.

There is considerable overlap between the TPB and social cognitive theory. The terms under the TPB have been said to be interchangeable with the terms under social cognitive theory. Social cognitive theory has termed attitudes and subjective norms as outcome expectations, perceived behavioural control as self-efficacy, and intention as proximal goals (Bandura, 2004). However, there is some debate as to whether perceived behavioural control and self-efficacy are two identical concepts, or whether perceived behavioural control is to do with control, and self-efficacy is to do with confidence (Armitage & Conner, 2001).

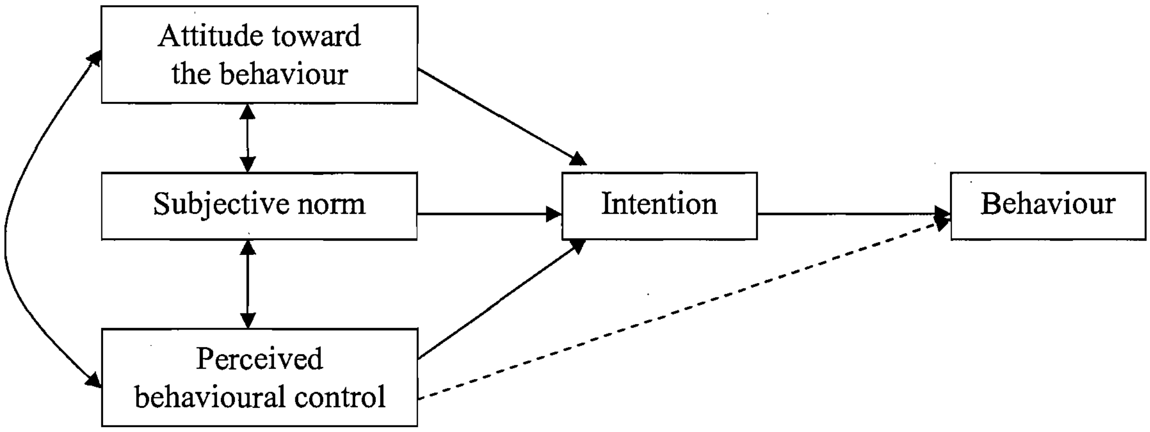


Figure 19. The theory of planned behaviour (Ajzen, 1988, p. 133).

Ajzen found predictive validity for the TPB in his review, finding that the theory significantly predicted behaviour with a large effect size (Cohen, 1992), explaining 26% of the variance (Ajzen, 1991). Since then, meta-analyses have found similar results. The theory has significantly predicted behaviour with a medium to large effect size, explaining 19-38% of the variance (Armitage & Conner, 2001; Downs & Hausenblas, 2005; Sutton, 1998). For physical activity behaviour, a meta-analysis found strong support for the theory of planned behaviour. Physical activity behaviour was significantly predicted by intention (ES = 1.09) and perceived behavioural control (ES = 1.01), with intention significantly predicted by attitudes, perceived behavioural control, and to a lesser extent by subjective norm (Hausenblas, Carron, & Mack, 1997). A recent meta-analysis of experiments also showed that interventions have a significant effect on increasing intention to change behaviours (d = .66), and on increasing behaviour change (d = .36.), with intention mediating the effect of interventions on behaviour change (Webb & Sheeran, 2006). Intention might be expected to have a stronger mediating relationship on behaviour in the case of balance training compared to behaviours such as smoking that require the breaking of habits, and behaviours such as contraception use that are negotiated with another; and when participants report high levels of self-efficacy / perceived behavioural control (Webb & Sheeran, 2006).

Thus, the TPB, and in particular its emphasis on intention as the critical predictor of adoption of behaviours, has been supported by reviews and meta-analyses of empirical studies. Hence, it is expected that intention will be an important predictor of the adoption of balance training. Tailoring the balance training advice would be expected to increase older people's intention to undertake balance training, because of the increased persuasiveness of the advice (due to the increased personal relevance, as explained by the ELM), and increased self-efficacy in being able to carry out balance training (as explained by social cognitive theory).

3.5 Conclusion

This chapter described in detail the website developed for this research. This chapter described the novelty, target audience, and structure of the website, and explained the rationale for the features of each webpage, including the factors used to tailor the balance training advice. The chapter concluded by describing the predicted changes in attitudes and beliefs that the tailored balance training advice would be expected to influence, in particular personal relevance (the ELM), self-efficacy (social cognitive theory), and intention (TPB).

CHAPTER FOUR
THE ACCEPTABILITY OF THE TAILORED BALANCE TRAINING WEBSITE: A QUALITATIVE STUDY

4.1 Aims of this Chapter

This chapter presents the first of four empirical studies of this research. The qualitative study described in this chapter explored the usability and acceptability of the balance training website developed for this research. As outlined in Chapter 1, there is a need to encourage older adults to prevent falls by taking up balance training. Thus, the acceptability of balance training advice requires as much research attention as its efficacy in motivating older adults to adopt balance training. The issue of usability – whether or not older people find the website easy enough to use to access the advice – was also investigated, because if the website is not easy to use, then older people will not access the advice (Nielsen, 2000). A qualitative approach was used to explore older people's views that the researcher could not predict, to complement the quantitative data gained in the next study by obtaining contextually rich data (see Chapter 1).

This study had two aims: 1) to obtain older adults' feedback concerning the usability, comprehension, and acceptability of the tailored advice; and 2) to obtain older adults' explanations for their responses to the questions on the tailored webpages, to elicit data on their decision making to provide further data regarding the acceptability of the website. This chapter presents the method, results, and discussion of this first qualitative study. This study was designed to provide data to help improve the balance training website, and provide tentative recommendations for health professionals preventing falls and website developers targeting older adults.

4.2 Method

4.2.1 Design

Single face-to-face interviews were conducted, as they are more conducive for generating rich qualitative data than questionnaires, because people can verbally provide more comments in the same amount of time than they can write them. In addition, rather than collecting data by phone or by post, face-to-face interviews were conducive for the researcher to witness the participant's experience of the website, and for the researcher to see what specific features the participants refer to.

Interviews were conducted that comprised two parts (see Appendix A for the interview schedule of both parts of the interview). Part one required the participants to access the balance training website and view its advice. As detailed in Chapter 3, the website's pages are presented sequentially, and so all users of the website advanced through the webpages in the same sequence. Only the tailored webpages were presented to the participants in this study for two reasons. First, as detailed in Chapter 3, because the generic advice was crafted from piecing together the different segments of the tailored advice, the older adults' views on the tailored webpages could be generalised to the generic webpages. Second, as the tailored webpages were predicted to be better received than the generic webpages (because of the tailoring), the tailored webpages would be the best webpages to present to the participants. This would avoid discovering problems with the generic webpages that could be solved by tailoring, which would not further understanding.

Whilst viewing the webpages, the participants were asked to 'think aloud' to verbalise their thoughts (Ericsson & Simon, 1993). It is desirable to obtain the participant's thoughts as they come, unfiltered, and so the researcher asked them not to worry about trying to plan what they would say or explain what they were saying, but to simply say what they were thinking at the time (Gilhooly & Green, 1996). If the participant made a comment that needed clarification, the researcher then asked follow-up questions. The think aloud or 'protocol analysis' method has been used effectively in a previous study assessing the usability of a website, where participants' views on aspects of a website were captured whilst participants were viewing the webpages (Benbunan-Fich, 2001).

Whilst protocol analysis is useful in capturing participant's views about specific features of the website, as their thoughts come, it was deemed helpful to capture participants' general reflections about their experience of using the website. Part two of the interview commenced once the participant had reached the end of the website, and consisted of a semi-structured interview (Wilkinson, Joffe, & Yardley, 2004) to obtain general comments regarding the website. Eight questions were asked and followed-up with probes for participants to elaborate on their responses. The eight questions are presented in Table 1.

Table 1. Semi-structured Questions

Question
1. Did you agree with all the advice the website gave or not?
2. Was the advice the website gave suitable for you or not?
3. Would you follow the advice the website gave or not?
4. Was there too much or too little advice?
5. How would you describe the website to a friend?
6. Is there any way you think the website could be improved?
7. Would you go to this website normally if you were not asked to for this study?
8. How would you search to find the website?

Questions were used to find the participant's personal view, for example, how suitable they found the advice for them. The fifth question asked participants to state how they would describe the website to a friend. This question was used to indirectly ascertain participants' overall view of the website. The eighth question asked how participants would locate the website if they did not know the website address. This question provided feedback that could be used to better match older adults expectations' as to where they would find links to the website, and what keywords they would use to trace the website on search engines. This information was gathered to improve recruitment of participants for the study reported in Chapter 7, and so comments in response to this question are not presented in this chapter.

4.2.2 Participants

Before recruitment commenced, ethical approval was obtained from the School of Psychology, University of Southampton. The inclusion criteria were that the participants were aged 60 and above; residing in Southampton, UK; able to read and orally communicate in English; dwelling in the community or in sheltered housing (not a resident in a care home); computer literate enough to use the Internet; and able to give consent, i.e. have sufficient cognitive ability to comprehend the requirements of the study and participate in the interview. A heterogeneous sample of older adults according to age, gender, health and balance ability, and computer literacy was required to meet two aims. First, the balance training website is targeted to older adults who are heterogeneous in health and balance ability. Second, as the balance training website tailors advice to older adults according to their self-perceived balance ability and reported health conditions associated with increased falls risk (as well as activity preference), by sampling people differing on these dimensions a variety of tailoring combinations would be presented to the participants, and older adults' views would be obtained in relation to as much of the advice that the website presents as possible.

Participants were recruited over a period of 15 weeks, from mid July to the end of October 2005, using convenience sampling and then purposive sampling (Robson, 1993). For convenience sampling, initially the study was advertised by placing posters in local public places including adult education centres, Internet cafes, libraries, churches, recreational clubs, supermarkets, post offices, and bingo halls (see Appendix B for the poster). However, this only led to the recruitment of one participant. The subsequent and main recruitment method for this study was approaching older people by visiting four adult education centres and a Christian church. At the adult education centres and church, the researcher provided potential participants with a copy of the poster and invited them to contact the researcher to arrange a convenient time for interview.

The researcher switched sampling methods to purposive sampling after 10 participants were recruited. This was because of the 10 participants recruited, seven were aged in their sixties and only three participants were aged in their seventies. Continuing to use convenience sampling may have lead to a narrow age-range in the sample, and not provide the benefit of a heterogeneous sample. The researcher then amended the posters to recruit adults aged 70 and above, and only accepted subsequent participants of this age into the study. Six further participants aged 70 and above were recruited using purposive sampling, bringing the total sample to 16 participants. The characteristics of the final sample is reported in the results section. Recruitment was curtailed at 16 interviews because of difficulty in recruiting participants. For over three months the researcher had invested time and resources into recruitment with little uptake, and had exhausted existing contacts. It was likely that further considerable investment was required to recruit further participants at a similarly slow rate as experienced. It was deemed that the time was better spent in analysing the existing data and to use new contacts for the intensive recruitment period expected for the final study.

4.2.3 Materials / Apparatus

The interviews took place in a cubicle (a small room in a quiet area of the building, with space for a table, two chairs, and a desktop computer) at the School of Psychology, University of Southampton, and were recorded using an audiotape recorder. A computer was used with a conventional 17" screen, keyboard, mouse, and Internet Explorer to access the website. The website was online and the computer was connected to the Internet using a broadband local area network.

4.2.4 Procedure

On arrival, the participant completed a consent form and was offered light refreshments (see Appendix C for the consent form). The researcher sat next to the participant who was stationed at the computer. After the participant read the instructions for the study and answered a short set of demographic questions, they were asked to view the first page of the balance training website, and continue viewing and interacting with the website until the final page (see Appendix D for the interview instructions). During the first part of the interview, where the participants were thinking aloud whilst accessing the website, if the participant was not verbalising many thoughts the researcher prompted them to do so. Also, the researcher provided technical assistance if the participant was unable to solve any problems. To aid analysis, the researcher said aloud for the audiotape visual information related to participant comments, including the access of each new webpage.

The participant was in control of the keyboard and mouse throughout the interview apart from when they reached the end of webpage two. To proceed on to webpage three, the researcher intervened to type in the uniform resource locator (web address for this particular webpage) in the address bar. This skipped the randomisation procedure, and ensured the participant progressed to the tailored webpages. Once the participant had come to the end of the website, the second part of the interview immediately followed, with the researcher asking the semi-structured questions. Once the interview finished, the researcher provided the participant with a debrief form and a copy of the advice pack (see Appendix E for the debrief form).

All data for this study were secured in a locked filing cabinet. Once the audio-tapes were transcribed verbatim and the analysis was complete, the audio-tapes were destroyed to protect the identity of the participants. The transcriptions of the audio-tapes omitted any details deemed as identifying characteristics of the participants or their friends and family.

4.2.5 Analysis

Each interview was transcribed into a computer Word document soon after the interview was conducted (to aid transcription as the interviews were fresh in the researcher's memory), but the analysis of transcripts was performed once all the interviews were transcribed. This was in contrast to the approach of analysing each interview during recruitment used in grounded theory. In using grounded theory to analyse data, researchers curtail recruitment once they have reached saturation. Saturation is the point in which further data collection is unlikely to yield new codes but simply corroborate codes already identified (Chamberlain, Camic, & Yardley, 2004). Saturation is also used at a later stage of grounded theory, in determining when the theory constructed from the codes is finished and does not require any further components or refinement (Chamberlain et al., 2004). As the interviews were not to be analysed using grounded theory this saturation criteria was not necessary in determining the number of participants (and volume of data) recruited. However, the sixteen interviews provided a wealth of data, and after transcribing the majority of transcripts, those remaining contributed few new codes.

The transcripts were split into headings according to each webpage (webpages 1-11) and the final interview questions. A separate document was created alongside the transcriptions providing the demographic details of each participant, and the participant's responses to the items that generated the tailored advice and responses to the questionnaires. The transcript excerpts were then cut-and-pasted into separate Word documents, so that all the transcript excerpts relating to each webpage were collated in a separate Word document. This resulted in a Word document for each of the 11 webpages, and a final document collating all the responses to the semi-structured interview questions.

The transcripts were then coded using thematic analysis to obtain a summary of the recurring relevant themes across the participants (Joffe & Yardley, 2004). Thematic analysis was appropriate to capture participants' views concerning the acceptability of the website, as content analysis would have limited the depth of analysis, and a more in-depth analysis, e.g. into the interconnections between meanings in participants' narratives, was not necessary for this study (Joffe & Yardley, 2004). The two parts of the interview - the think aloud technique and semi-structured interview - were analysed separately, with the think aloud transcripts analysed first.

4.2.5.1 Think Aloud Data

The transcripts were analysed using each meaningful phrase as the coding unit (i.e., the point at which each code begins and ends) (Joffe & Yardley, 2004), with the length of the meaningful phrases ranging from a few words to a few pages. These were analysed using codes that were exclusive (the data can only fall under one code) and manifest (only the explicit meaning of comments were coded). The codes were labelled with a brief summary of the participant's comment or usability problem, to keep the coding as concrete as possible. These codes were developed using inductive coding (codes created from the data during analysis) (Joffe & Yardley, 2004).

The analysis underwent three stages: First, all the data was coded; second, the codes were filtered to only retain the themes that were both relevant and recurring; and third, the coding frame (the total set of themes) was summarised.

The first stage of the analysis entailed reading through the transcripts and labelling each meaningful phrase. Any comments that were similar were identically labelled. This initial coding generated 492 codes across the transcripts that were then sorted with their selected meaningful phrases underneath.

The second stage entailed filtering through the codes to only retain the themes that were both relevant and recurring. For relevance, the majority of positive comments were uninformative and so were omitted from the analysis. The majority of positive comments were merely commentary (stating what medications they take when answering the question concerning their current medication; or indicating comprehension of the website's features, including the instructions for the interactive sections, the tailoring of the advice, and that the action plan helps the user to commit to performing balance training); expressing general interest (in either reading the advice or obtaining the advice pack); and indicating a preference for reading the tailored advice (which is what the participants viewed). For recurrence, themes were only considered recurring and included in the analysis if they were identified in more than one participant's transcript. In order to identify whether themes were recurring across the webpages, a separate Word file was created for four headings in which themes were to be presented, and all the codes relevant to these themes were cut-and-pasted into these documents. The previous stage of analysis identified 383 (92%) themes that were removed at this stage, as they were either uninformative or were only identified within one participant's transcript.

The third stage entailed summarising the coding frame. For each heading, this entailed creating a coding manual (a description of each theme, located in Appendix F), and listing the theme names and grouping them according to whether the theme had applied to only one webpage or across several webpages. The list of themes for each of the four headings were then tabulated, and the theme names were amended for clarification. These tabulated summaries were used for presenting the results.

4.2.5.2 Semi-structured Interview Data

The participants' general comments in response to the semi-structured questions were then analysed. The general comments were analysed in the same way as the think aloud comments, except for two differences. The first difference was that the general comments were analysed as a whole and not segregated across the eight semi-structured questions. This was because the participants were not viewing a webpage during this part of the interview, but were making general comments about the website. The second difference was that the aim of the analysis of the general comments was to only identify new themes. Because the participants were commenting on the website retrospectively, on occasion they would repeat comments they made at the time of viewing a webpage. Instead of creating themes that were repetitive of those already identified from the think aloud comments, any general comments that were repetitive were cut-and-pasted with the earlier think aloud comments relating to that theme. The general comments that were repetitive served to reinforce the previously identified think aloud themes, but were not considered as adding another webpage occurrence.

The analysis of the semi-structured interview transcripts underwent the same three stages of coding used for the analysis of the think aloud transcripts: coding the data, identification of themes that were relevant and recurring, and summarising the coding frame (see Appendix G for the coding manual). Sixty-five (87%) themes were removed because they were either uninformative or were only identified within one participant's transcript. Thus, a total of 42 themes (9%) are presented in the results.

4.3 Results

The results of the analysis are presented below in two sections to reflect the two parts of the interview. The first section presents the findings of the think aloud analysis and the second section presents the findings of the analysis of the general comments. The themes were grouped under four headings, three from the think aloud data: usability, reasons for inputs, and reaction to the advice; and one from the general comments: negative / positive comments. To aid interpretation, before the themes are presented, the characteristics of the participants are summarised.

4.3.1 Participant Characteristics

The participants were 16 white adults (10 women, 6 men), aged 60-81 years ($M = 70.81$, $SD = 7.39$). Thirteen participants were residing in the community and three were residing in sheltered housing. Seven had left education by the age of 14, three by the age of 15, two by the age of 17, and the other four participants had in addition a diploma or apprenticeship qualification requiring three to five years study. There was a range of computer experience across the participants from a month to a year ($n = 5$), 1-5 years ($n = 6$), to 5-10 years ($n = 5$). Three of the participants were computing tutors at one of the adult education centres sampled.

Three participants reported no chronic illnesses and that they did not take any medication. For the remaining participants, a number of heart-related conditions were reported, including high blood pressure ($n = 6$), high levels of cholesterol ($n = 3$), previously suffering a heart attack ($n = 3$), angina ($n = 3$), and an irregular heartbeat ($n = 1$). A number of respiratory conditions were reported, including asthma ($n = 1$), bronchiectasis ($n = 1$), and emphysema ($n = 1$). The remaining conditions included an under/overactive thyroid ($n = 3$), gout ($n = 1$), osteoporosis ($n = 1$), osteoarthritis ($n = 1$), glaucoma ($n = 1$), epilepsy ($n = 1$), use of a hearing aid on both ears ($n = 1$), labyrinthitis ($n = 1$), problems with their prostate gland ($n = 1$), and deep vein thrombosis ($n = 1$).

An even selection was made by the participants for the three groups of good balance ($n = 5$), quite good balance ($n = 5$), and having some balance problems ($n = 6$).

The participants chose whether to view advice regarding balance training carried out within the home (n = 7), outside the home (n = 3), in a class (n = 4), or a combination of these (n = 2). Of the 31 different options available for the participants, 28 (90%) were selected. The three options that were not selected were two health conditions, 'I feel dizzy when I shake my head' and 'I feel dizzy most of the time', and the 'sports' balance training activity. During one interview, a participant accidentally exited from the website and was unable to return to their website session. As the participant made this error on webpage 10/11, the researcher verbally summarised to the participant the information on the final (debrief form) webpage. The participant continued the interview, and their data was included in the analysis.

4.3.2 Think Aloud Analysis

The themes identified from the think aloud data are presented under three headings: usability, reaction to the advice, and reasons for inputs into the interactive sections. As shown in Table 2, the usability heading included eight themes, three that were identified across more than one webpage, and five from one webpage. Under usability, some participants commented on how the text size on screen could be increased, but only that of the main text, and not the text inside the smaller text-boxes that required participants to click on an option. It was evident that some participants were not scrolling down the webpage to read all the text on screen and find the button to click to proceed to the next webpage. Some participants were evidently inexperienced in using a mouse, and took several attempts to move the cursor over an option to click, or several attempts to correctly click on an option.

The key usability issue this theme identified was that most participants were unable to complete the action plan without assistance from the researcher. The inability to complete the action plan stemmed from participants typing in the date (to start their action plan) in the incorrect format, and not noticing the subsequent error message that alerted them to this. Other usability issues were that some participants were unsure how to respond to the question 'do you have poor vision?', as they wore glasses and were unsure if that constituted poor vision. Also, some participants were confused with the suggestions for balance training goals thinking that they were options to select, when they were required to type in their own goal into a free-text box.

Table 2. Themes identified under Heading 1: Usability

Theme	Sub-theme[a]
Comments identified on more than one webpage	
Option to increase text size applies to text on page, but not text in text boxes	A
Participants not scrolling down to advance in the website	B
Participants' lack of experience in using a mouse	C
Comments identified on one webpage	
Participants unable to complete the action plan – typing date in incorrect format	A
Participants unsure what constitutes the 'poor vision' health condition option	B
Participants confusing suggestions for a balance training goal as options to select	B
Participants' inability to respond to an Autocomplete prompt	C
Participants' inability to respond to an Internet explorer prompt	C

[a]A = Corrections. B = Issues for this website. C = Issues applicable to websites targeting older adults.

Participants were confused by software prompts and did not know how to respond to them. The Autocomplete prompt appeared after the user typed in a goal for carrying out balance training or after they typed in their action plan. The Autocomplete prompt informed the user that the Autocomplete function can store entries like those the user had just typed, and that in future the Autocomplete function can check the user's previous entries and make suggestions as the user types. The Autocomplete prompt required the user to select whether they wished to turn the Autocomplete function on by selecting 'yes', or not by selecting 'no'. The Internet Explorer prompt appeared after the user clicked on the selection boxes and checkboxes on the first instance the website requested inputs from the user. The Internet Explorer prompt informed the user that it might be possible for others to view the information on screen, and required the user to respond by clicking 'yes' to continue (to advance to the next webpage), or 'no' to not continue (to remain on the current webpage). For both the Autocomplete and Internet Explorer prompts, participants tended to need the help of the researcher to respond and continue advancing the website.

Lastly, usability themes were helpful for the development of the website, as it allowed for the identification of three typographical errors within the website advice, and two programming errors with the presentation of the advice in the action plan.

As shown in Table 3, the 'reasons for inputs into the interactive sections' heading included 15 themes, six were identified from more than one webpage, and nine from one webpage. Some participants commented that they are less active than they used to be, and thought the vigorous activities were too strenuous for older people. Cycling in particular was deemed too dangerous for older people, with the busy traffic requiring swift reactions from a cyclist. In contrast, some participants commented that they were already performing activities providing balance training. Also, it was evident that the action plan was less practical for two groups of participants. For those that did not keep to a routine, the action plan was less practical as they were unlikely to keep to their plan. For those who selected the option to join a class, the action plan was less practical as they did not know if such classes were available, or where or when they took place. In order to be allowed to continue through the website, the participants who selected the option to join a class had to pretend they knew the class details, and entered fictitious information into their action plan. The two groups of participants who found difficulty in completing the action plan also had difficulty in answering the two subsequent questions, that asked participants how much they intended to carry out the plan, and how confident they were in their ability to carry it out.

The participants had three options to select to indicate their perceived balance ability. There were no recurring themes within those who reported good balance. Whilst those who reported quite good balance said they did not have any balance problems, those who reported having some balance problems said they had balance problems. Whilst completing the health conditions section, some participants commented that they did not have poor vision, as they wore glasses to bring their vision back to an expected level of acuity. Others mentioned that they only experienced dizziness occasionally. Whilst inputting their goal for balance training, three participants stated that they did not need to improve their balance. After making this comment, one participant typed in his goal as to 'remain mobile'. The other two participants nonchalantly typed their goal as to 'improve health and fitness', as the website required the user to type in a goal in order to advance to the next webpage.

Table 3. Themes identified under Heading 2: Reasons for Inputs

Data to be input	Theme
Comments identified on more than one webpage	
	I'm not as active as I used to be
	Vigorous activity is too strenuous for older people
	Cycling is too dangerous for older people
	Already do balance training activities
	Do not have details of classes I want to attend
	Do not keep to a routine
Comments identified on one webpage	
Perceived balance ability (Good, quite good, or have some problems)	Quite good – have not got any balance problems
Perceived balance ability (Good, quite good, or have some problems)	Have some problems - awareness of balance problems
Health conditions	Have not got poor vision as wear glasses
Health conditions	Dizziness is only occasional
Goal for balance training	Do not need to improve balance
Selection of balance training activities	Enjoy the activities
Selection of balance training activities	Interested in Tai Chi
Selection of balance training activities	Cannot do much housework
Details to create an action plan	Add activities into days currently not busy

Others commented that they selected activities that they knew they enjoyed doing, that they selected Tai Chi because they were interested in this activity in that it sounded enjoyable and wanted to find out more, and that they could not do much housework due to frailty or a medical condition. In completing an action plan, some added their main balance training activity into their action plan on days there were currently not busy.

As shown in Table 4, the 'reaction to advice' heading included nine themes, seven that were identified across more than one webpage, and two from one webpage. Some participants commented that maintaining good balance ability was not something they had thought about before accessing the website. Some participants commented that older people need to stay active, to keep themselves mobile, whereas others commented that retaining good balance is an important issue for older people. Other comments that any advice on physical activity should include advice on diet, that balance training would require motivation to include it in their daily or weekly routine, and that some were either too old for Tai Chi, Yoga, or Pilates, or unfamiliar with Pilates. When viewing the first (introductory) webpage, some participants stated that the advice did not apply to them, and when viewing the advice on Tai Chi and Yoga, some participants stated they were wary of meditation.

Table 4. Themes identified under Heading 3: Reaction to the Advice

Theme
Comments identified on more than one webpage
Balance ability is not something I've thought about before
Older people need to stay active
Retaining good balance is an important issue for older people
Advice on diet is missing
Would need to be motivated to do balance training
I'm too old for Tai Chi, Yoga, or Pilates
Unfamiliar with Pilates
Comments identified on one webpage
The advice does not apply to me
Wary of meditation, used in Tai Chi and Yoga

4.3.3 Semi-structured Interview Analysis

As shown in Table 5, the semi-structured interview analysis identified 10 themes, four that were negative and six that were positive towards the website. Some frailer participants commented that the website better serves fitter adults, as there were not many low intensity activities that the frailer adults felt they could perform. Some participants commented that as they do not know many older people that use the Internet, the website will not reach a large section of the older generation. With regard to the general presentation of the website, some participants perceived the website as being too formal, and required more colour and graphics to make it more informal and attractive to sustain interest. Two participants also commented that the title of the website, 'balancetraining.org.uk', needed amending to be more effective. As the website did not state that it was intended for older people, one participant commented that the word 'training' may be confused with other forms of strenuous exercise such as weight training, or walking on narrow walls or crossbars. Despite the negative comments made by some participants, the majority of participants also made positive comments about the website across all six evaluative questions (excluding the question that asked how the website could be improved, which was used in the negative comments theme).

Table 5. Themes identified from the Semi-structured Interviews

Theme
Negative comments
Not as helpful for frailer older adults
Older people do not use the Internet
Need to use more colour and graphics
Title of website needs changing
Positive comments
Agree with the advice
The advice was suitable
Will follow the advice
The length of the website was about right
Would describe to a friend that the website is informative
Would look at website in my own time

4.4 Discussion

This study obtained older adults' views with regard to the balance training website developed for this thesis. Their feedback was sought to evaluate the website and its advice in terms of its usability and acceptability. The participants' think aloud comments were thematically analysed and presented under the headings of usability, reasons for inputs into the interactive sections, and reaction to advice, and their semi-structured interview responses were thematically analysed and presented under the heading of positive / negative comments. This discussion will summarise the results and relate them to the previous literature, although less literature is drawn upon for the theme of usability, as this is of less concern for this thesis than the themes which relate to uptake of balance training advice.

4.4.1 Summary of Analysis

Under the usability heading, one key correction concerned the date box on the action plan, in that the participants typed in a date that was not in the specified format required. Most participants did not click on the calendar to select their date even though it was simple to use. To correct for this, the researcher could remove the necessity for the participant to select a date, and require them to indicate whether they will start their action plan within a week, fortnight, or month's time. In regards to the feedback that not all of the text was enlarged when the text size function was used, unfortunately the programmers were unable to commit the time necessary to address this issue.

Under the usability heading, three issues for this website were identified, which were similar to those identified from a usability study of a tailored physical activity computer programme for older people (Boyette, Lloyd, Manuel, Boyette, & Echt, 2001; Kressig & Echt, 2002). First, as found in a previous study (Ellis & Kurniawan, 2000), the participants were not always intuitively scrolling down the webpage to advance in the website. An introductory note at the beginning of the website could inform the user of this requirement. Second, the participants were unsure whether the health condition 'poor vision' applied to them if they wore glasses. This issue could be addressed if the option stated that simply wearing glasses did not constitute poor vision. Third, some participants accidentally clicked on suggested goals for balance training, however, this was only considered a minor issue, as most participants realised their error after a few attempts.

Under the usability heading, an issue was identified that is applicable to websites targeting older adults. Some of the participants were unsure how to respond to an Autocomplete or Internet Explorer prompt. As older adults become more familiar with using the Internet and computers, their familiarity with computer terminology and Internet security will increase, and in turn their ability to respond to these prompts. In the meantime, perhaps some older adults may be wary of continuing to use a website when faced with these prompts, although older adults tend to have a younger relative they can consult for technical support (Selwyn, 2004). Whilst some of the participants were very experienced in using computers, and were voluntary IT tutors, others were evidently inexperienced, particularly in using the mouse to move a cursor on screen. Basic problems observed were incorrectly positioning the cursor over items to select (e.g. moving the cursor slightly past a button to select), and incorrect finger pressure on the left mouse button to make selections (e.g. pressing too hard so that they inadvertently moved the mouse or made another click when raising their finger resulting in a double-click). This reflected a range in participant computer skill and therefore a range in views toward the website. For the few participants that appeared to be inexperienced in using a mouse, they may benefit from purchasing more usable technology for mouse movements. For example, roller-ball mice or 'rats' are available so that to move the cursor on screen, instead of using the palm of the hand to move a mouse, a ball is rolled by the middle and / or index finger.

For the heading of reasons for inputs into the interactive sections, some participants commented that vigorous activity is too strenuous for older people; that cycling is too dangerous for them, as their reactions are not quick enough to manoeuvre on the roads; and that they are not as active as they used to be. A self-perception of being 'too old' has been previously identified as a barrier to physical activity and balance training (Booth et al., 1997; Grossman & Stewart, 2003; Simpson et al., 2003). Although being realistic about one's physical abilities will avoid injury and is perceived as a sensible decision (Arcury et al., 2001; Simpson et al., 2003), older adults have been found to unnecessarily restrict their activities due to a fear of falling (Howland et al., 1993; Tinetti, Deleon, Doucette, & Baker, 1994; Tinetti & Powell, 1993; Ward-Griffin et al., 2004; Yardley & Smith, 2002), and may increase their risk of falling due to their inactivity (Yardley, 1998, 2004). A common misconception is that only vigorous exercise brings health benefits (McMurdo, 2000; Stead et al., 1997), and so older adults may need to be reassured that they can still reap the benefits of balance training through low to moderate levels of exertion.

Some participants commented that they already perform activities that provide balance training, and these participants perceived that they were doing enough balance training. In a previous study, some participants were found to underestimate the duration and intensity of balance training required to improve balance (Simpson et al., 2003). Similarly, older people have reported that their busy sedentary activities were physical activities (Grossman & Stewart, 2003). In the current study, of the five participants who perceived themselves as having good balance, only one of them checked all four boxes on the questionnaire to indicate that they were currently doing enough activity that provided balance training.

Some participants commented that they selected certain balance training activities because they enjoyed them, as reflected in comments made by participants stating that they were interested in Tai Chi. This is consistent with previous research detailed in Chapter 3, finding that enjoyment of exercise is an important factor facilitating adherence to the activity (Canada Fitness Survey, 1983; Caserta & Gillett, 1998; Massie & Shephard, 1971; McInnes & Askie, 2004; Rose, 2007; Stead et al., 1997; Wankel, 1993; Yardley et al., 2006).

As with a previous study (Vandelanotte & De Bourdeaudhuij, 2003), it was evident that for some participants the action plan was less practical. These participants had selected to do balance training classes that they were not attending yet, and so they did not know if there was a class local to them, and if so, what days and times the classes ran. The website could be amended to be more useful for these participants, by giving them an option to indicate that they will find out the details of the class sessions. For the participants who stated they did not keep to a routine, perhaps a vague action plan – albeit less useful - may still be helpful for them to roughly plan when they would like to undertake balance training. Other comments made by participants were that they added balance training to days they were currently not busy, and that their current health was a for justification for their inputs into the website.

Under the heading of reaction to the advice, some participants made a realistic comment that they would need to be motivated to perform balance training. Indeed, adherence requires effort from the individual, and as balance training is a form of physical activity, it will require more effort from people than other health behaviours such as changing diet and taking medication (Chao, Foy, & Farmer, 2000). Some participants commented that retaining good balance is an important issue for older people. This comment was often made in reference to the participant's personal sense of reduced balance ability, for example, feeling giddy when turning quickly. This was in contrast to the comment by some participants that older people need to stay active, which was often made in reference to another person or older people in general. The contrast in participants disclosing reduced balance ability but indicating that others are less active is reflected in a previous study finding a tension between two competing values: to exercise precaution, but to strive for independence (Ward-Griffin et al., 2004).

The comment that other older people need to be encouraged to stay active relates to the comment by some participants that the advice did not apply to them, because they were active or independent. These two comments are resonant of the findings of previous research including a study conducted in the Netherlands that presented online tailored falls prevention advice to older adults (Ezendam et al., 2005), that older people perceive the older generation in general to be at risk of a fall, not themselves (Braun, 1998; Cameron & Quine, 1994; HEBS, 2001; Simpson & Mandelstam, 1995; Yardley & Todd, 2005). In this study, some participants commented that balance ability is not something that they had thought about before, which suggested that the participants did not perceive the advice to concern falls. Indeed, one participant commented that the website should include falls prevention advice. In line with recent recommendations, the advice stresses the benefits of balance training and not the risk of falls, as older people are likely to respond to falls prevention advice that is consistent with a positive self-identity (Ballinger & Clemson, 2006; Yardley et al., 2007a). Another comment was that advice on diet was missing, although this was beyond the scope of this research to address.

The last three themes concerned Tai Chi, Yoga, and Pilates. Some participants commented that they were too old for these three activities, that they were wary of the use of meditation in Tai Chi and Yoga, and that they were unfamiliar with Pilates. However, for the comments regarding age, Tai Chi has been taken up by those as old as

97 (Sattin, Easley, Wolf, Chen, & Kutner, 2005). Although some participants expressed an interest in Tai Chi (see the theme 'reasons for inputs'), perhaps older people will need to be made more aware of what is entailed in Tai Chi, Yoga, and Pilates before they will feel comfortable in undertaking these activities.

In the semi-structured interviews, some participants commented that older people rarely use the Internet, and so believed using the Internet as a medium to present the advice would not reach the majority of older people. This comment resonates with comments from older people in a previous study, that found that older people would not use a kiosk to access falls prevention advice (Wilmes, Radhamanohar, Vogel, Bennett, & Underwood, 2004). As shown in Chapter 1, although these comments are accurate, the Internet will become an increasingly useful tool for communicating advice to older people, despite the common ageist assumption that *old* age is incompatible with *new* technology (McHugh, 1991; Ory, Hoffman, Hawkins, Sanner, & Mockenhaupt, 2003; Sixsmith & Sixsmith, 1995).

Some participants commented that the title of the website needed changing to make clearer the intended audience of the website. However, previous research has shown that older adults dislike health promotion explicitly targeting older people (Ory et al., 2003; Stead et al., 1997), and so the website needs to retain its omission of explicitly stating it is intended for older adults. Some commented that the website needed to look more informal. Previous research has found that pictures supporting health advice can aid people's attention, recall, and adherence of written or spoken health education, especially those with low literacy skills (Houts, Doak, Doak, & Loscalzo, 2006). However, the use of many pictures was beyond the scope of this research, but could be used in further work.

Lastly, some frailer participants commented that the suggested activities were more suitable for fitter older adults. The activities recommended to those who self-rated their balance as quite good could be amended to provide more low intensity activities and less vigorous activities, as currently the good and quite good balance groups are presented with similar information.

The majority of participants stated that they found the balance training advice to be agreeable, suitable, of the right length, and of sufficient quality that they would follow the advice, describe to a friend that the website was informative, and read the advice if they came across the website in their own time (and not due to participating in the study). A previous study also found a tailored version of online physical activity advice to be rated more highly than a standardised version. Participants accessed the tailored version more often, and provided higher ratings of the website being usable, adaptive, enjoyable, personal, and the action plan to be useful (Hurling et al., 2006). Another study also found a tailored physical activity computer programme to be acceptable to older people (Kressig & Echt, 2002).

In summary, seven points can be inferred from the analysis of this study.

1. The participants appeared to find the advice useful and the website positive.
2. Some older adults enjoy activities that help with their balance, are interested in activities new to them such as Tai Chi, and plan to do the activities in consideration of their current routine.
3. Some older adults perceive that they are currently doing enough balance training, and this perception may underestimate the frequency, duration, and intensity of balance training required to improve balance.
4. Some older adults perceive that they are too old for some balance training activities.
5. The calendar option on the action plan needs amending to make it more usable; otherwise, the other usability issues raised by the participants in this study were minor.
6. The action plan appeared less useful for those selecting to do classes they are yet to join, and for those who do not keep to a routine.
7. Tai Chi, Yoga, and Pilates are activities older adults may be less familiar with, and even wary of due to the use of meditation in the activities.

4.4.2 Limitations

Two limitations were identified in this study, concerning the potential social desirability of participants' comments, and the closed-ended questions used in the semi-structured interviews. First, the participants were interviewed by a PhD student who was a mean of 45 years their junior. This was perhaps both advantageous and disadvantageous. As an advantage, as opposed to someone of similar age, the researcher's lifestyle was not in common with the participants', and so the participants may have felt more able to express their views as the researcher was less able to judge them. Also, the participants may have provided more data, as they would have had to explain more of their views than to someone of similar age who may have better understood their views implicitly. As a disadvantage, the participants in this dyad may have felt that they were relatively a computer novice, as the researcher was more experienced with computers, and provided technical support during the interviews. If the participants felt a computer novice, this may have provoked them to react in one of two ways. One way is that they may have desired to present themselves to the researcher as computer literate, and therefore appear more confident with using the website than they would be outside of the interview. A contrasting way is that they may have desired to present themselves to the researcher as not confident in using computers, and therefore appear not as independent with using the website than they would be outside of the interview.

Second, although the majority of participants provided detailed comments in the semi-structured interview, some participants only responded with monosyllabic answers to the questions. It is likely that open-ended questions would have elicited more data from the minority of participants who responded with monosyllabic answers (Joffe et al., 2004).

4.4.3 Conclusion

This study investigated the acceptability of the balance training website developed for this research. The study obtained feedback on the website's usability and advice, and explanations for inputs into the website. Despite one main usability correction to the date box of the action plan, the balance training website appeared to be usable and acceptable to the participants in this study. The explanations for inputs into the website also provided an insight into what users of the balance training website may be thinking whilst inputting data into the website. The action plan appeared less useful for those who are yet to join a class and those that do not keep to a routine, and some were unfamiliar and even wary of Tai Chi, Yoga, and Pilates. Activities appeared to be selected because they were enjoyable or of interest, and were carefully added to existing routines. However, the website also highlighted misperceptions that some underestimated how much balance training is required to improve their balance ("I do enough"), and others perceived that they were too old to benefit from balance training ("I'm too old").

CHAPTER FIVE
THE EFFICACY OF THE TAILORED BALANCE TRAINING WEBSITE

5.1 Aims of this Chapter

The previous chapter presented a qualitative study that investigated older adults' views of the tailored balance training website developed for this research. Chapter 6 will present a further qualitative study that investigated health and social care providers' views of the website. This chapter presents a study that assessed the efficacy of the tailored balance training advice compared to a generic version. Two hypotheses were generated for this study. First, it was hypothesised that participants receiving the tailored balance training advice would report more positive attitudes towards the advice, and more positive beliefs and intentions towards undertaking balance training. Second, it was hypothesised that the participants receiving the tailored balance training advice would report higher levels of self-efficacy and intention to undertake balance training after completing an action plan.

5.2 Method

5.2.1 Design

A between groups design was adopted, with a convenience sample of participants randomly assigned to receive advice to encourage uptake of balance training that was either tailored (intervention) or generic (control). An experimental design of randomly allocating participants to one of two conditions afforded the opportunity to directly compare two interventions and infer causality from the results. A summary of the website intervention is presented, as Chapter 3 described the website in detail, including how the advice was tailored to the participant, and the theoretical and empirical bases for the tailoring components.

5.2.1.1 The Website Intervention

As described in Chapter 3, the website was accessible on the world-wide web at www.balancetraining.org.uk (now no longer available, as it has been replaced by the revised version described in Chapter 7). Once the participant consented to take part in the study, they were randomly assigned to either the tailored or generic advice. Randomisation was achieved by recording the time when the participant clicked on the submit button to advance to the next webpage, and depending on whether the modulus of time (the number left over when divided two) was even or odd, the participant was directed to either the tailored or generic webpages respectively. Four factors were used to tailor the advice to the users: self-perceived balance ability (to tailor to the individual's perceived needs, capabilities, and self-image), health conditions known to be associated with falls risk, preferred physical activities, and an action plan. The generic advice was crafted from piecing together all the different segments of the tailored advice. Besides the manipulation of presenting either tailored or generic versions of the advice, the webpages were similar in content and identical in presentation format, to rule out the potential confound of differences in presentation format between the two advice versions.

5.2.1.2 Measures

Two short questionnaires were used to test the two hypotheses. The items of the first questionnaire are presented in Table 6. Six items were presented to the participants along with a six-point response scale: 1 = disagree strongly to 6 = agree strongly.

Table 6. Questionnaire Items that measured Attitudes, Beliefs, and Intention towards the Recommended Activities

Item
1. The recommended activities seemed suitable for me
2. The recommended activities were personally relevant to me
3. It was interesting to read about the recommended activities
4. I am confident that I will be able to carry out the recommended activities
5. I believe that the activities will improve my balance if I carry them out
6. I intend to carry out the recommended activities

The first item assessed the perceived suitability of the recommended balance training activities. This item assessed the perceived usefulness of the advice (Kreuter et al., 2000a), in terms of the appropriateness of the type and intensity of the recommended activities. Suitability was distinguished from self-efficacy, with suitability concerning whether participants deemed the recommended activities as appropriate for someone of their age, and self-efficacy concerning whether participants felt able to perform the activities. It was important to measure the suitability of the recommended activities, as older people have reported avoiding exercise and balance training activities that they perceive would lead to injury (Booth et al., 1997; King et al., 1998; O'Brien Cousins, 2000; Simpson et al., 2003; Stead et al., 1997; Ward-Griffin et al., 2004). In contrast, as discussed in Chapters 1 and 4, older people have reported falls prevention advice to be unsuitable for them (Yardley & Todd, 2005) as they perceive themselves to be too independent and active to benefit from falls prevention (Braun, 1998; Cameron & Quine, 1994; HEBS, 2001; Simpson & Mandelstam, 1995; Yardley & Todd, 2005). In addition, a recent study found that the most significant positive predictor of intention to carry out balance training was older adults' perception that they were 'the kind of person who should do strength and balance training' (Yardley & Todd, 2005). This finding provides partial support for the inclusion of the suitability measure in this study, as 'the kind of person who should do strength and balance training' concerns identity, and is related to but different from suitability. Suitability concerns the perceived usefulness of the advice, whereas identity concerns the perceived extent that the advice is for someone like them.

The second item assessed the perceived personal relevance of the recommended balance training activities. This item assessed whether the tailoring worked by increasing personal relevance (Kreuter et al., 2000a), and consequently increasing the likelihood of participants centrally processing the advice (Petty & Cacioppo, 1986). Personal relevance is related to but different from the compatibility of the advice with the individual's identity, as personal relevance concerns the meaningfulness of the advice to the individual (the fit between the advice and the individual).

The third item assessed the participants' interest in reading about the recommended balance training activities. Interest served as a further assessment of the participants' processing of the advice. Participants who found the advice interesting, as it presented advice that was new and informative (Kreuter et al., 2000a), would be expected to have more centrally processed the advice and found it more persuasive (Petty & Cacioppo, 1986).

The fourth item assessed the participants' self-efficacy in undertaking the recommended balance training activities. This item assessed whether the participants felt able to carry out the recommended activities (Bandura, 1977). As detailed in Chapter 3, self-efficacy is widely held as a key construct in health psychology, with strong empirical support for its use in predicting the adoption and maintenance of a variety of health behaviours (Bandura, 1997; Luszczynska & Schwarzer, 2005).

The fifth item assessed the participants' outcome expectancy in performing the recommended balance training activities, i.e. participants believed that performing balance training would lead to improved balance (Bandura, 1977). Although outcome expectancy is a weaker predictor of behaviour than self-efficacy, it is still an important part of an individual's consideration of whether to perform a behaviour. If a person does not believe that a behaviour will result in the desired outcome, then they will perceive little use in adopting it (Bandura, 1997). Outcome expectancy is also similar to the attitude construct used in the theory of planned behaviour, which is based on the anticipated positive or negative consequences of performing a behaviour (Ajzen, 1988).

The sixth item assessed the participants' intention to perform the recommended activities. Intention has been proposed as a pivotal predictor of behaviour (Ajzen, 1988; Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975), and a recent meta-analysis of experiments also showed that intention mediated the effect of interventions on behaviour change (Webb & Sheeran, 2006) (see Chapter 3).

The second questionnaire was used only with participants who received the tailored version of the balance training advice, to compare their self-efficacy and intention to perform the recommended activities before and after completing an action plan. The items of the second questionnaire are presented in Table 7. The second questionnaire was presented to participants along with an identical six-point response scale used in the first questionnaire. As described in Chapter 3, an action plan was included because of its benefits identified from research on implementation intentions, self-efficacy, and behaviour contracts.

Table 7. Questionnaire Items that measured Self-Efficacy and Intention towards implementing an Action Plan

Item
1. I intend to follow the plan
2. I am confident that I will be able to carry out the plan

5.2.2 Participants

Before recruitment commenced, the study was approved by the ethics committee of the School of Psychology, University of Southampton. As the study was conducted online, participants may have found the website from a search engine, or from an advertisement elsewhere, however, the bulk of participants were expected to have been recruited from an email and website advertisement. A broadcast was sent on two email distribution lists in August 2005, one held by Help the Aged, and one held by RioMed. The broadcasts were written by the holders of the distribution lists (see Appendix H for the broadcast sent by Help the Aged), and together, the email distribution lists comprised over 5,000 health care professionals who were working with older people within the National Health Service or freelance, plus members from organisations with an interest in falls and health. There was further promotion on Help the Aged's website, under their sections on falls prevention and resources about falls prevention. Participants were recruited over five months (20/07/2005 – 04/01/2006).

5.2.3 Materials / Apparatus

As the intervention was accessible on the world-wide web, participants accessed the website at their desired time and location where they had Internet access. Participants entered their responses directly into boxes on the website, which were recorded when the participant clicked on the submit button that advanced them on to the next webpage. Participants' data were automatically recorded onto a Microsoft Office Excel 2003 spreadsheet, which was available online to the researcher and password-protected. The data were analysed using SPSS 12.0 for Windows, and the web logs were analysed using Web Log Explorer Professional Edition 2.84. Data for users' country of residence were analysed, but not city, because many internet service providers (ISPs) assign internet protocol (IP) addresses dynamically, meaning that each time a user is online they are provided with a different IP address. This confounds web log analysis, as the web log data is of the ISP provider and not an IP assigned to a specific computer (Stout, 1997).

5.2.4 Data Preparation and Checks

Data collection ceased once the minimum number of participants was recruited for a desired power value of .80. The minimum sample size was 260 participants (130 per group), calculated from Oenema et al.'s (2001) mean scores and standard deviations for intention to eat less fat after receiving either tailored or generic computer-based nutrition education, with a two-tailed hypothesis, and an alpha level of .05.

The data was cleansed by removing participants who accessed the website more than once. This was achieved by manually identifying participants who made identical or almost identical inputs into the website more than once within 24 hours. Participants were also removed if they entered their year of birth as 1901 or 1900, as these entries were assumed to have been made in error. Multivariate analysis of variances (MANOVAs) were used to test the hypotheses, to directly test for differences between the two experimental conditions, and act as a conservative test of all the outcome measures simultaneously in order to minimise the possibility of a Type 1 error due to making multiple comparisons. If the study aimed to test a theory, such as the TPB, then regression analyses would have been performed using intention as the primary outcome measure, with the other variables as secondary potential mediators.

As MANOVAs were to be performed to test the hypotheses, checks were made to ensure that the MANOVA assumptions were not violated (Pallant, 2001). Checks for the normality of the dependent variable distributions identified a negative skew and kurtosis, and so each variable was reflect and logarithm transformed (Pallant, 2001; Tabachnick & Fidell, 2001). As MANOVAs are sensitive to outliers, three multivariate outliers identified from Mahalanobis distances tests were removed. Pearson correlation tests suggested that the dependent variables were moderately correlated (and not at risk of singularity). Scatter graphs of every pair of dependent variables split between the tailored and generic advice conditions suggested linear correlations (and thus not a reduction in power due to a minimised separation of variables across the tailored and generic advice conditions), and scatter graphs of the residuals for the predicted and obtained values of the dependent variables also suggested normality, linearity, and homoscedasticity (equal variance in scores across the dependent variables). To check the equality of variance and homogeneity of variance-covariance matrices (for pooled estimate of error), Levene's and Box's M tests were performed for each MANOVA, and are reported in the results section.

5.3 Results

The results are presented in three sections: first, a description of the participant characteristics, second, the results of the tests of the hypotheses, and third, the results of exploratory analyses to supplement the tests of the hypotheses.

5.3.1. Participant Characteristics

The total number of visitors that accessed the first (introductory) webpage was 2,836, and the total number of visitors that accessed the second (online consent form) webpage was 2,208. The majority of visitors accessed the website from the USA (44%) and the UK (29%), and the remaining visitors accessed the website from 39 other countries (< 3% each).

Four hundred and twenty-six participants were recruited (221 tailored group, 205 generic group). The number of participants who advanced through the website and completed the post-advice questionnaire was 280 (144 tailored group, 136 generic group), with an equal dropout rate between the tailored (35%) and generic groups (34%). Tests were performed to analyse the differences between the participants who completed the website and had complete data (n = 280), and those who provided demographic data but dropped out before filling in the post-advice questionnaires (n = 146). An unrelated t-test found no significant difference in age, and chi-square tests found no significant differences in the website version they accessed, gender, self-rated balance, poor vision, unsteadiness, and osteoporosis. There was a significant difference between the groups in the use of medications ($\chi^2(2, n=426) = 7.13, p < .05$), where dropouts were more likely to report taking no medications (37%) than participants who completed the website (28%), and participants who completed the website (32%) were more likely to report taking less than four medications than dropouts (20.5%). All further analyses presented in this chapter were performed on data from participants who completed the post-advice questionnaire for the between-groups comparisons (N = 280).

The participants were aged 65-97 years ($M = 77.25$, $SD = 7.11$), and there was no significant difference in age between the tailored ($M = 77.51$, $SD = 7.43$) and generic ($M = 76.96$, $SD = 6.77$) groups. As shown in Table 8, there was an even spread between the tailored and generic groups on gender, self-rated balance, and health conditions, and univariate tests found no significant difference between the tailored and generic groups on these variables. Two thirds of the sample were women, two thirds reported having some balance problems, three quarters reported suffering from unsteadiness, and three quarters were taking medications.

Table 8. Frequencies (% of group) of Gender, Self-rated Balance, and Health Conditions as a function of Advice Condition

	Tailored (n = 144)	Generic (n = 136)	Total (N = 280)
	Gender		
Male	54 (37)	42 (31)	96 (34)
Female	90 (63)	94 (69)	184 (66)
	Self-rated balance		
Good	11 (8)	13 (9.5)	24 (9)
Quite good	38 (26)	32 (23.5)	70 (25)
Have some problems	95 (66)	91 (67)	186 (66)
	Health condition		
Unsteadiness	106 (74)	97 (71)	203 (73)
Poor vision	43 (30)	34 (25)	77 (28)
Take ≥4 Medications	51 (35)	60 (44)	111 (40)
Take <4 Medications	52 (36)	38 (28)	90 (32)
Take no medication	41 (29)	38 (28)	79 (28)
Osteoporosis	44 (31)	42 (31)	86 (31)

5.3.2. Tests of the Hypotheses

5.3.2.1 Tailored vs. Generic Advice

The first hypothesis was that the participants who received the tailored balance training advice would report more positive attitudes towards the advice, and more positive beliefs and intentions towards undertaking balance training. A one-way between-groups MANOVA was performed with advice condition as the independent variable (tailored vs. generic). The six dependent variables were the responses to the post-advice questionnaire (see Table 6). A significant difference was found between the advice conditions on the combined dependent variable ($F_{(6, 273)} = 2.98, p < .01$; Pillai's Trace = .062).

The between-groups effects revealed that there was a significant difference between the tailored and generic groups on reports of the personal relevance of the advice ($F_{(1, 278)} = 6.15, p = .014$; partial $\eta^2 = .022$), self-efficacy in undertaking balance training ($F_{(1, 278)} = 3.98, p = .047$; partial $\eta^2 = .014$), and intention to undertake balance training ($F_{(1, 278)} = 4.31, p = .039$; partial $\eta^2 = .015$). As suggested by the means presented in Table 9, the tailored group reported that the advice was more personally relevant, and reported greater self-efficacy and intention to undertake balance training than the generic group. However, there was no significant difference between the tailored and generic groups on reports of the balance training advice being suitable ($F_{(1, 278)} = 2.02$, *ns*), interesting ($F_{(1, 278)} = .66$, *ns*), and the outcome expectancy that balance training would improve their balance ($F_{(1, 278)} = .14$, *ns*).

The variables that were found to be significant on the MANOVA – personal relevance, self-efficacy, and intention – were also found to be significant on a Levene's test of equality of error variances, indicating unequal variance in the two groups compared. To test whether these significant results were due to the unequal variance in the two groups, non-parametric Mann-Whitney U tests were performed to compare with the parametric analyses. The Mann-Whitney U tests also found that there was a significant difference between the tailored and generic groups on the variables of personal relevance, self-efficacy, and intention, suggesting that the results were not due to this violation of the MANOVA assumption.

Table 9. Mean (SD) Post-advice Questionnaire Reports as a function of Advice Condition

Item	Tailored (n = 144)	Generic (n = 136)	95% confidence interval for the between groups difference
Suitability	4.95 (.60)	4.80 (.79)	-.055, .009
Personal relevance	4.83 (.65)	4.60 (.77)	-.071, -.008
Interest	5.03 (.61)	5.08 (.64)	-.020, .048
Self-efficacy	4.61 (.70)	4.35 (.95)	-.069, -.000
Outcome expectancy	4.78 (.67)	4.79 (.74)	-.027, .039
Intention	4.86 (.61)	4.65 (.79)	-.068, -.002

5.3.2.2 Balance Training using or not using an Action Plan

The second hypothesis was that the participants receiving the tailored balance training advice would report higher levels of self-efficacy and intention to undertake balance training after completing an action plan. A repeated measures MANOVA was performed on the data of the tailored group, as the generic group did not complete an action plan. Of the 144 participants in the tailored group who had completed the six-item post-advice questionnaire, 113 had also completed the two-item post-action plan questionnaire. The two dependent variables, self-efficacy and intention, were tested against the independent variable of specificity (i.e. reports in relation to carrying out balance training or a balance training action plan). There was a significant difference between the reports on the combined dependent variable according to specificity ($F_{(2, 111)} = 3.37, p < .05$; Pillai's Trace = .057).

For self-efficacy, the within-groups contrasts revealed that there was a significant difference between the reports on specificity ($F_{(1, 112)} = 6.40, p = .013$; partial $\eta^2 = .054$). As shown in Table 10, the means suggested that participants reported greater self-efficacy for implementing their action plan than their self-efficacy for undertaking balance training. However, for intention, the within-groups contrasts revealed that there was no significant difference between the reports on specificity ($F_{(1, 112)} = .36$, *ns*, partial $\eta^2 = .003$).

Table 10. Mean (SD) Reports of Self-efficacy and Intention to undertake Balance Training and to Implement an Action Plan for carrying out Balance Training

Item	Balance training (n = 144)	Implement action plan (n = 113)	95% confidence interval for the difference
Self-efficacy	4.61 (.70)	4.76 (.83)	.007, .055
Intention	4.86 (.61)	4.89 (.75)	-.016, .031

5.3.3 Exploratory Analyses

The exploratory analyses comprised two parts. The first part consisted of analyses to explore the possibility that the significant results found from the hypothesis tests described above were moderated by other variables. The analyses tested the variables of age, gender, self-rated balance, and health conditions for significant associations with responses to the six-item post-advice questionnaire, and significant interaction effects with the variable of advice condition (tailored vs. generic). The second part provided a description of the participants' inputs on the interactive webpages of the tailored website.

5.3.3.1 Post-advice Questionnaire

Age. To test for differences on the post-advice questionnaire items according to age, the age variable was split at the median (77 years) into two dichotomous levels of 'young' (65-77 years) and 'old' (78-97 years). The dichotomous age variable was then entered into a MANOVA as an independent variable in addition to advice condition. A significant difference was found on the combined dependent variable as a function of age ($F_{(6,271)} = 3.12, p < .01$; Pillai's Trace = .065). The between-groups effects revealed a significant difference between young and old participants' reports on suitability ($F_{(1,276)} = 4.94, p = .027$), personal relevance ($F_{(1,276)} = 6.25, p = .013$), self-efficacy ($F_{(1,276)} = 5.83, p = .016$), and outcome expectancy ($F_{(1,276)} = 7.99, p = .005$). As shown in Table 11, the means suggested that the younger participants reported more positively on the post-advice questionnaire. However, there was no significant interaction effect with advice condition ($F_{(6,271)} = .97$, *ns*; Pillai's Trace = .021). This suggested that although younger participants responded more positively to the advice, tailoring led to more positive responses for both younger and older participants.

Table 11. Mean (SD) Post-advice Questionnaire Reports as a function of Age and Advice Condition

Item	Age	Tailored	Generic	95% confidence interval for the difference
Suitability	65-77	5.04 (.42)	4.87 (.81)	-.063, .027
	78-97	4.86 (.73)	4.72 (.76)	-.077, .012
Personal relevance	65-77	4.93 (.56)	4.70 (.75)	-.080, .007
	78-97	4.73 (.72)	4.48 (.79)	-.092, -.001
Interest	65-77	5.07 (.60)	5.08 (.76)	-.036, .064
	78-97	5.00 (.61)	5.08 (.46)	-.034, .058
Self-efficacy	65-77	4.70 (.61)	4.45 (1.00)	-.074, .026
	78-97	4.51 (.78)	4.22 (.87)	-.097, -.005
Outcome expectancy	65-77	4.95 (.57)	4.82 (.80)	-.065, .032
	78-97	4.60 (.73)	4.75 (.68)	-.015, .070
Intention	65-77	4.92 (.49)	4.67 (.82)	-.079, .011
	78-97	4.80 (.71)	4.62 (.76)	-.086, .011

Gender. To test for significant differences between male and female participants on the post-advice questionnaire items, a one-way between groups MANOVA was performed with gender as an independent variable in addition to advice condition. No significant difference was found on the combined dependent variable as a function of gender ($F_{(6,271)} = 1.52$, *ns*; Pillai's Trace = .033), nor the interaction between gender and advice condition ($F_{(6,271)} = 1.29$, *ns*; Pillai's Trace = .028). This suggested that tailoring the advice led to more positive responses to the advice for both men and women. The means and standard deviations of the male and female participants are presented in Table 12.

Table 12. Mean (SD) Post-advice Questionnaire Reports as a function of Gender and Advice Condition

Item	Gender	Tailored	Generic	95% confidence interval for the difference
Suitability	Male	4.91 (.71)	4.64 (.91)	-.108, .013
	Female	4.98 (.52)	4.87 (.72)	-.050, .025
Personal relevance	Male	4.87 (.62)	4.33 (.85)	-.149, -.041
	Female	4.81 (.67)	4.72 (.71)	-.052, .025
Interest	Male	4.94 (.71)	4.95 (.70)	-.056, .064
	Female	5.09 (.53)	5.14 (.62)	-.026, .057
Self-efficacy	Male	4.70 (.63)	4.26 (.94)	-.121, -.012
	Female	4.56 (.74)	4.38 (.95)	-.062, .026
Outcome expectancy	Male	4.76 (.64)	4.62 (.79)	-.080, .035
	Female	4.79 (.70)	4.86 (.71)	-.022, .059
Intention	Male	4.91 (.56)	4.55 (.77)	-.117, .008
	Female	4.83 (.64)	4.69 (.80)	-.063, .020

Balance. To test for differences on the post-advice questionnaire items according to self-rated balance, the self-rated 'good' and 'quite good' balance groups were merged together as the good balance group had a relatively small cell size (see Table 8). A one-way between groups MANOVA was to be performed on the post-advice questionnaire items, with the two-level self-rated balance variable (good and quite good vs. some problems) as an independent variable in addition to advice condition. However, the Box's M test was highly significant ($p < .001$), suggesting that the robustness of the test to the violation of the MANOVA assumption of homogeneity of variance-covariance matrices was not guaranteed (Tabachnick & Fidell, 2001). Consequently, a separate analysis of variance (ANOVA) was performed on each of the post-advice questionnaire items. There was a significant difference on participant reports of outcome expectancy as a function of self-rated balance ($F_{(1,276)} = 5.91, p < .025$; partial $\eta^2 = .021$). As shown in Table 13, participants who self-rated their balance as good or quite good reported greater belief that balance training would improve their balance than participants who reported that they had some balance problems. There were no significant differences found on the other post-advice questionnaire items or tests for interaction effects. This suggested that although those who self-rated their balance as good or quite good responded with more positive outcome expectancy, tailoring the advice led to more positive responses to the advice for both those with good or quite good balance, and those with self-rated balance problems.

Table 13. Mean (SD) Post-advice Questionnaire Reports as a function of Self-rated Balance and Advice Condition

Item	Self-rated balance	Tailored	Generic	95% confidence interval for the difference
Suitable	Good/quite good	4.98 (.43)	4.96 (.77)	-.043, .066
	Some problems	4.94 (.67)	4.73 (.79)	-.080, -.001
Personal relevance	Good/quite good	4.86 (.41)	4.80 (.66)	-.044, .046
	Some problems	4.82 (.74)	4.50 (.81)	-.101, -.018
Interest	Good/quite good	5.00 (.71)	5.07 (.75)	-.044, .082
	Some problems	5.05 (.55)	5.09 (.59)	-.030, .052
Self-efficacy	Good/quite good	4.73 (.64)	4.49 (.89)	-.089, .030
	Some problems	4.55 (.73)	4.27 (.97)	-.079, .005
Outcome expectancy	Good/quite good	4.92 (.57)	4.93 (.69)	-.049, .067
	Some problems	4.71 (.71)	4.71 (.76)	-.035, .045
Intention	Good/quite good	4.94 (.47)	4.71 (.76)	-.087, .025
	Some problems	4.82 (.67)	4.62 (.81)	-.077, .005

Health conditions. To test for significant differences on the post-advice questionnaire items between those who reported and those who did not report health conditions, one-way between groups MANOVAs were performed with the health conditions as independent variables in addition to advice condition. For unsteadiness, a significant difference was found on the combined dependent variable ($F_{(6,271)} = 4.06$, $p <$

.001; Pillai's Trace = .083), with the between-groups effects revealing a significant difference on the reports of suitability ($F_{(1,276)} = 5.85, p = .016$) and outcome expectancy ($F_{(1,276)} = 16.08, p < .001$). The means suggested that those who did not report unsteadiness reported more positively than those who reported unsteadiness, with regard to suitability ($M = 5.03$, $SD = .63$ vs. $M = 4.82$, $SD = .72$) and outcome expectancy ($M = 5.04$, $SD = .59$ vs. $M = 4.68$, $SD = .72$). There were no significant differences found on the other items. There were no significant interactions, indicating that although participants who did not report unsteadiness responded more positively in regards to suitability and outcome expectancy, tailoring the advice led to more positive responses to the advice for both those who did and did not report unsteadiness.

For poor vision, a significant difference was found on the combined dependent variable ($F_{(6,271)} = 2.62, p < .025$; Pillai's Trace = .055), with the between-groups effects revealing a significant difference on the reports of suitability ($F_{(1,276)} = 4.37, p = .038$; partial $\eta^2 = .016$), self-efficacy ($F_{(1,276)} = 6.29, p = .013$; partial $\eta^2 = .022$), outcome expectancy ($F_{(1,276)} = 12.65, p < .001$; partial $\eta^2 = .044$), and intention ($F_{(1,276)} = 6.32, p = .012$; partial $\eta^2 = .022$). The means suggested that those who did not report poor vision reported more positively than those who reported poor vision, with regard to suitability ($M = 4.94$, $SD = .61$ vs. $M = 4.71$, $SD = .87$), self-efficacy ($M = 4.56$, $SD = .80$ vs. $M = 4.29$, $SD = .90$), outcome expectancy ($M = 4.88$, $SD = .65$ vs. $M = 4.53$, $SD = .79$), and intention ($M = 4.82$, $SD = .66$ vs. $M = 4.58$, $SD = .82$). However, there was a no significant interaction with advice condition ($F_{(6,271)} = .53$, *ns*; Pillai's Trace = .012). This suggested that although participants who did not report poor vision responded more positively to the advice, tailoring the advice led to more positive responses to the advice for both those who did and did not report poor vision.

For taking medications, a one-way between groups MANOVA was to be performed on the post-advice questionnaire items, with the three-level medication variable (take four or more, up to three, or no medications) as an additional independent variable to advice condition. However, the Box's M test was highly significant ($p < .001$). Consequently, a separate ANOVA was performed on each of the post-advice questionnaire items. There was a significant difference in self-efficacy as a function of taking medication ($F_{(2,274)} = 3.34, p = .037$; partial $\eta^2 = .024$). The means suggested that the greatest self-efficacy was reported by those who were not taking medications ($M =$

4.63, SD = .77), followed by those taking up to three medications (M = 4.58, SD = .73), and the lowest self-efficacy was reported by those taking four or more medications (M = 4.30, SD = .93). There were no significant difference found on the other post-advice questionnaire items or tests for interaction effects. This suggested that although participants who reported taking no or fewer medications responded with greater self-efficacy, tailoring the advice led to more positive responses across participants regardless of their reported medication use.

For osteoporosis, no significant difference was found on the combined dependent variable ($F_{(6,271)}$ = 2.07, *ns*; Pillai's Trace = .044), nor the interaction with advice condition ($F_{(6,271)}$ = 1.21, *ns*; Pillai's Trace = .026). This suggested that tailoring the advice led to more positive responses to the advice for both those who did and did not report osteoporosis.

5.3.3.2 Details of Participants' Inputs into the Tailored Website

Participants in the tailored condition who self-rated their balance as good were asked to rate their current level of balance training activity. The website asked the self-rated good balance group to tick up to four statements if they were currently performing the activities in each statement: "I exert myself so that I am warmer and I breathe faster, for at least 90 minutes every week"; "I exert my leg muscles so I can feel them working hard for at least 90 minutes every week"; "I move my head and body quickly in all directions several times a week"; and "I get practice balancing and coordinating my eye and body movements more than once a week (e.g. standing on one leg or on my toes, walking on uneven ground, dancing, ball games, etc.)". Participants could tick any combination of statements, and by ticking all four they indicated that they were currently performing the required level of frequency, intensity, and duration of balance training to improve their balance. As shown in Table 14, of the 11 participants in the self-rated good balance group, only one participant was currently performing the required level of balance training to improve their balance.

Table 14. Frequencies of the Current Balance Training Activity of Participants with Self-rated Good Balance

Number of balance training activity statements participants agreed that they were currently performing (n = 11)				
None	Any 1	Any 2	Any 3	All 4
3	1	3	3	1

Participants receiving the tailored advice were required to report a goal to reach by undertaking balance training. Of the 98 different goals that were reported, the most frequently reported goals were two that were suggested by the website: to 'improve confidence in balance' (n = 17, 17%) and to 'be more independent' (n = 14, 14%).

Participants in the tailored group were required to select the type of activities they would like to carry out. The self-rated good and quite good balance groups had the choice of balance training that was either based at home, outside the home, in a class, or a combination of these three. The group that reported that they had some balance problems had the choice of either balance training that was based at home, outside the home or in a class (merged together), or both. As shown in Table 15, the vast majority of participants selected home-based balance training.

Table 15. Frequencies (%) of Types of Recommended Activities Viewed

Activity location	(n = 144)
At home	100 (69)
At home and outside[a]	18 (13)
Outside[a]	9 (6)
In class	8 (6)
At home and in class	5 (3)
Outside[a] and in class	2 (1.5)
At home, outside[a], and in class	2 (1.5)

[a]included class-based activities for the group that reported having some balance problems

Participants were then required to select what they would like to carry out as their main activity. The self-rated good and quite good balance groups were offered a selection of 10 activities, and the group that reported that they had some balance problems was offered a selection of three activities. As shown in Table 16, the home keep-fit workout was by far the most frequently selected main activity. In addition, of the 57 reported locations to perform balance training, 97 (78%) participants typed 'home' or a room in their home as their location to undertake balance training.

Table 16. Frequencies (%) of participants selecting each of the Main Activities

Main activity	(n =144)
Home keep-fit workout[a]	104 (72)
Walking	14 (10)
Keep-fit classes[a]	11 (8)
Tai Chi, Yoga, or Pilates[a]	10 (7)
Swimming	3 (2)
Cycling	1 (.05)
Going to the gym	1 (.05)
Rambling or jogging	0 (0)
Sports	0 (0)
Dancing	0 (0)

[a]Main activities available to the group that reported that they had some balance problems.

Participants were then given the option to select extra balance training activities to undertake. The self-rated good and quite good balance groups had a choice of nine extra activities, and the group that reported that they had some balance problems had a choice of six extra activities. As shown in Table 17, the four most frequently selected activities included the three activities that were only available to the group that reported having some balance problems: 'giving your balance a helping hand' (making home modifications to avoid difficult balancing situations), housework, and gardening.

Table 17. Frequency (%) of participants selecting each of the Extra Activities

Extra activity	(n = 144[a])
Walking[b]	69 (48)
Giving your balance a helping hand[b]	59 (41)
Housework[b]	37 (26)
Gardening[b]	30 (21)
Tai Chi, Yoga, or Pilates[b]	29 (20)
Keep-fit classes[b]	18 (13)
Home keep-fit workout[b]	16 (11)
Swimming	10 (7)
Dancing	9 (6)
Going to the gym	5 (3)
Rambling or jogging	4 (3)
Cycling	3 (2)
Sports	2 (1)

[a]Participants could select more than one activity, therefore the sum of this column is above 100%.
[b]Extra activities available to the group that reported that they had some balance problems.

5.4 Discussion

5.4.1 Summary of Results

This study assessed the efficacy of the tailored balance training website by comparing it with a generic version. Two hypotheses were tested for this study. The first hypothesis was that participants receiving the tailored balance training advice would report more positive attitudes towards the advice, and more positive beliefs and intentions towards undertaking balance training. The results provided partial support for the hypothesis, in that participants who received the tailored advice reported it as significantly more personally relevant, and reported significantly higher levels of self-efficacy and intention to undertake balance training. There was no significant difference between the tailored and generic groups in reports of the advice being suitable or interesting, or outcome expectancy in undertaking balance training. The second hypothesis was that the participants receiving the tailored balance training advice would report higher levels of self-efficacy and intention to undertake balance training after completing an action plan. The results found partial support for the hypothesis, in that participants reported greater self-efficacy for implementing their action plan than for their tailored recommended activities.

5.4.1.1 Hypothesis 1: Tailored vs. Generic Advice

The tailoring appeared to be successful, as the tailored version of the advice attracted higher reports of personal relevance of the recommended activities from the participants (Kreuter et al., 2000a). The higher levels of personal relevance arguably indicated that they were more likely to have centrally processed the advice (Petty & Cacioppo, 1986).

The tailored version of the advice attracted higher reports of self-efficacy to undertake the recommended balance training activities. This may have been because the tailored advice was more appropriate for the individual, and therefore did not include activities that were not too easy or difficult, or include irrelevant advice. Therefore, as the recommended activities were of the appropriate type and intensity, the participants would have been expected to have felt more able to carry out the activities. Alternatively, as the tailored advice was arguably more centrally processed than the generic advice, consequently it would be expected that the tailored version would be more persuasive (Petty & Cacioppo, 1986; Petty et al., 1994). The tailored advice was expected to have a greater impact upon the participants due to its greater attention to addressing the needs of the individual (Schooler, Chaffee, Flora, & Roser, 1998). As detailed in Chapter 2, according to the ELM, participants receiving the tailored advice were arguably more attentive to the arguments of the advice, more likely to be influenced if they were in agreement with the advice (as was the case with the current study, due to the ceiling effects of the reports as seen in Tables 9 and 10), more likely to be influenced by the advice for longer, and more likely to act on the advice (Petty & Cacioppo, 1986; Petty et al., 1994).

That the tailored balance training advice increased participants' self-efficacy in undertaking balance training is an important finding. There are several barriers that have been reported by older people as to why they feel unable to undertake exercise (Paxton et al., 1997; Shephard, 1994) and why they should not undertake balance training (Yardley et al., 2006). However, of these barriers, older people have been found to not engage in exercise because they perceive themselves as unable to perform the activities (King et al., 1998; Paxton et al., 1997), due to fear of injury, or that they are prevented by poor health, old age, lack of energy, illness, current injury (Arcury et al., 2001; Booth et al., 1997; Carter et al., 1991; King et al., 1998; Stead et al., 1997), or erroneous beliefs about exercise (King et al., 1998; Paxton et al., 1997), such as the myth that all exercise needs to be strenuous to be beneficial (McMurdo, 2000). Older people's perceived inability to perform exercise is also related to a fear of embarrassment, as they believe they will not be able to do it properly (Paxton et al., 1997). Fear of falling has also been found to be predicted by participants' fear of looking silly in public or letting someone down, and therefore affecting their confidence with social and outdoor activities (Yardley, 1998). Indeed, fear of falling has been found to predict activity restriction, and be predicted by feared consequences of falls - the consequences of social embarrassment and indignity resulting in damage to personal confidence, and to a lesser extent fear of physical injury, functional disability and loss of independence (Yardley & Smith, 2002).

The tailored version of the advice led to higher levels of intention to perform the recommended balance training activities. As arguably the tailored advice was more centrally processed by the tailored group, and their self-efficacy was enhanced, in turn their intention to undertake the recommended activities was expected to be enhanced. Indeed, recent meta-analyses have found self-efficacy to significantly positively correlate with intention (Armitage & Conner, 2001; Hausenblas et al., 1997; Webb & Sheeran, 2006).

There was no significant difference in reports of suitability, interest, and outcome expectancy between the tailored and generic groups. Although these measures were important to evaluate the advice, to find significant differences between the two advice versions on these measures was perhaps unlikely, as the advice given to the two groups was similar in content. As in a previous study measuring older people's attitudes, beliefs, and intentions in response to balance training advice (Yardley & Todd, 2005), this study found a ceiling effect on all the outcome measures. This suggested that either the two groups equally found the advice to be suitable, interesting, and believed balance training would improve their balance; were equally uncritical of the balance training advice; or that the sample was selective, in that the participants all wanted to receive the advice. The latter possibility is likely, as the participants were self-selected, and therefore were likely to be motivated to take part in the study in order to receive the balance training advice.

If participants were genuine in their reports of perceived suitability and interest in the advice then this would be encouraging as older people have sometimes been critical of falls prevention advice finding it unsuitable for them (Yardley & Todd, 2005), and perceive falls prevention interventions to be useful for the older generation in general, but not themselves (Braun, 1998; Cameron & Quine, 1994; HEBS, 2001; Simpson & Mandelstam, 1995; Yardley & Todd, 2005). In consideration of the findings presented in Chapter 4, it is possible that the participants in this study did not associate the balance training advice with falls prevention, and therefore the balance training advice was deemed suitable as it did not raise defensiveness in the participants, as balance training advice does not have the stigma of falls (HEBS, 2001). The high levels of reported interest might also be consistent with this interpretation, as arguably the participants may have found the advice new and informative (Kreuter et al., 2000a).

5.4.1.2 Hypothesis 2: Pre- vs. Post-Action Plan Completion

The second hypothesis was that the participants receiving the tailored balance training advice would report higher levels of self-efficacy and intention to undertake balance training after completing an action plan. The results provided partial support for the hypothesis, in that participants reported greater self-efficacy to implement their action plan than the recommended activities. Once participants had completed their action plan to undertake the recommended activities, they had thought through the specifics of when they will do their balance training. If their plan was completed realistically, the participant had developed a plan that they were confident they were able to perform. Thus, the action plan conception of the recommended activities, in comparison to a relatively vague conception (before completing an action plan), was expected to attract higher reports of self-efficacy (Bandura, 1997; Haber & Rhodes, 2004; Janz et al., 1984; Kanfer & Gaelick, 1986; Locke & Latham, 1990). Although self-efficacy was greater for implementing an action plan, intention was not. It was less likely to find significantly greater intention to implement an action plan than to undertake balance training, as when completing the post-advice questionnaire, participants would be expected to have already decided whether or not they will undertake the recommended activities. However, an increase in PBC can increase the likelihood that a person will adopt a new behaviour (Ajzen, 1988, 1991).

This study found that tailoring the balance training advice led to increased personal relevance, self-efficacy, and intention to undertake balance training, and the completion of an action plan led to greater self-efficacy in undertaking the recommended activities. As detailed in Chapter 2, reviews of tailored advice across a variety of health behaviours have found similar results, with tailored health advice significantly more likely to be perceived as personally relevant, and a positive trend for tailoring to receive higher intentions to change health behaviour (Revere & Dunbar, 2001; Ryan & Lauver, 2002; Skinner et al., 1999).

5.4.2 Limitations

Unfortunately, due to a programming error, the data for reports of suffering from the dizziness health conditions were not recorded in the generic group. Without the generic group to compare with, the tailored group's data was not presented, and exploratory analyses with these variables were not available. In addition, the advice pack provided to participants on the final (debrief) webpage was intended to be tailored, based on inputs into the interactive sections of the website. Unfortunately, because of limited resources, this additional tailoring was not possible for this study. Future research could investigate the impact of providing participants with a tailored advice pack, which could include a printout of the advice viewed on screen and their action plan.

Though, the current study was mainly limited by the sample recruited. From the mean age of the sample and large number of participants reporting unsteadiness and rating themselves as having balance problems, it was evident that the sample obtained was different than intended. The website was designed to be targeted to fitter adults aged 60-75, however, the sample obtained was frailer and older than expected. The discrepancy in the intended and obtained sample might stem from recruiting participants through health professionals on RioMed and Help the Aged's email distribution list. The health professionals in receipt of the email advertising the balance training website would have referred older adults to the website, and the older adults in contact with these health professionals may be frailer and older than the intended sample. Also, the website was advertised on Help the Aged's website under two of their falls prevention information sections. This was a surprising decision made by Help the Aged, as they could have posted the information under their exercise information section, and because they recently published a report entitled "Don't mention the f-word!", advising practitioners that when they communicate falls prevention messages to older people they should not mention 'falls' (Yardley & Todd, 2005a). The older and frailer sample obtained had two implications for this study.

The older and frailer sample skewed the results of the balance training activity selections. The sample may have skewed the results shown in Table 15, of the frequencies of types of recommended activities chosen, as this was skewed to home-based balance training. However, it is more evident that the sample skewed the results presented in Tables 16 and 17. Table 16 presented the main balance training activities selected, and three of the top four of these were the activities available to the group in the balance category of having some problems. Table 17 presented the extra balance training activities selected, and the top seven activities were available to those reporting having some problems. In addition, of the extra activities selected, the four most frequently selected activities included three activities that were only available to the reporting having some balance problems: home hazard reduction, housework, and gardening. Thus, a sample of younger and fitter older adults may well have led to different results for the main and extra activities selected by participants. However, even though the sample obtained was older and frailer than expected, the statistical analyses found no significant interactions between tailoring and age or health conditions known to increase the risk of falls. Thus, tailoring the advice led to more positive responses to the advice across differences in age and health conditions known to increase the risk of falls.

The other implication of recruiting a sample that was older and frailer than intended is that it is unknown how effective tailoring balance training advice will be with younger and fitter older people. As found in Chapter 4, younger and fitter older people will be able to perform a wider range of activities, and therefore it is likely that tailoring among younger and fitter older adults will be more effective, as there will be a greater depth of tailoring available. However, this group may also perceive less need to perform balance training.

5.4.3 Future Research

Further research could include a measure of all of the sample's current activity. This study only made this measure available to the participants who self-rated their balance as good, and mistakenly assumed that those who self-rated their balance as either quite good or as having some balance problems would already realise that they were not sufficiently active to improve their balance. Further studies could use a quiz to provide tailored feedback to all participants on their current level of activity.

5.4.4 Conclusion

This study aimed to quantitatively assess the efficacy of the tailored balance training advice, by comparing its effect with a generic comparison on attitudes towards the advice, and beliefs and intention towards undertaking balance training. The tailored version of the website was found to lead to significantly higher reports from participants than the generic version, of personal relevance, and self-efficacy and intention to undertake balance training. In addition, the participants reported greater self-efficacy to undertake balance training when they had completed an action plan. This suggested the tailoring of balance training was effective, even with an older and frailer sample than the website was designed for.

CHAPTER SIX
HEALTH AND SOCIAL CARE PROVIDERS' VIEWS AND USE OF THE TAILORED BALANCE TRAINING WEBSITE

6.1 Aims of this Chapter

As outlined in Chapter 4, the *acceptability* of balance training advice requires as much research attention as its *efficacy* in motivating older adults to adopt balance training. The previous two chapters reported studies that investigated the usability and acceptability of the balance training website among older people (Chapter 4), and tested the efficacy of the tailored balance training advice compared to a generic version (Chapter 5). To extend this research, this chapter describes two studies that explored health and social care providers' views and use of the balance training website. The two studies reported in this chapter were conducted because the quantitative study reported in the previous chapter recruited 280 older people, the majority of whom were believed to have been referred to the balance training website by health and social care providers. Thus, health and social care providers working with older people may be an important means of promoting the balance training website.

These studies were conducted in the context of the literature investigating the impact of health and social care providers' views on older people's uptake of health behaviours, and health and social care providers' views related to falls prevention. A selected review of this literature is presented before presenting the two separate method, results, and discussion sections of the current studies, concluding with a general discussion.

6.2 The Impact of the Health and Social Care Provider

The health and social care provider can play an important role in motivating people to adopt health behaviours (if they have a health and social care provider). The health and social care provider's behaviour, in particular their communication style, has a direct impact on a patient's uptake of health behaviours (DiMatteo et al., 1993), and their attitudes towards treatment efficacy can significantly predict the health of their patients (Weinberger, Cohen, & Mazzuca, 1984).

Ageism amongst health and social care providers has received much research attention, with concern that this reduces the healthcare older people receive. For example, an observation study found that general practitioners provide less counselling, health education, and prevention advice to older people (Callahan et al., 2000). A similar finding has also been reported from an American study (Schonberg, Marcantonio, & Leveille, 2007). Ageism may stem from the belief that older people are more resistant to change (Melillo, Houde, Williamson, & Futrell, 2000). Health and social care providers may also be susceptible to the false belief that most older people are ill and infirm, because they rarely come into contact with fit and healthy older people (Biggs, 1993; Greene, Adelman, Charon, & Hoffman, 1986; Lookinland & Anson, 1995). Ageism has been believed to be rife within the field of nursing, however, more recent studies challenge this notion. Nurses and health visitors have reported that they are inhibited in providing the effective healthcare they wish to deliver, as working conditions are too restrictive to treat older people as individuals (Pursey & Luker, 1995). In addition, student nurses claim that they avoid working with older people not because of ageist views, but because that work is less appealing than other more challenging specialisms (Herdman, 2002).

Perhaps the literature on ageism overlaps the literature on the gap between evidence-based recommendations and everyday healthcare practice (Armstrong, Waters, Roberts, Oliver, & Popay, 2006; Coulter, 1996; Davis & Taylor-Vaisey, 1997), because academic recommendations are not necessarily easily implemented in practice (Sabir et al., 2006). Indeed, it has been reported that falls and mobility problems in older people may only be attended to 34% of the time (Wenger et al., 2003), and that adherence to evidence-based falls prevention practice can be as low as 42% after an education intervention (Colón-Emeric et al., 2006). A qualitative study with general practitioners identified several barriers that inhibited them from using falls risk assessments with older patients (Chou, Tinetti, King, Irwin, & Fortinsky, 2006). Besides low awareness of falls risk and competing morbidities taking the general practitioner's priority, logistical factors such as lack of transport and patient underreporting of fall incidences inhibited implementation of the assessments.

Only one published study was identified that has evaluated health and social care providers' views towards a falls prevention website. Before this study is reviewed, two studies are summarised that concern health and social care providers' views that will influence their attitudes towards promoting falls prevention advice, and one study of health and social care providers' views of kiosk-based falls prevention advice for older people.

Thomas (1997) conducted a qualitative study seeking the views of general practice nurses. Although the nurses stated that falls are not given the attention they deserve, the nurses reported that they were principally concerned with the medical causes and consequences of falls, and therefore neglected the psychosocial factors. They believed that falls are inevitable, and that a fall signalled that the individual is becoming more dependent: "[it] marks the beginning of the end" (p. 155). These views are not conducive for nurses to advise older people to take up balance training to prevent future falls, as balance training is inconsistent with the view that falls are inevitable and that falls signal dependence on others (health and social care providers in particular).

Ballinger and Payne (2000) interviewed occupational therapists and physiotherapists for their views towards older people's risk of falls. These therapists believed that falls are predictable and preventable, but emphasised that older people need protecting from falls by therapists, and viewed older people as at risk of falling. Thus, although these therapists believed falls are preventable, they also had views that were unlikely to be in agreement with promoting balance training to older people, because balance training would be likely viewed as unsafe for their patients.

Kiosk-based falls prevention advice has been evaluated by health and social care providers (Wilmes et al., 2004). Kiosks provide information using a computer with a touch-screen. The health and social care providers believed that the kiosk would not be used much by older people because older people are less confident with using information technology. They predicted the kiosk would instead be used by older people's carers and relatives.

As described in Chapter 2, in the Netherlands, Alpay and Ezendam et al. have developed online interactive falls prevention advice (Alpay et al., 2004; Ezendam et al., 2005). They evaluated the original version of their website in part by inviting five health and social care providers (nurse, physician, and policy makers) to undertake four problem-solving scenarios, and provide feedback on the website. The healthcare professionals reported that the website was good and provided an important facility for older people, but reported poor matches between their queries and the website's answers, and a third of all the participants (older adults, carers, and health and social care providers) were unable to find a scenario they could identify with (Ezendam et al., 2005). Thus, this study suggested that the health and social care providers recruited were generally positive about the idea of a tailored falls prevention website, although the tailoring could be improved. If some health and social care providers are positive about introducing falls prevention advice to older people online, then they may well also be positive about the website designed for this research.

6.2.1 Aims of the Current Studies

The two current studies sought to obtain the views of health and social care providers as to the acceptability of the balance training website described in Chapter 3, to provide data to help improve the website to make it more useful to older people and health and social care providers, and explore how health and social care providers may promote the balance training website. A mixed methods approach was used, adopting both quantitative and qualitative methods (see Chapter 1). The quantitative data would provide the breadth of views across a larger sample, and the qualitative data would provide in-depth insights into the views of the health and social care providers. The studies had two aims: 1) to obtain health and social care providers' views concerning the quality and usefulness of the website advice for older people (directly or indirectly through health and social care providers); and 2) to obtain health and social care providers' explanations for how they have used the website with older people. This chapter will present separately the method, results, and discussion sections of the two studies, and then conclude with a general discussion.

6.3 Study 1

6.3.1 Method

As the health and social care providers across the UK in the previous study were to be re-contacted, data collection methods were required that could be used with participants across the UK. Data collection comprised two stages: first, an online questionnaire, and second, telephone interviews.

6.3.1.1 Online Questionnaire

Design / Procedure. The first stage of data collection was the publication of a questionnaire on the world-wide web at http://www.psychology.soton.ac.uk/olq/srn103/ (now no longer available). The questionnaire served two purposes. First, it quantitatively captured views of health and social care providers towards the balance training website described in Chapter 3. Second, it provided the sampling frame from which purposive sampling (Robson, 1993) was to be used for the telephone interviews.

The online questionnaire began with an introduction, including an information sheet, in order to recruit ethically. It was interpreted that users consented to participate in the study if they proceeded to complete the questionnaire. The questionnaire then asked the participant to report how they heard about the website by selecting one of four options: email, another website, word of mouth, or other. In addition, the participant could specify which organisation informed them of the website. The next question asked participants to report how much of the website they viewed by selecting one of five options: didn't look at it, first page only, a few pages, most of it, or all of it. The next question asked participants to report which version of the advice they viewed by selecting one of five options: tailored, generic, both, did not look at the advice, or cannot remember. The participants' views of the website were then assessed using five questions, which are presented in Table 18.

Table 18. Online Questionnaire Items to assess Views and Use of the Balance Training Website

Item
1. The website's recommended activities seemed suitable for older people
2. The website's recommended activities will improve older people's balance if they carry them out
3. Older people will be able to carry out the website's recommended activities
4. How many people did you recommend the website to?
5. If you recommended the website to anyone, how did the majority of people react to your suggestion?

The online questionnaire was interactive, in that it only presented rating scales for the version of the advice that the participant viewed. Thus, if the participant selected that they had accessed the tailored version of the advice, only the response options in relation to this version were presented. If the participant selected that they did not look at either versions or could not remember which version of the advice they accessed, then they were not presented the five questions concerning their views of the website.

The first three questions concerned the participants' overall impression of the website, and were measured on a six-point scale from 1 = agree strongly to 6 = disagree strongly. These questions were used in the quantitative study of older people's views of the website reported in the previous chapter. The fourth question concerned the participants' recommendations of the website to others, and was measured on a four-point scale: 1 = no one, 2 = one to three people, 3 = four to nine people, and 4 = ten or more people. Participants were asked to indicate separately how many older people and work colleagues they referred to the website. The fifth question concerned the perceived success of the participants' recommendations of the website to others and was measured on a three-point scale: 1 = they said they would not look at it, 2 = they said they might look at it, and 3 = they said they would look at it. This final question was interactive and distinguished between older people and health and social care providers.

The questionnaire then collected the following demographic details: age, gender, and optionally, the participant's profession, and city and country of residence. The questionnaire then invited participants to type any additional comments regarding the website. The questionnaire concluded with a submit button that sent the participant's data to a database to be accessed by the researcher. The online questionnaire was programmed so that if a participant did not complete a question, they were directed to answer it before they were able to submit their questionnaire. On clicking the submit button, the participant was presented with a debrief page that advised them of the purpose of the study, and contact details of the researcher and the Ethics Committee of the School of Psychology, University of Southampton.

Participants. Before recruitment commenced, ethical approval for both the online questionnaire and the telephone interviews were obtained from the School of Psychology, University of Southampton. In addition, approval of the security measures to protect the data obtained from the online questionnaire was obtained from the

Information and Systems Security Co-ordinator of the University of Southampton. Participants were recruited over a period of eight weeks (05/04/2006 to 01/06/2006). Recruitment entailed re-contacting the health and social care providers who were contacted in the first quantitative study (see previous chapter), emailing the same two distribution lists previously used (see Appendix I for recruitment email): one from Help the Aged, and one from RioMed. Together, the email distribution lists comprised over 4,500 health care professionals who were working with older people within the NHS or freelance, plus members from organisations with an interest in falls and health. The email advertising the study was sent to RioMed's distribution list on the 5th April 2006, and to Help the Aged's distribution list on the 28th April 2006, on their bulletin that is distributed every two months. A reminder of the advertisement was sent on RioMed's email distribution list on the 17th May 2006.

As the online questionnaire was accessible on the world-wide web, participants accessed the online questionnaire at their desired time and location where they had Internet access. Participants' data were automatically recorded onto a Microsoft Office Excel 2003 spreadsheet, which was available online to the researcher and password-protected. The data were analysed using SPSS 14.0 for Windows, and the web logs were analysed using Web Log Explorer Professional Edition 2.84. One participant requested a summary of the results of the study, and so a copy of the abstract was emailed to the participant upon completion.

6.3.1.2 Telephone Interviews

Design. The second stage of data collection entailed one-to-one telephone interviews to obtain further information. The interviews were conducted by phone, as the health and social care providers were located across the UK. The interviews were kept brief to not impinge upon the health and social care providers' time, and so telephone interviews were cost effective.

Telephone interviews have advantages over face-to-face interviews, in that they reduce the effect of the interviewer on the interviewee's responses and gather data more quickly (Shuy, 2001). However, telephone interviews are limited relative to face-to-face interviews (Herzog & Rodgers, 1988; Herzog, Rodgers, & Kulka, 1983; Shuy, 2001), in that telephone interviews lend themselves to question-answer dialogues (Shuy, 2001). In contrast, face-to-face interviews are characterised by a higher frequency of small talk, jokes, and the ability to communicate non-verbally that leads to more thoughtful and accurate responses to questions, more open-ended answers, more power to the interviewee in the dyad to govern the conversation, and more accurate interviewing, as face-to-face interviews are less demanding for the interviewer (Shuy, 2001). Thus, face-to-face interviews will generate richer data, however, if these are not practical, telephone interviews can also elicit useful data.

The interviews were semi-structured (Wilkinson et al., 2004) (see Appendix J for the interview schedule including planned prompts), and used five questions that are presented in Table 19. The third question asked the participant to suggest health and social care providers who may be able to use the website with older people, in order to identify the health and social care providers who would be most able to promote the website to older people. This question was asked to assist with recruitment for the final study of this research (reported in the next chapter), and so the results for this question are not presented.

Table 19. Semi-structured Questions for the Telephone Interviews

Question
1. What was your initial response to hearing about the website, "balancetraining.org.uk"?
2. *A: If referred older people to the website:* Please tell me how you talked to older people about the website.
2. *B: If did not refer older people to the website:* Please tell me what your reservations were about talking to older people about the website.
3. What health and social care providers would be able to use the website with older people?
4. Is there anything about the website that could be improved?
5. Is there anything else you would like to say about the website that was not covered in the previous questions?

Participants. Participants were recruited over a period of five weeks (18/04/2006 to 26/05/2006). At the end of the online questionnaire, participants consented to participate in the telephone interview by providing their name, contact details, and times that they would be available for interview. The researcher then emailed the participants to arrange a convenient time for the interview (see Appendix K), and attached the consent form explaining the requirements of the interview (see telephone interview schedule, Appendix J). Participants who provided their email address to take part in a telephone interview but had not responded to the researcher's email within two weeks were sent another email to encourage participation.

A heterogeneous sample of views of the website was desired, in order to receive both positive and negative feedback on the website, and to learn from the different experiences of participants, i.e. those that successfully or unsuccessfully referred older people to the website, and those that did not refer older people to the website. To this end, the telephone interviews were intended to be recruited using purposive sampling. However, the online questionnaire had a low response rate, and so all the participants that provided their details to be contacted for a telephone interview were contacted. Thus, convenience sampling was used for the telephone interviews (Robson, 1993).

Procedure. The researcher telephoned from a small quiet room at the School of Psychology, University of Southampton, and recorded the interviews using a telephone recording connector and audiotape recorder. At the beginning of the telephone interview, the researcher checked that the participant had understood the consent form attached to the researcher's previous email and whether they had any questions. The researcher then proceeded by recording the interview and asking the questions on the schedule. Once the interview had finished, the researcher stopped the recording and read aloud to the participant the debrief form (see telephone interview schedule, Appendix J). The interview data was secured in a locked filing cabinet. Once the audio-tapes were transcribed verbatim and the analysis was complete, the audiotapes were destroyed to protect the identity of the participants. The transcriptions of the audiotapes omitted any details deemed as identifying characteristics of the participants or anyone else mentioned.

Analysis. Each interview was transcribed into a computer Word document and split into headings according to each interview question. The transcript excerpts were then cut-and-pasted into one Word document, so that all the transcript excerpts relating to each interview question were collated together in one Word document. The transcripts were then coded (or themed) using thematic analysis (Joffe & Yardley, 2004). Thematic analysis was used to obtain a summary of the recurring relevant themes across the participants. Thematic analysis was appropriate to capture participants' views concerning the acceptability of the website, as content analysis would have limited the depth of analysis, and a more in-depth analysis, e.g. into the interconnections between meanings in participants' narratives, was not necessary for this study (Joffe & Yardley, 2004). The transcripts were analysed using each meaningful phrase as the coding unit (the point at which each code begins and ends) (Joffe & Yardley, 2004), with the length of the meaningful phrases ranging from a few words to several lines. The meaningful phrases were analysed using codes that were exclusive (the data can only fall under one code) and manifest (only the explicit meaning of comments were coded). The codes were developed using inductive coding (codes created from the data during analysis) (Joffe & Yardley, 2004), and were labelled with a brief summary of the participant's comment to keep the coding as concrete as possible.

The analysis underwent the same three stages used in the previous study with older people (see Chapter 4): First, all the data was coded; second, the codes were filtered to only retain the codes that were both relevant and recurring; and third, the coding frame (the total set of codes) was summarised. The first stage of the analysis entailed reading through the transcripts and labelling each meaningful phrase. Any comments that were similar were identically labelled. This initial coding identified 49 codes across the five questions. The second stage entailed filtering through the codes to only retain those that were both relevant and recurring. Codes were considered relevant if they concerned the website and were informative, i.e. non-descriptive comments such as "the website was good" were excluded from the analysis. Codes were only considered recurring and included in the analysis if they were identified in more than one participant's transcript. The previous stage of analysis identified 38 (78%) codes that were removed at this stage. The third stage entailed summarising the coding frame of the 11 codes identified in the analysis. For each code, this entailed creating a coding manual (a description of each code, located in Appendix L), and listing the code names. The list of codes for each theme was then tabulated, and the code names were amended for clarification. These tabulated summaries were used for presenting the results of this study.

The additional free-text comments provided by participants at the end of the online questionnaire were then used in conjunction with the codes identified from the analysis of the telephone interviews. This was because the data from the comments on the online questionnaire were not sufficient to identify any codes in isolation from the telephone interview data. The data from the comments on the online questionnaires were not used to identify any new codes, but to provide additional support for the codes already identified in the telephone interviews.

6.3.2 Results

First, the results from the online questionnaire are presented, and second, the themes identified from the analysis of the telephone interviews. As the additional free-text comments provided by participants at the end of the online questionnaire were analysed in conjunction with the analysis of the telephone interviews, the online questionnaire results concerned quantitative data, and the telephone interview results concerned qualitative data.

6.3.2.1 Online Questionnaire

The web logs for the online questionnaire were analysed for the period of 05/04/2006 to 01/06/2006, with six entries from Southampton removed, as they were identified as the researcher or a colleague within the University of Southampton. From the approximately 4,500 addresses that were sent the recruitment email, 39 users visited the questionnaire, with an estimated response rate of 0.87%. The location from where the visitors accessed the questionnaire was not available for nine participants. Of the 30 participants for whom this information was available, participants accessed the online questionnaire from three countries: the UK ($n = 25$), USA ($n = 3$), and Ireland ($n = 2$). The time that it took to complete the questionnaire was available for eight participants. The participants completed the online questionnaire in 1.52 to 8.28 minutes ($M = 3.48$ minutes).

Of the 39 users that visited the questionnaire, 13 completed the questionnaire and accessed the debrief page, with a completion rate of 33% (overall response rate of 0.29%). Participants were aged 34 to 59 years ($M = 47.15$, $SD = 7.70$), and the majority were women (10). One participant accessed the questionnaire from Ireland, and the remaining participants accessed the website from across England. The participants represented a range of professions, including: two doctors, two nurses, two falls prevention coordinators, a chair of a National Health Service Trust, geriatrician, consultant physician, clinical specialist physiotherapist, physiotherapist for older people, and a specialist nurse in falls prevention (one participant did not complete this field).

The majority of participants heard about the balance training website from an email (n = 10), with the remaining participants hearing about it from a website (n = 1), word of mouth (n = 1), or other (n = 1). Those that had heard about the balance training website from an email, did so from: Help the Aged (n = 2), RioMed (n = 2), a doctor (n = 2), or a colleague in a Primary Care Trust (n = 1). Two participants incorrectly reported receiving an email from 'balance training' or the University of Southampton. One participant reported hearing about the website through a website dedicated to a product developed by RioMed (Cellma). One participant reported hearing about the website through word of mouth from a colleague in the NHS. The participant who reported they had heard about the website through 'other' means, reported hearing about it from their manager.

Nine participants had either viewed all (n = 6) or most (n = 3) of the website, and the remainder only viewed a few pages (n = 2) or just the first page (n = 2). Four participants viewed both the tailored and generic versions of the website, five viewed the tailored version only, and two viewed the generic version only. One participant reported that they did not look at it, and one participant reported that they couldn't remember which version they viewed, and so these two participants were prevented from inputting answers to the five questions on the online questionnaire regarding the balance training website. Thus, the analyses below were conducted on a sample of 11 participants.

Rating. A participant that viewed the tailored advice did not complete this section - an oversight in the programming allowed this to happen - and so 10 participants rated the advice that they viewed. As shown in Table 20, there was a ceiling effect with the majority of participants agreeing or strongly agreeing that the website advice was suitable for older people, that the recommended activities if performed would help older people improve their balance, and that older people would be able to perform the recommended activities.

Table 20. Mean (SD) ratings of Beliefs as a function of Advice Condition

Item[a]	Tailored (n = 8)	Generic (n = 6)	Total (N = 14)[b]
Recommended activities are suitable for older people	1.88 (0.83)	1.83 (0.75)	1.86 (0.79)
Recommended activities will improve older people's balance if performed	2.00 (0.76)	1.83 (0.75)	1.92 (0.76)
Older people will be able to perform the recommended activities	2.25 (1.04)	2.50 (1.38)	2.38 (1.21)

[a]Measured on a six-point scale (1 = agree strongly to 6 = disagree strongly).

[b]10 participants provided 14 ratings (4 tailored, 2 generic, and 4 both versions).

Recommendation to others. As shown in Table 21, only three participants recommended the website to older people, one of whom recommended it to ten or more older people. The participants were more likely to recommend the website to work colleagues, as seven participants recommended the website to colleagues, one of whom recommended it to ten or more.

Table 21. Frequencies of People the Website was Recommended to

Number of people	Older People	Work Colleagues
None	*8*	*4*
1-3	2	5
4-9	0	1
10+	1	1
Total	11	11

Response to their recommendation. The participants rated the responses of the older people and work colleagues to whom they recommended the website. As shown in Table 22, five participants reported that their work colleagues responded that they might or will access the website, whereas only two participants reported that the older people might access the website. As only two thirds of the participants answered this question (7/11), it is likely that the participants were either reluctant to recommend the website or were selective in who they recommended the website to.

Table 22. Frequencies of Responses to the participants' Recommendations to Access the Website (N = 7)

Response	Older People	Work Colleagues
Would not access it	0	0
Might access it	2	3
Would access it	0	2

6.3.2.2 Telephone Interviews

Of the 13 participants who completed the online questionnaire, three participants did not provide their contact details to participate in a telephone interview, one participant only provided an email address that was incorrect (the researcher's email was returned) and so was unable to be contacted, and one participant did not reply to the invitation to take part in an interview. The response rate of the eight participants who completed the questionnaire and took part in an interview was 62%.

The participants were aged 37 to 59 years (M = 48.63, SD = 8.11), and the majority were women (n= 6). One participant was residing in Ireland, and the remaining seven participants were residing in various parts of England. The participants represented a range of professions, including: two doctors, two falls prevention coordinators, a clinical specialist physiotherapist, consultant physician, physiotherapist for older people, and a specialist nurse in falls.

The thematic analysis of the telephone interviews identified 11 sub-themes under four themes, which are presented in Table 23.

Table 23. Themes and Sub-themes identified from the Telephone Interviews (N = 8)

Theme	Sub-theme
1. Interest in the website	
	Accessed the website because it is my job
	Accessed the website for my own education
2. Usability of the website	
	Easy to use
	Easy to read
	Attractive presentation
3. Aim of the website	
	Good idea
	More older people are using the Internet
	Will reach young but not old older people
	My patients do not have computers
	Suggest using an advice sheet or booklet
4. Content of the website	
	Wanted a tailored programme of exercises

1. Interest in the website. Some participants stated that they accessed the website because it was part of their professional role to be interested in resources to help older people prevent falls. Alternatively, a couple of participants stated that they accessed the website to gain more information about falls prevention. For the first reason, health and social care providers may have been interested in the website in order to find a resource to refer older people to, whereas the second reason identified a primary interest to further the health and social care providers' own understanding of falls prevention.

2. Usability of the website. Some participants commented that the website was easy to use and the webpages flowed logically. A couple of participants commented that the advice was easy to read, in that the language was accessible. Some participants commented that the website was attractively presented, in that they found the layout and graphics pleasant to look at, which helped sustain their interest in viewing the website's advice.

3. Aim of the website. A few participants commented that the balance training website was a good idea, as it was a positive way to encourage balance training and reduce falls in older people. Some participants commented that the number of older people using the Internet is increasing, although they did acknowledge that it is still currently the minority. A few participants commented that the website will only be effective in reaching the younger and fitter older adults aged 50 and above, and will not reach older and frailer older people who are not computer literate. Indeed, a couple of participants commented that the patients they come into contact with do not have access to a computer, and so they would not recommend the website to them. Consequently, a couple of participants made a suggestion that paper-based versions of the website advice could be distributed to communicate to those who are not computer literate. They suggested printing off an advice sheet containing exercises for the older person to stick on their fridge to remind them to do everyday, or simply reproducing the advice within the website in booklet form, and distributing them to patients when attending a falls clinic.

4. Content of the website. A few participants were disappointed with the advice, because it only provided users with ideas of activities that they could do and links to other organisations to obtain further information or to find local classes. They were expecting the website to provide the user with a set of tailored balance training exercises that they could print off and follow, which they felt would have been more useful to an older person.

6.3.3 Discussion

6.3.3.1 Online Questionnaire

The online questionnaire had a disappointingly low response and completion rate: only 39 health and social care providers accessed the questionnaire, of which 13 completed it. This was surprising as the questionnaire was simple to use, interactive, and took on average under four minutes to complete. A disadvantage of the questionnaire was that it required participants to recall their use of a website and to indicate whether they promoted it. It may have been up to 10 months prior to this study that the health and social care providers accessed the website, and they may have disliked the website and therefore not recommended it to anyone. A lack of recall of originally accessing the website, coupled with a potential social desirability to state they recommended the website to people when they did not, may have dissuaded health and social care providers from participating in this study. The results of the online questionnaire therefore are to be considered with caution, as the sample obtained may reflect views of a minority that are not representative of the health and social care providers originally contacted for the first quantitative study, nor health and social care providers across the UK.

The results of the online questionnaire suggested that the health and social care providers heard about the website predominantly by email. This was expected due to the method of recruitment used in the first quantitative study. The website's recommended activities were rated highly in terms of suitability for older people, that they will improve older people's balance if performed, and that older people will be able to perform the recommended activities. Thus, these ratings suggested that the health and social care providers found the balance training website's advice to be highly acceptable.

An unexpected finding was that the majority of participants did not refer older people to the balance training website. Indeed, the previous quantitative study reported that the majority of visitors accessed the website from the USA, whereas the health and social care providers who were emailed were dwelling in the UK. Thus, for the previous study, it is uncertain whether participants were referred to the website by health and social care providers. The majority of older people may have found the website themselves, or were referred to the website from another source, e.g. Help the Aged's website, or a friend or relative. This finding may reflect that the health and social care providers did not feel that the balance training website was appropriate for the older people they come into contact with, because they are older, frailer, and less likely to be computer literate. This notion is supported by the finding that the participants were twice as likely to recommend the website to work colleagues.

In sum, the participants rated the balance training website highly for its suitability, outcome expectancy, and self-efficacy for older people. However, they were more likely to recommend the website to work colleagues than to older people. Due to the small sample size, the results of this study are inconclusive as to whether health and social care providers referred older people to the balance training website in the first quantitative study.

6.3.3.2 Telephone Interviews

As the online questionnaire did not yield many participants, consequently, the telephone interviews also did not yield many participants. A larger sample of participants would have provided greater depth to the data, and improved the quality of the analysis, by either identifying more themes or elucidating more information about the themes already identified. The analysis of the telephone interviews identified 11 sub-themes organised under four themes.

The first theme concerned the participants' *interest in the website.* Some participants accessed the website because it was their job to be interested, or to advance their own education of falls prevention. This was not surprising, as the results from the online questionnaire suggested that the health and social care providers did not refer many older people to the website.

The second theme concerned the perceived *usability of the website.* Some participants commented that the website was easy to use, easy to follow, and attractively presented. The participants would be expected to be competent users of computers and easily cope with the demands of the website. In turn, they would also perhaps be more likely to be critical of the presentation of the website, due to their familiarity with websites and higher expectations of presentation than less experienced computer users. The positive comments regarding usability are encouraging, as the usability of the website is critical to whether the public will access the website advice (Nielsen, 2000).

The third theme concerned the *aim of the website.* Some participants noted that more and more older people are becoming computer literate. This comment is correct, as the number of older adults using the Internet is increasing in both the UK and the USA (Madden, 2006; National Statistics, 2006b). Some participants astutely commented that the website will reach younger and fitter but not older and frailer older people. This comment was posed as a limitation, as the participants did not come into contact with older people who would be able to access the Internet. Health and social care providers have similarly reported scepticism over whether older people will use a kiosk that provides falls prevention advice and a computer providing information on renal replacement therapy, because they perceived that older people were not confident with information technology (Firby, Luker, & Caress, 1991; Wilmes et al., 2004). Consequently, some participants in the current study suggested making use of paper-based formats to communicate the advice to older people. The website is intended to reach younger and fitter older adults, so rather than a limitation, the participants' comments were consistent with the targeting strategy employed. The suggestion of promoting balance training through leaflets at a falls clinic is not consistent with the aim of preventing falls, but is more consistent with rehabilitation and prevention of further falls. Although the use of paper-based formats to communicate the tailored advice are possible, and have been the predominant format used in tailored advice interventions, these were beyond the scope of this research. Future research could investigate the acceptability and efficacy of paper-based formats to communicate tailored balance training advice, particularly among frailer older older adults.

The fourth theme concerned the *content of the website* advice. Some participants commented that they wanted to receive a tailored exercise programme to be able to give to an older person. As detailed in Chapter 3, the balance training website aimed to motivate older people to undertake balance training by offering suggestions of activities that they might enjoy carrying out. The older adult is then encouraged to choose an activity they would like to undertake at a time that is convenient for them. This approach was based on the literature in support of lifestyle exercise. Although the website does not promote balance training in a prescriptive manner, for those participants who selected that they would like to perform balance training activities within their home, they could be offered a set of tailored balance training activities. The insertion of tailored activity programmes is beyond the scope of this research. Future research could compare the use of more prescriptive approaches to balance training advice with the approach used in the current balance training website.

As with the online questionnaire, those that participated in the telephone interviews may have had to recall their use of the website up to 10 months before this study. This not only may have been a disincentive to participate in the study, but also subjected comments made in the interviews to memory bias. From the interviewees' comments it was apparent that some participants accessed the balance training website again to refresh their memory, and so were reporting on their initial experience of the website and more recent experience. These biases may have been exacerbated by the lack of rapport generated between the interviewer and interviewee because the interviews were conducted by telephone.

In sum, the analysis of the telephone interviews was restricted by the limited data collected, may have been subject to biases such as memory and interviewer bias, and may not be representative of health and social care workers working with older people in the UK. Caution thus must be exercised in interpreting the results of this study. The results of the analysis were: that the participants did not explicitly report an interest in the balance training website to find a resource for older people, the participants were positive about the usability of the website, they felt the website would reach younger and fitter participants, but they desired other formats for reaching those who are older and are not computer literate, and they wanted the advice to include a tailored exercise programme.

6.4 Study 2

A second study was conducted to investigate health and social care providers' views of the balance training website described in Chapter 3. A second study was conducted because Study 1 was limited in two ways. First, Study 1 received a very low response and completion rate, limiting both the generalisability of the quantitative data and the depth of the qualitative data. A second study could recruit more participants to obtain richer data. Second, Study 1 recruited health and social care providers who did not refer many older people to the balance training website. These health and social care providers may have been working principally with frail older people at risk of falling. A second study could recruit health and social care providers who come into contact with older people of a range of ages and mobility, and ascertain whether these health and social care providers would also not refer older people to the balance training website.

6.4.1 Method

Design. Health and social care providers working locally in Southampton were required as participants, so that the researcher could provide technical support to the participant whilst accessing the website, and only present them the tailored version of the advice (see Chapter 4 for the benefits of only presenting the tailored version of the advice to participants). Also, as described above, face-to-face interviews have advantages over telephone interviews in that they are conducive for conversational dialogues, which generate richer data. However, face-to-face interviews are not always practical, e.g.

because participants are not dwelling locally, or because of insufficient time and funds (Shuy, 2001).

The design of the face-to-face interviews was an amalgamation of the format used for the face-to-face interviews conducted with older people reported in Chapter 4, and the telephone interviews of Study 1 above. Participants accessed and interacted with the balance training website, and then took part in a semi-structured interview (Wilkinson et al., 2004). The same five questions from the telephone interviews were used, which are presented in Table 24. Each question was supported with a list of prompts in case the participant found difficulty answering the question (see Appendix M for the interview schedule). The first two questions were modified slightly because the interviewees had only just viewed the website for the first time.

Table 24. Questions for the Face-to-Face Semi-structured Interviews

Question
1. What was your initial reaction to the website, "balancetraining.org.uk"?
2. Would you talk to older people about the website?
3. What health and social care providers would be able to use the website with older people?
4. Is there anything about the website that could be improved?
5. Is there anything else you would like to say about the website that wasn't covered in the previous questions?

Participants. The first study reported in this chapter recruited health and social care providers who were primarily clinically trained and hospital-based. A number of the participants did not refer older people to the balance training website, which may be because they were predominantly in contact with frailer and older elderly people. For this second study, it was desirable to recruit a different sample of health and social care providers for comparison; those who provided more informal care and were community-based, and who were in contact with older people representing a range of health, mobility, and independence. Sheltered housing wardens were ideal participants, and could be quickly recruited through the researcher's contacts from a previous study where wardens assisted the researcher in recruiting older people. Whilst sheltered housing wardens are unlikely to have as their residents older people who are very fit and independent, as these older people would predominantly be still living in their homes in the community, their residents can be relatively healthy, active, and independent, whilst others can require a lot of care, be home-bound, and dependent.

Thus, sheltered housing wardens and assistant wardens working for Southampton City Council (SCC) were selected as participants for face-to-face interviews. This chapter will use the term 'warden' to refer to both wardens and assistant wardens. Sheltered housing is the provision of rented flats for adults aged 55 years and above. Sheltered housing is available to all adults aged 55 and above, though priority is given to those with more council housing points, such as those who own less than £75,000 in property (SCC, personal communication, October 9, 2006). Residents have emergency pull cords in their flats that telephones a warden during office hours, or a city-wide care service that is available 24 hours every day of the year (SCC, 2002). The wardens do not provide care for residents, but assist in designing and arranging care packages (e.g. meals on wheels and home carers). SCC sheltered housing was divided into three categories of service: one, two, and two and-a-half (SCC, 2002). Category One Courts were for those who were relatively independent, and each resident (or residents if cohabitating) was visited monthly by the warden. Category Two Courts were for those who were somewhat independent, and each resident was visited weekly by the warden. Category Two-and-a-half Courts were for those who were relatively dependent, and each resident was automatically provided with a high level of care, approximately 24 hours a day, seven days a week.

SCC owned 2,675 flats, divided between 24 sheltered housing courts and attached satellite courts (flats separate to a court but under the care of a warden). One court was a Category Two and-a-half (60 flats), whereas the remaining courts were Category Two (1,437 flats), with attached Category One satellite flats (1,178 flats). Over forty-six wardens were on duty at the courts (C. Daykin, personal communication, July 20, 2006).

Before recruitment commenced, ethical approval was granted from the School of Psychology, University of Southampton. In addition, permission to recruit the sheltered housing wardens was obtained from the area managers of the sheltered housing courts. Sheltered housing wardens working for SCC were deemed to represent a workforce that works with older people from a range of socio-economic backgrounds. This was because the Council owned sheltered housing flats in various parts of the city, and private sheltered housing is more expensive.

Recruitment was conducted over a period of two weeks (13/06/2006 to 29/06/2006). Quota sampling was used (Robson, 1993), in that all 24 courts were contacted to recruit at least one member of staff for the study. The area managers of the sheltered housing courts contacted the wardens informing them of the study and that they were to be contacted by the researcher in the near future. The researcher telephoned the courts, and if the staff were interested in the study, they arranged a mutually convenient time for the interview.

The interviews were conducted at the sheltered housing courts, in the wardens' office or the communal lounge. As the majority of courts did not have computers, the researcher brought a conventional laptop to present the website to the participants. The laptop had a 15" screen, plug-in mouse, used Internet Explorer to access the website that was on the world-wide web. The laptop was connected to the Internet using a 3G datacard and the interviews were audio-recorded.

Procedure. At the interview, the participants completed a consent form (see Appendix N), and then accessed and interacted with the balance training website. The participants were encouraged to input their details into the interactive webpages or the details of an older person, as if they were accessing the website on behalf of the older person. The researcher sat next to the participant and provided assistance in completing the website where necessary. Three participants were not confident in using the laptop to access the website, so the researcher used the mouse and keyboard for them. To proceed to webpage three, the researcher intervened to type in the uniform resource locator (address for this particular webpage) in the address bar. This was because the randomisation to either the generic or tailored advice webpages occured upon selecting to progress to webpage three. Typing in the uniform resource locator skipped this randomisation procedure, and ensured each participant progressed to the tailored webpages. Whilst the participants were completing the website, the researcher observed and made notes of any comments made by the participant relevant to the study. These notes were used to assist with the researcher's prompts in the semi-structured interviews.

Once the participant had completed the website, the researcher began the semi-structured interview following the interview schedule (see Appendix M). After the acceptability questions were posed (see Table 25), the researcher elicited demographic data from the participant, the participants' history of using computers, and length of service as a warden. The researcher then provided the participant with a debrief form (see Appendix O). The interview data was secured and transcribed in the same manner as for the telephone interviews. Further debriefing of the results of the study was provided by the researcher when he visited a staff team meeting and gave a short presentation.

Analysis. The face-to-face interviews were analysed in the same way as performed for the telephone interviews. The analysis underwent three stages: First, all the data was coded; second, the codes were filtered to only retain the codes that were both relevant and recurring; and third, the coding frame was summarised. The first stage of the analysis entailed reading through the transcripts and labelling each meaningful phrase. Any comments that were similar were identically labelled. This initial coding identified 75 codes across the five questions. The second stage entailed filtering through the codes to only retain the codes that were both relevant and recurring. The previous stage of analysis identified 55 (73%) codes that were removed at this stage. The third stage entailed summarising the coding frame of the 20 codes identified in the analysis. For each code, this entailed creating a coding manual (located in Appendix P), and listing the code names. The list of codes for each theme was then tabulated, and the code names were amended for clarification. These tabulated summaries were used for presenting the results of this study.

6.4.2 Results

All 24 courts were contacted for recruitment. Wardens from four courts declined to participate because of: technophobia (n = 1), lack of confidence in computer literacy (n = 1), or inability to devote time to the study, because the court was having building work (n = 1) or staff shortage (n = 1). Thus, 20 courts were represented in the study, with a response rate of 83%. Twenty-six of the 46 wardens participated in the study, representing 56.5% of the Council's workforce.

The 26 participants were aged 21 - 62 years (M = 48.35, SD = 10.85), and were predominantly white (25 white, 1 Asian) women (n = 20). The age participants left education ranged from 14 to 22 years (M = 16.82 years, SD = 2.42), however, nine older participants later returned to education, comprising National Vocational Qualifications (n = 5), a junior apprenticeship, nursing course at college, secretary course, and adult education classes. Participants' computer experience ranged from none (n = 1) to 10 or more years (n = 10) (M = 4.85 years, SD = 4.42). Participants' Internet experience was less, ranging from none (n = 5) to 10 years (n = 1) (M = 2.81 years, SD = 2.78). One participant was a voluntary teacher in information technology at a local college. The participants' experience as a warden ranged from three months to 19 years (M = 8.36 years, SD = 5.72). The wardens worked in Category Two Courts with attached satellite Category One flats, except for one participant who worked in the Category Two and-a-half Court.

With regard to the advice that the participants viewed, due to time restrictions, one participant only viewed the advice as far as webpage seven (where they were asked to select main and extra balance training activities). Thus, this participant only viewed recommended activities to be performed at home, for a person with some balance problems. Another participant was able to access all of the website except for the final debrief page. These participants still took part in an interview, and so their data were included in the analysis.

The participants selected a range of options available on the interactive sections of the website. An even selection was made across the three balance groups of good balance (n = 8), quite good balance (n = 8), and having some balance problems (n = 10). Most participants viewed advice regarding balance training carried out within the home (n = 14), although some participants viewed advice regarding activities in a class (n = 7), outside the home (n = 3), or a combination of these (n = 2). Of the 31 different options available for the participants, 28 (90%) were selected. The three options that were not selected were: the health condition of feeling dizzy most of the time, the main or extra activity of performing sports, and activities to be performed outside the home under the quite good balance category. Coincidentally, the first two options that were not selected were also not selected in the previous qualitative chapter that recruited older people (reported in Chapter 4).

The thematic analysis of the face-to-face interviews identified 20 sub-themes under four themes, which are presented in Table 25.

1. Usability of the website. A number of participants commented that the website was easy to use, in that it was clear how to advance through the website, self-explanatory, and straightforward. Several participants commented that the website format used a layout that was easy to follow. Several participants commented that the website was easy to read, in that it was accessible and it did not contain jargon or complex words. Some participants commented that the option to increase the text size was positive, as some older people would require the font size to be larger to be able to comfortably read the advice.

2. Aim of the website. A minority of participants commented that older people are learning how to use computers. However, the majority of participants commented that most older people are not computer literate. They commented that older people tend to not understand modern technology, can be technophobic, would not be competent or have the patience to go through a website, and are not interested in learning how to use computers.

3. Content of the website. A number of participants commented that the website was interesting and that balance training should be thought about more. Several participants commented that the website was informative and comprehensive. Some participants commented that as long as older people follow the advice, the website will help them improve their balance and meet other older people. Some participants commented that the website helped them, in that they learnt something new, in that it made them more aware of the importance of keeping a healthy balance. A couple of participants commented that the website could promote more gentle activities. Chair-based exercises were consistently suggested, although there were contradicting views regarding yoga. One participant recommended the website place more emphasis on yoga, whereas another participant felt yoga was inappropriate, because yoga entails getting down on the floor and many older people would be unable to rise again.

Table 25. Themes and Sub-themes identified from the Face-to-face Interviews

1. Usability of the website	
	Easy to use
	Layout easy to follow
	Easy to read
	Option to increase the text size is positive
2. Aim of the website	
	Older people are learning how to use computers
	Older people do not use computers
3. Content of the website	
	Interesting
	Informative
	Will help older people
	Helped me
	Could have more gentle activities
4. Promotion of the website	
	Wardens could be promoters
	I do not use computers and so will not promote it
	Would be good to have it for the residents
	Would promote it if I could
	Communal computers could be used for promotion
	I would be willing to sit and go through it with them
	Would recommend it to those with computers
	Would recommend it to those with balance problems
	Would recommend it to those who are active

4. Promotion of the website. Many participants commented that they or their colleagues at other courts could promote the balance training website among older people, although one participant contradicted this view, stating that they would not have time to promote the website. Some participants commented that because they themselves do not use computers, that they would not promote the balance training website, as they are not interested in websites. This comment was not specific to this website, but for all websites. In contrast, several participants were positive about the website, and stated it would be good for their residents to access. Some participants stated that they would promote the balance training website if they could, i.e. if they had a computer with Internet access in their office, or a communal computer for the residents. Indeed, some participants commented that in the future, the sheltered housing courts will have a communal computer available to the residents, and so the residents could access the balance training website from these machines. Several participants commented that they would be willing to sit with their residents who are not computer literate, to help them access the advice on the website. The remaining three themes concerned the type of residents that some participants stated they would recommend the website to: those who own a computer, those who have balance problems, and those who are active, in that they currently go swimming or attend keep-fit classes.

6.4.3 Discussion

Because of the limitations of Study 1, Study 2 was conducted to evaluate the acceptability of the balance training website among sheltered housing wardens. Staff at SCC's sheltered housing courts were invited to access and interact with the website, and then participate in a semi-structured interview. The use of quota sampling was successful with over half of the workforce of Southampton City Council's sheltered housing wardens sampled. Sampling wardens from all of the sheltered housing units also allowed for a maximum range of views as the units were located in different areas of the city. The thematic analysis of the face-to-face interviews identified 20 sub-themes under four themes.

The first theme concerned the *usability of the website*. The participants found the website easy to use, follow, read, and included an option to increase the text size that will be important for enabling some older people to access the website. As noted in the discussion of the telephone interviews, the positive comments regarding usability were encouraging, as the usability of the website is critical as to whether the public will access the website advice (Nielsen, 2000).

The second theme concerned the *aim of the website*. A few participants commented that older people are learning how to use computers, however, the majority commented that older people are not currently using computers. As noted previously, although the majority of older people do not currently use the Internet, the number is growing (Madden, 2006; National Statistics, 2006b). It would be expected that participants commented that older people are not using computers, as sheltered housing residents will be expected to be older and less mobile than those still living in their own homes in the community. As noted in the discussion of the telephone interviews, future research could investigate the acceptability and efficacy of paper-based formats to communicate tailored balance training advice, particularly among frailer older older adults.

The third theme concerned the *content of the website*. The first four sub-themes were positive, in that participants commented that the website was interesting, informative, would help older people, and was of help to themselves. The comments regarding interest and information support the sub-theme above that the website was usable and communicated the advice well. The comments regarding the helpfulness of the website is encouraging, as it suggests it could meet the aim of helping older people improve their balance. As some of the wardens were approaching late middle age (the oldest was 62 years, $M = 48.35$), it was not surprising that some of the participants found the advice useful for them too. The last sub-theme concerning the content of the website was the suggestion that the website include more activities for frailer and older older adults. The participants were in disagreement on whether or not to promote more of yoga, but were in agreement that more chair-based activities could be promoted within the website. A link to chair-based activities is already provided in the advice pack, which can be downloaded on the final page of the website.

The fourth theme concerned the *promotion of the website*. The wardens were predominantly positive about promoting the balance training website themselves. A couple of participants commented that they do not use computers, and therefore would not promote the website. Similarly, nurse and general practitioners have respectively been found to be less likely to promote physical activity if they themselves are not engaged in physical activity or hold less positive attitudes towards exercise (Burns, Camaione, & Chatterton, 2000; Milan, Marcus, Goldstein, & Taylor, 1994). However, the majority of participants commented that wardens could promote the website, or that they would if they had a communal computer, of which some stated this would become available in the future. Some stated that the website would be beneficial for their residents, and that they would be willing to sit with their residents who are not computer literate, so that they could access the advice. This finding was encouraging, as health and social care providers' attitudes can have a major influence upon people's uptake and adherence to health advice (Cable, Meland, Soberg, & Slagsvold, 1999; DiMatteo et al., 1993; Fields, 2003; Pincock, 2003; Yardley, Sharples, Beech, & Lewith, 2001). The positive attitudes of the participants towards the website may help with residents' motivation to access the balance training website, as health and social care providers' attitudes towards interventions can predict patients' adherence to them (Weinberger et al., 1984).

The participants also highlighted three groups of residents that they would particularly promote the website to: those who own a computer, who have balance problems, or are currently active. Residents who own a computer would be computer literate and may even have home Internet access; the website will be of particular importance to residents who have balance problems, and those who are already active will presumably be interested in viewing the website because they are interested in keeping healthy. In addition, younger and fitter older people will be more likely to own a computer and be active, which is the target group for the website.

6.4.3.1 Experience of working with wardens.

From interviewing the wardens for this study, and from previous experience of obtaining their assistance in recruiting sheltered housing residents as participants, it was a particularly positive finding that most of the participants would recommend the website to their residents because of their positive influence on residents. The sheltered housing warden's role appeared very much to be an instigator of activity and interest within the sheltered housing units. The wardens organised weekly activities such as bingo, social events, day trips, hosted a day centre, and invited external speakers. This role helped create a sense of community and vibrancy in the units. This initiative presumably fell under their remit of encouraging the residents to get out of their flats to socialise, to maintain good mental and physical health, and enjoy themselves. The wardens are also well-placed for broadcasting news and organising events because they regularly visited all their residents. Thus, obtaining the views of sheltered housing wardens of the balance training website was important, as wardens could be an important means of encouraging older people in sheltered housing units to access health promotion websites. Further research could investigate the contributions of other community-based staff, such as carers and visiting nurses in promoting balance training to older people.

6.4.3.2 Limitations.

Asking wardens about whether or not they would talk to older people about the website is indicative of their intention to do so, but not necessarily whether they will act on that intention and indeed talk to older people about the balance training website. Further research is required to determine the extent that sheltered housing wardens do promote the website to their residents, and how persuasive their encouragements are. In addition, study 2 was limited by the sample recruited. It is likely that the data would have been enriched by also recruiting staff from private sheltered housing. Staff working in private sheltered housing are likely to serve a different clientele than those that reside in Council owned sheltered housing, and so would have provided a broader range of views towards the website. Time and resources spent on Study 1 limited Study 2 recruitment, and so further research could make use of recruiting staff from different organisations, that may have differences in their ethos towards their residents and what constitutes healthy ageing.

6.5 General Discussion

These two current studies sought to provide data to help improve the website to make it more useful to older people and health and social care providers. The two studies both identified themes concerning the usability, aim, content, and promotion of the website. Whilst both studies found that the balance training website was very usable to the health and social care providers, the remaining three themes warrant discussion.

Aim of the website. The two studies found positive results, in that the participants thought the website was a good idea, that it will reach younger and fitter older adults, and more older people are learning how to use computers. This positive finding is in contrast to previous studies that have identified that health and social care providers can hold views that are inconsistent with the view that older people can undertake balance training to prevent future falls (Ballinger & Payne, 2000; Thomas, 1997). Perhaps it was because the health and social care providers in the current studies acknowledged that the website is aimed at younger and fitter older adults, that they were positive about the appropriateness of the website for these older people, and did not express negative attitudes about falls and older people as identified in previous research. However, the two current studies also found that the participants were concerned that the majority of older people will currently not be reached by the advice as it is delivered online, and so other formats of delivering the advice could be explore at least until more older people are computer literature.

Content of the website. The majority of comments for this theme were positive, about the website being interesting, informative, and helpful. However, there were some comments requesting a tailored programme of exercises and more gentle activities for frailer older older adults.

Promotion of the website. The participants in Study 1 were less likely to refer older people to the website, and they felt the website would not reach older older adults and so they recommended the use of paper-based formats for presenting the advice. However, the wardens in Study 2 showed a willingness to promote the website among their residents. Perhaps this is because the more medical staff in Study 1 did not come into contact with many younger and fitter older people, whereas the sheltered housing wardens who coordinate care came into contact with older people of a range of ages and mobility, and so were more able to promote the website to the intended target audience of younger and fitter older people.

6.5.1 Conclusion

The results from both studies suggested that the balance training website had high acceptability among the health and social care providers. The suggestions to improve the website included the use of a tailored exercise programme and paper-based formats of communicating the advice, until more older people are Internet users. The health and social care providers from the first study were not referring older people to the website, whereas the majority of sheltered housing wardens were willing to promote the website among their residents.

CHAPTER SEVEN
THE EFFICACY OF THE REVISED TAILORED BALANCE TRAINING WEBSITE

7.1 Aims of this Chapter

This chapter presents a study that assessed the efficacy of the revised tailored balance training website compared to a generic version. This final study was a partial replication of the quantitative study reported in Chapter 5. The website was revised based on the feedback received from older people and health and social care providers working with older people, recruited in the previous two qualitative studies (reported in Chapters 4 and 6). The study design was also revised based on the limitations identified in the previous quantitative study. Whilst the revisions to the study design are detailed within the method section, the revisions to the website are detailed before presenting the method, results, and discussion sections.

7.2 Revisions to the Balance Training Website

The new sequence of webpages for both the tailored and generic groups is presented in Figure 20 (see appendix Q for a screen shot of each of the revised webpages). This section describes the revised website in two parts, describing the changes in the content of the website and the measures used to evaluate the effect of tailoring. Minor revisions such as correcting typing and programming errors are not detailed in this chapter. Only changes to the tailored version of the website are presented, as these changes equally applied to the relevant equivalent sections of the generic webpages. A total of 34 revisions were made to the website (16 for both versions, 14 for tailored, and 4 for generic), of which 11 revisions affected the dependent variables recorded.

To enhance recruitment, keywords were added into the programming so that older people using search engines would be more likely to locate the website. Thirty-six keywords were entered into the programming that the older people in the qualitative study reported they would use to search for the website, and that the researcher deemed important. The keywords concerned ageing, education, the researcher's name and affiliated University, dizziness, and balance training.

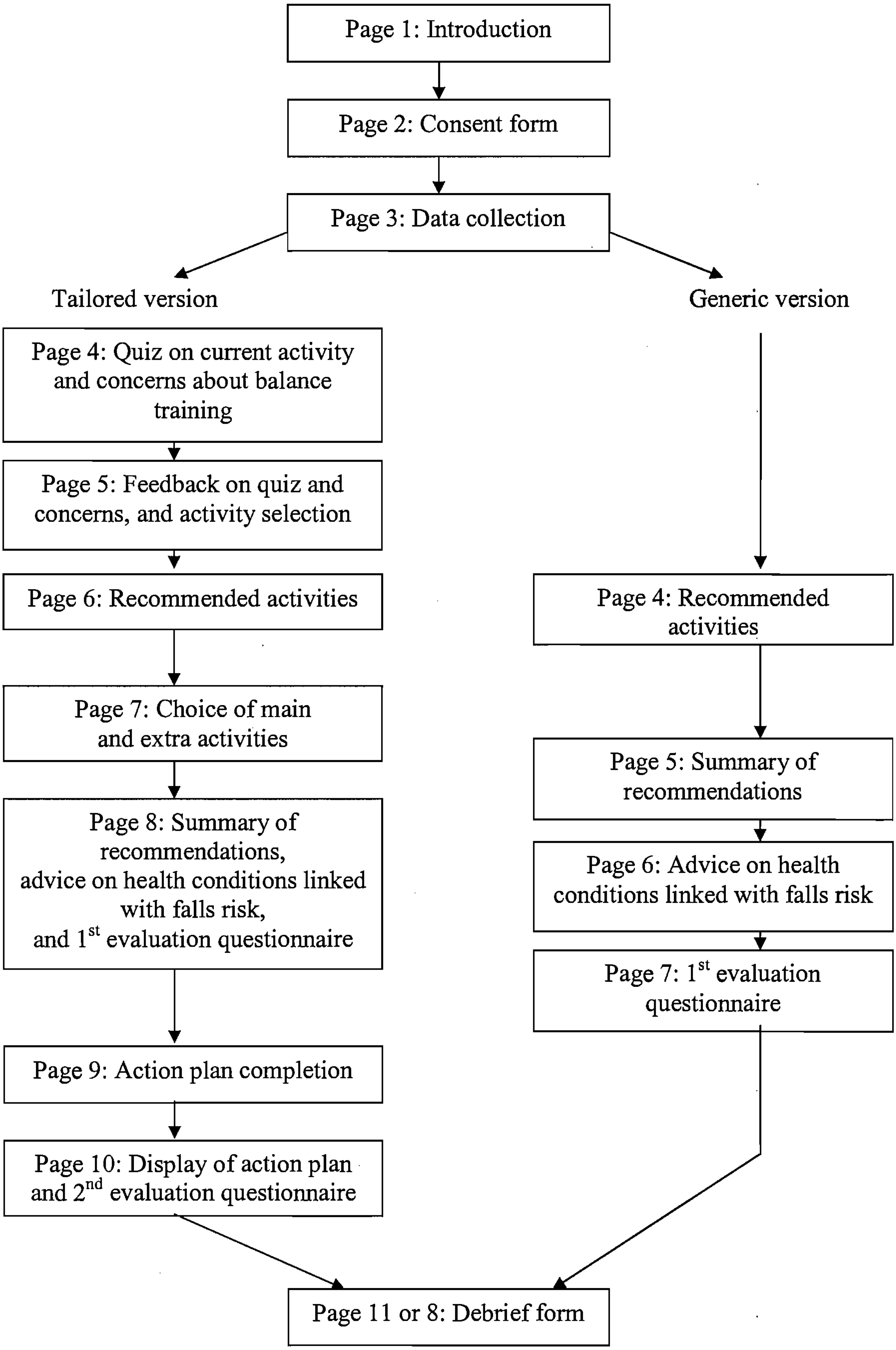


Figure 20. Sequence of webpages for the tailored and generic versions of the advice.

The first three webpages obtained a readability score of 87.3. From webpage four onwards, the following readability scores were obtained for the (tailored) self-rated balance groups: good = 63.1, quite good = 63.8, and having some problems = 63.7. The mean readability score for all the webpages (1-11) across the three self-rated balance groups was 69.5. These readability scores indicated that the tailored webpages were of standard readability, and equivalent to the language used in a reader's digest (Flesch, 1948). A standard level of readability is believed to be understood by 70% of the British population (Payne et al., 2000) and most Internet users, as Internet users are above average in education level (Fox, 2004).

7.2.1 Revisions to the Content

Whilst the generic version of the advice presented the user with one set of advice, the tailored version was able to present the user with 28-31 different sets of advice across the three self-rated balance groups. The total number of possible tailored advice sets was 88, equating to 1,729 possible advice combinations.

In the original website, four factors were used to tailor the advice to users: self-rated balance ability (to tailor to the individual's perceived needs, capabilities, and self-image), health conditions known to be associated with falls risk, preferred physical activities, and an action plan. Two additional factors were introduced: feedback on the individual's current level of balance training, and advice on common concerns about undertaking balance training. For feedback, the quiz regarding the user's current level of activity - that was previously only presented to users who self-rated their balance as good - was presented to all users (including those who self-rated their balance as quite good or as having problems). This change was made because the findings from the qualitative study with older people suggested that the participants underestimated the amount of balance training that they needed to do to improve their balance.

The second new section comprised questions asking the user if they had any concerns about undertaking balance training. These questions regarded concerns of not having time to undertake balance training, that balance training is too strenuous, may cause an injury, or is too expensive. These questions were added because the qualitative study with adults and older people (Chapter 4) and previous research suggested that these are common barriers that older people confront when deciding to undertake physical activity (Allen, 2001; Biddle, 2001; Booth et al., 1997, 2000; Buckworth &

Dishman, 2002; Canada Fitness Survey, 1983; Caserta & Gillett, 1998; Jones, Harris, & McGee, 1998; King et al., 1992; Paxton et al., 1997; Shephard, 1994; Stead et al., 1997; Stones, 2003). Advice on concerns in undertaking balance training was presented on webpage 5, underneath feedback on current level of activity (see Figure 21 for an example).

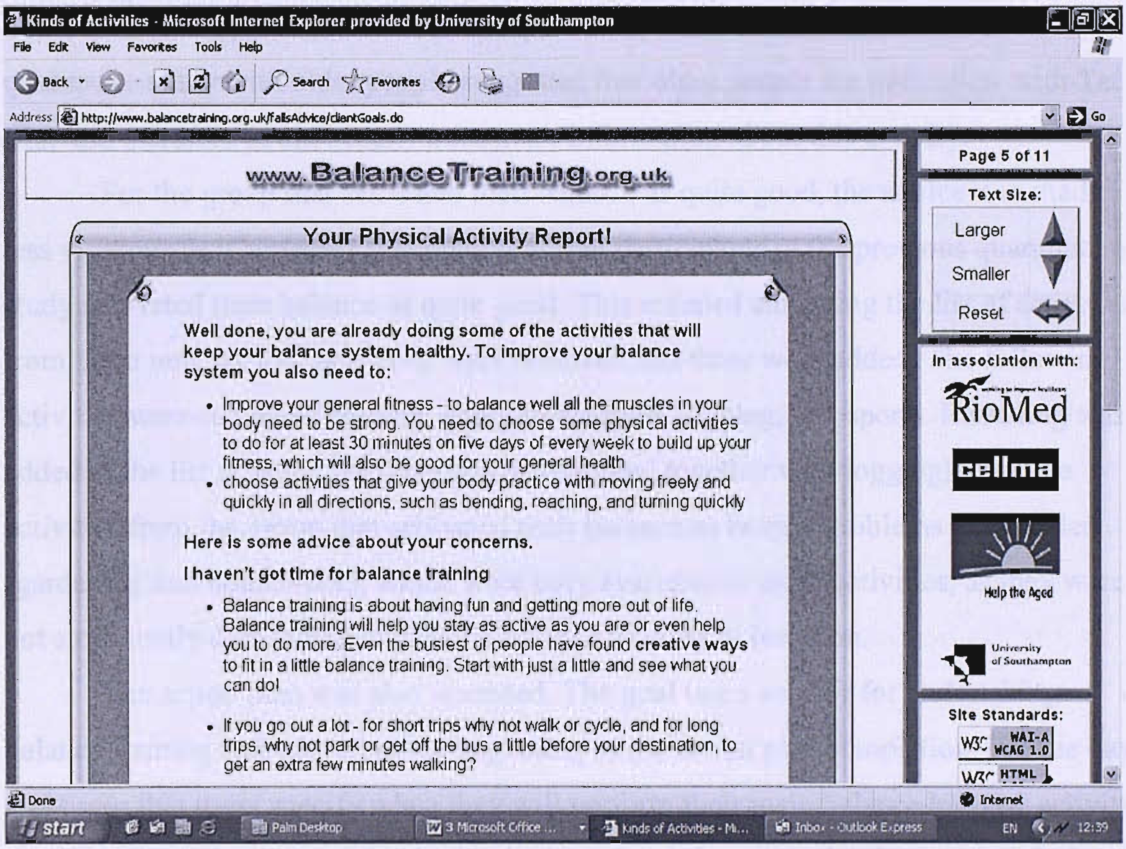


Figure 21. Screen print of the fifth tailored webpage, illustrating the presentation of new advice on concerns with undertaking balance training.

Other changes to the content of the website included amendments to the quiz on current level of activity, recommended activities presented, and the action plan. The four statements for the quiz on current level of activity were revised by increasing the frequency of balance training, from 90 minutes a week to 150, to be in line with current government guidelines for physical activity. Current guidelines state that adults need to engage in physical activity of a moderate intensity, for 30 minutes, five days a week or more (Department of Health, 2004; Killoran, Fentem, & Caspersen, 1994; Secretary of State for Health, 1999).

For the activities presented, the advice regarding Tai Chi, Yoga, and Pilates was amended, and the activities for the group that self-rated their balance as quite good were reduced in vigour. The advice regarding Yoga and Pilates was omitted as there is not a strong evidence-base for recommending these activities for the prevention of falls. However, Tai Chi has received strong support for its use in preventing falls (Gardner et al., 2000; Gillespie et al., 2003; Mazzeo et al., 1998; NICE, 2004; Skelton & Todd, 2004). Advice regarding Tai Chi was expanded upon as the findings from the qualitative study with older people suggested that older people are unfamiliar with Tai Chi, and therefore could benefit from more information about this activity.

For the group that self-rated their balance as quite good, the advice was made less vigorous as it appeared that relatively frail participants in the previous quantitative study self-rated their balance as quite good. This entailed amending the list of activities from 10 to nine, as four activities were removed and three were added. The following activities were removed: cycling, going to the gym, jogging, and sports. Rambling was added to the list of activities (previously presented together with jogging), and two activities from the group that self-rated their balance as having problems were added (gardening and housework), which were only available as extra activities, as they were not sufficiently demanding to provide balance training in isolation.

The action plan was also amended. The goal users specify for undertaking balance training was moved to the beginning of the action plan completion. For the days and times that users specify when they will perform their main balance training activity, another option was created for those who intend to join a class, but have yet to find out the session times: "Click here if you're going to join a group or class and you've yet to find out when they will meet". This option was added based on older people's comments from the previous qualitative study. The date upon which users would start their plan was changed from a specific date, to the options of within a week, within a fortnight, and within a month. This change was made because interviewees in the previous qualitative study found typing in the specific date unusable. Also, changing the response options to these three categories allowed the data to be more easily comparable across participants than calculating how many days it would be before participants intended to start their action plan from the date they accessed the website.

7.2.2 Revisions to the Measures

The outcome measures were changed to revise the between-groups comparison between the tailored and control groups. The questionnaire was revised to use the newly-created attitudes to falls-related interventions scale (AFRIS) (ProFaNE, 2006b). This scale was used as it is a coherent set of items designed to evaluate interventions such as the balance training website, was of similar length to that used in the previous study (increasing the number of items by just one), and contained half of the items that were used in the previous questionnaire study (attitude / outcome expectancy, perceived behavioural control [PBC] / self-efficacy, and intention). The AFRIS consists of six items that are based on findings from a qualitative study (Yardley et al., 2006) and the theory of planned behaviour (TPB) (Ajzen, 1988, 1991). The items concern attitudes, subjective norm, PBC, and intention. An item concerning identity was also included, which recent research has suggested may be an important addition to the theory (Yardley, Donovan-Hall, Francis, & Todd, 2007b). The six items are measured on a seven-point scale (1 = disagree strongly to 7 = agree strongly), with a total scale range of 6-42. The personal relevance item was retained and its scale was increased from six to seven, by adding a 'neither agree nor disagree' fourth option, in line with the scale used for the AFRIS. Thus, a total of seven items were used in the questionnaire (see Table 26).

Table 26. Questionnaire Items that measured the Personal Relevance of and Attitudes towards the Recommended Activities

Item
1. The recommended activities were personally relevant to me
2. Doing the recommended activities would be good for me
3. Doing the recommended activities would make me feel confident
4. Other people whose opinions matter to me (e.g. family, friends, doctor) would think it was a good idea for me to do the recommended activities
5. If I wanted to, it would be easy for me to do the recommended activities
6. I am the kind of person who should do the recommended activities
7. I intend to do the recommended activities (if I am offered the opportunity)

The outcome measures were also revised for the pre- and post-action plan comparison. The second questionnaire was used only with participants who received the tailored version of the balance training advice, to compare their responses before and after completing an action plan. The two items - PBC and intention to perform the recommended activities - were changed to match the wording and response scale of the AFRIS to allow for a repeated measures analysis (see Table 27).

Table 27. Questionnaire Items that measured Perceived Behavioural Control and Intention to undertake Balance Training after completing an Action Plan

Item
1. If I wanted to, it would be easy for me to do the recommended activities
2. I intend to do the recommended activities (if I am offered the opportunity)

In addition to the outcome measures, the measures assessing demographic characteristics were revised (webpage 3). The first two questions concerning age and gender were corrected so that the user was required to respond, as inadvertently, previously users were allowed to advance in the website with the default settings of 1969 as year of birth and male gender. The wording of the health condition was revised from "poor vision" to "poor vision (if wearing glasses does not help)". This change was based on the finding from the previous qualitative study with older people, that they were unsure whether wearing glasses constituted poor vision.

Three more items were added to the set of baseline questions. First, to provide additional demographic data, users were asked to type in a free-text box the country they were accessing the website from. Second, to find out how users had heard about the website, users were required to select one of six options: 'found it by searching the Internet', 'recommendation from a friend', 'recommendation from a family member', 'recommendation from a health professional', 'saw an advertisement for it', and 'heard about it through the media'. Third, to exclude health professionals accessing the website on behalf of older people, the user was required to indicate whether they were accessing the website for themselves or on behalf of someone else. For the analysis, only adults aged 60 and above and who accessed the website for themselves were included.

7.2.3 Current Study

Two hypotheses were tested in this study. First, it was hypothesised that participants receiving the tailored balance training advice would report a greater total score on the outcome measures (personal relevance plus the AFRIS), indicating a more positive attitude towards undertaking balance training. Second, it was hypothesised that the participants receiving the tailored advice would report greater PBC and intention to undertake balance training after completing an action plan.

7.3 Method

7.3.1 Design

A between groups design was used, with a convenience sample of participants randomly assigned to receive either tailored (intervention) or generic balance training advice (control). An experimental design of randomly allocating participants to one of two conditions afforded the opportunity to directly compare two interventions, and infer causality from the results. The revised version was available online at the original location of www.balancetraining.org.uk, and the website advanced users sequentially through the pages. The generic webpages were similar in content and identical in presentation format to the tailored version. Randomisation to either the tailored or generic group was identical to the previous version of the website (see Chapter 3): once participants had clicked to give their consent to take part in the study, they were advanced to the data collection webpage of either the tailored or generic group (webpage 3).

7.3.2 Participants

Before recruitment commenced, the study was approved by the ethics committee of the School of Psychology, University of Southampton. One of the limitations identified from the previous quantitative study was that the subpopulation of older people that the website is targeted to – younger and fitter older people aged 60-75 years – was underrepresented in the sample. For this study, greater effort was made to recruit younger and fitter older people.

Participants were recruited over 7 months (01/09/2006 – 01/04/2007) through four advertising strategies: email, the Internet, print, and in-person. First, a broadcast was sent to two email distribution lists, one held by RioMed (sent September 2006) and one held by Help the Aged (sent October 2006) (see Appendix R). Together, the email distribution lists comprised over 3,900 health care professionals who were working with older people within the NHS or freelance, plus members from organisations with an interest in falls and health. In addition, approximately 60 emails were sent to older people aged 60 and above and who had an email address, who had agreed to take part in up to three psychological studies a year at the University of Southampton (see Appendix S for the recruitment email). Their details were held on a database managed by colleagues in the School of Psychology. Access to the database was granted in exchange for the researcher recruiting further older people to the database.

Second, the website was advertised on the Internet. The website continued to be promoted on Help the Aged's website, which had been promoting the website since August 2005 (originally for the first quantitative study). Because the website was listed under Help the Aged's online advice section on falls prevention, and many younger and fitter older adults would not view themselves as at risk of a fall (Braun, 1998; Cameron & Quine, 1994; HEBS, 2001; Simpson & Mandelstam, 1995; Yardley et al., 2006; Yardley & Todd, 2005), from September 2006, Help the Aged agreed to also promote the website under their advice section on exercise. The researcher also emailed approximately 109 hosts of websites that were targeted to adults aged 50+, requesting they post an advert designed by the researcher (see Appendix T for the online advertisement). The websites were identified by links from approximately 16 other websites and articles (British Heart Foundation, n.d.), articles discussing websites for older people (BBC News, 2006; Blake, 1998; Meara, 2005) and a column on Internet resources on aging (Post, 1996). The researcher also posted the study on websites advertising psychological experiments delivered on the Internet. The study was advertised mainly on websites that were based in the USA.

Third, the website was advertised using print. An advertisement was placed in the University of Southampton staff internal bulletin (See Appendix U), and a feature of the research was placed in the quarterly bulletin sent to older people on the recruitment database held at the School of Psychology. Posters with small cards (containing the same information as the posters) advertising the website were also sent to a local outreach coordinator who promoted leisure activities in the community, and to local social clubs and education centres that provided an IT suite for public use (but no classes) (See Appendix V for the poster).

Fourth, the website was advertised in person locally in Hampshire. The researcher visited organisations where older people socialise, identified from a search in the Yellow Pages. These organisations included two computer classes and drop in IT sessions, a carers association, three bingo halls (one was sent posters and cards to advertise on the researcher's behalf), a dance class for over 50s, a sheltered housing court, an independent living court for older people, and social clubs. Of the 57 social clubs identified from the Yellow Pages search, 21 were inappropriate or were unable to be contacted, and six declined involvement in the study. However, of the remaining 30, 19 were visited and 11 were sent posters and cards to advertise the study. In person, the researcher advertised the website by approaching older people and handing out cards that provided the website uniform resource locator (website address). However, it is believed that most participants were recruited from visiting 16 of Hampshire's 27 branch meetings of the University of the Third Age. At the meetings the researcher gave a short presentation and then handed out cards to those who approached him. Eleven branches refused a visit, because they were not readily contactable (n = 1), not interested (n = 3), publicised the study on the branch website (n = 1), or publicised the study at meetings using posters and cards (n = 6).

7.3.3 Materials / Apparatus

As the intervention was accessible on the world-wide web, participants accessed the website at their desired time and location where they had Internet access. Participants entered their responses directly into boxes on the website, which were recorded when the participant clicked on the submit button that advanced them to the next webpage. Participants' data were automatically recorded onto a Microsoft Office Excel 2003 spreadsheet, which was available online to the researcher and password-protected. The data were analysed using SPSS 14.0 for Windows, and the web logs were analysed using Web Log Explorer Professional Edition 2.84.

7.3.4 Data Preparation and Checks

Data collection ceased once the minimum number of participants was recruited for a desired power value of .80. The minimum sample size was 276 participants (138 per group), calculated from the previous quantitative study's mean scores and standard deviations for intention to undertake balance training after receiving either tailored or generic balance training advice, with a one-tailed hypothesis, and an alpha level of .05.

The variable of intention to undertake balance training from the previous study was the most conservative calculation relative to the variables of personal relevance of the advice, and self-efficacy in performing balance training.

The data was cleansed by removing data from participants who accessed the website more than once. This was achieved by manually identifying participants who made identical or almost identical inputs into the website more than once within 24 hours. For the participants who entered the website more than once, their first entry of data was included in the analysis (n = 15), but their duplicated visits were removed (n = 22). Of the participants who entered the website more than once, 8/15 viewed the generic advice more than once, 4/15 viewed the tailored advice and then the generic advice, 2/15 viewed the tailored advice more than once, and 1/15 viewed the tailored, generic, and then tailored advice again. Of the 15 participants that provided duplicate data, 12 completed the post-advice questionnaire, but only six provided data on their first visit and were included in the analysis. Five participants were also removed because their year of birth was entered as 1901 or 1900, which were assumed to have been entered in error. Thus, cleansing removed 27 participant entries from the data set.

As an ANOVA was to be performed to test the first hypothesis, checks were made to ensure the ANOVA assumptions were met. Histograms indicated a similar spread of scores in the tailored and generic groups on the total score (AFRIS plus personal relevance). Checks for the normality of the dependent variable distributions identified a pattern similar to that reported in Chapter 5 of negative skew and kurtosis, but on this occasion the skew was that there was a tendency for participants to select "agree" (6/7) for each item. Reflect and logarithm transformations did not satisfactorily alter the distribution curves, however, the cell sizes were deemed large enough to provide robustness to the ANOVA from this modest violation of the normal distribution curves.

Follow-up analyses were to be performed using MANOVAs, and so further checks were made to ensure that the MANOVA assumptions were not violated (Pallant, 2001; Tabachnick & Fidell, 2001). As MANOVAs are sensitive to outliers, 15 multivariate outliers that were identified from a Mahalanobis distances test were removed. Pearson correlation tests suggested that the dependent variables were moderately correlated (and not at risk of singularity). Scatter graphs of the residuals for the predicted and obtained values of the dependent variables also suggested normality, linearity, and homoscedasticity (equal variance in scores across the dependent variables). To check the equality of variance and homogeneity of variance-covariance matrices (for pooled estimate of error), Levene's and Box's M tests were performed for each MANOVA, and are reported in the results section. A repeated measures MANOVA was to be performed to test the second hypothesis. The assumptions for this test were checked separately. Similar results were found as reported for the between groups MANOVA, except that two further multivariate outliers that were identified from a Mahalanobis distances test were removed (but were retained for the previous between groups MANOVA).

7.4 Results

The results are presented in four sections: first, a description of the participant characteristics, second, the results of the tests of the hypotheses, third, the results of exploratory analyses to supplement the tests of the hypotheses, and fourth, a meta-analysis pooling the results of this study with the previous study reported in Chapter 5, to provide an overall measure of the effect of tailoring in relation to the hypotheses.

7.4.1 Participant Characteristics

Unfortunately, web logs were only available for the period of 17/01/2007 - 01/04/2007, only representing the last 2.5 months of the 7 month recruitment period. From this sub-sample of visitors to the website, the total number of visitors over the 7 months that accessed the first (introductory) webpage was estimated at 5,103, and the total number of visitors that accessed the second (online consent form) webpage was estimated at 3,528. The majority of visitors who accessed the first webpage were from the USA (44%) and the UK (26%), and the remaining visitors accessed the website from 51 other countries (< 3% each).

Four hundred and thirty-five participants were recruited, with 222 in the tailored group and 213 in the generic group. The number of participants that advanced through the website and completed the post-advice questionnaire was 302 (157 tailored group, 145 generic group). For the participants who dropped out before filling in the post-advice questionnaire (n = 133, 31%), there was no significant difference between the tailored (n = 65, 15%) and generic groups (n = 68, 16%).

Univariate tests were performed to compare those who had continued through the website and completed the post-advice questionnaire (n = 302) with those who only provided demographic data (n = 133). There was a significant difference between those who continued on the website and those who dropped out according to how they found the website ($\chi^2(5, n=435)= 19.61, p < .001$), as those who dropped out were less likely to have found the website by viewing an advert (6% vs. 20%), but more likely from an Internet search (40% vs. 28%) or a friend's recommendation (27% vs. 19%). There were no significant differences between those who continued on the website and those who dropped out in regards to country where they accessed the website from, age, gender, self-rated balance, or health conditions. All further analyses presented in this chapter were performed on the data from participants who completed the post-advice questionnaire used for the between-groups comparison (N = 302).

Participants were aged 60-88 years ($M = 70.41$, $SD = 7.07$), and there was no significant difference in age between the tailored ($M = 70.61$, $SD = 7.02$) and generic ($M = 70.19$, $SD = 7.14$) groups. There was also no significant difference between the tailored and generic groups according to gender, self-rated balance, how they found the website, country where they accessed the website from, and health conditions. Despite the estimates from the web logs suggesting that the majority (44%) of visitors to the first webpage were from the USA, from Table 28 it was apparent that the majority of participants (users who went further than the third webpage and provided data) were recruited from the UK. Table 29 shows that the most frequent way in which participants found the website was from an Internet search. Two-thirds of the participants were women, and there was an even spread of self-rated balance (see Table 30). Two-thirds of the participants were taking medication, a third reported suffering from unsteadiness and a fifth reported suffering from dizziness when getting up quickly.

Table 28. Frequencies (% of group) of Country where the Website was reported to be accessed from as a function of Advice condition

Country where website was accessed	Tailored (n = 157)	Generic (n = 145)	Total (N = 302)
United Kingdom[a]	142 (90)	126 (87)	268 (89)
United States	11 (7)	7 (5)	18 (6)
Canada	1 (0.75)	4 (2.75)	5 (2)
Australia	1 (0.75)	3 (2)	4 (1)
New Zealand	1 (0.75)	2 (1)	3 (1)
Austria	-	1 (0.75)	1 (0.25)
Greece	-	1 (0.75)	1 (0.25)
Ireland	1 (0.75)	-	1 (0.25)
Switzerland	-	1 (0.75)	1 (0.25)

[a] included 1 participant from the Cayman Islands

Table 29. Frequencies (% of group) of How the Website was Found as a function of Advice condition

How the website was found	Tailored (n = 157)	Generic (n = 145)	Total (N = 302)
Internet search	45 (29)	40 (28)	85 (28)
Saw advertisement	35 (22)	26 (18)	61 (20)
Recommendation from friend	27 (17)	31 (21)	58 (19)
Recommendation from health professional	21 (13.5)	22 (15)	43 (14)
Heard about it through the media	18 (11.5)	20 (14)	38 (13)
Recommendation from family	11 (7)	6 (4)	17 (6)

Table 30. Frequencies (% of group) of Gender, Self-rated Balance, and Health conditions as a function of Advice condition

	Tailored (n = 157)	Generic (n = 145)	Total (N = 302)
Gender			
Male	57 (36)	58 (40)	115 (38)
Female	100 (64)	87 (60)	187 (62)
Self-rated balance			
Good	50 (32)	51 (35)	101 (33)
Quite good	50 (32)	36 (25)	86 (29)
Have some problems	57 (36)	58 (40)	115 (38)
Health condition			
Unsteadiness	56 (36)	52 (36)	108 (36)
Poor vision	8 (5)	9 (6)	17 (6)
Osteoporosis	19 (12)	17 (12)	36 (12)
Take ≥4 Medications	34 (22)	41 (28)	75 (25)
Take <4 Medications	58 (37)	52 (36)	110 (36)
Take no medication	65 (41)	52 (36)	117 (39)
Dizziness when get up quickly	31 (20)	31 (21)	62 (21)
Dizziness when roll over in bed	8 (5)	11 (8)	19 (6)
Dizziness when shake or nod head	11 (7)	15 (10)	26 (9)
Dizziness most of the time	5 (3)	3 (2)	8 (3)
Dizziness in unexpected spells	26 (17)	15 (10)	41 (14)

7.4.2. Tests of the Hypotheses

7.4.2.1 Tailored vs. Generic Advice

The first hypothesis was that participants who received the tailored advice would report more positive attitudes towards undertaking balance training. The dependent variables were the total score and individual responses to the post-advice questionnaire items, assessing the personal relevance of the advice and the six-item AFRIS (see Table 26). The AFRIS had a Cronbach's alpha value of .88, which increased to .90 when the item assessing personal relevance was included, confirming reliability. A one-way between-groups ANOVA was performed to test the first hypothesis with advice condition as the independent variable (tailored vs. generic). The dependent variable was the total score of the seven items (AFRIS scale and personal relevance), with possible scores ranging from 7 to 49. The total scores were positive for both the tailored (M = 40.34, SD = 4.95) and generic groups (M = 39.19, SD = 5.55). The ANOVA found a marginally significant difference on the total score as a function of advice condition ($F_{(1, 300)} = 3.58, p = .059$; partial $\eta^2 = .012$). A Mann-Whitney U test was performed to check whether this marginally significant result was due to a violation of the normal distribution assumption of the ANOVA. A significant difference was found ($U_{(157,145)} = 9467.50, p = .011$), suggesting that the result found from the ANOVA was not due to a violation of the parametric test assumption.

As a marginally significant result was obtained on the ANOVA of the total score, a one-way between-groups MANOVA was performed to analyse each item individually according to advice condition. Fifteen multivariate outliers were removed, and so the MANOVA was performed on 287 participants (150 tailored, 137 generic). Using the seven dependent variables, no significant difference was found between the advice conditions on the combined dependent variable ($F_{(7, 279)} = 1.15$, ns; Pillai's Trace = .028, partial $\eta^2 = .028$). However, the between-groups univariate effects revealed that there was a significant difference between the advice conditions on perceived personal relevance of the advice ($F_{(1, 285)} = 5.81, p = .017$; partial $\eta^2 = .02$) and reports that the recommended activities would be good for them ($F_{(1, 285)} = 4.00, p = .047$; partial $\eta^2 =$ .014). Although perceived personal relevance of the advice was also found to be significant on a Levene's test of equality of error variances, it was still significant at a more stringent p value ($< .025$).

To test whether the significant results were due to violations of the normal distribution assumption of a MANOVA, non-parametric Mann-Whitney U tests were performed to compare with the parametric analyses. The Mann-Whitney U tests found similar results to the above between-groups effects, in that there was a significant difference between the tailored and generic groups on the variables of personal relevance and that balance training would be good for them. As suggested by the means presented in Table 31, the tailored group were more likely to report that the advice was personally relevant and that the recommended activities would be good for them. The tailored group also reported more positively on the other five dependent variables, but not significantly: would give me confidence ($F_{(1, 285)} = 1.30, p = .26$, *ns*; partial $\eta^2 = .005$), others would think it was good ($F_{(1, 285)} = 1.53, p = .22$, *ns*; partial $\eta^2 = .005$), would be easy to do ($F_{(1, 285)} = .17, p = .68$, *ns*; partial $\eta^2 = .001$), I should do it ($F_{(1, 285)} = 2.52, p = .11$, *ns*; partial $\eta^2 = .009$), and I intend to do it ($F_{(1, 285)} = 1.22, p = .27$, *ns*; partial $\eta^2 = .004$).

Table 31. Mean (SD) Post-Balance training Advice Questionnaire Reports as a function of Advice condition

Item	Tailored (n = 150)	Generic (n = 137)	95% confidence interval for the between groups difference
Personally relevant	5.87 (.79)	5.64 (.78)	.041, .408
Would be good for me	6.09 (.70)	5.93 (.64)	.002, .316
Would give me confidence	5.67 (.85)	5.55 (.92)	-.087, .325
Others would think it was good	5.79 (.81)	5.66 (.87)	-.072, .317
Would be easy to do	5.68 (.89)	5.64 (.96)	-.170, .260
I should do it	5.84 (.76)	5.69 (.88)	-.037, .345
Intend to do it	5.83 (.73)	5.73 (.75)	-.076, .269

7.4.2.2 Balance Training using or not using an Action Plan

The second hypothesis was that the participants receiving the tailored balance training advice would report higher levels of PBC and intention to undertake balance training after completing an action plan. A repeated measures MANOVA was performed to test this hypothesis, and was only performed on the data of the tailored group, as the generic group did not complete an action plan. Of the 150 participants in the tailored group who had completed the seven-item post-advice questionnaire, 26 did not complete the post-action plan questionnaire, and two outliers were removed. Thus, data from 122 participants were tested on the two dependent variables against the independent variable of completing an action plan (with or without a plan). There was a significant difference between the reports on the combined dependent variable according to the completion of an action plan ($F_{(2, 120)} = 3.88, p = .023$; Pillai's Trace = .061; partial $\eta^2 = .061$). For PBC, the within-groups contrasts revealed that there was a significant difference ($F_{(1, 121)} = 7.83, p = .006$; partial $\eta^2 = .061$). As shown in Table 32, the means suggested that participants reported greater PBC for undertaking balance training after they had completed an action plan. However, for intention, the within-groups contrasts revealed that there was no significant change after completing an action plan ($F_{(1, 121)} = .81$, *ns*, partial $\eta^2 = .007$).

Table 32. Mean (SD) Reports of Perceived Behavioural Control (PBC) and Intention to undertake Balance Training before and after completing an Action Plan (N = 122)

Item	Before	After	95% confidence interval for the difference
PBC	5.73 (.84)	5.87 (.76)	-.238, -.041
Intention	5.86 (.71)	5.90 (.72)	-.131, .049

7.4.3 Exploratory Analyses

The exploratory analyses comprised two parts. The first part consisted of analyses to explore the possibility that the significant results found from the hypothesis tests described above were moderated by other variables. The analyses tested the variables of age, gender, self-rated balance, health conditions, country the website was accessed from, and how the participants found the website for significant associations with responses to the seven-item post-advice questionnaire, and significant interaction effects with the variable of advice condition (tailored vs. generic). The second part provided a description of the participants' inputs on the interactive webpages of the tailored website. This included an analysis of the tailored group's intention to undertake balance training as a function of their current level of activity, to test whether those who were currently engaged in more balance training were more likely to hold positive attitudes towards continuing or undertaking further balance training.

7.4.3.1 Post-advice Questionnaire

ANOVAs were performed to identify whether there were any significant effects on the total score of the seven items as a function of independent variables besides advice condition. No significant differences were found using the following independent variables, either as a main effect or as an interaction effect with advice condition: age, gender, self-rated balance, unsteadiness, poor vision, medication use, suffering from dizziness mainly after getting up too quickly, suffering from dizziness sometimes when shaking or nodding their head quickly several times, suffering from unexpected spells of dizziness, suffering from light-headedness or dizziness most of the time, country where the website was accessed (within vs. outside the UK), and how the website was found.

A significant difference was found according to reports of suffering from osteoporosis ($F_{(1,283)} = 4.24, p = .040$; partial $\eta^2 = .015$). Those who reported suffering from osteoporosis obtained slightly higher total scores than those who did not report suffering from osteoporosis ($M = 41.69, SD = 3.82$ vs. $M = 40.13, SD = 4.35$). However, there was no significant interaction effect ($p = .68$, partial $\eta^2 = .001$), suggesting that tailoring had a similar effect on both those reporting and not reporting suffering from osteoporosis.

A significant difference was found according to reports of suffering from dizziness sometimes when rolling over in bed ($F_{(1,283)} = 4.56, p = .034$; partial $\eta^2 = .016$). Those who did not report suffering from dizziness sometimes when rolling over in bed obtained slightly higher total scores than those that reported suffering from dizziness ($M = 40.47, SD = 4.27$ vs. $M = 38.16, SD = 4.48$). However, there was no significant interaction effect ($p = .31$, partial $\eta^2 = .004$), suggesting that tailoring had a similar effect on both those reporting and not reporting suffering from dizziness sometimes when rolling over in bed.

7.4.3.2 Details of Participants' Inputs into the Tailored Website

This section presents the analyses on the tailored group who provided complete data (n = 157). Participants in the tailored condition were asked to rate their current level of balance training activity. The website asked the participant to tick up to four statements if they were currently performing the activities in each statement. Participants could tick any combination of statements, and by ticking all four they indicated that they were currently performing the required frequency, intensity, and duration of balance training to improve their balance. As shown in Table 33, there was a spread of agreement with the four items. Two thirds of the participants reported agreement with either none (n = 61, 39%) or one (n = 47, 30%) of the items, indicating a low level of current balance training activity. Progressively less participants were likely to tick another statement with the lowest number of participants ticking all four statements, and thus currently performing the required level of balance training to improve their balance: participants reported agreement with two (n = 25, 16%), three (n = 15, 9.5%), or all four statements (n = 9, 5.5%).

Table 33. Frequencies (%) of Current level of Balance Training Activity (N = 157)

Item	Frequency
"I exert myself so that I am warmer and I breathe faster, for at least 150 minutes every week"	43 (27%)
"I exert my leg muscles so I can feel them working hard for at least 150 minutes every week"	50 (32%)
"I move my head and body quickly in all directions several times a week"	33 (21%)
"I get practice balancing and coordinating my eye and body movements more than once a week (e.g. standing on one leg or on my toes, walking on uneven ground, dancing, ball games, etc.)"	52 (33%)

To test whether those that were currently conducting more balance training were more likely to hold positive attitudes towards undertaking balance training, an ANOVA was conducted with current level of balance training activity as the independent variable, and the total score on the AFRIS plus the personal relevance item as the dependent variable. Because ANOVAs are sensitive to unequal sample sizes (Howell, 2002), and to increase the cell sizes, the nine participants who ticked all four statements were combined with those that ticked three statements (n = 24, 15%). The ANOVA found a marginally significant difference ($F_{(3, 153)} = 2.52, p = .060$; partial $\eta^2 = .047$). Attitudes towards the advice increased with each increase in agreement with the items on current level of balance training activity (see Table 34). Participants who reported that they were in agreement with three or four items reported the highest total scores, which was significantly higher than those who indicated agreement with only one item ($p = .029$) and no items ($p = .008$). No other pairwise comparisons were significant. Thus, older people receiving tailored advice to motivate them to undertake balance training were more likely to intend on undertaking balance training if they were currently engaged in relatively more balance training activities.

Table 34. Mean (SD) total AFRIS[a] scores as a function of Current level of Balance Training Activity (N = 157)

Number of activity statements participants agreed they were currently performing	*M* (*SD*)
None	39.61 (6.04)
Any 1	40.09 (4.35)
Any 2	40.24 (3.92)
Any 3 or 4	42.79 (3.08)

[a]plus the measure for personal relevance (total of 7 items, with possible scores ranging from 7-49)

Participants were then asked if they had any of four concerns about undertaking balance training. Participants could tick any combination of statements. As shown in Table 35, there was a spread of agreement with these items. Three quarters of participants were not in agreement with any of the four concerns presented (n = 121, 77%), and so this section of the tailored website was not used as much as anticipated. The remaining participants were in agreement with either one (n = 31, 20%) or two statements (n = 5, 3%) indicating a concern.

Table 35. Frequencies (%) of Concerns about Undertaking Balance Training (N = 157)

Item	Frequency
"I haven't got time for balance training"	11 (7%)
"Balance training is too strenuous"	3 (2%)
"I'm not fit enough for balance training. I might get hurt"	15 (10%)
"I can't afford the cost of balance training"	12 (8%)

Participants were then asked to select the type of activities they would like to carry out. For those that self-rated their balance as good or quite good, their choice was balance training that was based in their home, outside, in a class, or a combination of these three. For those that self-rated their balance as having some problems, their choice was balance training that was based in their home, outside or in a class, or a combination of these two. As shown in Table 36, the vast majority of participants selected home-based balance training.

Table 36. Frequencies (%) of Types of Recommended Activities Viewed

Activity location	(n = 154)
At home	107 (68)
Outside[a]	41 (26)
In a class	23 (15)
At home and outside[a]	20 (13)
At home, outside[a], and in a class	5 (3)
Outside[a] and in a class	3 (2)
At home and in a class	2 (1)

[a]included class-based activities for the group that reported having some balance problems

Participants then selected the balance training activity they would like to undertake as their main activity. A selection of activities was presented to the self-rated balance groups: 11 to those with good balance, 7 to those with quite good balance, and 3 to the group that had some balance problems. As shown in Table 37, almost half the participants selected exercises at home and a quarter selected walking as their main activity. Of the four most frequently selected main activities, all three main activities for the group that reported having some balance problems were represented.

Table 37. Frequencies (%) of Main Activity selections

Main activity[a]	(n =153)
Exercises at home[bc]	70 (46)
Walking[b]	34 (22)
Tai Chi[bc]	13 (9)
Keep-fit classes[bc]	10 (7)
Swimming[b]	9 (6)
Cycling	5 (3)
Rambling[b]	4 (2.5)
Dancing[b]	3 (2)
Going to the gym	2 (1)
Jogging	2 (1)
Sports	1 (0.5)

[a]All the activities were available to the group that reported good balance.

[b]Main activities available to the group that reported quite good balance.

[c]Main activities available to the group that reported having some balance problems.

After selecting the main balance training activity they would carry out, participants were given the option to select extra balance training activities to undertake. A selection of activities was presented to the self-rated balance groups: 10 to those with good balance, 8 to those with quite good balance, and 6 to the group that had some balance problems. As shown in Table 38, four out of the six most frequently selected activities were based in and around the home.

Table 38. Frequencies (%) of Extra Activity selections

Extra activity	(n = 150)[a]
Walking[bcd]	60 (40)
Gardening[cd]	41 (27)
Home hazard reduction[d]	35 (23)
Housework[cd]	31 (21)
Tai Chi[bcd]	29 (19)
Exercises at home[bcd]	24 (16)
Rambling[bc]	23 (15)
Swimming[bc]	19 (13)
Dancing[bc]	14 (9)
Keep-fit classes[bcd]	13 (9)
Cycling[b]	10 (7)
Going to the gym[b]	5 (3)
Sports[b]	4 (3)
Jogging[b]	2 (1)

[a]Participants could select more than one activity, therefore the sum of this column is above 100%

[b]Extra activities available to the group that reported good balance

[c]Extra activities available to the group that reported quite good balance

[d]Extra activities available to the group that reported having some balance problems

Action plan completion. One hundred and thirty-two participants continued through the website to complete an action plan, beginning with outlining a goal they wished to achieve from undertaking balance training. Of the 31 different goals that were reported, the most frequently reported goal was 'to improve health or fitness' (n = 41, 31%). This was worded either exactly as one of the six suggestions on the website (n = 25, 19%) or phrased differently, e.g. 'to improve balance' (n = 16, 12%). The second most frequently reported goal was another website suggestion, to 'improve confidence in balance', either generally or with a specific task or activity (n= 16, 12%).

For days and times the participants were to start their balance training, there was a spread of days selected. Mondays (81, 55%) was the most selected day, with Saturdays as the least selected (45, 31%). Seventeen (12%) participants indicated that they would undertake balance training by joining organised classes and attending these on the designated days. Most participants indicated that they would undertake balance training in the morning (92, 62%), and 15 (10%) participants reported they would undertake balance training by joining organised classes and attending these at the designated times.

Regarding where the participants were to undertake their balance training, the majority of participants typed their home (room or garden) as the location (n = 59, 45%). Most other participants either typed in a specific location known to them (n = 32, 24%) or an area outside local to them (e.g. promenade, forest, park, etc.) (n = 24, 18%). For when the participants were to begin their balance training action plan, the vast majority of participants selected to begin within a week (n = 112, 85%). Fewer participants selected to begin within a fortnight (n = 9, 7%) or within a month (n = 11, 8%). For who will act as their social support, 57 (43%) participants specified the name of the person. For those who specified their relationship to who will act as their social support, most participants selected their spouse (n = 35, 27%) or they did not select anyone (10, 7%).

7.4.4 Meta-analysis

A meta-analysis was performed to combine the results presented above with the first quantitative study presented in Chapter 5. This analysis was performed to test the two hypotheses above that were tested in both studies. The studies had a pooled sample of 582 adults (301 tailored group, 281 generic group) aged 60-97 years (M = 73.83, SD = 7.09) (see Table 39). Of note in this sample is the skew in the previous study to participants more likely to report that they had some balance problems, less likely to report good balance, and more likely to report suffering from unsteadiness. There was no significant difference between the two studies in their effect sizes from testing the first hypothesis (study 1: $r = .25$ vs. study 2: $r = .11$, $p = .06$ *ns*) or the second hypothesis (study 1 $r = .24$ vs. study 2 $r = .25$, $p = .47$ *ns*).

The pooled effect sizes were calculated by converting the eta (ŋ) values into z-scores (z_r), averaging them, and then converting them into Pearson's r values (Howitt & Cramer, 2000). The pooled significance levels were calculated by converting the *p* values into z-scores (z), dividing them by the square root of the number of studies, and then converting them back into *p* values (Howitt & Cramer, 2000).

Table 39. Frequencies (% of group) of Gender, Self-rated Balance, and Health conditions as a function of Advice condition

	Tailored (n = 301)	Generic (n = 281)	Total (N = 582)
	Gender		
Male	111 (36.5)	100 (35.5)	211 (36)
Female	190 (63.5)	181 (64.5)	371 (64)
	Self-rated balance		
Good	61 (20)	64 (23)	125 (21)
Quite good	88 (29)	68 (24)	156 (27)
Have some problems	152 (51)	149 (53)	301 (52)
	Health condition		
Unsteadiness	162 (54)	149 (53)	311 (53)
Poor vision	51 (17)	43 (15)	94 (16)
Take ≥4 Medications	85 (28)	101 (36)	186 (32)
Take <4 Medications	110 (37)	90 (32)	200 (34)
Take no medication	106 (35)	90 (32)	196 (34)
Osteoporosis	63 (21)	59 (21)	122 (21)

Hypothesis 1. The pooled effect was significant in favour of the tailored advice over the generic ($r = .18, p = .01$). Three questionnaire items were measured in both studies and were meta-analysed. The pooled effect for PBC was not significant ($r = .07, p = .20$ *ns*), however, there was a significant effect in favour of tailoring for personal relevance of the advice ($r = .15, p = .001$) and intention to undertake balance training ($r = .10, p = .05$).

Hypothesis 2. The pooled effect of the repeated measures tests within the tailored group (n= 235) found the action plan to significantly increase the persuasiveness of tailoring ($r = .24, p = .001$). Both questionnaire items were measured in both studies and were meta-analysed. The pooled effect for intention was not significant ($r = .07, p = .16$ *ns*), however, there was a significant effect in favour of the completion of an action plan on PBC ($r = .24, p = .001$).

7.5 Discussion

7.5.1 Summary of Results

The current study recruited older people to access a website that provided advice to encourage them to undertake balance training. The study was a partial replication, in that it was aimed to be an improvement on the previous study reported in Chapter 5, in terms of the presentation of the advice and the sample recruited. For the presentation of the advice, the website was revised to omit the limitations previously identified and had new sections added. For the sample recruited, it was desired that a younger and fitter sample be obtained. This aim was achieved as the mean age was 6.69 years younger ($M = 70.41$), an even spread of self-rated balance groups was obtained, and fewer health conditions were reported. Two hypothesises were tested: 1) that those randomised to receive tailored advice would report a greater total score on the outcome measures (personal relevance plus the AFRIS), indicating a more positive attitude towards undertaking balance training, and 2) that participants in the tailored group would report more confidence and intention to undertaking balance training after completing an action plan.

7.5.1.1 Hypothesis 1: Tailored vs. Generic Advice

The first hypothesis received partial support, in that a marginally significant difference was found between the tailored and generic groups on the total score. Whilst the trend across the individual items were in favour of the tailored advice, between-groups univariate effects from a MANOVA revealed the difference to be significant on two variables: that the tailored advice was reported as more personally relevant and contained advice that would be good for the participants. As discussed in Chapter 5, the greater personal relevance of the tailored advice can be interpreted as indicating that the tailored group were more likely to have centrally processed the advice (Petty & Cacioppo, 1986). This interpretation is supported by the finding that the tailored group were more likely to report that the recommended activities would be good for them (positive outcome expectancy as a measure of attitude).

The current study found a contrary finding to the previous study, in that a measure of outcome expectancy was significantly greater in the tailored group compared to the generic group, whereas the previous study found no significant difference. Perhaps the wording of the items caused this difference. The previous study item was specific to the participant's belief that balance training will improve their balance: "I believe that the activities will improve my balance if I carry them out". However, the current study item was more general, relating to the participant's belief that balance training would be beneficial: "doing the recommended activities would be good for me". Perhaps participants in the current study reported greater outcome expectancy because they had in mind factors other than their balance ability, such as that balance training would be good for their fitness, social networking, or having an active and independent lifestyle.

This notion is consistent with research into the incentives that motivate older people to engage in physical activity. Younger older people have reported that they engage in physical activity to improve their health (Burton, Shapiro, & German, 1999; Finch, 1997; Grossman & Stewart, 2003; Health Education Authority, 1999; Rose, 2007; Stones, 2003). However, middle older people (those predominantly aged 70 and above) have shown that older people engage in physical activity for other reasons including social networking, fun and enjoyment, maintaining independence, and mental stimulation (Caserta & Gillett, 1998; Finch, 1997; HEA, 1999; Horne, Skelton, & Todd, 2005; McInnes & Askie, 2004; O'Brien Cousins & Janzen, 1998; Rose, 2007; Snodgrass, Rivett, & Mackenzie, 2005; Stead et al., 1997; Stones, 2003; Wankel, 1993). Specifically, older people have reported a desire to undertake balance training for both maintaining independence, social networking, to learn new things, build their confidence, and maintain a positive physical appearance and mood (to look and feel good) (Horne et al., 2005; Yardley et al., 2006).

There was no significant difference between the tailored and generic versions of the advice on the variables of affective attitude / outcome expectancy ("the recommended activities would make me feel confident"), subjective norm, PBC, identity, and intention. Attitude, subjective norm, PBC, and identity were found to be positively associated with intention to undertake balance training in the original unabridged version of the AFRIS (Yardley et al., 2007b). According to the TPB, if the tailored group did not have significantly higher ratings compared to the generic group on attitude, subjective norm, PBC, (nor identity), then it would be unlikely that they would report significantly greater intention to undertake balance training.

The previous study reported in Chapter 5 found a stronger effect for tailoring, with a larger effect size for the combined dependent variable than the current study (η = 0.25 vs. η = 0.11). The previous study found a similar effect size for personal relevance (η = 0.15 vs. η = 0.14), but larger effect sizes for PBC (η = 0.12 vs. η = 0.02) and intention (η = 0.12 vs. η = 0.07). There are a number of explanations for the stronger effect found in the previous study. The current study presented slightly different advice, which may have had a counter-effect making it less acceptable to older people. For example, the quiz on webpage four was presented to everyone in the tailored group (and no longer just the group that self-rated their balance as good), and the feedback from this quiz for most older people was a need to do more balance training which may have been more off-putting. The sample was different, in that the website advice may be more persuasive among older and less active people, perhaps because those who are younger may perceive themselves as already active and to not benefit from the advice. The measures used were different, and so perhaps the AFRIS was not as sensitive as the previous items used in Chapter 5. For example, as mentioned above, the previous study found a significantly greater likelihood for the tailored group to report positive outcome expectancy of balance training, but the current study did not.

The sample was also recruited differently. Although the Web Logs suggested that the majority of visitors accessed the website from the USA, participants were probably recruited mainly from face-to-face contact and not from impersonal advertising via printed posters or online adverts. Eighty-nine percent of participants reported accessing the website from the UK (see Table 28), and during recruitment, low numbers were gained from the impersonal methods (such as advertising online) and from visiting social clubs. However, participant numbers increased once the researcher travelled in person to Hampshire branches of the University of the Third Age. In addition to the likelihood that the participants were mainly recruited from face-to-face contact, the reports of how participants found the website (see Table 29) are likely to be unreliable. This is because an option was not included specifying that the participant accessed the website from the request of the researcher in person (e.g. at a University of the Third Age branch meeting). Those who were approached by the researcher may have reported this by selecting that they found the website from a recommendation from a friend (19%) or health professional (14%) or through an advertisement (20%), totalling 53%. How the participants were recruited may be an important difference from the previous study, in that the participants in this study may have been biased towards responding positively to the advice in an effort to be polite to the researcher. This could explain why there was less variation in participant scores on each statement evaluating the website advice (with most participants scoring agree, 6/7), rather than the positive skew but wider variation observed in the previous quantitative study.

The meta-analysis of the current study and the previous study found positive results for tailoring. The tailored advice was perceived as more personally relevant, which according to the ELM, demonstrates that the tailored group was more likely to have centrally processed the advice (Chaiken, 1980; Petty & Cacioppo, 1979, 1990). Because they had more centrally processed the advice, as expected, the tailored group were more likely to intend to undertake balance training (Krosnick, 1988; Petty et al., 1983; Sivacek & Crano, 1982). Reviews of tailored advice across a variety of health behaviours have found similar results, with tailored health advice more likely to be perceived as personally relevant, and lead to greater intentions to change health behaviour (Revere & Dunbar, 2001; Ryan & Lauver, 2002; Skinner et al., 1999). As with the study reported in Chapter 5, the current study adds support to the literature that has found positive results for tailoring on psychological constructs related to physical activity (Bull et al., 2001; Calfas et al., 2002; Hurling et al., 2006, 2007; Kreuter et al., 1999a, 2000b; Vandelanotte & De Bourdeaudhuij, 2003). However, other studies have not found positive results for tailoring on physical activity-related psychological constructs (Bull et al., 1999a, 1999b; Cardinal & Sachs, 1995; Hageman et al., 2005), and so further work is required to decipher how tailoring impacts psychological constructs related to undertaking balance training and other forms of physical activity.

7.5.1.2 Hypothesis 2: Pre- vs. Post-Action Plan Completion

Partial support was found for the second hypothesis, in that PBC was significantly higher in the tailored group after an action plan had been completed. The previous study found similar results, with slightly smaller effect sizes compared to the current study for PBC ($\eta = 0.23$ vs. $\eta = 0.25$) and intention ($\eta = 0.06$ vs. $\eta = 0.08$). Hence, the meta-analysis of the two studies found very similar results. Planning has been found to increase PBC, help prepare for performing a behaviour, and predict problems and how to solve them (Bandura, 1997; Kanfer & Gaelick, 1986; Locke & Latham, 1990). However, as with the previous study, implementing an action plan did not increase intention to undertake balance training. A significant increase in intention was less likely when completing the post-advice questionnaire, as participants would be expected to have already decided whether or not they will undertake the recommended balance training activities. However, an increase in PBC can increase the likelihood that a person will adopt a new behaviour (Ajzen, 1988, 1991).

7.5.1.3 Exploratory Analyses

In regards to the inputs into the interactive sections of the tailored version, five findings are of note. First, only 9 (5.5%) participants indicated that they were currently performing sufficient balance training to improve their balance. This is an indication of the need for balance training promotion among older people. Second, the more balance training participants reported that they were currently performing; the more likely they were to hold positive attitudes towards undertaking balance training. Although the tailored advice was more effective at increasing intention to undertake balance training across the sample, those already engaged in balance training are likely to hold greater intention to continue doing or undertake further balance training, presumably because they already hold positive attitudes towards balance training. Third, although a new section of the website addressed concerns with undertaking balance training, this was underused, and indicated this sample did not perceive the factors presented as barriers to undertaking balance training (lack of time, finance, fitness, or that balance training is too strenuous). Fourth, the most frequent goals to achieve from undertaking balance training were to improve health or fitness, and to improve confidence in balance.

Lastly, the majority of participants indicated that they preferred to carry out balance training in or around their home, with balance training performed outside - especially walking - preferred over class-based balance training. The literature on physical activity suggests that one might expect the finding that home-based balance training would be popular. Previous research has found that older people tend to prefer home-based over group-based physical activity (King et al., 2000). It is likely that this is because there are fewer barriers to home-based physical activity, with reported barriers of inconvenience, transport, and inability to leave the house not applicable (Whitehead, Wundke, & Crotty, 2006). Indeed, older people have reported a preference for physical activity that is simple, convenient, and informal, which is in line with home-based activities and lifestyle exercise (Brawley, Rejeski, & King, 2003; Schutzer & Graves, 2004). Indeed, there is some evidence that home-based activities have received higher participation rates among adults and older adults than class-based activities (Brawley et al., 2003; Hillsdon, Foster, & Thorogood, 2005; Hillsdon, Thorogood, Anstiss, & Morris, 1995).

7.5.2 Limitations

There were two limitations to the current study that concerned the design of the generic advice and the ceiling effect of the outcome scores. First, the generic version of the advice could have been more comparable to the tailored version, in that a new webpage was not created for the generic group. As the tailored group had a new webpage introduced that provided feedback on current level of balance training (which was previously only available to those who self-rated their balance as good) and concerns about carrying out balance training, a similar webpage should have been created that presented all the advice for these two variables. Unfortunately, the website programmers did not have time to introduce this new webpage into the generic version. The inclusion of these two additional factors (feedback on current level of balance training and concerns about undertaking balance training), along with the existing action plan, was coincidentally the same factors used in a previous study providing online tailored physical activity advice (Hurling et al., 2006). Whilst it is unknown how essential the effect of feedback on current level of activity was on the effect of tailoring, it is unlikely that the section on concerns about undertaking balance training was critical as only 23% of participants selected one or two advice options.

Second, as in a previous study measuring older adults' attitudes, beliefs, and intention in response to balance training advice (Yardley & Todd, 2005), the current study had a ceiling effect on the outcome measures. When comparing the mean of the total six-item AFRIS score with that of a previous study, the current study had a higher score ($M = 5.68$, $SD = .76$ vs. $M = 4.54$, $SD = 1.83$) (L. Yardley, personal communication, May 2, 2007). Perhaps this reflects that the participants in this study were uncritical, perceived the website to be very useful, or all wanted to receive the advice. The latter possibility is likely, as the participants in this study were self-selected, and therefore were likely to be motivated to take part in the study in order to receive the balance training advice. Whilst this is an interesting finding in itself, the lack of variance in the data limited the opportunity for the tailoring to affect the outcome measures.

If participants were genuine in their reports of attitudes towards the advice then this would be encouraging as older people have sometimes been critical of falls prevention advice, finding it unsuitable for them (Yardley & Todd, 2005) if it concerned falls prevention measures that they consider would be useful for the older generation in general, but not themselves (Braun, 1998; Cameron & Quine, 1994; HEBS, 2001; Simpson & Mandelstam, 1995; Yardley & Todd, 2005). In consideration of the findings presented in Chapter 4, it is possible that the participants in this study did not associate the balance training advice with falls prevention, and therefore the balance training advice was deemed suitable as it did not raise defensiveness in the participants, as balance training advice does not have the stigma of falls (HEBS, 2001).

7.5.3 Conclusion

This study provided results that partially supported the hypotheses. Tailoring was found to have a positive effect on the outcome measures, but only marginally for the total score, and only significantly for personal relevance and a measure of outcome expectancy (the recommended activities would be good for them). Nevertheless, a meta-analysis, combining the results of the previous study and the partial replication reported above, supported the use of tailoring with a positive impact on the personal relevance of the advice and increasing intention to undertake balance training. The action plan, from both the current study and the meta-analysis of the previous and current studies, was found to increase PBC for undertaking balance training. This suggested that the tailoring of balance training advice combined with the use of an action plan is more effective than generic balance training advice on increasing intention and confidence to undertake balance training.

CHAPTER EIGHT
DISCUSSION

8.1 Aims of this Chapter

The aim of this chapter is to bring a general discussion to the thesis, taking into consideration the previous literature and empirical evidence presented in the previous seven chapters. The chapter is divided into five parts: first, the general limitations across the studies; second, reflections on the PhD and how the work would be done differently if conducted again; third, the implications of the results of each study in consideration of these limitations; fourth, recommendations for policy and practice, and fifth, ideas for future research.

8.2 Limitations and Directions for Future Research

Whilst each empirical study included a discussion section specific to each chapter, there were limitations that were applicable across the studies. These concerned non-compliance with website standards, fusion of interactivity with tailoring, self-selection bias, the potential misdirection of home hazard reduction advice, interviewer bias for the qualitative studies, and for the quantitative studies only: including those that were and were not currently engaged in balance training activities in the same sample, the use of insensitive measures, the use of self-reports, the lack of process data, and the disadvantages of online research.

8.2.1 Non-compliance with Website Standards

Standards have been set for websites that provide health information and for websites to be accessible to older people. For providing health information, the Health on the Net Code (HONcode) was published for websites to attain acceptable levels of integrity (Health on the Net Foundation, 1997). The revised balance training website was compliant with 11/14 HONcode standards, and would have achieved a rating of 5/8 if analysed using a checklist from a recent review (S. Whitehead, personal communication, January 09, 2008; Whitehead, Skelton, & Todd, 2008). Complying with all the HONcode standards permits registration as HONcode compliant, which is important as this can be displayed on the website to demonstrate the integrity of its health advice, and will be likely to be deemed more trustworthy by visitors. The website could be improved to meet all the HONcode standards concerning privacy / confidentiality, disclosure of sources of funding, and advertising policy: explicitly stating the policy for the website is to not request personal information or contact details that could be linked with their medical information; explicitly stating that the website was developed free of charge by RioMed, and that the researcher was funded by the Economic and Social Research Council; and stating that the website does not display advertising. All three of these statements should be made on every webpage.

For website accessibility, the National Institute on Aging (NIA) and National Library of Medicine (NLM) (2002) published a checklist to aid website developers to make their websites 'senior friendly'. Complying with all of the NIA & NLM standards are important for increasing the usability of the website. The revised balance training website was compliant with most of these standards, and would have achieved a rating of 26/31 if analysed using a checklist from a recent review (S. Whitehead, personal communication, January 09, 2008; Whitehead et al., 2008). The website could be improved by using more readable text and more usable navigation: double-spacing the body text, providing previous and next buttons to ease navigation of webpages, providing a site map, using icons with text as hyperlinks, and providing a telephone number for questions and comments.

8.2.2 Fusion of Interactivity with Tailoring

In order to provide tailored information to an individual, it is necessary to engage the individual by asking them to complete a questionnaire to determine what messages to present to them. The very act of completing a questionnaire - and even more so with this website as the questions were spread across the webpages – would engage the user in the advice, and in turn increase the likelihood they would centrally process the advice, which would make the advice more persuasive (Petty & Cacioppo, 1986; Petty et al., 1994). Thus, active participation in health promotion should be more effective than passively receiving advice. Indeed, from a review of 217 nutrition education studies with strong evaluation designs, among the recommendations was to encourage active participation in educating people in nutrition, not only for activities, but in analysing current eating and goal setting (Contento et al., 1995). Although there is an inevitable fusion of interactivity and tailoring, this questions the extent that tailoring is persuasive in isolation from the effect of active participation.

8.2.3 Self-selection Bias

The samples recruited were limited as they were vulnerable to the common self-selection bias that occurs in sampling human populations (Braver & Bay, 1992), in that it is likely that those least likely to participate in balance training interventions are also less likely to participate in studies evaluating a balance training website. Indeed, the ecological validity of health interventions that use the Internet to communicate advice has been questioned by a study conducted in the USA. Dutta-Bergman (2004) has shown through a population-representative postal survey that people who search for health information online are more likely to be responsive to an online health intervention. In addition, population case-controlled studies have shown that those at a reduced risk of falling are more likely to be currently engaged in healthy behaviours such as using proactive coping strategies when under stress, engagement in social activities, sleeping 7/8 hours per night, and taking sunscreen precautions when outdoors (Peel, McClure, & Hendrikz, 2006, 2007). This means that online intervention studies may not contribute to our understanding of how to motivate people to become healthy who are currently not inclined to do so. For the current research, this limitation was compounded by the use of nonprobability sampling, where for quantitative studies, it is unknown how representative the sample is in relation to the population to be generalised to (Robson, 1993). Thus, for the older people recruited in the quantitative studies, not only is it unknown how representative their reports are of the older population in the UK, it is likely that self-selection bias occurred, and so it is unknown how efficacious the balance training website would be with older people who are less interested in carrying out balance training.

For the qualitative studies, the use of nonprobability sampling methods is not a hindrance to interpreting the findings. This is because qualitative research is used to answer different research questions, which explore examples of experiences that can provide greater insight into phenomena (Camic et al., 2003; Yardley, 2000; Yardley & Bishop, 2007). Such experiences are not intended to be representative of the population, but provide greater depth and meaning to phenomena (Eisner, 2003). Thus, whilst different findings would have been obtained from different samples than the ones recruited in the qualitative studies (e.g. a sample of older people who were less experienced with computers), this is inevitable in qualitative research.

Whilst the above limitations were applicable to both the qualitative and quantitative studies, the remaining limitations only concerned the two quantitative studies.

8.2.4 Potential Misdirection of Home Hazard Reduction Advice

The advice concerning home hazard reduction was only presented to those that self-rated their balance as having some problems. Since the website was developed, a review has found that environmental factors appear to be of more relevance to falls risk for those that are more active (and would self-rate their balance as good or quite good), because they take more risks, e.g. in ascending ladders (Todd et al., 2007). Thus, perhaps the website advice on home hazard reduction was misdirected and should have been presented to those who did not self-rate their balance as having some problems. However, it is possible that whilst home hazard reduction should be directed to those that are more active, this group may also be the most resistant to the advice, because it is not the environment per se that causes falls, but its interaction with the older person's behaviour, health status, and mobility (Todd et al., 2007). This could explain why home hazard reduction interventions have been more successful in reducing falls among those who have a history of falls (Todd et al., 2007; Tse, 2005). Further research is required to explain the mechanism(s) by which home hazard reductions help prevent falls (Todd et al., 2007), especially as such interventions in the community have only reduced falls when part of a multi-factorial intervention (Tse, 2005). Further research could also investigate the acceptability of home hazard reduction advice. Two home modification interventions in Australia, although criticised as having inflated outcome results (Cameron, Kurrle, & Cumming, 1996; Gill, 1999), were well received with an acceptance rate of 90% out of 4,000 homes (Thompson, 1996), and only a dropout rate of 4.7% (Cumming et al., 1999). However, older people can be resistant to making changes to their home (Downton, 1993; Simpson et al., 2003), as they already view their homes as safe despite being potentially hazardous (Carter, Campbell, Sanson-Fisher, Redman, & Gillespie, 1997).

8.2.5 Interviewer Bias

For the qualitative studies reported in Chapters 4 and 6, the researcher who co-developed the website with his supervisor was the interviewer, and this was made known to participants at the recruitment stage. This may have provoked the participants to provide socially desirable comments, to provide positive and not negative feedback about the website (Fife-Schaw, 2000). It is unknown whether the participants would have provided similar comments to a researcher not involved with the development of the website (or at least that the participants believed the interviewer was not involved). However, the findings from the studies do contain negative feedback, and participants appeared comfortable in providing both positive and negative comments. The remaining limitations were pertinent to the quantitative studies only

8.2.6 Including those who were and were not Currently Engaged in Balance Training Activities in the Same Sample

For the quantitative studies, the samples were recruited with no distinction between participants who were already performing the frequency, intensity, and duration of balance training required to improve their balance and those that were not. Likewise, selections on the website did not distinguish between participants who selected an activity that they were already performing, or an activity that they wished to restart or start for the first time. Recruiting participants who are already engaged in balance training activities in the same sample as those who are not may dilute the effect of tailoring, because tailoring is likely to have little effect on those already active as they do not need to change their behaviour (Ryan & Lauver, 2002).

However, further analysis of the data from the final quantitative study (Chapter 7) indicated that participants who were currently carrying out relatively more balance training reported more positive attitudes towards continuing or undertaking further balance training. As 94.5% of the tailored group were not currently performing enough balance training to improve their balance, and only 15% were in agreement with at least three of the four statements indicating current balance training activity, it is argued that the effect of tailoring on making balance training motivational advice more persuasive was not confined to those currently carrying out enough or nearly enough balance training to improve their balance. Further research could measure current level of activity in generic advice comparison groups, to make possible the analysis of potential interaction effects of advice condition with current level of balance training activity.

8.2.7 Use of Insensitive Measures

The quantitative studies used two short questionnaires using single-item measures for each variable. Single-item measures have been criticised for their lack of sensitivity. For example, with self-efficacy, it has been noted that single-item measures are unable to distinguish between self-efficacy on different tasks that may be more or less demanding, and therefore require different levels of self-efficacy (Bandura, 1997). The short questionnaires were used in these studies to reduce attrition rates, as the questionnaires were presented after the participants had received the advice, and the more questions the more laborious completion of the study would be for the participants. In addition, the quantitative studies used six- and seven-point scales for the dependent variables. Scales using 10 or more scale points have been recommended in order to increase sensitivity, such as when measuring self-efficacy (Bandura, 1997). However, larger scales can be confusing for some older people, and some older people have been found to prefer smaller scale-points in questionnaires (Kirby, Coleman, & Daley, 2004). Nevertheless, where practical, future research could use more sensitive measures to evaluate tailored advice.

8.2.8 Use of Self Reports

Self-reports cannot be guaranteed to reflect the participants' true attitudes, beliefs, and intentions (Robson, 1993). Indeed, participants may have felt provoked to respond to the website's post-advice questionnaires in a socially desirable manner (Fife-Schaw, 2000), by reporting more positive attitudes towards the advice. Despite the limitations of using self-reports, self-report data was the only feasible way of measuring the effect of tailoring on psychological constructs, such as the intention to undertake balance training.

8.2.9 Lack of Process Data

Process data is as important to capture as outcome data, as it helps to explain what factors led to a change in outcomes observed. For example, Danaher and colleagues found that whilst a more interactive version of a website providing smoking cessation advice would be predicted to be more persuasive, it was also accessed more times and for longer than a less interactive version (Danaher, Boles, Akers, Gordon, & Severson, 2006). Thus, an intervention obtaining only outcome data may find an interactive version of the advice to lead to greater behaviour change, but be unaware that the comparison is of different versions of the advice *plus* different usage of the advice. Another study found a pattern in usage of health advice. It was found that of the participants that accessed a website providing physical activity advice, 77% of hits occurred in the first 2 weeks of the 8 week intervention, and 42% of these were from participants in the action or maintenance stages of change (Leslie, Marshall, Owen, & Bauman, 2005). A study conducted in the Netherlands also found differences in participants who repeatedly accessed a tailored health advice website (Verheijden, Jans, Hildebrandt, & Hopman-Rock, 2007). Those who revisited the website were significantly more likely to be aged 41 or above, overweight or obese, a former smoker or had never smoked, insufficiently physically active of a moderate intensity, and had a sufficient intake of vegetables. These studies show that selective retention in web-based health behaviour change interventions is as important an issue as selective uptake.

Whilst the qualitative studies reported in this thesis provide data as to how older people and health and social care providers experienced the tailored balance training website, the quantitative studies were limited in that they did not capture process data. It was unfortunate that a complete dataset of web logs was unavailable to analyse in conjunction with the participants' self-reports. The data was unavailable for two reasons. First, participants were unidentifiable on the web logs, because no identifier was recorded in the data automatically sent to the spreadsheet when participants accessed the website. Without an identifier for each participant, there was no means of matching participant inputs into the website with the web log data. This data would have been particularly useful in identifying how many adults reporting an age of 60 and above visited the first three webpages but did not proceed to receive the advice. Second, because the tailored webpages were able to present different advice on the same webpage simultaneously to multiple users, the webpages were programmed to be dynamic. Whilst this made it possible to tailor the advice to the user, it meant that a web log was not available for the tailored webpages. This was unfortunate, as if the web logs were available for each webpage, this would have allowed for an analysis of the dropout rate of each webpage, and an analysis of how long participants accessed each webpage.

8.2.10 Disadvantages of Online Research

In Chapter 1, the advantages and disadvantages of using the Internet in psychological research were summarised. For the advantages, it was noted that online research can facilitate recruitment and make research more economical, and enhance internal validity by removing experimenter bias and because unmotivated participants are more likely to dropout out. For the disadvantages, the researcher had less control over the conditions under which the balance training website users participated. It cannot be ruled out that people other than adults aged 60 and above were participants, and that participants viewed the website in different ways due to technical variance (e.g. accessing the website using a Firefox browser rather than Internet Explorer). However, because the quantitative studies randomly assigned participants to one of two conditions, it can be assumed that participants not meeting the inclusion criteria and technical variance were equally distributed between the two conditions.

To add to the limited generalisability of the samples recruited because of convenience sampling and self-selection bias, online studies have higher dropout rates, and the demographic profile of Internet users is not representative of the UK population. Thus, users that continued through the website to provide data were more likely to be interested in balance training (self-selection bias to continue through the website in addition to self-selection bias to accessing the website), and were more likely to be white, married, highly educated, living in an urban area, relatively younger, and on higher retirement incomes (Adler, 2002; Fox, 2004; Fox et al., 2001).

8.3 Reflections on the PhD

Besides the limitations identified above, in hindsight, if this programme of research was conducted again, there are three main decisions that would be made differently. First, the development of the website would be started later. For this research, because an external IT company was used for the website programming, the researcher had to be flexible to accommodate the IT programmer's timetable, especially as the IT company provided the programming free of charge. The programmers wanted to start work before this research programme began, and so website development began at the very beginning of this research. Ideally this work would have started after more background reading and initial chapters of the thesis had been written. A more thorough immersion in the health psychology literature may have facilitated the development of the website in a manner that was more theory-based, e.g. in using the theory of planned behaviour or social cognitive theory to design how the advice was presented and variables upon which to tailor to participants. Consequently, a more theory-based design could have led to the use of a validated scale attached to the theory used for the quantitative study reported in Chapter 5. In addition, more time would have been available to ensure that standards such as the HONcode NIA and NLM's senior friendly checklist were fully adhered to.

Second, for recruitment of participants, especially for the final study, the researcher would more candidly introduce himself to potential participants and participants as a researcher not involved with the development of the website. This would help to reduce the experimenter effects in the qualitative studies, and reduce socially desirable in responses in the final study.

Third, the action plan would be included in the generic webpages. This would be introduced after the questionnaire concerning post-advice beliefs, attitudes, and intentions for comparison with the tailored group. As with the tailored group, two post-action measures would be presented participants assessing the effect of the action plan on perceived confidence and intention to undertake balance training. Including the action plan in the generic webpages could test whether those in the tailored group report higher levels than the generic group of confidence and intention to undertake balance training after completing an action plan.

8.4 Implications

In light of the above limitations of the studies in this research, and how the PhD would be conducted differently if given the opportunity, the results of the empirical studies of this research are summarised with a discussion of their implications. The four studies are discussed in the following order: qualitative study recruiting older people, qualitative study recruiting health and social care providers, and the two quantitative studies.

8.4.1 The Acceptability of the Tailored Balance Training Website: A Qualitative study

From the first study, reported in Chapter 4, whilst further quantitative studies with representative samples would need to be carried out to generalise the findings to older people in the UK, the data suggests that the website could well be usable and acceptable to older people. Only one usability issue was identified regarding participants inputting the date to start their action plan, which was addressed in revising the website. The website advice also appeared to be acceptable, without the participants perceiving it as concerning falls prevention. This was in contrast to a previous study, that found when presenting older people with generic falls prevention advice, that some viewed the advice as either common sense and potentially patronising, or frightening and oppressive (Yardley & Todd, 2005).

However, as noted above, there may have been a bias to positive evaluations of the website, using a self-selected sample that may have been more likely to find the website usable and acceptable, and most of whom were already physically active. Recruiting participants representing different ethnic groups and older older people may have yielded different comments. Also, the interviewer may have provoked socially desirable comments as he co-designed the website. In addition, the qualitative study raised three concerns with the website based on the participants' comments. First, some older adults perceived that they were too old for some activities, and this may be a reflection of an awareness of their limitations, or an unnecessary restriction of their activities, perhaps due to fear of falling. Second, some participants perceived that they were doing enough balance training, which was an overestimation for the majority of participants. Third, it some participants were not aware of Tai Chi. These three concerns highlighted the need to foster greater awareness among older people about what activities – including less strenuous ones – help improve strength, balance, and coordination; the required frequency, duration, and intensity of such physical activities to improve balance, and the further information about Tai Chi.

8.4.2 Health and Social Care Providers' Views and Use of the Tailored Balance Training Website

The implications of both the qualitative studies with health and social care providers, reported in Chapter 6, are that tailored advice to motivate older people to undertake balance training presented on the Internet may be supported by health and social care providers. In Study 1, from the online questionnaire reports, the participants found the website to recommend activities that are suitable for older people in improving balance. Study 2 found that although the sheltered housing wardens noted that currently most older people are not online, they appeared willing to promote the website among their residents and assist those who were not computer literate. It is likely that the sheltered housing wardens came into contact with older people representing a broader range of health, independence, and balance ability, and therefore were more positive about the usefulness of the website as it is targeted to younger and fitter older adults.

However, as with the qualitative study recruiting older people, there may have been a bias to positive evaluations of the website, using a self-selected sample that may have been more likely to find the website usable and acceptable, and the interviewer provoking socially desirable comments as he co-designed the website. Study 1 also only recruited a very small sample, and so the views provided in the online questionnaire and telephone survey may not be representative of health and social care providers working with older people across the UK.

In addition, study 1 raised concerns about the website. Participants were less likely to refer the website to older people than work colleagues and suggested the use of prescribed tailored programmes of exercises or an advice sheet / booklet of exercises. Study 2 raised concerns about the website also. The website did not have a universal appeal, in that three participants were not confident with using the computer and so asked the researcher to do this for them, and those that did not use computers were less likely to promote it. Some wardens noted how at present, most older people are not computer literature, and that there is not the facility in every sheltered housing unit for a communal computer for residents to use. Three groups of older people were reported as groups to target in promoting the website (those who are physically active, those that own a computer, and those that have balance problems), meaning that the website would not be promoted wholesale to their residents. Some also commented that the website could have more gentle activities, which was addressed in the revised version.

8.4.3 The Efficacy of the Tailored Balance Training Website and the Revised Tailored Balance Training Website

The theoretical implications of the two quantitative studies, reported in Chapters 5 and 7, are that they provide some support for tailoring theory and the elaboration likelihood model to explain the efficacy of tailoring (Kreuter et al., 2000b; Petty & Cacioppo, 1986). The main clinical recommendation from these studies is that tailoring advice to motivate older people to undertake balance training, as from the meta-analysis of these two studies, may lead to greater personal relevance of the advice and intention to undertake balance training. Stronger evidence was found from both studies that the inclusion of an action plan is likely to lead to greater confidence in undertaking balance training. The revised website evaluated in Chapter 7 provided weaker evidence for the use of tailoring when encouraging older people to undertake balance training; a result not easily explained. Further research could explore why the revised website produced weaker results, and may investigate whether the difference in result was due to a change in outcome measure, sample, or limitations in the website or study design.

However, as with the qualitative studies, the samples for the quantitative studies were self-selected, and therefore likely to be biased to older people who are motivated to undertake balance training and respond positively to the website advice. The measures used to evaluate the advice were self-reports using insensitive items. With the experiments conducted online there was less control over the conditions in which older people completed the website and evaluation items, although with the randomisation to conditions (tailored or generic), this effect is likely to have been equally distributed between groups to not bias the efficacy of tailoring. Because baseline measures were not collected, it is uncertain whether the difference between the tailored and generic groups was caused by the tailoring and not because of differences that already existed at baseline, although again, because participants were randomised to conditions, this is unlikely. Another limitation is that because those who were already active were included in the sample, it is unclear whether the efficacy of tailoring speaks to those undertaking balance training for the first time, those who are continuing with current balance training, or those who are increasing on their current level of balance training.

8.5 Recommendations for Policy / Practice

If the final study found similar or more positive results than the study reported in Chapter 5, then stronger recommendations could be made for tailoring advice for increasing intention to undertake balance training. However, from the current research, for policy and practice it is recommended that:

1. Where appropriate, new technology should be considered when communicating advice to older people that seeks to encourage them to undertake balance training, as websites such as www.balancetraining.org.uk can be usable and acceptable to older people and health and social care providers that work with them. Whilst currently a minority of older people will have access to the Internet, access to the Internet is increasing and will be a very useful means of communicating with future cohorts as they enter into retirement age.

2. Where appropriate, older people should be encouraged to construct an action plan, as this is likely to help increase their confidence in their intention to undertake balance training.
3. When communicating advice on balance training, the use of a tailored approach should be considered, as it is possible that this might be more persuasive by increasing the personal relevance of the advice, therefore increasing engagement with the advice, and therefore greater intention to undertake the activities recommended in the advice.

The above recommendations may be relevant to health promotion contexts with older people on other health conditions, such as general exercise, and other measures for preventing falls (e.g. improving nutrition and use of assistive devices, and specific exercises that are helpful for preventing falls for those suffering health conditions such as osteoporosis).

8.6 Future Research

The current research has raised several avenues that future research could pursue. These include investigating the impact of tailored advice to motivate older people to undertake balance training on actual behaviour, how much tailoring is required and different ways of tailoring, and research with ethnic minority groups.

8.6.1 Investigating Actual Behaviour

The research presented in this thesis has investigated the impact of tailoring on older people's immediate reaction to the advice and their intention to undertake balance training, which may not relate to the participants' actual behaviour. Whilst this phase of research was necessary, the next phase would measure behaviour change several weeks and months after receiving the advice, to assess whether the advice led to an increase in balance training activity (Medical Research Council, 2000). Follow-up data could be measured using self-reported physical activity using the Stanford 7-day activity Physical Activity Recall Questionnaire (although it needs amending to be self-administered) or the Community Health Activities Model Program for Seniors Questionnaire (although its reliability needs improving) (Jørstad-Stein et al., 2005). Future research could also use objective measures to measure whether older people have engaged in adequate balance training (and not rely on self-reports as mentioned above), by measuring changes in balance ability and therefore changes in falls risk [e.g. test muscle force, reaction time, and balance, using the physiological profile assessment (Lord, Menz, & Tiedeman, 2003)].

8.6.2 How much Tailoring is required and different ways of Tailoring

Further research could investigate how much tailoring is required to increase the personal relevance of advice, over what period of time, and for how long the effects last for (Kreuter & Holt, 2001). It would be assumed that providing advice on more than one occasion or making it available over a period of time would lead to greater uptake. However, a previous study found that dividing up and delivering advice over a period of weeks led to lower uptake of physical activity than presenting all the advice at once (Owen, Lee, Naccarella, & Haag, 1987). Thus, further research is required to determine how best to present tailored advice to motivate older people to undertake balance training.

Advice to motivate older people to undertake balance training could be tailored according to other factors than those used in this research. Different theories of behaviour change could be used, for example, previous tailored physical activity interventions have been based on the TPB (Spittaels & De Bourdeaudhuij, 2006; Vandelanotte et al., 2005) and social cognitive theory (Bull et al., 1999a; Campbell et al., 2004; Williams et al., 2006). Out of these five studies, four studies generally found results in favour of tailoring physical activity advice. It is perhaps the fusion of tailoring with behaviour change theory that led to the success of previous studies and the current research. Further research could determine the optimum mix of tailoring with behaviour change theory, as poor content that is tailored will not be persuasive; nor will sound content that is not engaging (Hurling et al., 2006).

Tailoring could be made according to other factors such as cultural norms and values (e.g. collectivism, racial pride, religiosity) (Kreuter, Lukwago, Bucholtz, Clark, & Sanders-Thompson, 2003) or individual learning style (participatory, observational, abstract, concrete) (Kreuter & Holt, 2001). Tailoring could also be trialled in different settings in the community (e.g. on public transport and in supermarkets), and delivered on different platforms (e.g. using mobile technology) (Kreuter et al., 2000a). Indeed, advances in technology will open up new avenues for presenting advice. For example, Diefenbach, Butz, and Mohamed (2007) have developed a CD-ROM intervention that presents health advice in a virtual health centre, which makes use of video clips and tailors advice to the user's health information processing style (Miller, Fang, Diefenbach, & Bales, 2001).

8.6.3 Research with Ethnic Minority Groups

Further research could also investigate what factors are pertinent to enhancing tailored advice to motivate older people to undertake balance training among different subgroups. Sociodemographic factors such as gender and culture may be important factors upon which to tailor advice to motivate older people to undertake balance training (Horton, 2006; Scott, 2007; Todd et al., 2007), and interventions may need to be targeted to those at lower levels of socio-economic status who are less robust to the impact of a fall due to poorer health (Todd et al., 2007). A particular factor that may be important in tailoring advice to motivate older people to undertake balance training is ethnicity. Current research suggests that Caucasians generally have higher rates for falling, although most studies have been conducted in the USA, and some studies have conflated rural vs. urban dwelling with ethnicity (Todd et al., 2007). A recent study suggests that whilst some older people from ethnic minority groups express similar views to the older people reported in previous studies, they would prefer physical activities that are culture-specific (Belza et al., 2004). Activities were suggested to be made culturally specific by using an instructor who speaks the native language and incorporates traditional song and dance into the physical activities. Other studies also suggest that adherence to advice may be facilitated if advice givers are sensitive to cultural variances in how older people evaluate their health, values such as the role of the family in care giving, and needs such as eating and food preparation (McMullen & Luborsky, 2006; Temple, Glenister, & Raynes, 2002).

8.7 Conclusion

This thesis presented the evaluation of a website designed to encourage older people to undertake balance training for the prevention of falls. This chapter summarised the findings of the empirical studies, their limitations, and the implications of the results. A number of limitations were identified that raise caution to the interpretation of the results, including the following: the name of the website, non-compliance with website standards, fusion of interactivity with tailoring, self-selection bias, interviewer bias for the qualitative studies, and for the quantitative studies: including those that were and were not currently engaged in balance training activities in the same sample, the use of insensitive measures, the use of self-reports, the potential misdirection of home hazard reduction advice, the lack of process data, and the disadvantages of online research.

From the qualitative studies, it appeared that the balance training website may well be usable and acceptable to older people and health and social care providers. Sheltered housing wardens were willing to promote the website and assist older people who are not computer literate. However, further work is required in promoting balance training to people who feel too old to do balance training, who believe they do enough balance training to improve their balance, and to raise awareness of the benefits of Tai Chi for improving balance. From the quantitative studies, support was found for the use of tailoring and the elaboration likelihood model to explain its efficacy. From the meta-analysis of the two studies, it is likely that tailoring will lead to greater personal relevance of the advice and intention to undertake balance training, and the use of an action plan will increase older people's confidence in undertaking balance training. www.balancetraining.org.uk is a new resource to help motivate older people to engage in balance training. It is argued that the tailored website may well be usable and acceptable among older people and health and social care providers who work with them, and that the tailored advice with an action plan may lead to increased intention and confidence to undertake balance training.

APPENDICES

Appendix A. Interview Schedule

Date/Time:

Participant ID No:

Age:

Gender:

General Health:

Age when left education:

Dwelling: Community / sheltered accommodation

IT experience:

During Think Aloud

Once the participant has notified the researcher that they have reached the end of webpage 2, type in the following uniform resource locator (URL) to skip the randomisation to either the tailored or generic webpages, and ensure that the participant enters the tailored webpages:

`http://www.balancetraining.org.uk/fallsAdvice/03_myDetails.jsp`

Semi-structured Interview Questions

1. Did you agree with all the advice the website gave or not?
2. Was the advice the website gave suitable for you or not?
3. Would you follow the advice the website gave or not?
4. Was there too much or too little advice?
5. How would you describe the website to a friend?
6. Is there any way you think the website could be improved?
7. Would you go to this website normally if you were not asked to for this study?
8. How would you search to find the website?

Appendix B. Advertisement Poster

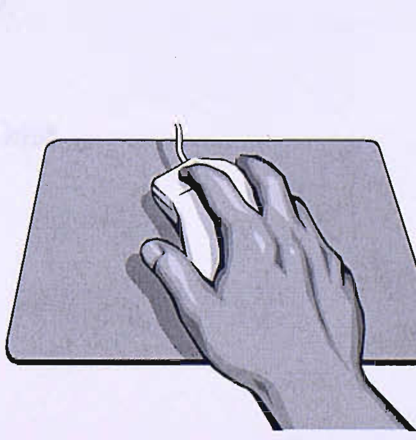
Aged 60+ and Use the Internet?

The University of Southampton has set up a website giving preventive health advice for adults aged 60+. It would be very helpful if some people in this age group could have a look at it, and tell us what they think and how it could be improved.

You don't need to be a computer expert – you just need to have some experience of using the Internet. The interviews will take a maximum of 60 minutes, and will be held at the University of Southampton in Highfield.

If you can help, please contact me to arrange a time that is good for you. Thank you.

Sam Nyman
Tel: (023) 8059 8721
(day time)
Email: srn103@soton.ac.uk



Appendix C. Consent Form

Older Adults' Views on a Website providing
Tailored Balance Training Advice
Consent Form for Research Participants

I am a postgraduate student at the school of psychology, University of Southampton. I am requesting your participation in a study regarding what older adults think about a website giving tailored balance training advice.

This will involve you taking part in one interview. The interview will consist of you going through a website from start to finish, and speaking aloud what you think as you go along. Once you have finished going through the website, I will ask you a few general questions about the website. All your comments about the website will be audio-recorded. The interview will last for a maximum of 60 minutes.

There are no right or wrong answers, and this is not a test. This study simply aims to find out what you think about the website, so that we can improve it.

Personal information will not be released to or viewed by anyone other than myself, or my supervisor involved in this project. Results of this study will not include your name or any other identifying characteristics.

Your participation is entirely voluntary and you can leave at any time. If you have any questions please ask them now.

Signature Date

Name Mr Sam Nyman

Statement of Consent

I ________________________ have read the above informed consent form.

I understand that I may withdraw my consent and leave at any time without penalty or loss of benefit to myself. I understand that data collected as part of this research project will be treated confidentially, and that published results of this research project will maintain my confidentiality. In signing this consent letter, I am not waiving my legal claims, rights, or remedies. A copy of this consent letter will be offered to me.

(Circle Yes or No)

I give consent to participate in the above study. Yes No

I give consent for any comments I make to be anonymously quoted word-for-word in this study, and any further studies which may be published

Yes No

I give consent to be audio-taped Yes No

I understand that these audio-tapes will be destroyed after analysis

Yes No

Signature Date

Name

I understand that if I have questions about my rights as a participant in this research, or if I feel that I have been placed at risk, I can contact the Chair of the Ethics Committee, School of Psychology, University of Southampton, Southampton, SO17 1BJ. Tel: (023) 8059 3995.

Appendix D. Instructions to Participants

I would like you to look at a website providing health advice that has recently been developed at the University of Southampton. It is a website designed for adults aged 60 and above. As it is a new website, the university needs members of the public to go through the website and say what they think of it. Any difficulties or problems that people have in going through the website can be used to improve the website. Although I will be asking you questions, I will need you to go through the website as if I'm not sat next to you (I won't be able to answer questions or provide any help once you have started).

I would like you to start with the first page, and work your way through the different screens. As you are doing this, I would like you to 'think aloud'. By 'think aloud', I mean that I want you to speak out loud all the thoughts you have whilst looking at the screen. I am interested in your thoughts as they come, so don't worry about trying to plan what you will say or explaining what you are saying, just simply say what you are thinking at that time. Please say what you think about the advice – whether it makes sense, whether you agree with it, whether you would follow it, etc. I will record everything you say on the audio-cassette recorder in front of you. Please try and speak loud and clear. After you have finished going through the website, I will ask you a few general questions about the website. Do you have any questions before you start?

Appendix E. Debrief Form

Older Adults' Views on a Website providing Tailored Balance Training Advice

Debrief Form for Research Participants

The aim of this research is to find out what older adults think about a new website that gives tailored balance training advice to older adults. This study aims to find ways of improving the website, so that the information is better received by older adults.

The results of this study will not include your name or any other identifying characteristics. You may have a copy of this summary if you wish, and also a summary of the results of my study once it has been finished.

If you have any further questions please contact me, Mr Sam Nyman, on telephone: (023) 8059 8721, and/or email: srn103@soton.ac.uk.

If you have questions about your rights as a participant in this research, or if you feel that you have been placed at risk, you may contact the Chair of the Ethics Committee, School of Psychology, University of Southampton, Southampton, SO17 1BJ. Tel: (023) 8059 3995.

Appendix F. Coding Manual for the Think Aloud Analysis

1. Usability

Title	*Description*
Corrections	
Option to increase text size applies to text on page, but not text in text boxes	After clicking on the increase text size option, state that it has not increased the text size within the text boxes (although has increased the text size in the main text), or ask the researcher if the text size in the text boxes increases.
Participants unable to complete the action plan – typing date in incorrect format	Clicking to move on to webpage 10, however, the website does not allow them to do so because they have not completed the date box in the action plan in the format required, and the participants' subsequent trouble-shooting to resolve this problem.
Issues for this website	
Participants not scrolling down to advance in the website	Participants not scrolling down the webpage, and stating that they are unsure of where to click next, or asking the researcher where to click next to advance in the website.
Participants unsure what constitutes the 'poor vision' health condition option	Stating that they are unsure of how to respond, or asking the researcher how to respond to the medical question concerning poor vision.
Participants confusing suggestions for a balance training goal as options to select	Participants attempting to click on the suggestions to make them appear in the

	text box, or to drag them into the text box, instead of typing in the text box.
Issues applicable to websites targeting older adults	
Participants' lack of experience in using a mouse	Participants showing difficulty in moving the cursor or clicking the mouse buttons to make their selections, characterised by mistakes or making several attempts.
Participants' inability to respond to an Autocomplete prompt	Participants stating they are unsure how to respond, or ask the researcher how to respond to the Autocomplete prompt.
Participants' inability to respond to an Internet explorer prompt	Participants stating they are unsure how to respond, or ask the researcher how to respond to the Internet explorer prompt.

2. Reasons for Inputs into the Interactive Sections

Data to be input	*Title*	*Description*
	I'm not as active as I used to be	Stating that they are not as active as they were, or that they no longer perform an activity.
	Vigorous activity is too strenuous for older people	Stating that a suggested activity would be too strenuous for them or an older person.
	Cycling is too dangerous for older people	Stating that it is too dangerous for them or older people to cycle, due to ageing reducing their or older people's ability to make swift manoeuvres on the busy roads.
	Already do balance training activities	Stating what activities they currently perform, or that the

Data to be input	*Title*	*Description*
		activities they have selected are the ones they are currently performing.
	Do not have details of classes I want to attend	Stating that they do not know the details of the class they wish to attend (if a class runs near to them, and if so where and when), and how this hinders their ability to input truthful selections into the website.
	Do not keep to a routine	Stating that they do not keep to a rigid routine, or keep to a very flexible routine, or that their routine can often be different each week, and how this affects their ability to input truthful selections into the website.
Perceived balance ability (good, quite good, or have some problems)	Quite good – have not got any balance problems	Stating that their balance is quite good, and that they do not have, or that they are not aware that they have any balance problems.
Perceived balance ability (good, quite good, or have some problems)	Have some problems - awareness of balance problems	Stating that they have some balance problems, and an awareness that on occasion they might fall, or put themselves in situations where they might fall.
Health conditions	Have not got poor vision as wear glasses	Stating that they have not or cannot have poor vision as they are wearing glasses (that corrects their vision back to healthy acuity)
Health conditions	Dizziness is only	Stating that they suffer from

Data to be input	*Title*	*Description*
	occasional	dizziness, and that they only suffer from it rarely / occasionally.
Goal for balance training	Do not need to improve balance	Stating that they are content with their current state of health, or that they do not want/need to receive any advice, or that they are not like others who need advice with regard to their balance.
Selection of balance training activities	Enjoy the activities	When referring to an activity they state that they like it, are interested in it, or enjoy it.
Selection of balance training activities	Interested in Tai Chi	Stating that they are interested in Tai Chi, state that Tai Chi would be good, they would like to do Tai Chi, or that they would be interested in Tai Chi if they had more information about it.
Selection of balance training activities	Cannot do much housework	Stating they are currently unable to perform much housework due to an illness, whether acute or chronic.
Details to create an action plan	Add activities into days currently not busy	Stating that they will do their planned activity on certain days, because they are busy on the other days of the week.

3. Reaction to Advice

Title	*Description*
Balance ability is not something I've thought about before	Stating that balance ability is not something they had thought about before accessing the website.
Older people need to stay active	Stating that older people need to stay active to maintain their mobility or independence, or simply stating that exercise is important.
Retaining good balance is an important issue for older people	Stating that as they have entered old age their balance is not as good as it was, and this is something that they or others are to be aware of to prevent falls.
Advice on diet is missing	Observing that the website does not provide advice on diet, or suggesting the inclusion of advice on diet in the website.
Would need to be motivated to perform balance training	Stating that it requires motivation to prioritise balance training, or to keep balance training in their routine.
I'm too old for Tai Chi, Yoga, or Pilates	Stating that they are too old to be able to perform Tai Chi, Yoga, or Pilates.
Unfamiliar with Pilates	Stating they are unfamiliar with Pilates, in that they have not heard of it before, or do not know what it is.
The advice does not apply to me	Stating that the advice does not apply to them, because they are already active and or independent.
Wary of meditation, used in Tai Chi and Yoga	Stating they are wary of Tai Chi and Yoga because these activities use meditation, and they are not sure what it entails, or are fearful that it may be harmful.

Appendix G. Coding Manual for the Semi-structured Interview Analysis

Title	*Description*
Negative comments	
Not as helpful for frailer older adults	Stating that the website is less helpful for those who are frail, in that the advice is less suitable for them, as they cannot perform many of the suggested activities.
Older people do not use the Internet	Stating that from older people in general, or from their social network, that older people rarely use the Internet.
Need to use more colour and graphics	Stating that the website could use more colour and graphics, e.g. to keep the interest of the user, or to ease the reading demand on the user, or to make the 'feel' of the website more lively / informal.
Title of website needs changing	Stating that the website needs changing, as the title "balancetraining.org.uk" is insufficient, because it is vague or does not capture enough interest.
Positive comments	
Agree with the advice	Stating that they agreed with the advice the website presented.
The advice was suitable	Stating that they found the website's advice to be suitable to them.
Will follow the advice	Stating that beyond the interview they will follow the advice the website presented.
The length of the website was about right	Stating that the website's length was about right (neither too short nor too long).

Would describe to a friend that the website is informative	Stating that they would describe the website as informative, when describing it to a friend.
Would look at website in my own time	Stating that if they had not taken part in the interview, and incidentally came across the website in their own time, that they would access the website.

Appendix H. Recruitment Broadcast sent by Help the Aged

Dear Colleague

Welcome to the August edition of the Help the Aged Preventing Falls update

....

New website available

A new website is available to older people to help them assess what activities they should undertake to reduce their risk of falling. Designed by the University of Southampton and RioMed, the site is part of a research project that enables older people to identify factors that increase their risk of falling and to plan an exercise programme around their needs and requirements. Visit www.balancetraining.org.uk to find out more.

...

Appendix I. First-stage Recruitment Email for the Online Questionnaires

Email sent to health and social care providers who received the email from Help the Aged or RioMed in the first quantitative study.

To Help The Aged's Distribution List

Dear Colleague

In the August edition of our Falls update, we told you about a new website that is available to older people to help them assess what activities they should undertake to reduce their risk of falling (www.balancetraining.org.uk). The website, designed by the University of Southampton working with RioMed and Help the Aged, has received a lot of interest. To improve the website for future use, the University of Southampton need to find out about how and why you did or did not use the website, what you liked about the website and what you didn't. If you are able to help by giving your views about the website, just fill in their short questionnaire online at [insert weblink].

To RioMed's Distribution List

Dear Colleague

In August, we told you about a new website that is available to older people to help them assess what activities they should undertake to reduce their risk of falling (www.balancetraining.org.uk). The website, designed by the University of Southampton working with RioMed and Help the Aged, has received a lot of interest. To improve the website for future use, the University of Southampton need to find out about how and why you did or did not use the website, what you liked about the website and what you didn't. If you are able to help by giving your views about the website, just fill in their short questionnaire online at [insert weblink].

Appendix J. Telephone Interview Schedule

Consent Form

My name is Sam Nyman, a health researcher at the University of Southampton. I am requesting your participation in a study of health and social care providers' views and use of the balance training website "balancetraining.org.uk". This will involve taking part in a telephone interview that will last for approximately 15 minutes, and will be recorded using a tape recorder. Your personal information will not be released to or viewed by anyone other than my supervisor and I, and the results of this study will not include your name or any other identifying characteristics. In particular, this means that your views will be kept confidential from your colleagues.

Your continued participation in this research will be taken as evidence of you giving informed consent to participate in this study and for your data to be used for the purposes of research, and that you understand that published results of this research project will maintain your confidentially. Your participation is voluntary and you may withdraw your participation at any time. If you have any questions please ask them now.

If you have questions about your rights as a participant in this research, or if you feel that you have been placed at risk, you may contact the Chair of the Ethics Committee at the School of Psychology, University of Southampton. If you would like their contact details, the full address [repeat first part] is Southampton, SO17 1BJ, and their telephone number is (023) 8059 3995.

Questions

The tape recorder is now on and our conversation is being recorded.

1. What was your initial response to hearing about the website, "balancetraining.org.uk"?
    a. Prompt: What led to your decision to look or not look at the website?
    b. Prompt: What were your expectations of the website?
    c. Prompt: [If looked at website] What were your expectations of the rest of the website after looking at the first couple of pages?
    d. Prompt: How do you think your colleagues would view the website?
    e. Prompt: How do you think older people will take to the website?

f. Prompt: How do you think older people will take to balance training?

g. Prompt: What is your view on encouraging older people to use computers?

If referred older people to the website

2. Please tell me how you talked to older people about the website.
   a. Prompt: What were the main features of the website that encouraged you to talk to older people about it?
   b. Prompt: What was the main advice you were trying to get across when you were talking about the website?
   c. Prompt: How did the older people respond to your suggestion?

If did not refer older people to the website

2. Please tell me what your reservations were about talking to older people about the website.
   a. Prompt: What changes would need to be made to the website before you think it could be discussed with older people?

3. What health and social care providers would be able to use the website with older people?

   a. Prompt: [If the participant objects to using the website in its current state] Repeat question starting with "If the website was improved"...?

   b. Prompt: What health and social care providers in *health care settings* would be able to use the website with older people?

   c. Prompt: What health and social care providers in *the community* would be able to use the website with older people?

4. Is there anything about the website that could be improved?
   a. Prompt: Could the advice be better? – How?
   b. Prompt: Could the website be more interesting? – How?
   c. Prompt: Could the website be easier to use? – How?

5. Is there anything else you would like to say about the website that wasn't covered in the previous questions?

Thank you, that is the end of the interview.

The tape is now switched off and our conversation is no longer being recorded.

Debrief Form

Thank you for taking part in this study. Your interview will help us find out how health and social care providers view and use the balance training website. This information will be used to improve the website, so that the website will be of more use to health and social care providers, and that older people will be more likely to look at the website and receive balance training advice. The results of this study will not include your name or any other identifying characteristics, and your views will be kept confidential from your colleagues. If you request it, you may have a copy of the summary of the results of this study when completed. If you have any further questions please contact me, Sam Nyman, at the University of Southampton. If you would like to take my phone number and email address, they are (023) 8059 8721, and Sam.Nyman@soton.ac.uk. If you have questions about your rights as a participant in this research, or if you feel that you have been placed at risk, you may contact the Chair of the Ethics Committee [contact details above]. Do you have any questions?

Appendix K. Second-stage Recruitment Email for the Online Questionnaires

Subject: Balance Training Website – Telephone interview

Dear *

Thank you for completing the online questionnaire regarding the balance training website, "balancetraining.org.uk". At the end of the questionnaire, you provided your email address to be contacted to take part in a telephone interview so that I can find out more about your views of the website.

If you are still able to take part, could you take part in an interview on one of the times below?

*

If so, please email back with a time and confirm that the number I should call you on is: *. If you are not able to take part on one of these days, please advise when would be a convenient time.

If you are to take part in an interview during your working hours, please ask permission if necessary, as I will be unable to fund you for your time. Please also read the attached consent form that provides details of the interview.*

I look forward to hearing from you in the near future.
Many thanks

Mr Sam Nyman
Health researcher
University of Southampton

Appendix L. Coding Manual for the Telephone Interview Analysis

Title	*Description*
1. Interest in the website	
Accessed the website because it is my job	Stating that their reason for accessing the website was related to their current job role.
Accessed the website for my own education	Stating that their reason for accessing the website was to benefit their knowledge of balance training or falls prevention.
2. Usability of the website	
Easy to use	Stating that they found how to use and interact with the website easy to understand.
Easy to read	Stating that the website advice was easy to understand.
Attractive presentation	Stating that they found the presentation of the website to be attractive.
3. Aim of the website	
Good idea	Stating that the website or the idea of presenting balance training advice online was positive.
More older people are using the Internet	Stating that the number of older people using the Internet is increasing.

Will reach young but not old older people	Stating that the website will be reached by younger or fitter older people; or stating that the website will not be reached by older or frailer older people; or making both statements.
My patients do not have computers	Stating that the older people they come into contact with are not computer literate, followed by a description of the kind of older people they come into contact with.
Suggest using an advice sheet or booklet	Suggesting communicating the balance training advice in a paper-based format, either an advice sheet or booklet.
4. Content of the website	
Wanted a tailored programme of exercises	Stating that the balance training advice was not sufficient, and that a tailored exercise programme would have been better.

Appendix M. Interview Schedule for the Face-to-Face Interviews

Before the participant advances to webpage three, type in the following uniform resource locator to skip the randomisation to either the tailored or generic webpages, and ensure that the participant enters the tailored webpages:
`http://www.balancetraining.org.uk/fallsAdvice/03_myDetails.jsp`

1. What was your initial reaction to the website, "balancetraining.org.uk"?
    a. Prompt: What were your expectations of the website?

2. Would you talk to older people about the website?
    b. Prompt: What were the main features of the website that would encourage you to talk to older people about it?
    c. Prompt: What changes would need to be made to the website before you think it could be discussed with older people?
    d. Prompt: How do you think older people will respond to a suggestion to look at this website?

3. What health and social care providers would be able to use the website with older people?
    e. Prompt: [If the participant objects to using the website in its current state] Repeat question starting with "If the website was improved"...?
    f. Prompt: What health and social care providers in *health care settings* would be able to use the website with older people?
    g. Prompt: What health and social care providers in *the community* would be able to use the website with older people?

4. Is there anything about the website that could be improved?
    h. Prompt: Could the advice be better? – How?
    i. Prompt: Could the website be more interesting? – How?
    j. Prompt: Could the website be easier to use? – How?

5. Is there anything else you would like to say about the website that wasn't covered in the previous questions?

6. Can I please take some details about you

- What is your age?
- What age did you finish education?
- How long have you been using computers?
- How long have you been using the Internet?
- How long have you been a sheltered warden?
- How many flats are under your supervision?
- What category is this sheltered housing court?

[Gender and ID Number taken from the spreadsheet containing the data for interactions with the website]

Appendix N. Consent Form for the Face-to-Face Interviews

I am a postgraduate student at the School of Psychology, University of Southampton. I am requesting your participation in a study regarding what sheltered housing wardens think about a website giving tailored balance training advice.

This will involve you taking part in one interview. You will be asked to go through the website and then answer a few questions about your views on the website. All your comments about the website will be audio-recorded and the interview will last for a maximum of half an hour.

There are no right or wrong answers, and this is not a test. This study simply aims to find out what you think about the website, so that we can improve it.

Personal information will not be released to or viewed by anyone other than myself, or my supervisor involved in this project, and so your views will be kept confidential from your colleagues. Results of this study will not include your name or any other identifying characteristics.

Your participation is entirely voluntary and you can stop the interview at any time. If you have any questions please ask them now.

Signature Date

Name Mr Sam Nyman

Statement of Consent

I __________________________ have read the above informed consent form.

I understand that I may withdraw my consent and leave at any time without penalty or loss of benefit to myself. I understand that data collected as part of this research project will be treated confidentially (and kept private from my colleagues), and that published results of this research project will maintain my confidentiality. In signing this consent letter, I am not waiving my legal claims, rights, or remedies. A copy of this consent letter will be offered to me.

(Circle Yes or No)

I give consent to participate in the above study. Yes No

I give consent for any comments I make to be anonymously quoted word-for-word in this study, and any further studies which may be published Yes No

I give consent to be audio-taped Yes No

I understand that these audio-tapes will be destroyed after analysis Yes No

Signature Date

Name

I understand that if I have questions about my rights as a participant in this research, or if I feel that I have been placed at risk, I can contact the Chair of the Ethics Committee, School of Psychology, University of Southampton, Southampton, SO17 1BJ. Tel: (023) 8059 3995.

Appendix O. Debrief Form for the Face-to-Face Interviews

The aim of this research is to find out what sheltered housing wardens think about a new website that gives tailored balance training advice to older adults. This study aims to find ways of improving the website, so that the information is better received by older people and health and social care providers working with older people.

The results of this study will not include your name or any other identifying characteristics, and your views will be kept confidential. You may have a copy of a summary of the results of my study once it has been finished.

If you have any further questions please contact me, Mr Sam Nyman, on telephone: (023) 8059 8721, email: Sam.Nyman@soton.ac.uk.

If you have questions about your rights as a participant in this research, or if you feel that you have been placed at risk, you may contact the Chair of the Ethics Committee, School of Psychology, University of Southampton, Southampton, SO17 1BJ. Tel: (023) 8059 3995.

Appendix P. Coding Manual for the Face-to-Face Interview Analysis

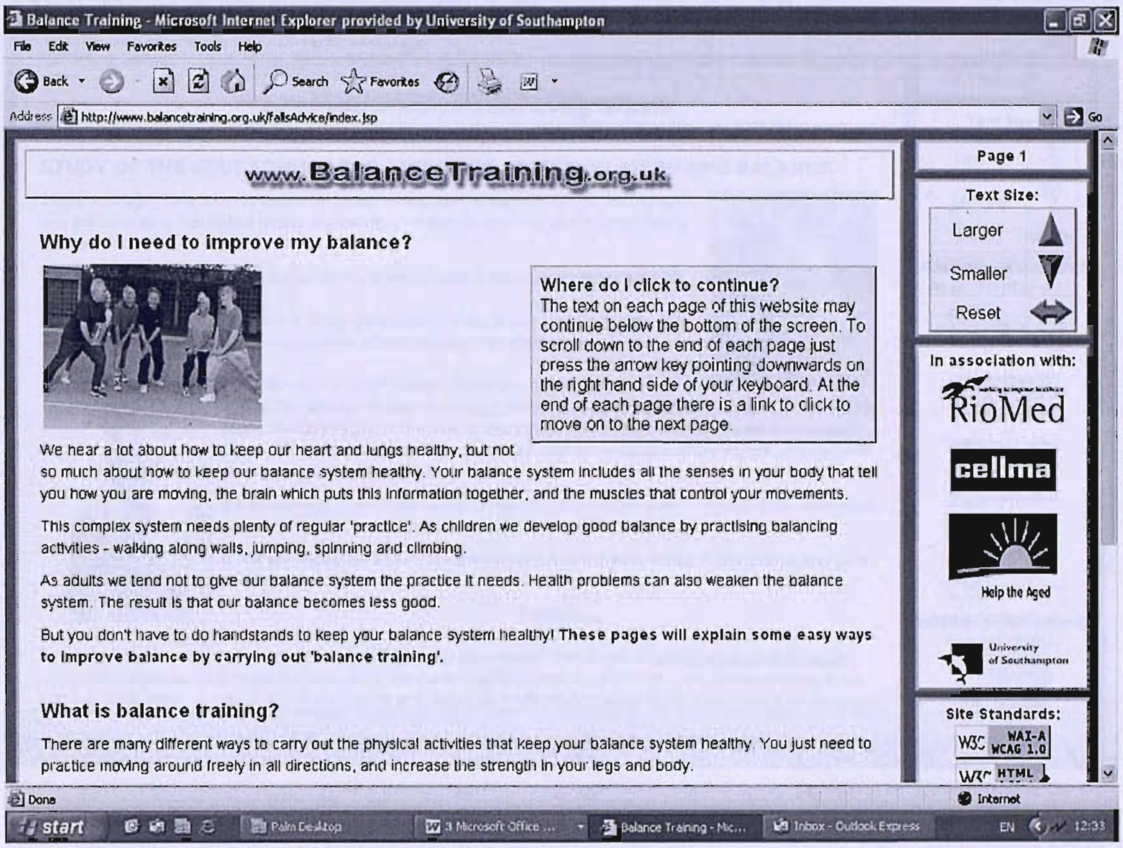
Title	*Description*
1. Usability of the website	
Easy to use	Stating that the website was easy to use, in that they understood how to interact with the website.
Layout easy to follow	Stating that the layout of the website was easy to follow, in that they understood where they were and where they were going in the website.
Easy to read	Stating that they found the text easy to read, in that the language was accessible.
Option to increase the text size is positive	Stating that they found the option to increase the text size was good and important.
2. Aim of the website	
Older people are learning how to use computers	Stating that older people are learning or are interested in learning how to use computers.
Older people do not use computers	Stating that older people do not use or are not interested in computers, or that older people are not competent or patient with computers, or that older people are technophobic.

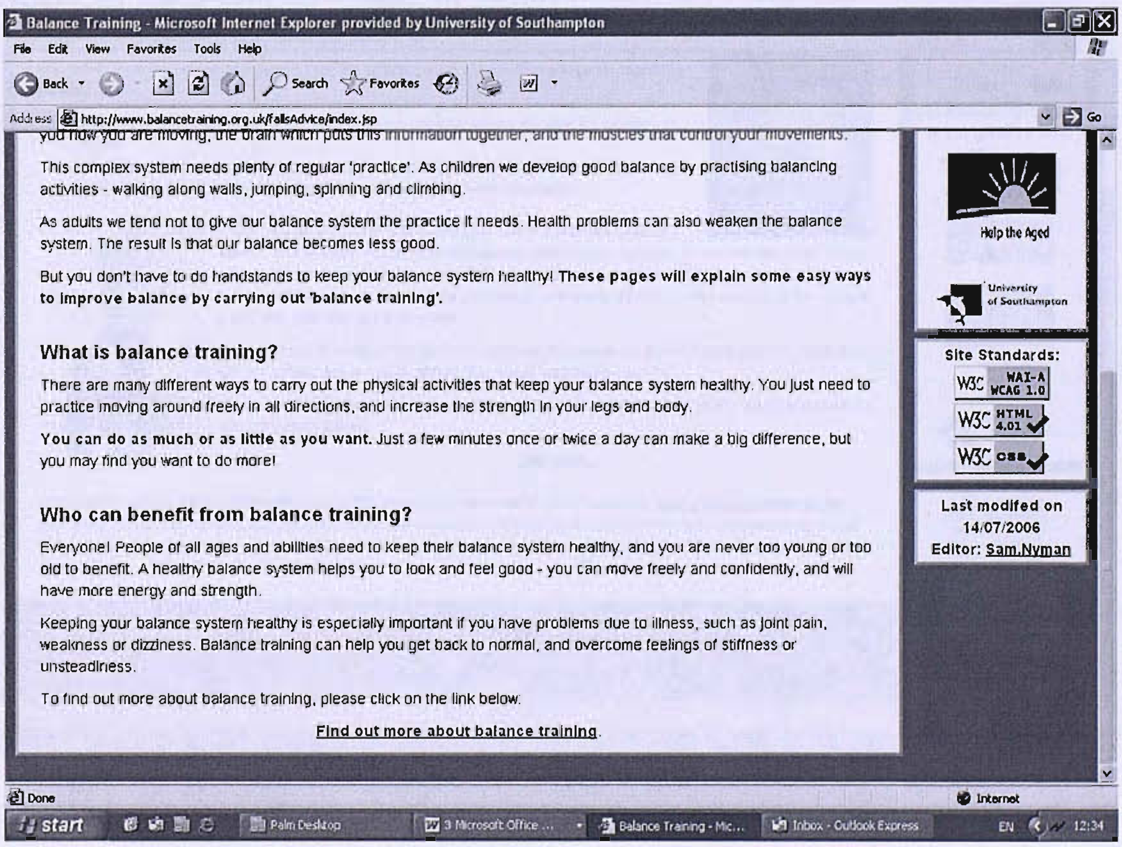
3. Content of the website	
Interesting	Stating that they found the website advice interesting.
Informative	Stating that they found the website advice informative or comprehensive.
Will help older people	Stating that they believe that the website advice will be helpful for older people.
Helped me	Stating that they found the website advice to be helpful for them personally.
Could have more gentle activities	Suggesting that the website could be improved by including more activities that are gentle, i.e. suited for frailer and older older adults.
4. Promotion of the website	
Wardens could be promoters	Stating that wardens of sheltered housing courts could promote the balance training website.
I do not use computers and so will not promote it	Stating that they do not use or are not interested in computers, or are technophobic, and therefore would not promote the balance training website.
Would be good to have it for the residents	Stating that they would like to have the website available to their sheltered housing residents.

Would promote it if I could	Stating that they would promote the website in their sheltered housing courts if they had a computer with Internet access.
Communal computers could be used for promotion	Stating that sheltered housing courts are to have communal computers and so the website could be promoted at sheltered housing courts, as the residents could use the communal computer to access the balance training website.
I would be willing to sit and go through it with them	Stating that they are willing to sit with their residents who are not computer literate, to help them access the balance training website.
Would recommend it to those with computers	Stating that they would recommend the balance training website to residents that they know who own a computer.
Would recommend it to those with balance problems	Stating that they would recommend the balance training website to residents that they know have balance problems.
Would recommend it to those who are active	Stating that they would recommend the balance training website to residents that they know who are active, i.e. residents who go swimming or attend a keep-fit class held at the sheltered housing court.

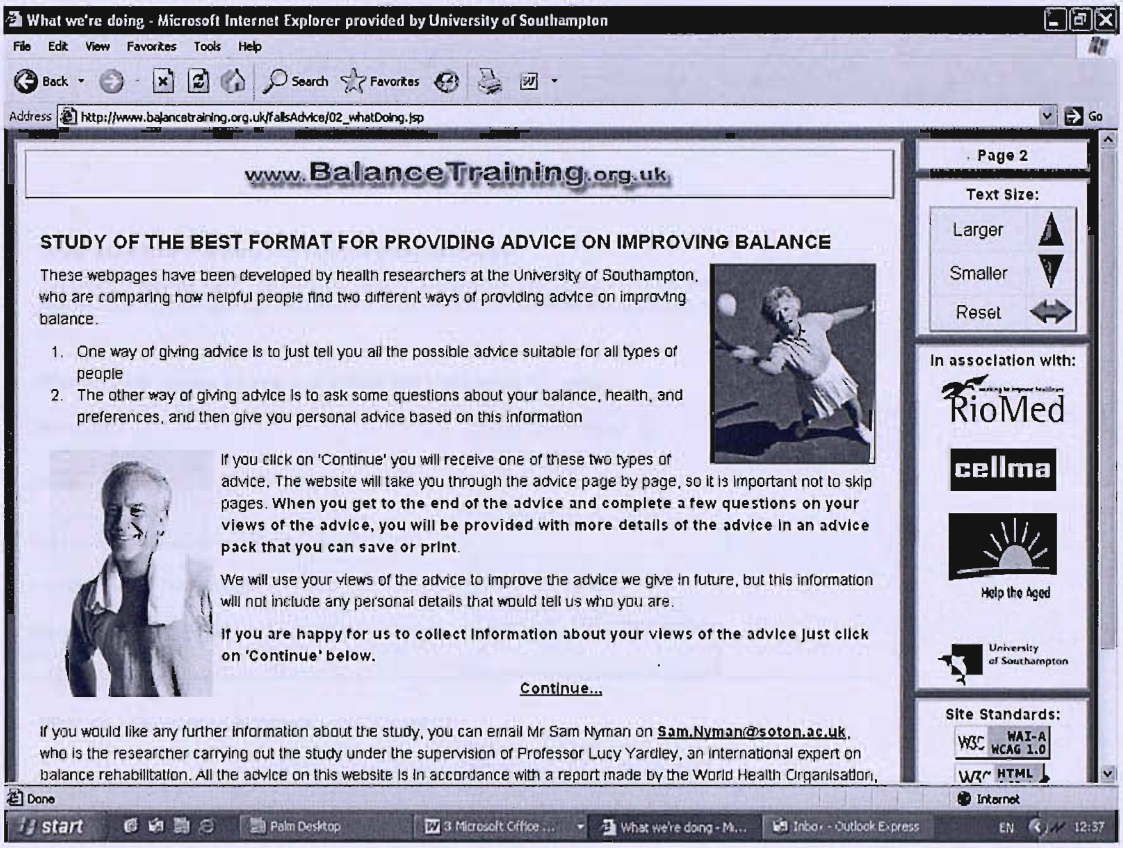
Appendix Q. Screen shots of the Revised Webpages

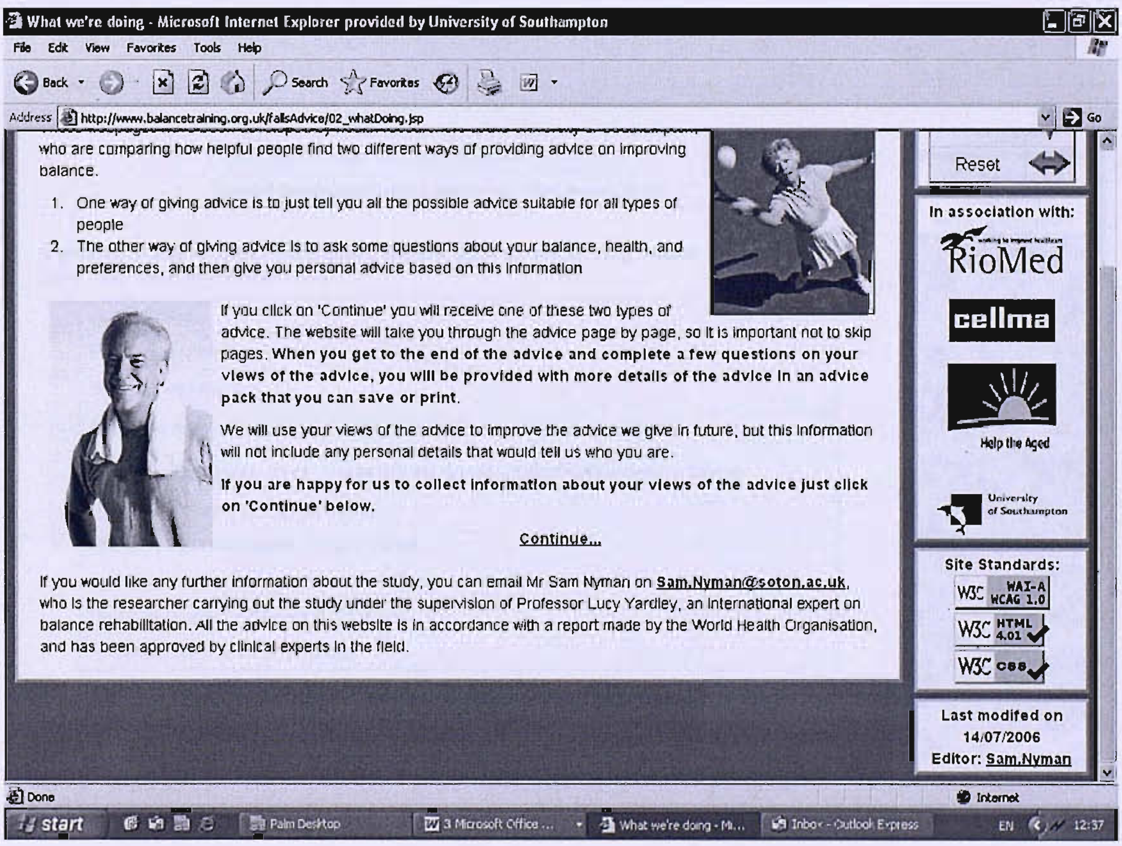
The first tailored webpage.



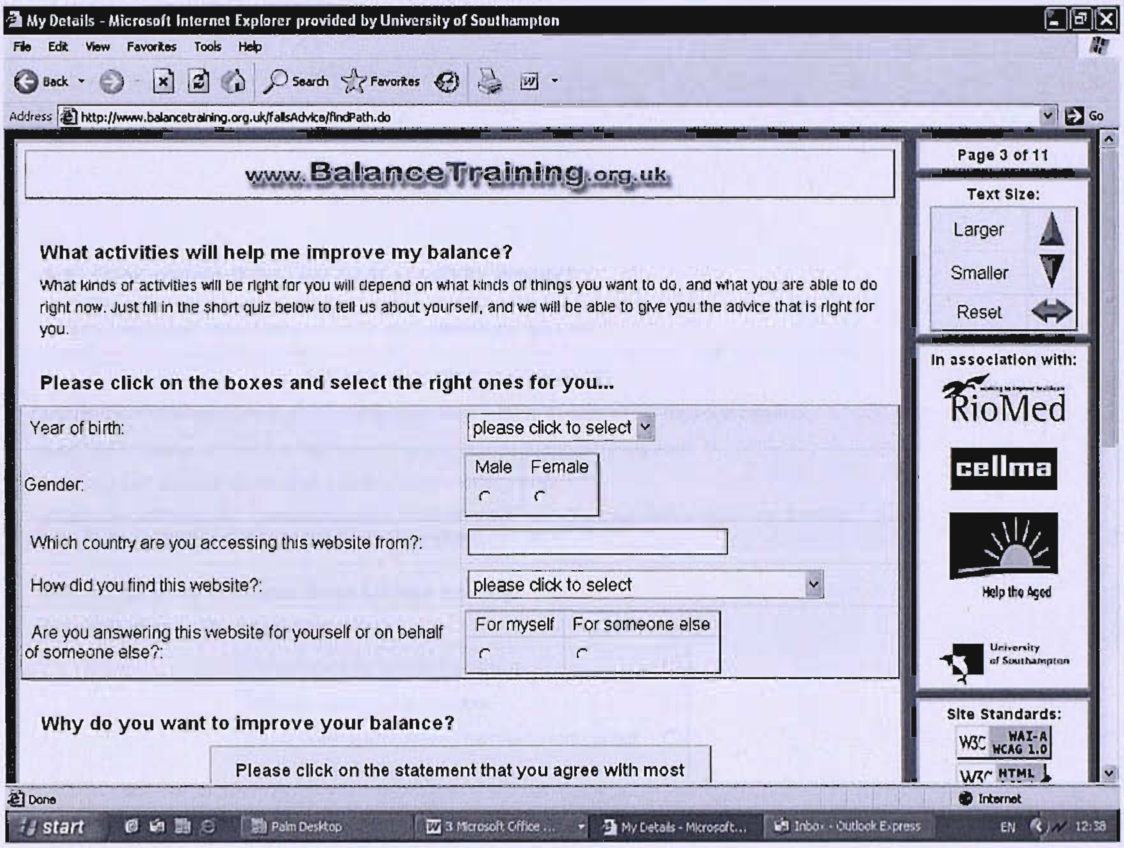


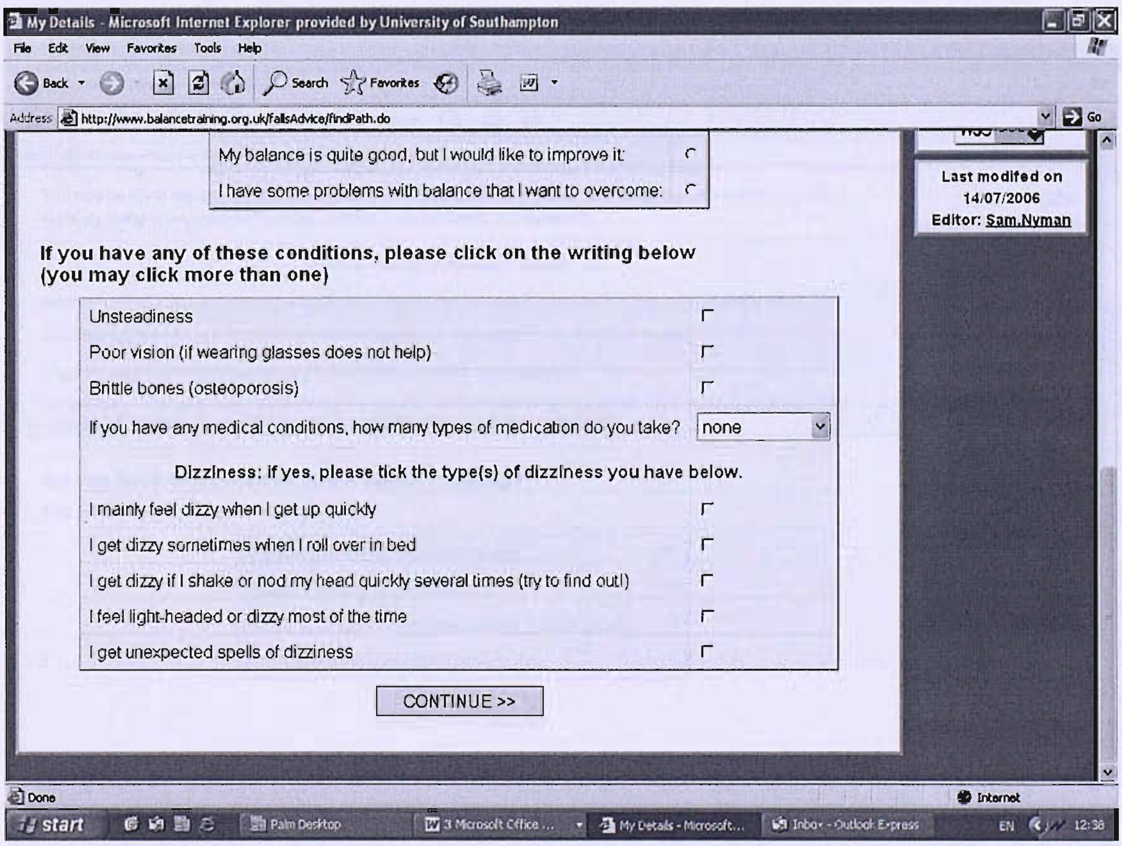
The second tailored webpage.



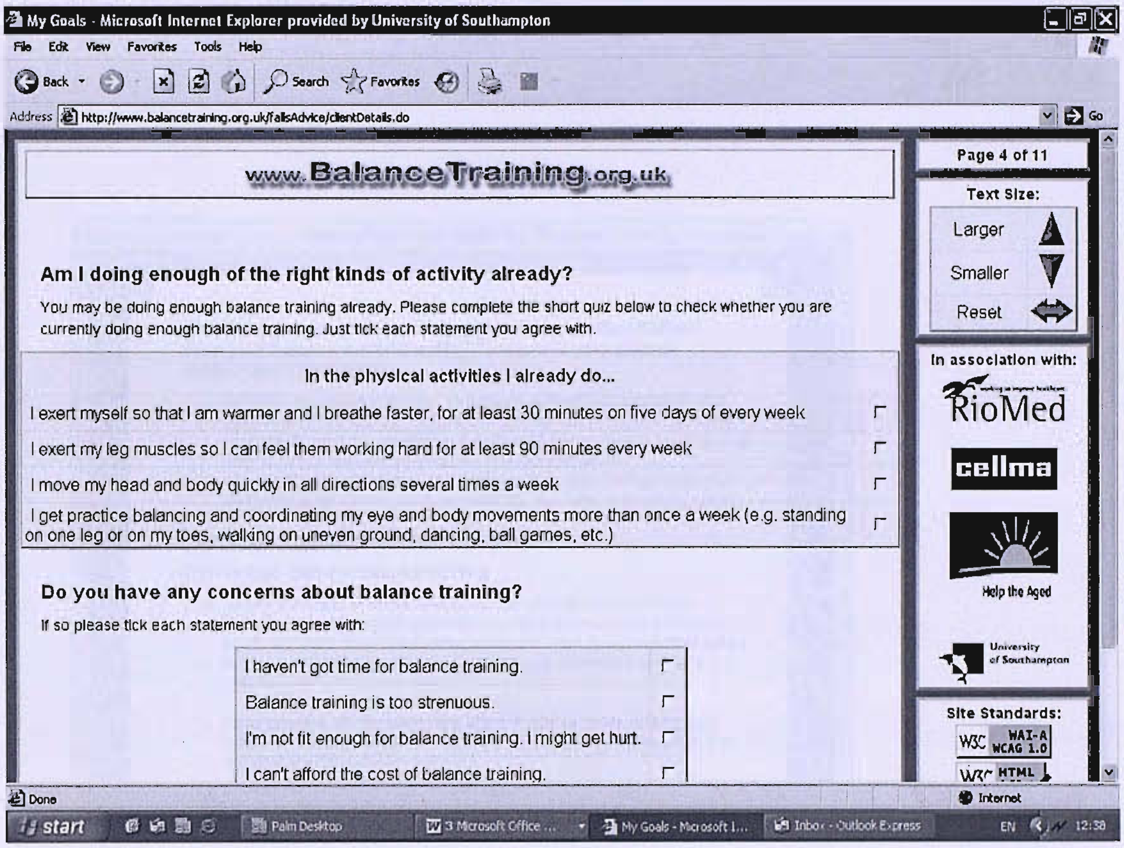


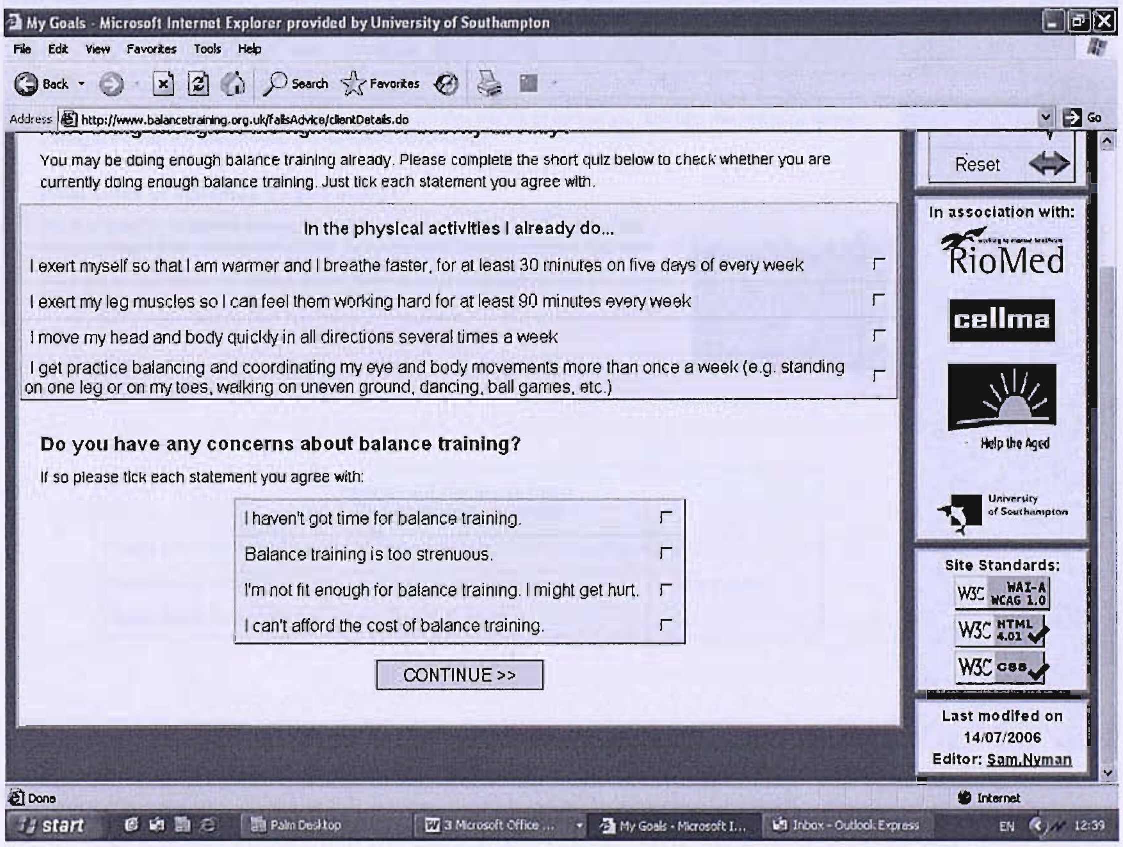
The third tailored webpage.



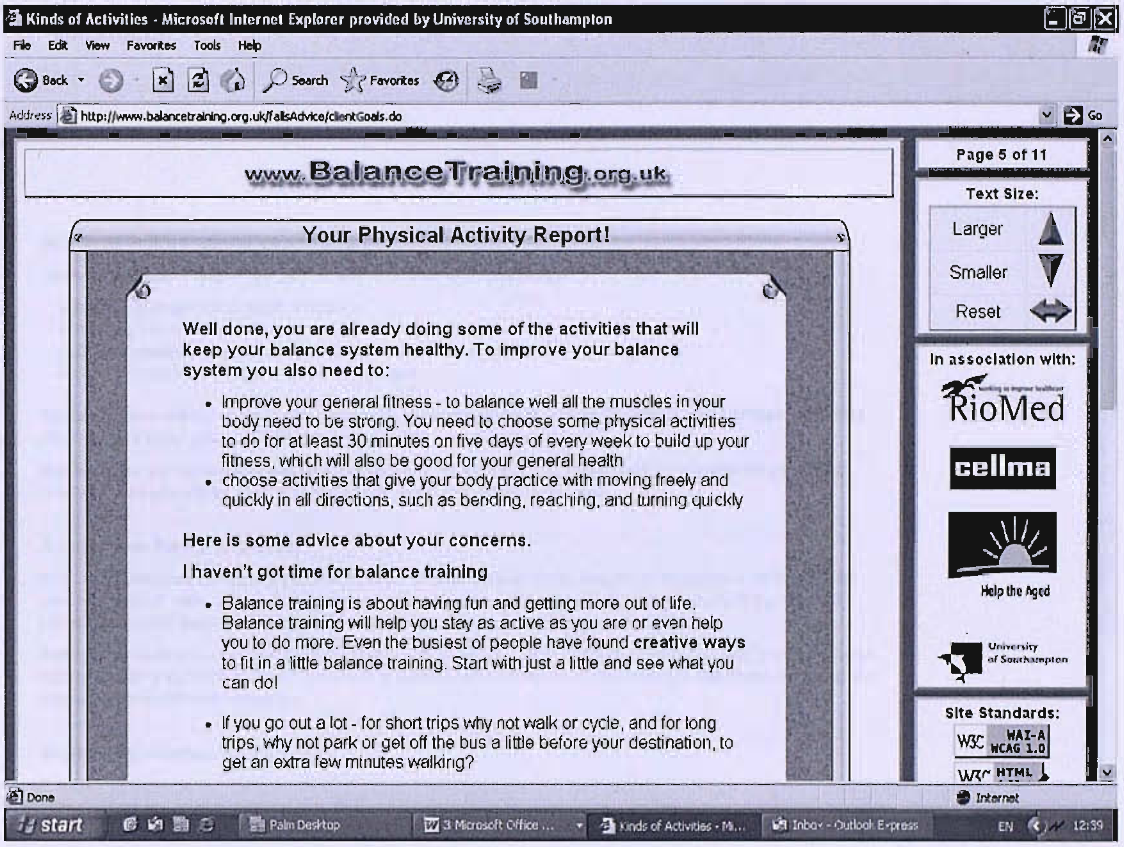


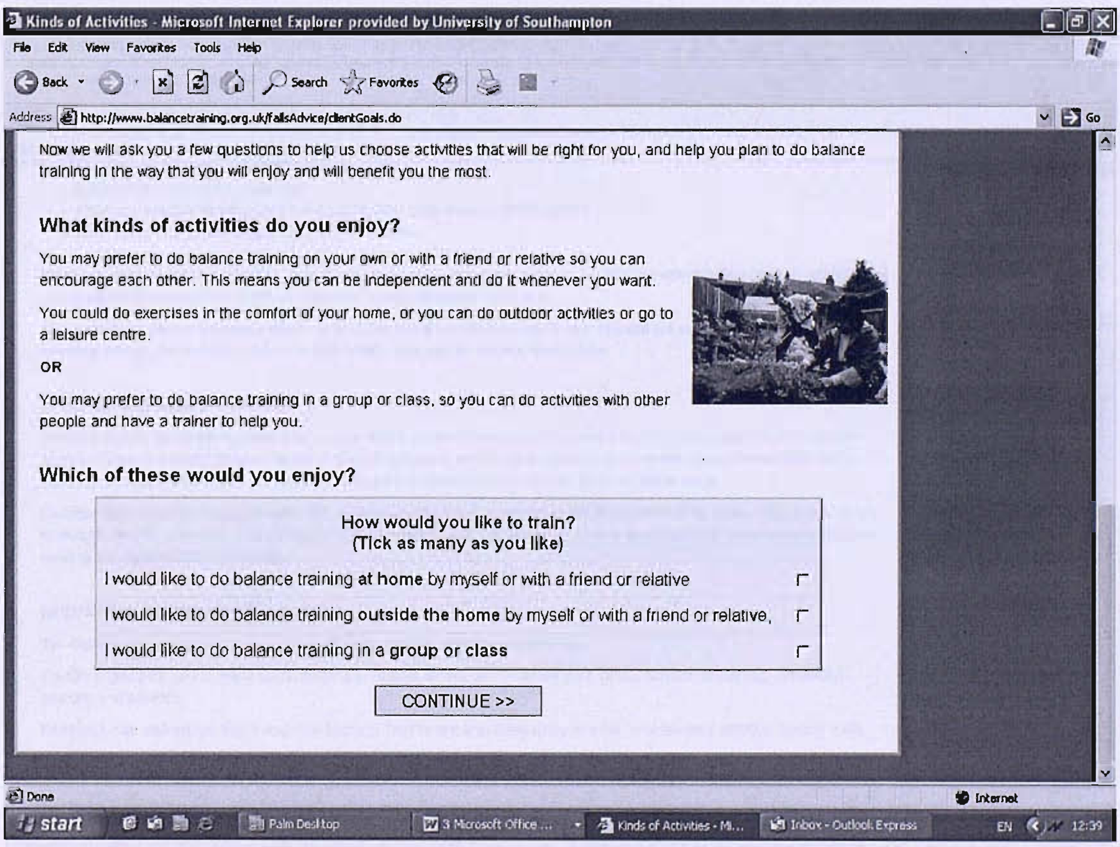
The fourth tailored webpage.



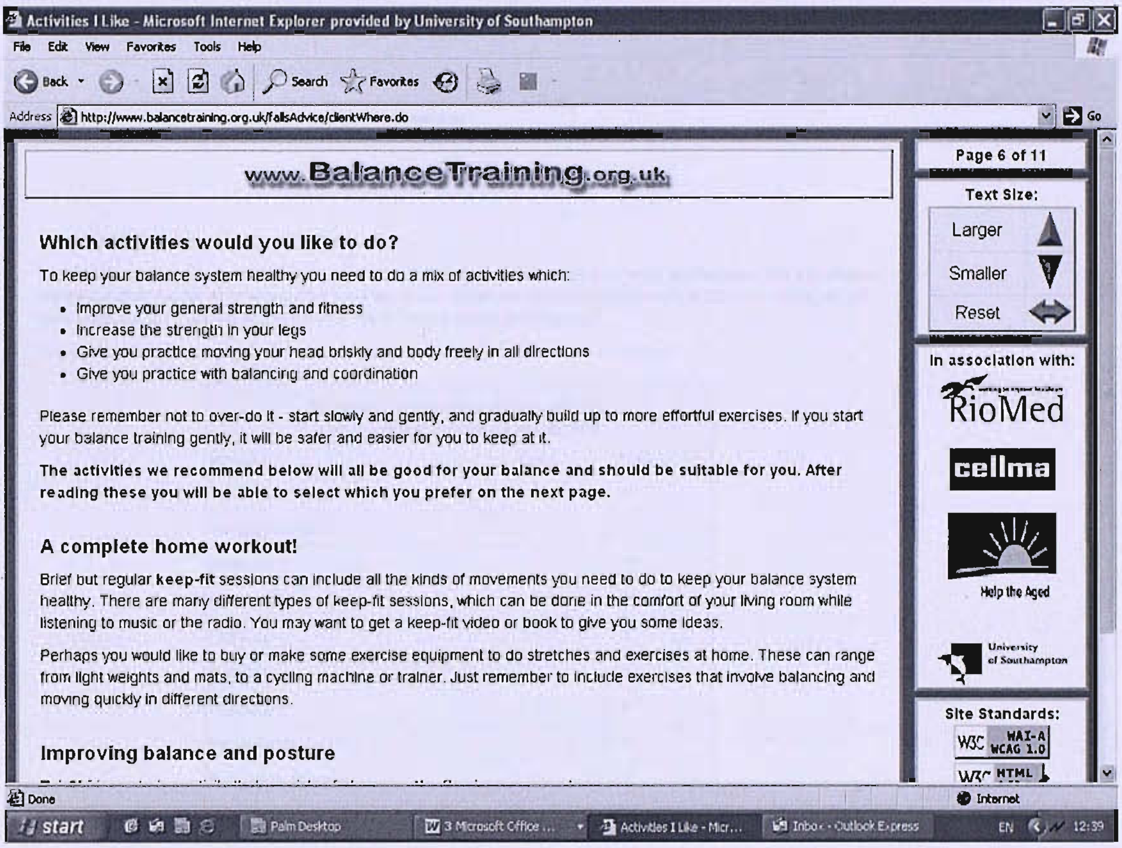


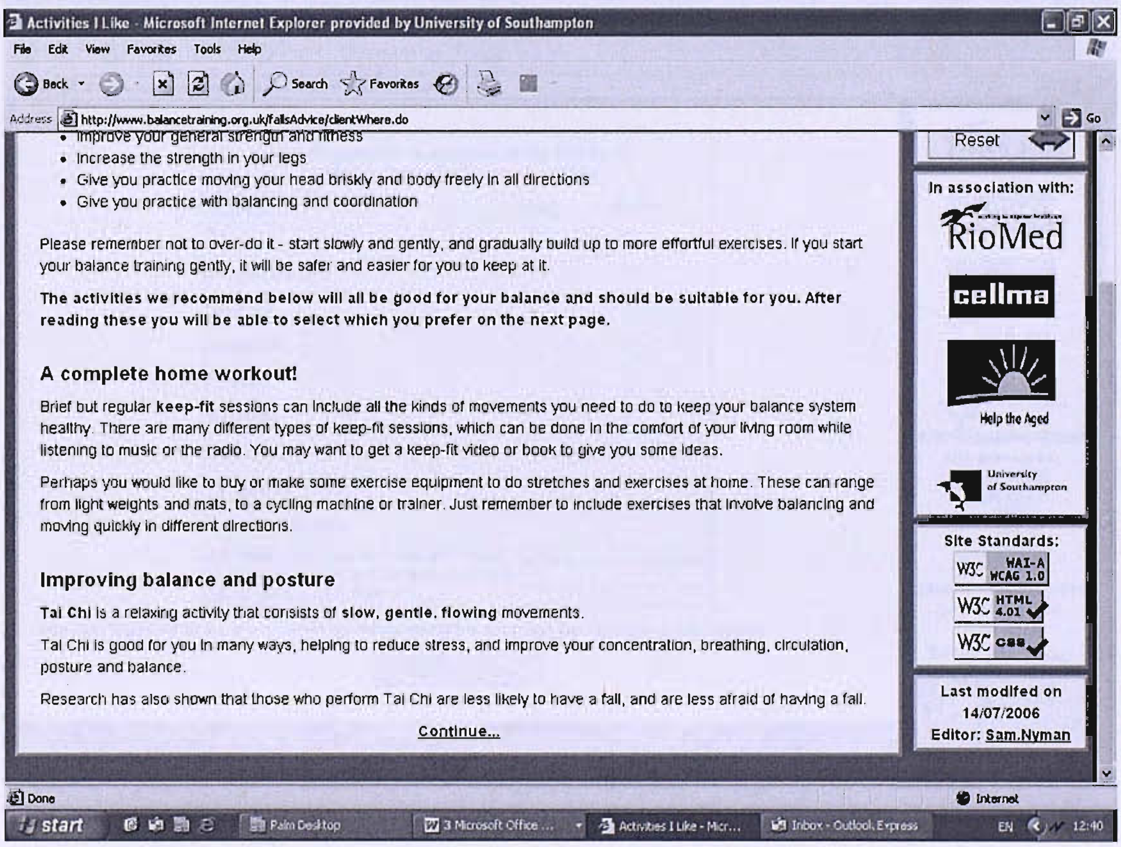
The fifth tailored webpage.



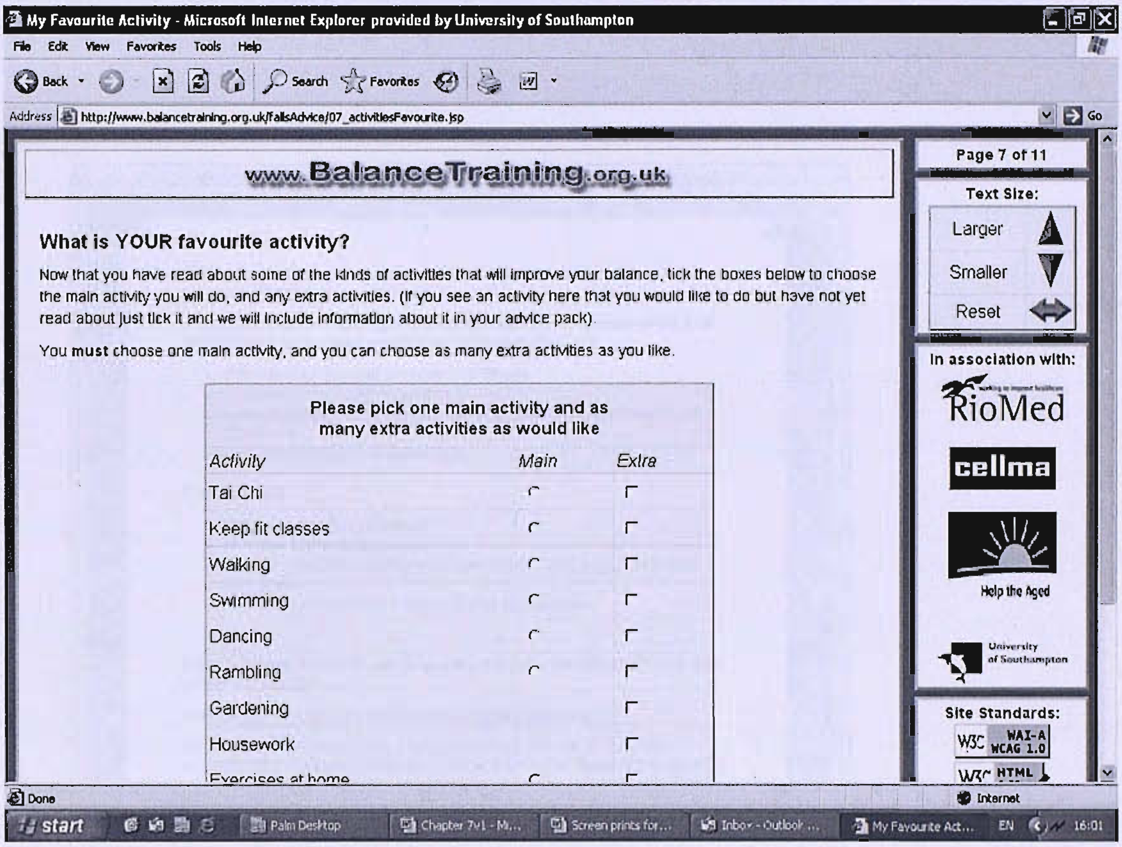


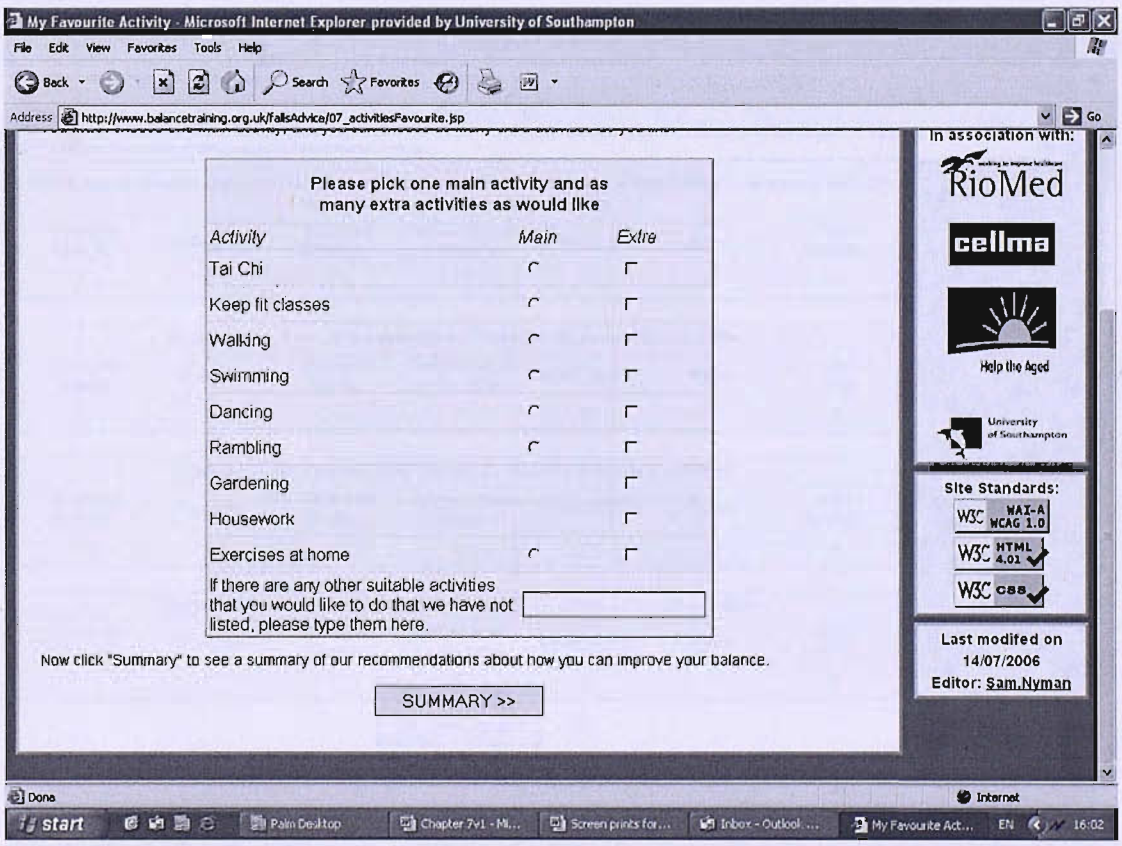
The sixth tailored webpage.



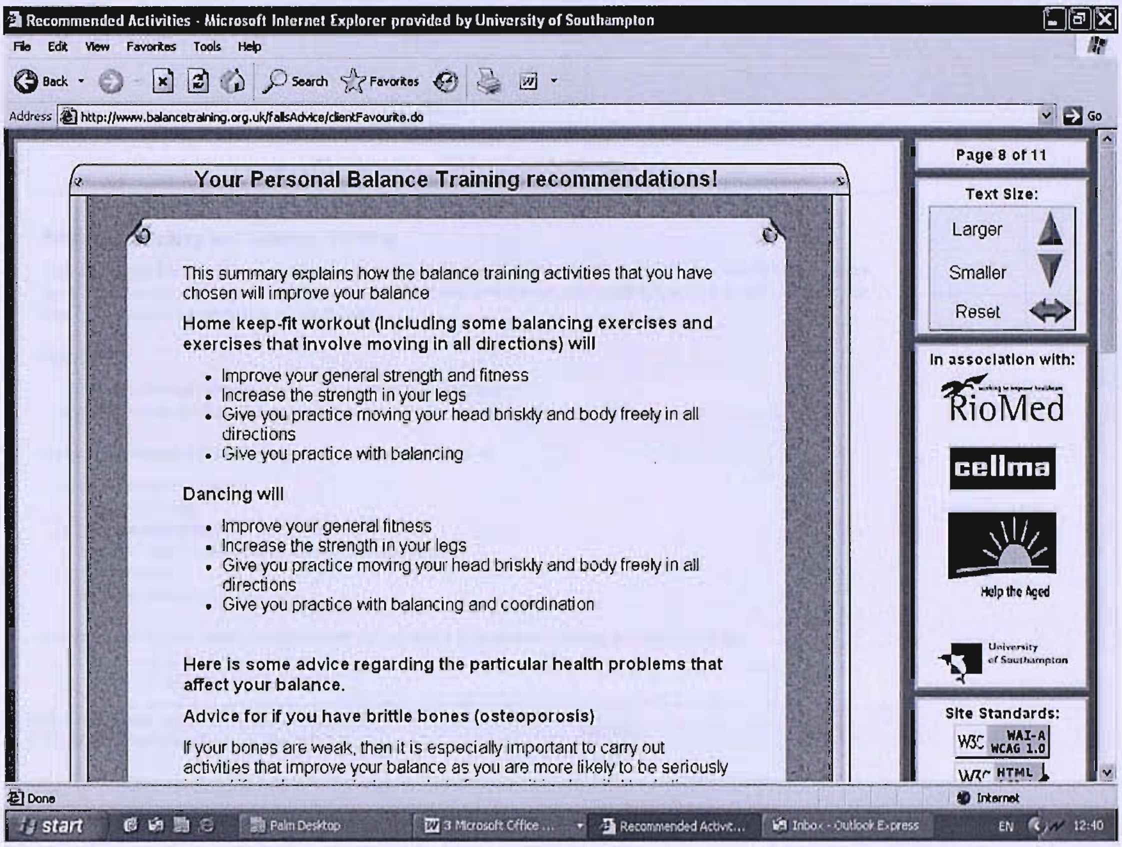


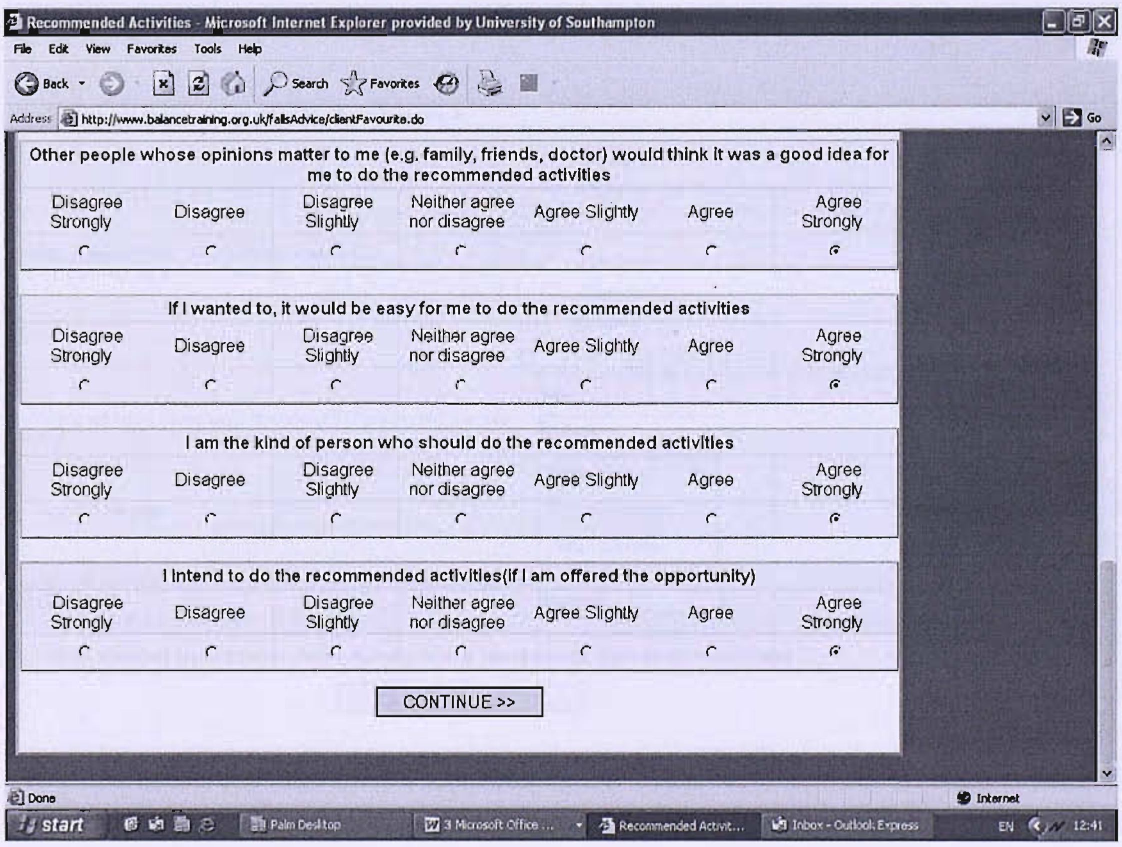
The seventh tailored webpage.



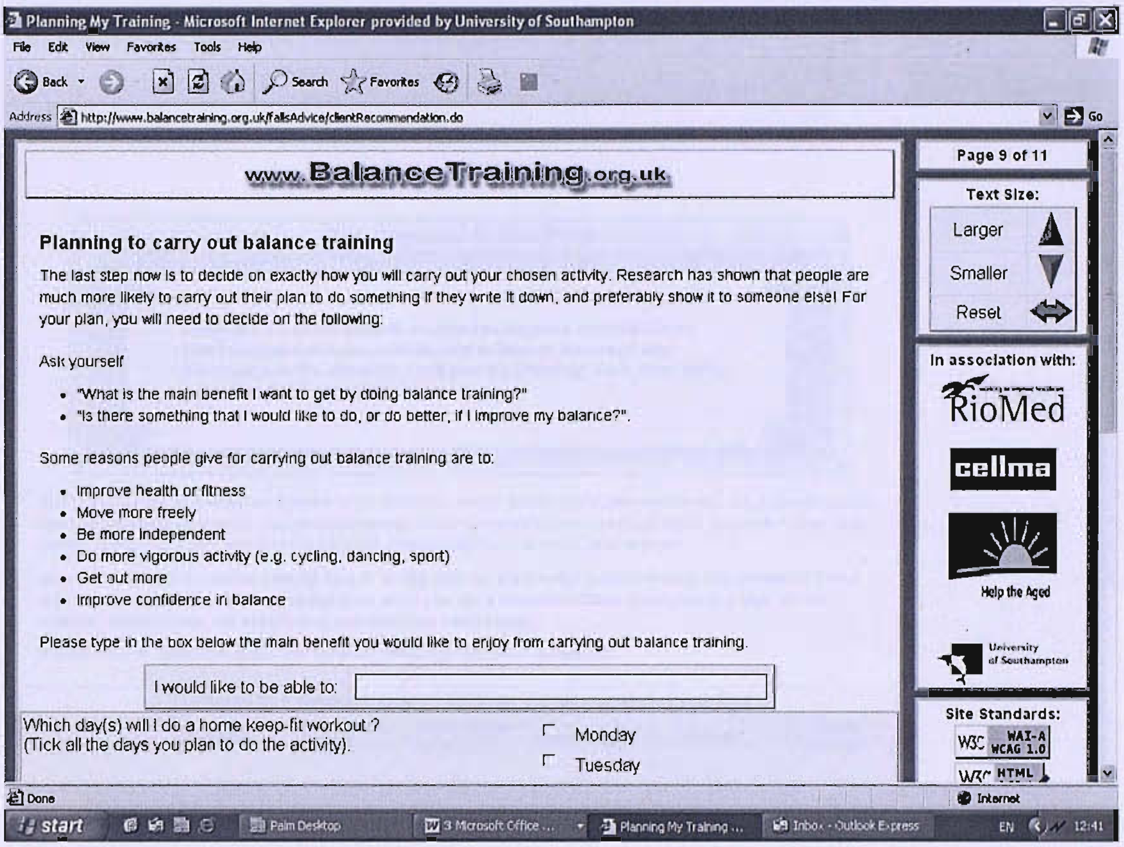


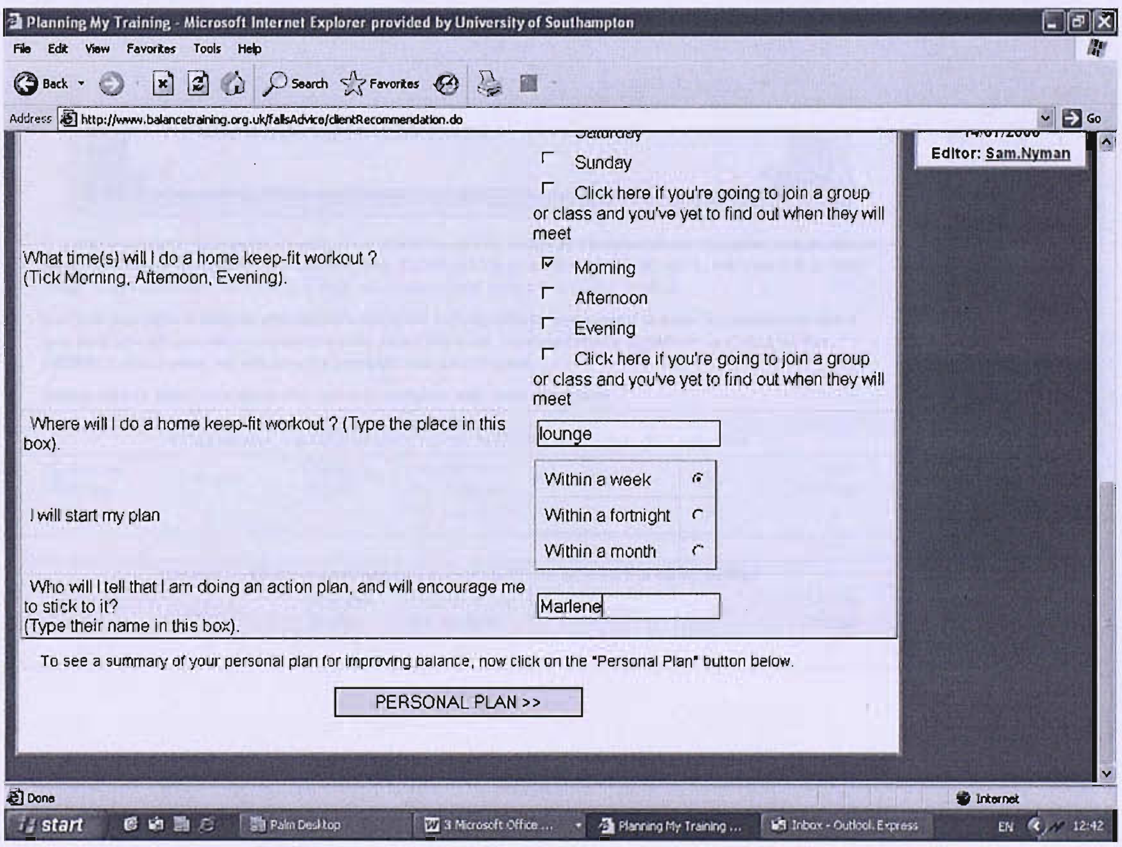
The eighth tailored webpage.



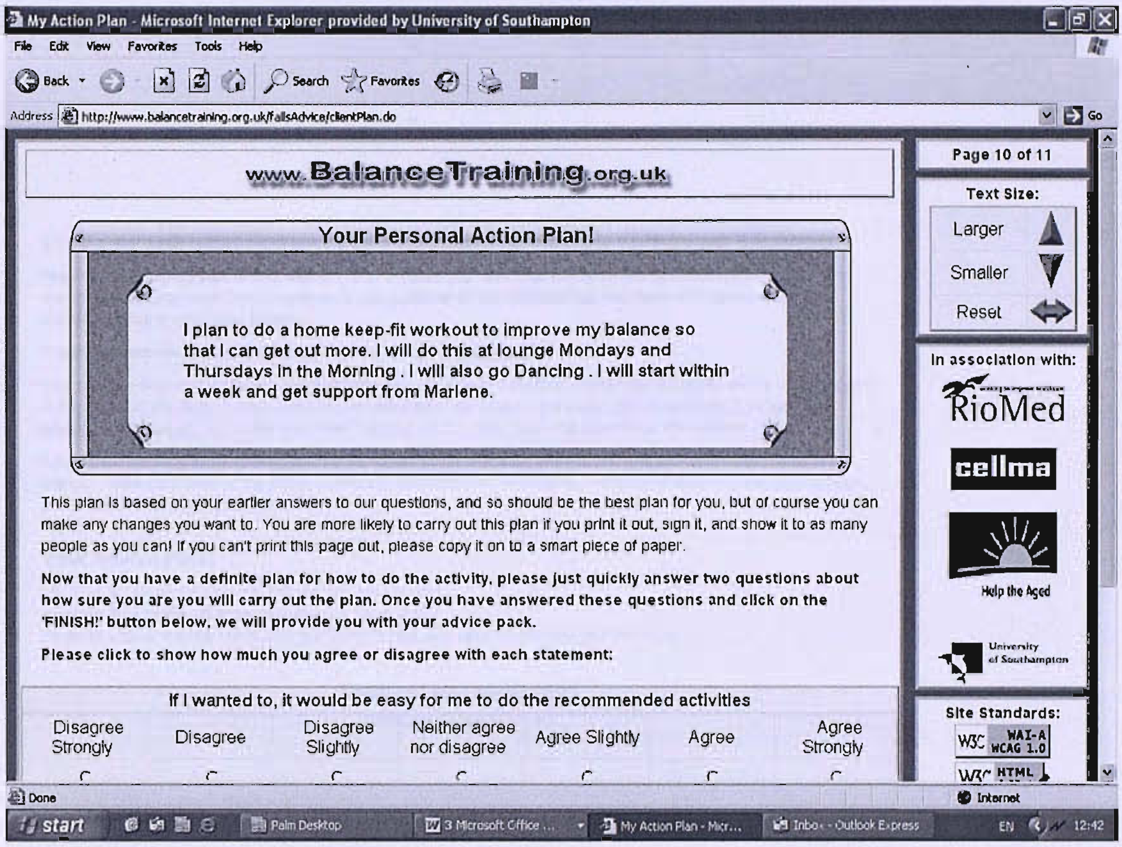


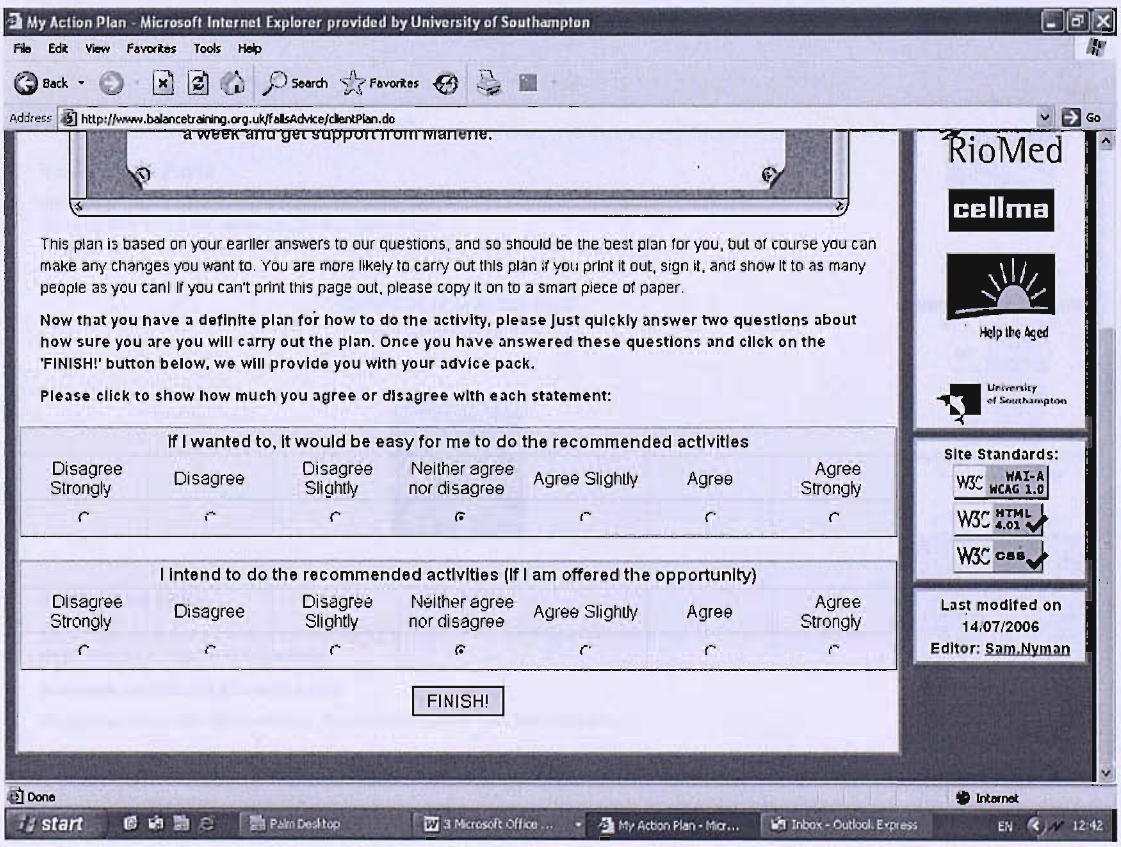
The ninth tailored webpage.



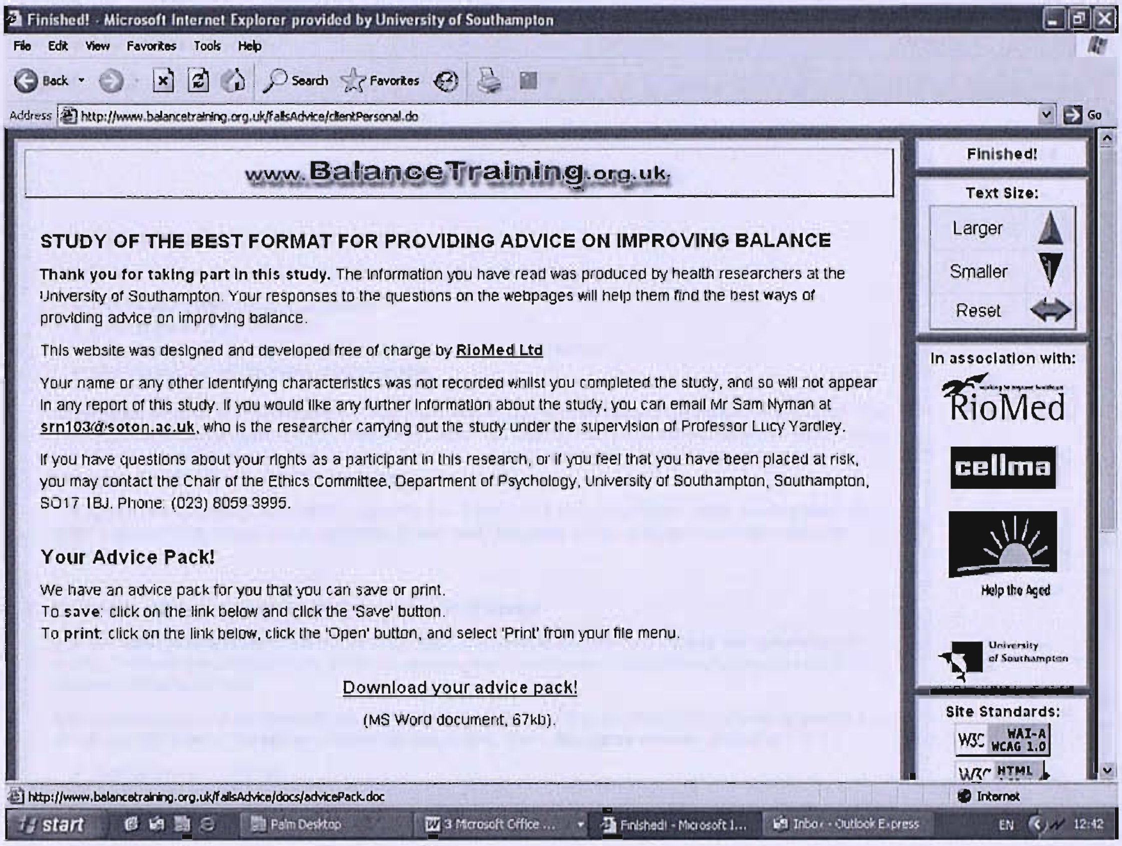


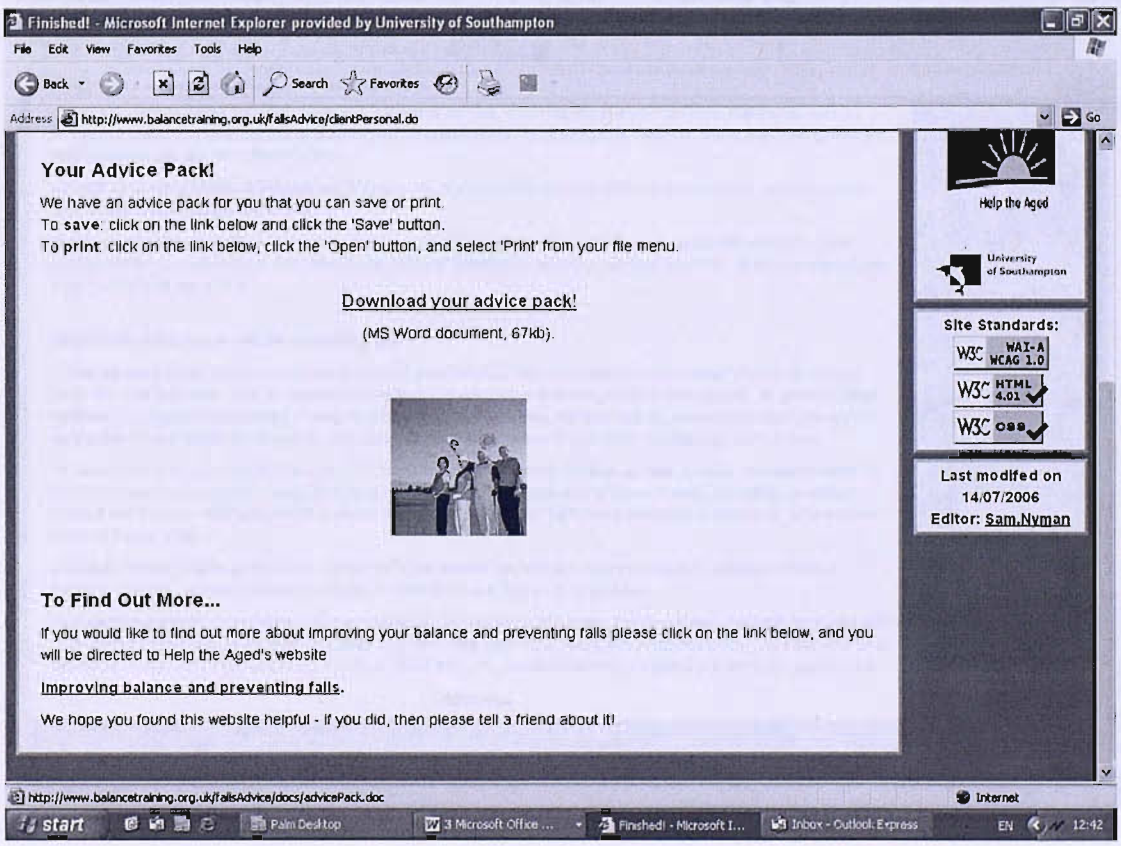
The tenth tailored webpage.



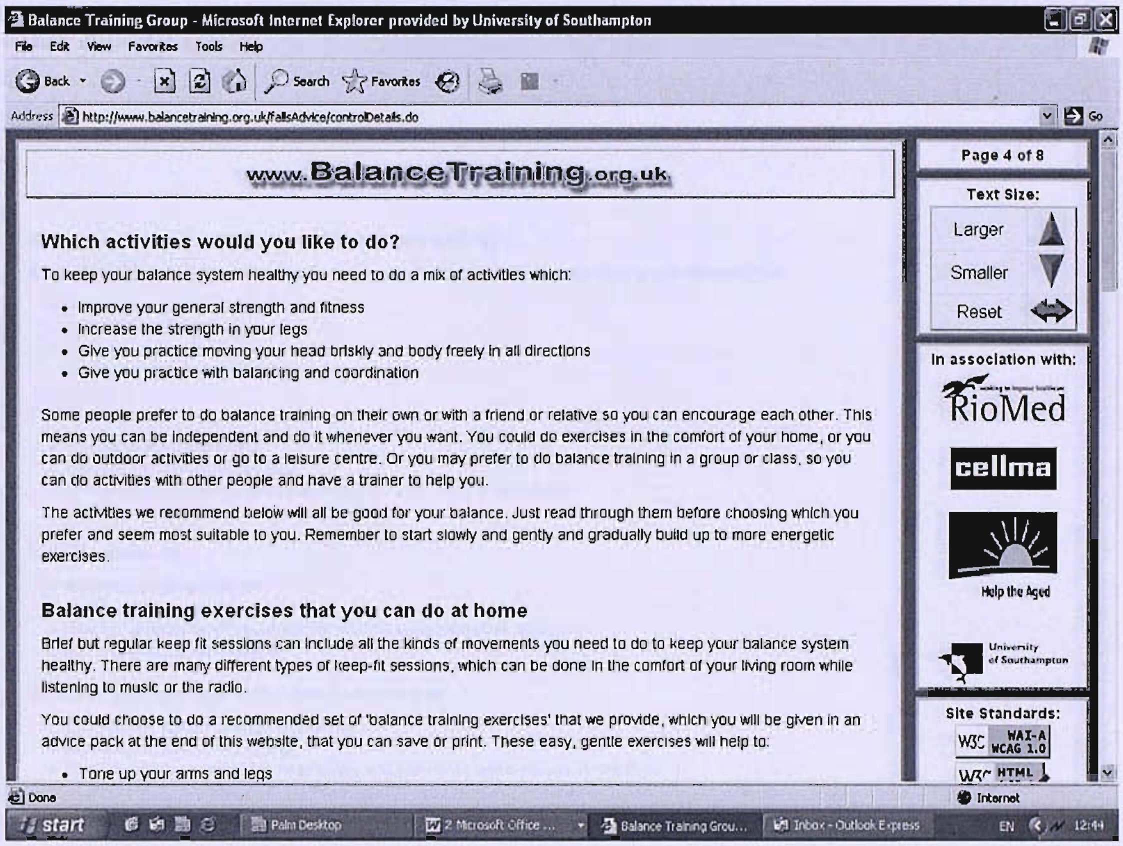


The eleventh tailored webpage.





The fourth generic webpage.



Balance Training Group - Microsoft Internet Explorer provided by University of Southampton

Address http://www.balancetraining.org.uk/fallsAdvice/controlDetails.do

www.BalanceTraining.org.uk

Page 4 of 8

Text Size: Larger Smaller Reset

In association with: RioMed cellma Help the Aged University of Southampton

Site Standards: W3C WAI-A WCAG 1.0 W3C HTML

Which activities would you like to do?

To keep your balance system healthy you need to do a mix of activities which:

- Improve your general strength and fitness
- Increase the strength in your legs
- Give you practice moving your head briskly and body freely in all directions
- Give you practice with balancing and coordination

Some people prefer to do balance training on their own or with a friend or relative so you can encourage each other. This means you can be independent and do it whenever you want. You could do exercises in the comfort of your home, or you can do outdoor activities or go to a leisure centre. Or you may prefer to do balance training in a group or class, so you can do activities with other people and have a trainer to help you.

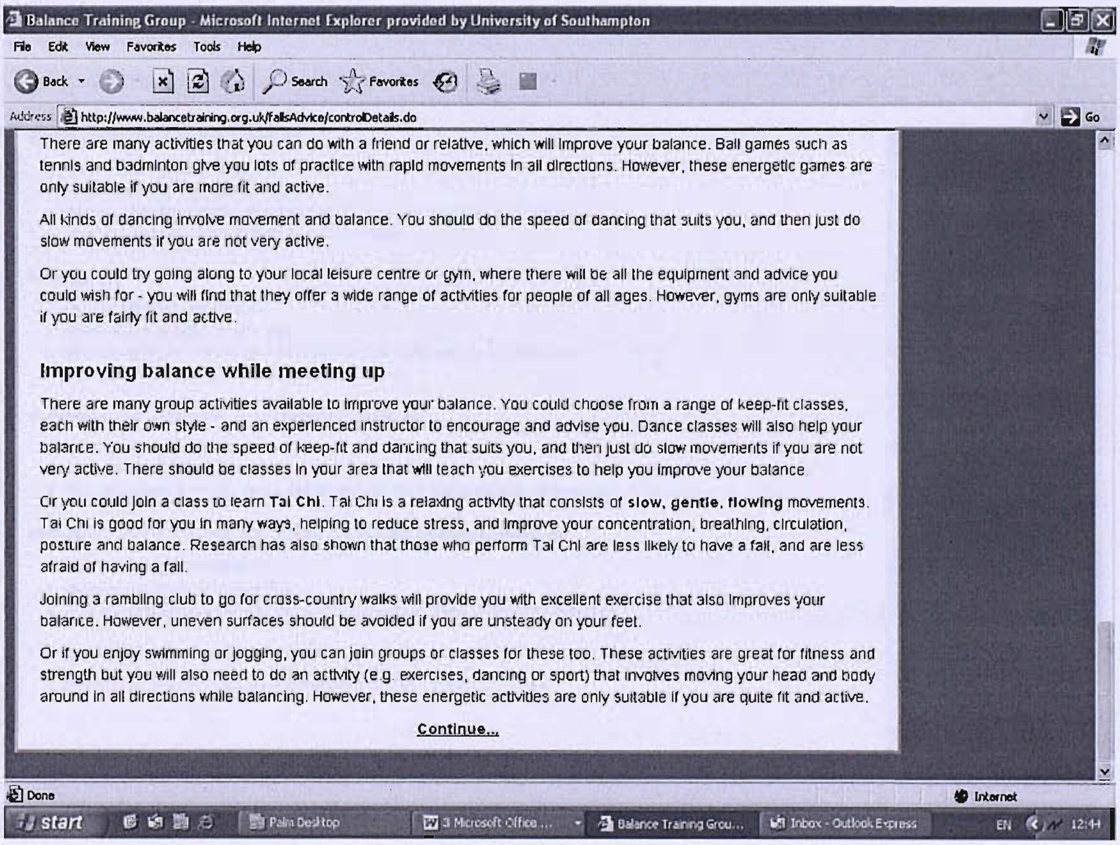
The activities we recommend below will all be good for your balance. Just read through them before choosing which you prefer and seem most suitable to you. Remember to start slowly and gently and gradually build up to more energetic exercises.

Balance training exercises that you can do at home

Brief but regular keep fit sessions can include all the kinds of movements you need to do to keep your balance system healthy. There are many different types of keep-fit sessions, which can be done in the comfort of your living room while listening to music or the radio.

You could choose to do a recommended set of 'balance training exercises' that we provide, which you will be given in an advice pack at the end of this website, that you can save or print. These easy, gentle exercises will help to:

- Tone up your arms and legs



Balance Training Group - Microsoft Internet Explorer provided by University of Southampton

Address http://www.balancetraining.org.uk/fallsAdvice/controlDetails.do

There are many activities that you can do with a friend or relative, which will improve your balance. Ball games such as tennis and badminton give you lots of practice with rapid movements in all directions. However, these energetic games are only suitable if you are more fit and active.

All kinds of dancing involve movement and balance. You should do the speed of dancing that suits you, and then just do slow movements if you are not very active.

Or you could try going along to your local leisure centre or gym, where there will be all the equipment and advice you could wish for - you will find that they offer a wide range of activities for people of all ages. However, gyms are only suitable if you are fairly fit and active.

Improving balance while meeting up

There are many group activities available to improve your balance. You could choose from a range of keep-fit classes, each with their own style - and an experienced instructor to encourage and advise you. Dance classes will also help your balance. You should do the speed of keep-fit and dancing that suits you, and then just do slow movements if you are not very active. There should be classes in your area that will teach you exercises to help you improve your balance.

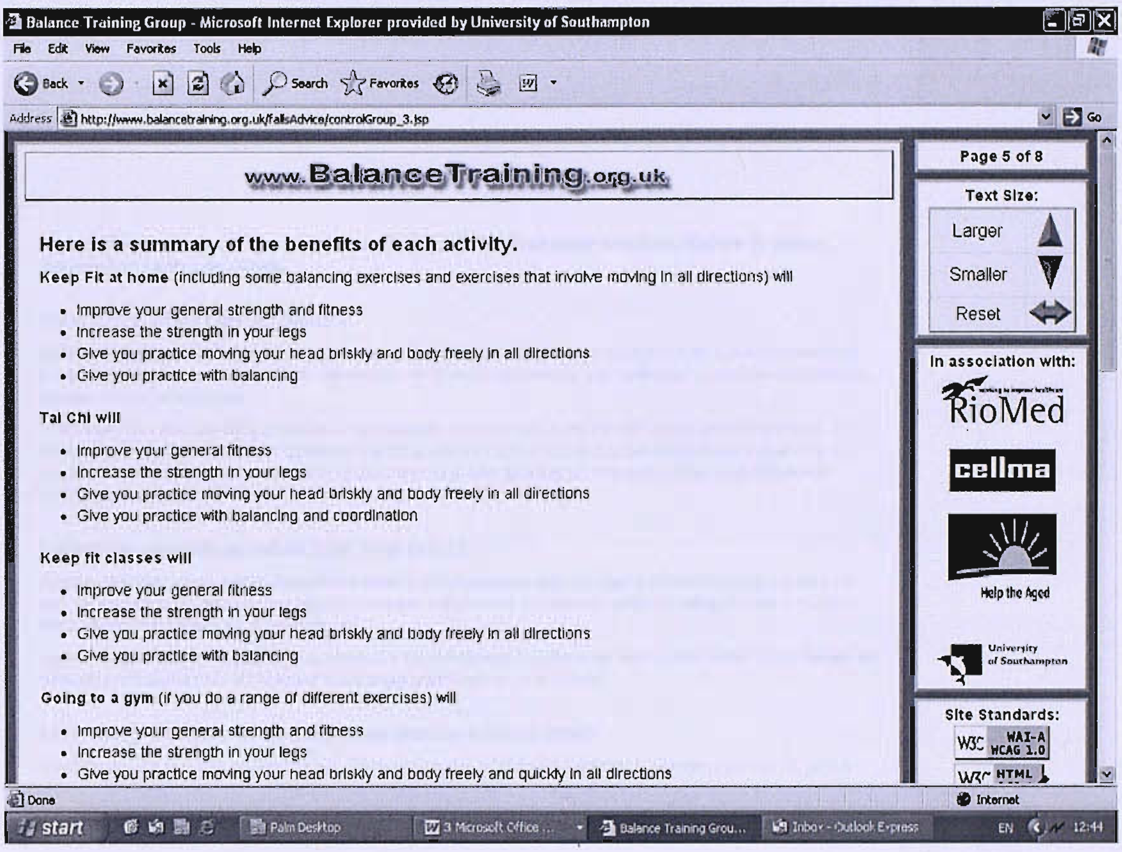
Or you could join a class to learn **Tai Chi**. Tai Chi is a relaxing activity that consists of **slow, gentle, flowing** movements. Tai Chi is good for you in many ways, helping to reduce stress, and improve your concentration, breathing, circulation, posture and balance. Research has also shown that those who perform Tai Chi are less likely to have a fall, and are less afraid of having a fall.

Joining a rambling club to go for cross-country walks will provide you with excellent exercise that also improves your balance. However, uneven surfaces should be avoided if you are unsteady on your feet.

Or if you enjoy swimming or jogging, you can join groups or classes for these too. These activities are great for fitness and strength but you will also need to do an activity (e.g. exercises, dancing or sport) that involves moving your head and body around in all directions while balancing. However, these energetic activities are only suitable if you are quite fit and active.

Continue...

The fifth generic webpage.



Balance Training Group - Microsoft Internet Explorer provided by University of Southampton

File Edit View Favorites Tools Help

Address http://www.balancetraining.org.uk/fallsAdvice/controlGroup_3.jsp

www.BalanceTraining.org.uk

Page 5 of 8

Text Size: Larger Smaller Reset

In association with: RioMed cellma Help the Aged University of Southampton

Site Standards: W3C WAI-A WCAG 1.0 W3C HTML

Here is a summary of the benefits of each activity.

Keep Fit at home (including some balancing exercises and exercises that involve moving in all directions) will

- Improve your general strength and fitness
- Increase the strength in your legs
- Give you practice moving your head briskly and body freely in all directions
- Give you practice with balancing

Tai Chi will

- Improve your general fitness
- Increase the strength in your legs
- Give you practice moving your head briskly and body freely in all directions
- Give you practice with balancing and coordination

Keep fit classes will

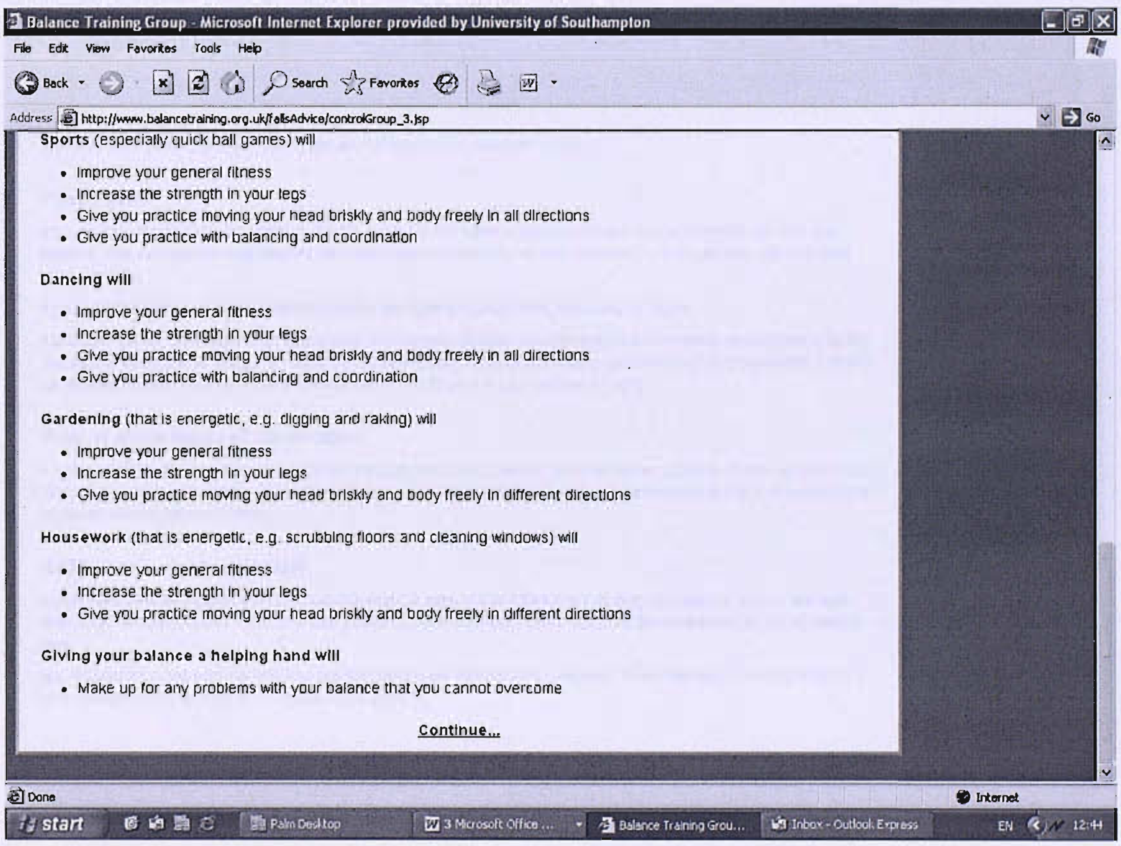
- Improve your general fitness
- Increase the strength in your legs
- Give you practice moving your head briskly and body freely in all directions
- Give you practice with balancing

Going to a gym (if you do a range of different exercises) will

- Improve your general strength and fitness
- Increase the strength in your legs
- Give you practice moving your head briskly and body freely and quickly in all directions

Done Internet

start Palm Desktop 3 Microsoft Office ... Balance Training Grou... Inbox - Outlook Express EN 12:44



Balance Training Group - Microsoft Internet Explorer provided by University of Southampton

File Edit View Favorites Tools Help

Address http://www.balancetraining.org.uk/fallsAdvice/controlGroup_3.jsp

Sports (especially quick ball games) will

- Improve your general fitness
- Increase the strength in your legs
- Give you practice moving your head briskly and body freely in all directions
- Give you practice with balancing and coordination

Dancing will

- Improve your general fitness
- Increase the strength in your legs
- Give you practice moving your head briskly and body freely in all directions
- Give you practice with balancing and coordination

Gardening (that is energetic, e.g. digging and raking) will

- Improve your general fitness
- Increase the strength in your legs
- Give you practice moving your head briskly and body freely in different directions

Housework (that is energetic, e.g. scrubbing floors and cleaning windows) will

- Improve your general fitness
- Increase the strength in your legs
- Give you practice moving your head briskly and body freely in different directions

Giving your balance a helping hand will

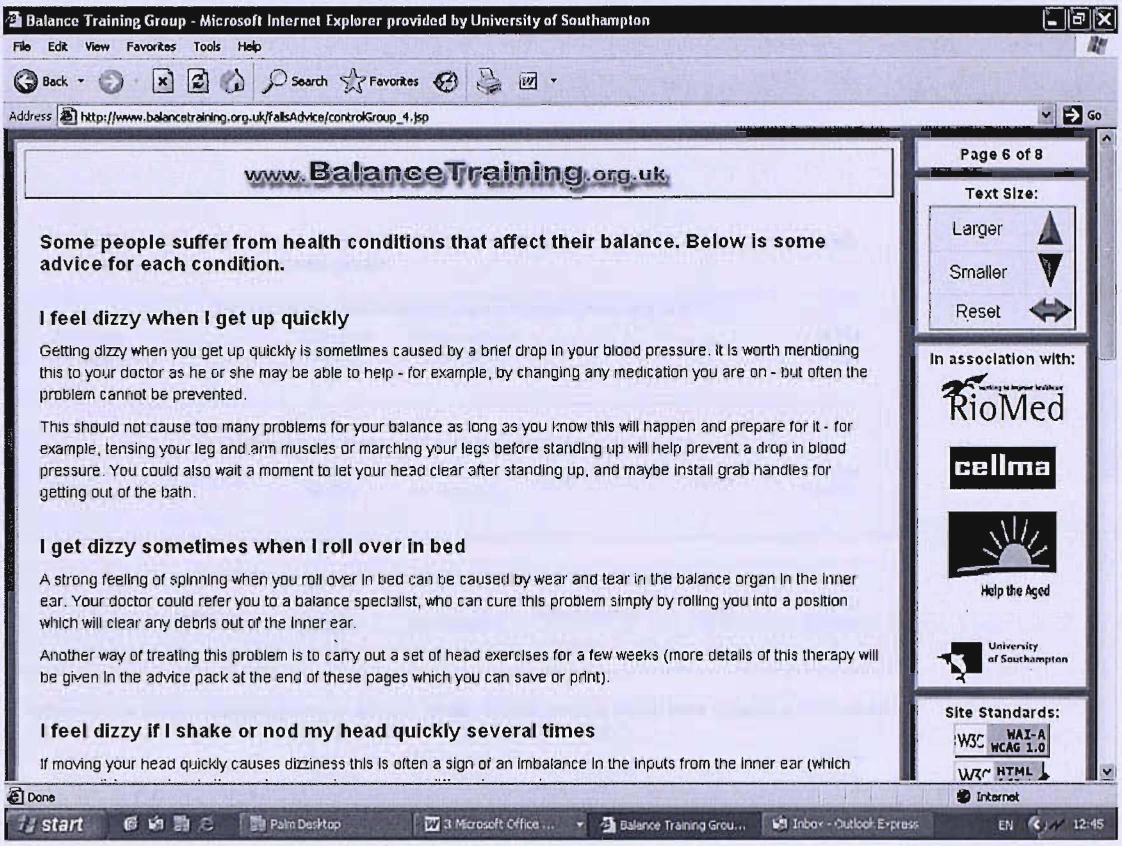
- Make up for any problems with your balance that you cannot overcome

Continue...

Done Internet

start Palm Desktop 3 Microsoft Office ... Balance Training Grou... Inbox - Outlook Express EN 12:44

The sixth generic webpage.


Balance Training Group - Microsoft Internet Explorer provided by University of Southampton

Address http://www.balancetraining.org.uk/fallsAdvice/controlGroup_4.jsp

www.BalanceTraining.org.uk

Some people suffer from health conditions that affect their balance. Below is some advice for each condition.

I feel dizzy when I get up quickly

Getting dizzy when you get up quickly is sometimes caused by a brief drop in your blood pressure. It is worth mentioning this to your doctor as he or she may be able to help - for example, by changing any medication you are on - but often the problem cannot be prevented.

This should not cause too many problems for your balance as long as you know this will happen and prepare for it - for example, tensing your leg and arm muscles or marching your legs before standing up will help prevent a drop in blood pressure. You could also wait a moment to let your head clear after standing up, and maybe install grab handles for getting out of the bath.

I get dizzy sometimes when I roll over in bed

A strong feeling of spinning when you roll over in bed can be caused by wear and tear in the balance organ in the inner ear. Your doctor could refer you to a balance specialist, who can cure this problem simply by rolling you into a position which will clear any debris out of the inner ear.

Another way of treating this problem is to carry out a set of head exercises for a few weeks (more details of this therapy will be given in the advice pack at the end of these pages which you can save or print).

I feel dizzy if I shake or nod my head quickly several times

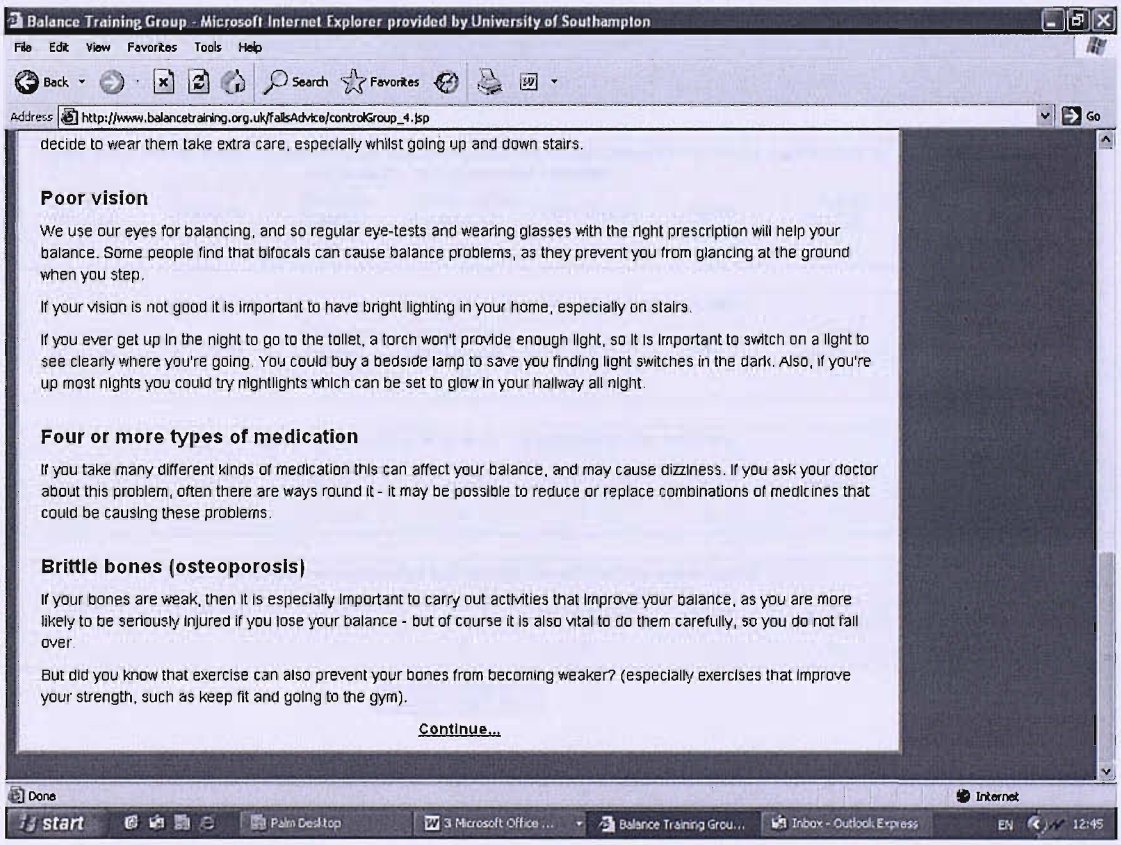
If moving your head quickly causes dizziness this is often a sign of an imbalance in the inputs from the inner ear (which

Page 6 of 8

Text Size:
Larger
Smaller
Reset

In association with:
RioMed
cellma
Help the Aged
University of Southampton

Site Standards:
W3C WAI-A WCAG 1.0
W3C HTML


Balance Training Group - Microsoft Internet Explorer provided by University of Southampton

Address http://www.balancetraining.org.uk/fallsAdvice/controlGroup_4.jsp

decide to wear them take extra care, especially whilst going up and down stairs.

Poor vision

We use our eyes for balancing, and so regular eye-tests and wearing glasses with the right prescription will help your balance. Some people find that bifocals can cause balance problems, as they prevent you from glancing at the ground when you step.

If your vision is not good it is important to have bright lighting in your home, especially on stairs.

If you ever get up in the night to go to the toilet, a torch won't provide enough light, so it is important to switch on a light to see clearly where you're going. You could buy a bedside lamp to save you finding light switches in the dark. Also, if you're up most nights you could try nightlights which can be set to glow in your hallway all night.

Four or more types of medication

If you take many different kinds of medication this can affect your balance, and may cause dizziness. If you ask your doctor about this problem, often there are ways round it - it may be possible to reduce or replace combinations of medicines that could be causing these problems.

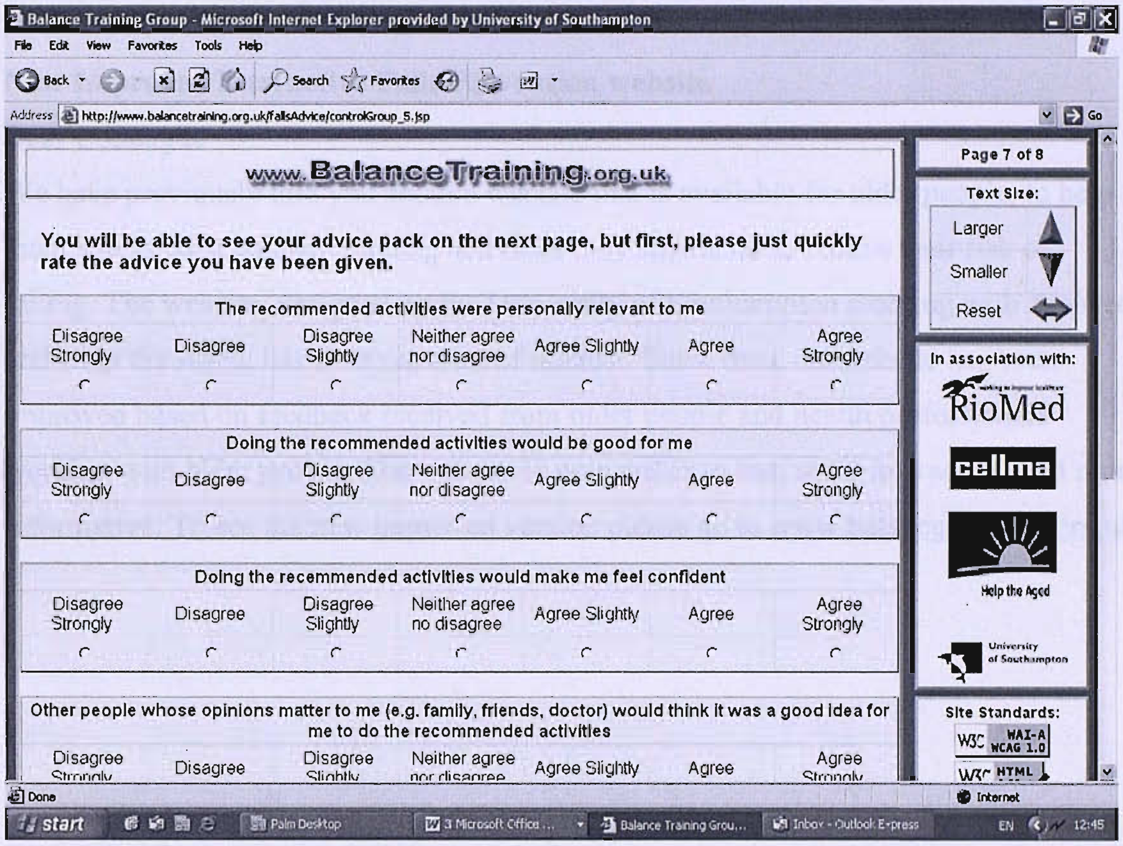
Brittle bones (osteoporosis)

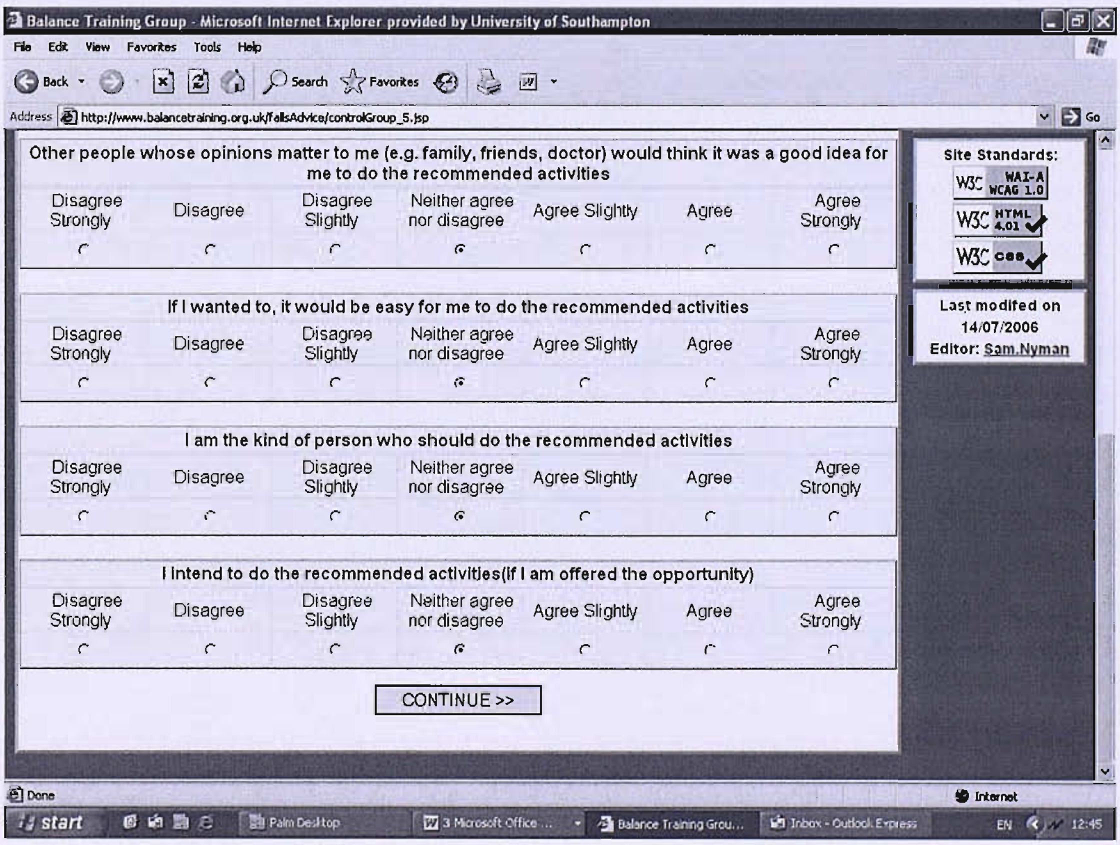
If your bones are weak, then it is especially important to carry out activities that improve your balance, as you are more likely to be seriously injured if you lose your balance - but of course it is also vital to do them carefully, so you do not fall over.

But did you know that exercise can also prevent your bones from becoming weaker? (especially exercises that improve your strength, such as keep fit and going to the gym).

Continue...

The seventh generic webpage.





Appendix R. Broadcast sent on Help the Aged and RioMed's email distribution lists

New Improved Interactive Falls Prevention website

Dear Colleague

We have previously told you about a website that is available for older people, to help them assess what balance training activities they should do to reduce their risk of falling. The website, designed by the University of Southampton working with RioMed and Help the Aged, has received a lot of interest. Since then, the website has been improved based on feedback received from older people and health professionals working with older people. The website is now easier to use, more interactive, and more informative. To see the new improved version please go to www.balancetraining.org.uk

Appendix S. Email sent to Older People who had an Email Address kept on a Research Database held by the School of Psychology

Dear [insert name]

My name is Samuel Nyman, a PhD student at the School of Psychology, University of Southampton. I am contacting you as you have provided your details on the School of Psychology volunteer list. I have helped set up a new website that provides free advice on balance training – physical activities that help with balance and coordination. I am interested in the best way to present this advice, and so I am inviting you to participate in a study that examines this. Anyone is free to access the website, but I am particularly looking for those aged 60 years or above to visit the website.

What does this involve?

You will need to have access to the Internet. The website you will visit is easy to use and gives instructions on what to do once you are there. The website will give you some advice about balance training, and then ask you to complete a short questionnaire about what you think of the advice. It will take approximately 20 minutes to complete the website.

Your participation in this study is entirely voluntary. If you access the website and half way through you decide you no longer wish to continue, you can simply click off the website, and there will be no way I can track who has and who has not been on the website. Because of this, if you do complete the website, I ask that you email me to let me know. This will help the School of Psychology keep the volunteer records up to date, so that you will not be asked to participate in more studies than you have agreed.

What will happen with my data?

The website does not collect any personal data, and so results of this study will not include your name or contact details. Your answers to the questions on the website will be recorded and used in statistics to help find which way of presenting the advice was best. Only the researchers involved in this study will see the data, and only summary information will be published in reports.

Why is investigating how to present advice important?

As we get older, we don't give our balance as much practice as we should, and so there is a need to give people advice on balance training. Balance training helps improve people's quality of life by helping them maintain their independence.

Yes, I'd like to take part, what do I do now?

If you do not want to take part, you need take no further action. If you would like to take part, simply visit the website and follow the instructions all the way to the end. Please visit: www.balancetraining.org.uk. Once you have completed the study please email me at Sam.Nyman@soton.ac.uk to let me know you have completed the study.

I have some questions, whom do I contact?

If you have any questions, please contact me on the details below. Similarly, if you wish for your details to be removed from the School of Psychology volunteer list, please contact me on the details below.

Thank you for your time.

Yours sincerely

Samuel Nyman
Health Researcher
School of Psychology
University of Southampton
Southampton
SO17 1BJ
Tel: (023) 8059 8721
E: Sam.Nyman@soton.ac.uk

Appendix T. Recruitment Advertisement posted on Websites for Older People

What's my balance system?

We hear a lot about how to keep our heart and lungs healthy, but not so much about how to keep our balance system healthy. Your balance system includes all the senses in your body that tell you how you are moving, the brain which puts this information together, and the muscles that control your movements.

As adults we tend not to give our balance system the practice it needs. Health problems can also weaken the balance system. The result is that our balance becomes less good.

Do you want a healthy balance system?

People of all ages and abilities need to keep their balance system healthy, and you are never too young or too old to benefit. A healthy balance system helps you to look and feel good - you can move freely and confidently, and will have more energy and strength.

Keeping your balance system healthy is especially important if you have problems due to illness, such as joint pain, weakness or dizziness. Balance training can help you get back to normal, and overcome feelings of stiffness or unsteadiness.

Check out this New Website

Health researchers at the University of Southampton have created a website that gives advice on activities to help you improve your balance system. If you visit the website and answer the questions you'll also help with their research.

Please visit: www.balancetraining.org.uk

University of Southampton

Appendix U. Recruitment Advertisement placed in the University of Southampton Internal Staff Bulletin

New Interactive Balance Training website Launched
Health researchers at the School of Psychology are launching a new website that gives advice on balance training - physical activities that help improve balance, coordination, and lower-leg muscle strength.

The website compares two ways of presenting the advice: an interactive, tailored version that gives personally relevant advice, compared to a standard version that simply provides all the advice.

The researchers hope to attract a lot of interest in the website that will both help with their research into the different ways of presenting advice, and help to get the advice out to as many people as possible. If you know of anyone approaching retirement or who has retired please tell them about the website.

Visit the website at: www.balancetraining.org.uk

Appendix V: Recruitment poster

Aged 60+?

We hear a lot about how to keep our heart and lungs healthy, but not so much about how to keep our balance system healthy.
Would you like to see some easy ways to keep your balance healthy?

Visit: www.balancetraining.org.uk

This website is designed by the University of Southampton. If you visit the website and answer the questions you'll also help with research. Thank you.

University of Southampton

REFERENCES

Aaronson, L. S. (2003). Evaluation of individually tailored interventions on exercise adherence - commentary by Aaronson. *Western Journal of Nursing Research, 25,* 641-643.

ACRS. (2007). Digital inclusion and the older market. London: Age Concern.

Adler, R. P. (2002). *Older adults and computers: Report of a national survey.* Retrieved April 15, 2005, from: http://www.seniornet.org/php/default.php?PageID=5476&Print=1.

Ajzen, I. (1988). *Attitudes, personality, and behavior.* Milton Keynes, UK: Open University Press.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50,* 179-211.

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior.* London: Prentice Hall.

Allan, J. D. (2003). Evaluation of individually tailored interventions on exercise adherence - commentary by Allan. *Western Journal of Nursing Research, 25,* 644-646.

Allen, A. (2001). Developing an innovative fall prevention strategy in a primary care setting. In A. Chiva & D. Stears (Eds.), *Promoting the health of older people: The next step in health generation* (pp. 99-111). Buckingham, UK: Open University Press.

Alpay, L. L., Toussaint, P. J., Ezendam, N. P. M., Rövekamp, T. A. J. M., Graafmans, W. C., & Westendorp, G. J. (2004). Easing Internet access of health information for elderly users. *Health Informatics Journal, 10,* 185-194.

Alpay, L., Toussaint, P., Ezendam, N., Rövekamp, T., Westendorp, R., Verhoef, J. et al. (2007). The Dutch website: 'SeniorGezond': An illustration of a road map for the informed patient. *Managed Care, 2,* 1-11.

American Geriatrics Society [AGS]., British Geriatrics Society [BGS]., & American Academy of Orthopaedic Surgeons [AAOS] Panel on Falls Prevention. (2001). Guidelines for the prevention of falls in older persons. *Journal of the American Geriatrics Society, 49,* 664-672.

Anderson, R. T., Ory, M., Cohen, S., & McBride, J. S. (2000). Issues of aging and adherence to health interventions. *Controlled Clinical Trials, 21,* 171S-183S.

Anthony, D. (1995). The Internet. *Health Informatics, 1,* 69-72.

Anthony, D. (1996). World wide web. *Health Informatics, 2,* 44-48.

Arcury, T. A., Quandt, S. A., & Bell, R. A. (2001). Staying healthy: The salience and meaning of health maintenance behaviors among rural older adults in North Carolina. *Social Science & Medicine, 53,* 1541-1556.

Areni, C. S., & Lutz, R. J. (1988). The role of argument quality in the elaboration likelihood model. *Advances in Consumer Research, 15,* 197-203.

Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behaviour: A meta-analytic review. *British Journal of Social Psychology, 40,* 471-499.

Armstrong, R., Waters, E., Roberts, H., Oliver, S., & Popay, J. (2006). The role and theoretical evolution of knowledge translation and exchange in public health. *Journal of Public Health, 28,* 384-389.

Ballinger, C., & Clemson, L. (2006). Older people's views about community falls prevention: An Australian perspective. *British Journal of Occupational Therapy, 69,* 263-270.

Ballinger, C., & Payne, S. (2000). Falling from grace or into expert hands? Alternative accounts about falling in older people. *British Journal of Occupational Therapy, 63,* 573-579.

Ballinger, C., & Payne, S. (2002). The construction of the risk of falling among and by older people. *Ageing & Society, 22,* 305-324.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84,* 191-215.

Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist, 37,* 122-147.

Bandura, A. (1997). *Self-efficacy: The exercise of control.* NY: W.H. Freeman and Company.

Bandura, A. (1998). Health promotion from the perspective of social cognitive theory. *Psychology and Health, 13,* 623-649.

Bandura, A. (2004). Health promotion by social cognitive means. *Health Education & Behavior, 31,* 143-164.

Bandura, A., Adams, N. E., & Beyer, J. (1977). Cognitive processes mediating behavioral change. *Journal of Personality and Social Psychology, 35,* 125-139.

Bandura, A., Blanchard, E. B., & Ritter, B. (1969). Relative efficacy of desensitization and modeling approaches for inducing behavioral, affective, and attitudinal changes. *Journal of Personality and Social Psychology, 13,* 173-199.

Bandura, A., Jeffery, R. W., & Gajdos, E. (1975). Generalising change through participant modelling with self-directed mastery. *Behaviour Research and Therapy, 13,* 141-152.

Baron, J., & Siepmann, M. (2000). Techniques for creating and using web questionnaires in research and teaching. In M. H. Birnbaum (Ed.), *Psychological experiments on the Internet* (pp. 235-265). London: Academic Press.

BBC News. (2006). *Over-35s drive eBay UK web hits.* Retrieved August 24, 2005, from:

http://newsvote.bbc.co.uk/mpapps/pagetools/print/news.bbc.co.uk/1/hi/technology/4177644.stm.

Belza, B., Walwick, J., Shiu-Thornton, S., Schwartz, S., Taylor, M., & LoGerfo, J. (2004). Older adults perspectives on physical activity and exercise: Voices from multiple cultures. *Preventing Chronic Disease, 1,* 1-12.

Benbunan-Fich, R. (2001). Using protocol analysis to evaluate the usability of a commercial web site. *Information and Management, 39,* 151-163.

Bental, D. S., Cawsey, A., & Jones, R. (1999). Patient information systems that tailor to the individual. *Patient Education and Counseling, 36,* 171-180.

Biddle, S. (2001). *What helps older people to become physically active?* Paper presented at the meeting of The British Heart Foundation National Centre for Physical Activity and Health, Leicestershire, UK.

Biggs, S. (1993). *Understanding ageing: Images, attitudes and professional practice.* Buckingham, UK: Open University Press.

Birnbaum, M. H. (2000). Decision making in the lab and on the web. In M. H. Birnbaum (Ed.), *Psychological experiments on the Internet* (pp. 3-34). London: Academic Press.

Blake, M. (1998). *Internet resources for older people.* Retrieved October 6, 2004, from: http://www.ariadne.ac.uk/issue14/older-people/.

Blalock, S. J., Devellis, B. M., Patterson, C. C., Campbell, M. K., Orenstein, D. R., & Dooley, M. A. (2002). Effects of an osteoporosis prevention program incorporating tailored educational materials. *American Journal of Health Promotion, 16,* 146-156.

Bock, B. C., Marcus, B. H., & Pinto, B. M. (2001). Maintenance of physical activity following an individualized motivationally tailored intervention. *Annals of Behavioral Medicine, 23,* 79-87.

Bohner, G., & Schwarz, N. (2001). Attitudes, persuasion, and behavior. In A. Tesser & N. Schwarz (Eds.), *Blackwell handbook of social psychology* (pp. 413-435). Oxford: Blackwell.

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

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

Bowling, A., See-Tai, S., Ebrahim, S., Gabriel, Z., & Solanki, P. (2005). Attributes of age-identity. *Ageing & Society, 25,* 479-500.

Boyette, L. W., Lloyd, A., Manuel, S., Boyette, J. E., & Echt, K. V. (2001). Development of an exercise expert system for older adults. *Journal of Rehabilitation Research and Development, 38,* 79-91.

Bradley, P. (2002). *Getting and staying noticed on the web: Your web promotion questions answered.* London: Facet.

Brassington, G. S., Atienza, A., Perczek, R. E., DiLorenzo, T. M., & King, A. C. (2002). Intervention-related cognitive versus social mediators of exercise adherence in the elderly. *American Journal of Preventive Medicine, 23,* 80-86.

Braun, B. L. (1998). Knowledge and perception of fall-related risk factors and fall-reduction techniques among community-dwelling elderly individuals. *Physical Therapy, 78,* 1262-1276.

Braver, S. L., & Bay, R. C. (1992). Assessing and compensating for self-selection bias (non-representativeness) of the family research sample. *Journal of Marriage and the Family, 54,* 925-939.

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

British Heart Foundation. (n.d.). Physical activity and older adults information pack. Retrieved May 16, 2005, from: www.bhfactive.org.uk/resources/index.html.

British Psychological Society. [BPS]. (2006). *Code of ethics and conduct.* Leicester, UK: BPS.

Brody, J. A., Brock, D. B., & Williams, T. F. (1987). Trends in the health of the elderly population. *Annual Review of Public Health, 8,* 211-234.

Brug, J., Campbell, M., & van Assema, P. (1999). The application and impact of computer-generated personalized nutrition education: A review of the literature. *Patient Education and Counseling, 36,* 145-156.

Brug, J., Oenema, A., & Campbell, M. (2003). Past, present, and future of computer-tailored nutrition education. *American Journal of Clinical Nutrition, 77,* 1028S-1034S.

Brug, J., Steenhuis, I., van Assema, P., & de Vries, H. (1996). The impact of a computer-tailored nutrition intervention. *Preventive Medicine, 25,* 236-242.

Buchanan, T. (2002). Online assessment: Desirable or dangerous. *Professional Psychology: Research and Practice, 33,* 148-154.

Buckworth, J., & Dishman, R. K. (2002). *Exercise psychology.* Leeds, UK: Human Kinetics.

Bull, F. C., Holt, C. L., Kreuter, M. W., Clark, E. M., & Scharff, D. (2001). Understanding the effects of printed health education materials: Which features lead to which outcomes? *Journal of Health Communication, 6,* 265-279.

Bull, F. C., Jamrozik, K., & Blanksby, B. A. (1999a). Tailored advice on exercise - does it make a difference? *American Journal of Preventive Medicine, 16,* 230-239.

Bull, F. C., Kreuter, M. W., & Scharff, D. P. (1999b). Effects of tailored, personalized and general health messages on physical activity. *Patient Education and Counseling, 36,* 181-192.

Burke, B. L., Arkowitz, H., & Menchola, M. (2003). The efficacy of motivational interviewing: A meta-analysis of controlled clinical trials. *Journal of Consulting and Clinical Psychology, 71,* 843-861.

Burns, K. J., Camaione, D. N., & Chatterton, C. T. (2000). Prescription of physical activity by adult nurse practitioners: A national survey. *Nursing Outlook, 48,* 28-33.

Burton, L. C., Shapiro, S., & German, P. S. (1999). Determinants of physical activity initiation and maintenance among community-dwelling older persons. *Preventive Medicine, 29,* 422-430.

Cable, T. A., Meland, E., Soberg, T., & Slagsvold, S. (1999). Lessons from the Oslo study diet and anti-smoking trial: A qualitative study of long-term behaviour change. *Scandinavian Journal of Public Health, 27,* 206-212.

Calfas, K. J., Sallis, J. F., Zabinski, M. F., Wilfley, D. E., Rupp, J., Prochaska, J. J. et al. (2002). Preliminary evaluation of a multicomponent program for nutrition and physical activity change in primary care: PACE+ for adults. *Preventive Medicine, 34,* 153-161.

Callahan, E. J., Bertakis, K. D., Azari, R., Robbins, J. A., Helms, L. J., & Chang, D. W. (2000). The influence of patient age on primary care resident physician-patient interaction. *Journal of the American Geriatrics Society, 48,* 30-35.

Cameron, I., Kurrle, S., & Cumming, R. (1996). Preventing falls in the elderly at home: A community-based program. *Medical Journal of Australia, 165,* 459.

Cameron, I. D., & Quine, S. (1994). External hip protectors - likely noncompliance among high-risk elderly people living in the community. *Archives of Gerontology and Geriatrics, 19,* 273-281.

Camic, P. M., Rhodes, J. E., & Yardley, L. (2003). Naming the stars: Integrating qualitative methods into psychological research. In P. M. Camic, J. E. Rhodes, & L. Yardley (Eds.), *Qualitative research in psychology: Expanding perspectives in methodology and design* (pp. 3-15). WA: American Psychological Association.

Campbell, A. J., Borrie, M. J., Spears, G. F., Jackson, S. L., Brown, J. S., & Fitzgerald, J. L. (1990). Circumstances and consequences of falls experienced by a community population 70 years and over during a prospective study. *Age and Ageing, 19,* 136-141.

Campbell, A. J., Robertson, M. C., Gardner, M. M., Norton, R. N., & Buchner, D. M. (1999). Psychotropic medication withdrawal and a home-based exercise program to prevent falls: A randomized, controlled trial. *Journal of the American Geriatrics Society, 47,* 850-853.

Campbell, M. K., DeVillis, B. M., Strecher, V. J., Ammerman, A. S., DeVillis, R., & Sandler, R. S. (1994). Improving dietary behavior: The effectiveness of tailored messages in primary care settings. *American Journal of Public Health, 84,* 783-787.

Campbell, M. K., James, A., Hudson, M. A., Carr, C., Jackson, E., Oates, V. et al. (2004). Improving multiple behaviors for colorectal cancer prevention among African American church members. *Health Psychology, 23,* 492-502.

Campbell, M. K., Tessaro, I., Devellis, B., Benedict, S., Kelsey, K., Belton, L. et al. (2002). Effects of a tailored health promotion program for female blue-collar workers: Health works for women. *Preventive Medicine, 34,* 313-323.

Canada Fitness Survey. (1983). *Fitness and lifestyle in Canada.* Ottawa, ON: Directorate of Fitness and Amateur Sport.

Cardinal, B. J., & Sachs, M. L. (1995). Prospective analysis of stage-of-exercise movement following mail-delivered, self-instructional exercise packets. *American Journal of Health Promotion, 9,* 430-432.

Cardinal, B. J., & Sachs, M. L. (1996). Effects of mail-mediated, stage-matched exercise behavior change strategies on female adults' leisure-time exercise behavior. *Journal of Sports Medicine and Physical Fitness, 36,* 100-107.

Carter, S. E., Campbell, E. M., Sanson-Fisher, R. W., Redman, S., & Gillespie, W. J. (1997). Environmental hazards in the homes of older people. *Age and Ageing, 26,* 195-202.

Carter, W. B., Elward, K., Malmgren, J., Martin, M. L., & Larson, E. (1991). Participation of older adults in health programs and research - a critical review of the literature. *The Gerontologist, 31,* 584-592.

Caserta, M. S., & Gillett, P. A. (1998). Older women's feelings about exercise and their adherence to an aerobic regimen over time. *The Gerontologist, 38,* 602-609.

Chaiken, S. (1980). Heuristic versus systematic information processing and the use of source versus message cues in persuasion. *Journal of Personality and Social Psychology, 39,* 752-766.

Chaiken, S., & Trope, Y. (Eds). (1999). *Dual-process theories in social psychology.* London: The Guilford Press.

Chamberlain, K., Camic, P., & Yardley, L. (2004). Qualitative analysis of experience: Grounded theory and case studies. In D. F. Marks & L. Yardley (Eds.), *Research methods for clinical and health psychology* (pp. 69-89). London: Sage.

Chang, J. T., Morton, S. C., Rubenstein, L. Z., Mojica, W. A., Maglione, M., Suttorp, M. J. et al. (2004). Interventions for the prevention of falls in older adults: Systematic review and meta-analysis of randomised clinical trials. *British Medical Journal, 328,* 680-683.

Chao, D., Foy, C. G., & Farmer, D. (2000). Exercise adherence among older adults: Challenges and strategies. *Controlled Clinical Trials, 21,* 212S-217S.

Charness, N., & Czaja, S. J. (2005). Adaptation to new technologies. In M. L. Johnson (Ed.), *The Cambridge handbook of age and ageing* (pp. 662-669). Cambridge, UK: Cambridge University Press.

Chen, S., & Chaiken, S. (1999). The heuristic-systematic model in its broader context. In S. Chaiken & Y. Trope (Eds.), *Dual-process theories in social psychology* (pp. 73-96). London: The Guilford Press.

Chou, W. C., Tinetti, M. E., King, M. B., Irwin, K., & Fortinsky, R. H. (2006). Perceptions of physicians on the barriers and facilitators to integrating falls risk evaluation and management into practice. *Journal of General Internal Medicine, 21,* 117-122.

Clemson, L., Taylor, K., Kendig, H., Cumming, R. G., & Swann, M. (2007). Recruiting older participants to a randomised trial of a community-based fall prevention program. *Australasian Journal on Ageing, 26,* 35-39.

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112,* 155-159.

Colón-Emeric, C., Schenck, A., Gorospe, J., McArdle, J., Dobson, L., DePorter, C. et al. (2006). Translating evidence-based falls prevention into clinical practice in nursing facilities: Results and lessons from a quality improvement collaborative. *Journal of the American Geriatrics Society, 54,* 1414-1418.

Compston, J. E., & Rosen, C. J. (2004). *Fast facts: Osteoporosis* (4th ed.). Oxford, UK: Health Press.

Connell, B. R. (1996). Role of the environment in falls prevention. *Clinics in Geriatric Medicine, 12,* 859-880.

Contento, I., Balch, G. I., Bronner, Y. L., Lytle, L. A., Maloney, S. K., Olson, C. M. et al. (1995). The effectiveness of nutrition education and implications for nutrition education policy, programs and research: A review of research. *Journal of Nutrition Education, 27,* 277-422.

Cooper, C. (1996). Epidemiology and definition of osteoporosis. In J. E. Compston (Ed.), *Osteoporosis: New perspectives on causes, prevention and treatment* (pp. 1-10). London: Royal College of Physicians.

Coulter, A. (1996). Theory into practice: Applying the evidence across the health service. *Baillière's Clinical Obstetrics and Gynaecology, 10,* 715-729.

Cryer, C., & Patel, S. (2001). *Falls, fragility & fractures: National service framework for older people: The case for and strategies to implement a joint health improvement and modernisation plan for falls and osteoporosis.* Alliance for Better Bone Health.

Culos-Reed, S. N., Rejeski, W. J., McAuley, E., Ockene, J. K., & Roter, D. L. (2000). Predictors of adherence to behavior change interventions in the elderly. *Controlled Clinical Trials, 21,* 200S-205S.

Cumming, R. G., Thomas, M., Szonyi, G., Salkeld, G., O'Neill, E., Westbury, C. et al. (1999). Home visits by an occupational therapist for assessment and modification of environmental hazards: A randomized trial of falls prevention. *Journal of the American Geriatrics Society, 47,* 1397-1402.

Danaher, B. G., Boles, S. M., Akers, L., Gordon, J. S., & Severson, H. H. (2006). Defining participant exposure measures in web-based health behavior change programs. *Journal of Medical Internet Research, 8,* e15.

Dang, S., Ma, F., Nedd, N., Aguilar, E. J., & Roos, B. A. (2006). Differential resource utilization benefits with Internet-based care coordination in elderly veterans with chronic diseases associated with high resource utilization. *Telemedicine Journal and e-Health, 12,* 14-23.

Danziger, K. (1976). *Interpersonal communication.* Oxford, UK: Pergamon.

Davies, A. J., & Kenny, R. A. (1996). Falls presenting to the accident and emergency department: Types of presentation and risk factor profile. *Age and Ageing, 25,* 362-366.

Davis, D. A., & Taylor-Vaisey, A. (1997). Translating guidelines into practice: A systematic review of theoretic concepts, practical experience and research evidence in the adoption of clinical practice guidelines. *Canadian Medical Association Journal, 157,* 408-416.

Day, A. T. (1985). *'We can manage': Expectations about care and varieties of family support among people 75 years and over.* Melbourne: Institute of Family Studies Monograph No 5.

Day, L., Fildes, B., Gordon, I., Fitzharris, M., Flamer, H., & Lord, S. (2002). Randomised factorial trial of falls prevention among older people living in their own homes. *British Medical Journal, 325,* 128-131.

de Vries, H., & Brug, J. (1999). Computer-tailored interventions motivating people to adopt health promoting behaviours: Introduction to a new approach. *Patient Education and Counseling, 36,* 99-105.

Department of Health [DoH]. (1989). *Terms of service for doctors in general practice.* London: DoH.

Department of Health [DoH]. (2001). *National service framework for older people.* London: DoH.

Department of Health [DoH]. (2002). *Preventing accidental injury – priorities for action: Report to the chief medical officer from the Accidental Injury Task Force.* London: DoH.

Department of Health [DoH]. (2004). *At least five a week: Evidence on the impact of physical activity and its relationship to health: A report from the chief medical officer.* London: DoH.

Department of Trade & Industry [DTI]. (1998). *Accidental falls in the home, regional distribution of cases involving people aged over 65 in the UK.* London: DTI.

Department of Trade & Industry [DTI]. (2001). *Avoiding slips, trips and broken hips: How to avoid falls in the home: Information for older people* [leaflet].

Diefenbach, M. A., Butz, B. P., & Mohamed, N. (2007). Development of a multimedia interactive education system for prostate cancer. *The European Health Psychologist, 9,* 26-29.

Dijkstra, A., & de Vries, H. (1999). The development of computer-generated tailored interventions. *Patient Education and Counseling, 36,* 193-203.

Dillman, D. A. (2000). *Mail and Internet surveys: The tailored design method* (2nd ed.). Chichester, UK: John Wiley & Sons.

DiMatteo, M. R., Sherbourne, C. D., Hays, R. D., Ordway, L., Kravitz, R. L., McGlynn, E. A. et al. (1993). Physicians' characteristics influence patients' adherence to medical treatment: Results from the medical outcomes study. *Health Psychology, 12,* 93-102.

Downs, D. S., & Hausenblas, H. A. (2005). The theories of reasoned action and planned behavior applied to exercise: A meta-analytic update. *Journal of Physical Activity and Health, 2,* 76-97.

Downton, J. H. (1992). Falls in the elderly. In J. C. Brocklehurst, R. C. Tallis, & H. M. Fillit (Eds.), *Textbook of geriatric medicine and gerontology* (4th ed., pp. 317-325). London: Churchill Livingstone.

Downton, J. H. (1993). *Falls in the elderly.* London: Edward Arnold.

Dracup, K. A., & Meleis, A. I. (1982). Compliance: An interactionist approach. *Nursing Research, 31,* 31-36.

Dunn, A. L., Andersen, R. E., & Jakicic, J. M. (1999). Lifestyle physical activity interventions: History, short- and long-term effects, and recommendations. *American Journal of Preventive Medicine, 15,* 398-412.

Dutta-Bergman, M. J. (2004). Health attitudes, health cognitions, and health behaviors among Internet health information seekers: Population-based survey. *Journal of Medical Internet Research, 6,* e15.

Eagly, A. H., & Chaiken, S. (1993). *The psychology of attitudes.* London: Harcourt Brace Jovanovich College.

Eakin, B. L., Brady, J. S., & Lusk, S. L. (2001). Creating a tailored, multimedia, computer-based intervention. *Computers in Nursing, 19,* 152-160.

Ecclestone, N. A., Myers, A. M., & Paterson, D. H. (1998). Tracking older participants of twelve physical activity classes over a three-year period. *Journal of Aging and Physical Activity, 6,* 70-82.

Eisner, E. W. (2003). On the art and science of qualitative research in psychology. In P. M. Camic, J. E. Rhodes, & L. Yardley (Eds.), *Qualitative research in psychology: Expanding perspectives in methodology and design* (pp. 17-29). WA: American Psychological Association.

Ellis, R. D., & Kurniawan, S. H. (2000). Increasing the usability of online information for older users: A case study in participatory design. *International Journal of Human-Computer Interaction, 12,* 263-276.

Ericsson, K. A., & Simon, H. A. (1993). *Protocol analysis: Verbal reports as data* (Revised ed.). London: The MIT Press.

Ezendam, N. P. M., Alpay, L. L., Rövekamp, T. A. J. M., & Toussaint, P. J. (2005). Experimenting with case-based reasoning to present educative health information on the internet - the example of SeniorGezond. *Connecting Medical Informatics and Bio-Informatics: Proceedings of Medical Informatics Europe (MIE),* 867-872.

Feder, G., Cryer, C., Donovan, S., & Carter, Y. (2000). Guidelines for the prevention of falls in people over 65. *British Medical Journal, 321,* 1007-1011.

Ferguson, T., & Frydman, G. (2004). The first generation of e-patients: These new medical colleagues could provide sustainable healthcare solutions. *British Medical Journal, 328,* 1148-1149.

Fields, B. L. (2003). Client-professional interaction and level of participation in preventive health screenings in community-dwelling African American older adults: Testing a middle-range theory derived from Cox's interaction model of client health behavior. *Dissertation Abstracts International: Section B: The Sciences and Engineering, 63,* 3229.

Fife-Schaw, C. (2000). Questionnaire design. In G. M. Breakwell, S. Hammond, & C. Fife-Schaw (Eds.), *Research methods in psychology* (2 ed., pp. 158-174). London: Sage.

Finch, H. (1997). *Physical activity 'at our age': Qualitative research among people over the age of 50.* London: Health Education Authority.

Firby, P. A., Luker, K. A., & Caress, A.-L. (1991). Nurses' opinion of the introduction of computer-assisted learning for use in patient education. *Journal of Advanced Nursing, 16,* 987-995.

Fishbein, M. (2000). The role of theory in HIV prevention. *AIDS Care, 12,* 273-278.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behaviour: An introduction to theory and research.* London: Addison-Wesley.

Flesch, R. (1948). A new readability yardstick. *Journal of Applied Psychology, 32,* 221-233.

Fox, S. (2004a). *Older Americans and the internet.* WA: Pew Internet & American Life Project.

Fox, S., & Fallows, D. (2003). *Internet health resources: Health searches and email have become more commonplace, but there is room for improvement in searches and overall Internet access.* WA: Pew Internet & American Life Project.

Fox, S., Rainie, L., Larsen, E., Horrigan, J., Lenhart, A., Spooner, T. et al. (2001). *Wired seniors: A fervent few, inspired by family ties*. WA: Pew Internet & American Life Project.

Franklin, B. A. (1988). Program factors that influence exercise adherence: Practical adherence skills for the clinical staff. In R. K. Dishman (Ed.), *Exercise adherence: Its impact on public health* (pp. 237-258). Leeds, UK: Human Kinetics Books.

Furstenberg, A.-L. (1986). Expectations about outcome following hip fracture among older people. *Social Work in Health Care, 11,* 33-47.

Gardner, M. M., Buchner, D. M., Robertson, M. C., & Campbell, A. J. (2001). Practical implementation of an exercise-based falls prevention programme. *Age and Ageing, 30,* 77-83.

Gardner, M. M., Robertson, M. G., & Campbell, A. J. (2000). Exercise in preventing falls and fall related injuries in older people: A review of randomised controlled trials. *British Journal of Sports Medicine, 34,* 7-17.

Gilhooly, K., & Green, C. (1996). Protocol analysis: Theoretical background. In J. T. E. Richardson (Ed.), *Handbook of qualitative research methods for psychology and the social sciences* (pp. 43-54). Leicester, UK: The British Psychological Society.

Gill, T. M. (1999). Preventing falls: To modify the environment or the individual? *Journal of the American Geriatrics Society, 47,* 1471-1472.

Gillespie, L. D., Gillespie, W. J., Robertson, M. C., Lamb, S. E., Cumming, R. G., & Rowe, B. H. (2003). Interventions for preventing falls in elderly people. *Cochrane Database of Systematic Reviews* (Issue 4, Art. No.: CD000340, DOI: 10.1002/14651858.CD000340).

Goldberg, G., & Shephard, R. J. (1982). Personality profiles of disabled individuals in relation to physical activity patterns. *Journal of Sports Medicine and Physical Fitness, 22,* 477-484.

Gollwitzer, P. M. (1999). Implementation intentions: Strong effects of simple plans. *American Psychologist, 54,* 493-503.

Gollwitzer, P. M., & Brandstätter, V. (1997). Implementation intentions and effective goal pursuit. *Journal of Personality & Social Psychology, 73,* 186-199.

Greene, M. G., Adelman, R., Charon, R., & Hoffman, S. (1986). Ageism in the medical encounter: An exploratory study of the doctor-elderly patient relationship. *Language & Communication, 6,* 113-124.

Grossman, M. D., & Stewart, A. L. (2003). "You aren't going to get better by just sitting around": Physical activity perceptions, motivations, and barriers in adults 75 years of age or older. *American Journal of Geriatric Cardiology, 12,* 33-37.

Guinness World Records. (n.d.). *Oldest female marathon finisher*. Retrieved March 19, 2004, from: http://www.guinnessworldrecords.com/index.asp?id=45714.

Haber, D., & Rhodes, D. (2004). Health contract with sedentary older adults. *The Gerontologist, 44,* 827-835.

Hageman, P. A., Noble Walker, S., & Pullen, C. H. (2005). Tailored versus standard Internet-delivered interventions to promote physical activity in older women. *Journal of Geriatric Physical Therapy, 28,* 29-34.

Hart, S. (1990). Psychology and the health of elderly people. In P. Bennett, J. Weinman, & P. Spurgeon (Eds.), *Current developments in health psychology* (pp. 247-275). London: Harward Academic.

Hausenblas, H. A., Carron, A. V., & Mack, D. E. (1997). Application of the theories of reasoned action and planned behavior to exercise behavior: A meta-analysis. *Journal of Sport & Exercise Psychology, 19,* 36-51.

Health Education Authority. (1999). *Physical activity & the prevention & management of falls & accidents among older people: A framework for practice.* London: Health Education Authority.

Health Education Board for Scotland [HEBS]. (2001). *The construction of the risks of falling in older people: Lay and professional perspectives.* Edinburgh: HEBS.

Health Education Board for Scotland [HEBS]. (2003). *Taking positive steps to avoid trips and falls.* Edinburgh: HEBS.

Health On the Net Foundation. (1997). *HON code of conduct (HONcode) for medical and health web sites.* Retrieved January 06, 2008, from: https://www.hon.ch/HONcode/Conduct.html.

Herdman, E. (2002). Challenging the discourses of nursing ageism. *International Journal of Nursing Studies, 39,* 105-114.

Herzog, A. R., & Rodgers, W. L. (1988). Interviewing older adults: Mode comparison using data from a face-to-face survey and a telephone resurvey. *Public Opinion Quarterly, 52,* 84-99.

Herzog, A. R., Rodgers, W. L., & Kulka, R. A. (1983). Interviewing older adults: A comparison of telephone and face-to-face modalities. *Public Opinion Quarterly, 47,* 405-418.

Hillsdon, M., Foster, C., & Thorogood, M. (2005). Interventions for promoting physical activity. *Cochrane Database of Systematic Reviews* (Issue 1, Art. No.: CD003180, DOI: 10.1002/14651858.CD003180.pub2).

Hillsdon, M., Thorogood, M., Anstiss, T., & Morris, J. (1995). Randomised controlled trials of physical activity promotion in free living populations: A review. *Journal of Epidemiology & Community Health, 49,* 448-453.

Hoffman, C., Rice, D., & Sung, H.-Y. (1996). Persons with chronic conditions: Their prevalence and costs. *Journal of the American Medical Association, 276,* 1473-1479.

Holt, C. L., Clark, E. M., Kreuter, M. W., & Scharff, D. P. (2000). Does locus of control moderate the effects of tailored health education materials? *Health Education Research, 15,* 393-403.

Horne, M., Skelton, D. A., & Todd, C. J. (2005). Attitudes and beliefs about the uptake and adherence of exercise and physical activity in 60 – 70 year olds in relation to fall prevention. Poster presented at the British Psychological Society Annual Conference, Coventry, UK.

Horton, K. (2006). Gender and the risk of falling: A sociological approach. *Journal of Advanced Nursing, 57,* 69-76.

Houts, P. S., Doak, C. C., Doak, L. G., & Loscalzo, M. J. (2006). The role of pictures in improving health communication: A review of research on attention, comprehension, recall, and adherence. *Patient Education & Counseling, 61,* 173-190.

Howell, D. C. (2002). *Statistical methods for psychology* (5th ed.). CA: Duxbury.

Howitt, D., & Cramer, D. (2000). *An introduction to statistics in psychology: A complete guide for students* (2nd ed.). London: Prentice Hall.

Howland, J., Peterson, E. W., Levin, W. C., & Fried, L. (1993). Fear of falling among the community-dwelling elderly. *Journal of Aging & Health, 5,* 229-243.

Hurling, R., Catt, M., De Boni, M., Fairley, B. W., Hurst, T., Murray, P. et al. (2007). Using Internet and mobile phone technology to deliver an automated physical activity program: Randomized controlled trial. *Journal of Medical Internet Research, 9,* e7.

Hurling, R., Fairley, B. W., & Dias, B. (2006). Internet-based exercise intervention systems: Are more interactive designs better? *Psychology and Health, 21,* 757-772.

Janz, N. K., Becker, M. H., & Hartman, P. E. (1984). Contingency contracting to enhance patient compliance: A review. *Patient Education and Counseling, 5,* 165-178.

Jarvis, K. L., Friedman, R. H., Heeren, T., & Cullinane, P. M. (1997). Older women and physical activity: Using the telephone to walk. *Women's Health Issues, 7,* 24-29.

Jette, A. M., Lachman, M., Giorgetti, M. M., Assmann, S. F., Harris, B. A., Levenson, C. et al. (1999). Exercise - it's never too late: The strong-for-life program. *American Journal of Public Health, 89,* 66-72.

Joffe, H., & Yardley, L. (2004). Content and thematic analysis. In D. F. Marks & L. Yardley (Eds.), *Research methods for clinical and health psychology* (pp. 56-68). London: Sage.

Johnson, B. A., & Eagly, A. H. (1989). Effects of involvement on persuasion: A meta-analysis. *Psychological Bulletin, 106,* 290-314.

Jones, F., Harris, P., & McGee, L. (1998). Adherence to prescribed exercise. In L. B. Myers & K. Midence (Eds.), *Adherence to treatment in medical conditions* (pp. 343-362). Amsterdam: Harwood Academic Publishers.

Jørstad, E. C., Hauer, K., Becker, C., & Lamb, S. E. (2005). Measuring the psychological outcomes of falling: A systematic review. *Journal of the American Geriatrics Society, 53,* 501-510.

Jørstad-Stein, E. C., Hauer, K., Becker, C., Bonnefoy, M., Nakash, R. A., Skelton, D. A. et al. (2005). Suitability of physical activity questionnaires for older adults in fall-prevention trials: A systematic review. *Journal of Aging and Physical Activity, 13,* 461-481.

Judge, J. O. (2003). Balance training to maintain mobility and prevent disability. *American Journal of Preventive Medicine, 25,* 150-156.

Kanfer, F. H., & Gaelick, L. (1986). Self-management methods. In F. A. Kanfer & A. P. Goldstein (Eds.), *Helping people change: A textbook of methods* (3rd ed., pp. 283-345). Oxford: Pergamon Press.

Kannus, P., & Khan, K. M. (2001). Prevention of falls and subsequent injuries in elderly people: A long way to go in both research and practice. *Canadian Medical Association Journal, 165,* 587-588.

Keele-Smith, R., & Leon, T. (2003). Evaluation of individually tailored interventions on exercise adherence. *Western Journal of Nursing Research, 25,* 623-640.

Kellogg International Work Group on the prevention of falls by the elderly. (1987). The prevention of falls in later life. *Danish Medical Bulletin, 34,* 1-24.

Kenny, R. A. (2005). Mobility and falls. In M. L. Johnson (Ed.), *The Cambridge handbook of age and ageing* (pp. 131-140). Cambridge, UK: Cambridge University Press.

Killoran, A. J., Fentem, P., & Caspersen, C. (1994). *Moving on: International perspectives on promoting physical activity.* London: Health Education Authority.

King, A. C., Blair, S. N., Bild, D. E., Dishman, R. K., Dubbert, P. M., Marcus, B. H. et al. (1992). Determinants of physical activity and interventions in adults. *Medicine and Science in Sports and Exercise, 24,* S221-S236.

King, A. C., Castro, C., Wilcox, S., Eyler, A. A., Sallis, J. F., & Brownson, R. C. (2000). Personal and environmental factors associated with physical inactivity among different racial-ethnic groups of US middle- aged and older-aged women. *Health Psychology, 19,* 354-364.

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

Kingston, P. (2000). Falls in later life: Status passage and preferred identities as a new orientation. *Health, 4,* 216-233.

Kirby, S. E., Coleman, P. G., & Daley, D. (2004). Spirituality and well-being in frail and nonfrail older adults. *Journal of Gerontology Series: Psychological Sciences, 59B,* 123-129.

Krantz, J. H., & Dalal, R. (2000). Validity of web-based psychological research. In M. H. Birnbaum (Ed.), *Psychological experiments on the Internet* (pp. 35-60). London: Academic Press.

Kraut, R., Olson, J., Banaji, M., Bruckman, A., Cohen, J., & Couper, M. (2004). Psychological research online: Report of board of scientific affairs' advisory group on the conduct of research on the Internet. *American Psychologist, 59,* 105-117.

Kressig, R. W., & Echt, K. V. (2002). Exercise prescribing: Computer application in older adults. *The Gerontologist, 42,* 273-277.

Kreuter, M. W., Bull, F. C., Clark, E. M., & Oswald, D. L. (1999a). Understanding how people process health information: A comparison of tailored and nontailored weight-loss materials. *Health Psychology, 18,* 487-494.

Kreuter, M. W., Farrell, D., Olevitch, L., & Brennan, L. (2000a). *Tailoring health messages: Customizing communication with computer technology.* NJ: Lawrence Erlbaum Associates.

Kreuter, M. W., & Holt, C. L. (2001). How do people process health information? Applications in an age of individualized communication. *Current Directions in Psychological Science, 10,* 206-209.

Kreuter, M. W., Lukwago, S. N., Bucholtz, D. C., Clark, E. M., & Sanders-Thompson, V. (2003). Achieving cultural appropriateness in health promotion programs: Targeted and tailored approaches. *Health Education & Behavior, 30,* 133-146.

Kreuter, M. W., Oswald, D. L., Bull, F. C., & Clark, E. M. (2000b). Are tailored health education materials always more effective than non-tailored materials? *Health Education Research, 15,* 305-315.

Kreuter, M. W., & Skinner, C. S. (2000). Tailoring: What's in a name? *Health Education Research, 15,* 1-4.

Kreuter, M. W., & Strecher, V. J. (1996). Do tailored behavior change messages enhance the effectiveness of health risk appraisal? Results from a randomized trial. *Health Education Research, 11,* 97-105.

Kreuter, M. W., Strecher, V. J., & Glassman, B. (1999b). One size does not fit all: The case for tailoring print materials. *Annals of Behavioral Medicine, 21,* 276-283.

Kroeze, W., Werkman, A., & Brug, J. (2006). A systematic review of randomized trials on the effectiveness of computer-tailored education on physical activity and dietary behaviors. *Annals of Behavioral Medicine, 31,* 205-223.

Krosnick, J. A. (1988). The role of attitude importance in social evaluation: A study of policy preferences, presidential candidate evaluations, and voting behavior. *Journal of Personality and Social Psychology, 55,* 196-210.

Kyngas, H., Duffy, M. E., & Kroll, T. (2000). Conceptual analysis of compliance. *Journal of Clinical Nursing, 9,* 5-12.

Lachman, M. E., Howland, J., Tennstedt, S., Jette, A., Assmann, S., & Peterson, E. W. (1998). Fear of falling and activity restriction: The survey of activities and fear of falling in the elderly (SAFE). *Journal of Gerontology: Psychological Sciences, 53B,* P43-P50.

Lamb, S. E., Jørstad-Stein, E. C., Hauer, K., & Becker, C. (2005). Development of a common outcome data set for fall injury prevention trials: The Prevention of Falls Network Europe consensus. *Journal of the American Geriatrics Society, 53,* 1618-1622.

Laxton, C. E., Freeman, C. J., Todd, C. J., Payne, B. V., Camilleri-Ferrante, C., Palmer, C. R. et al. (1997). Morbidity at 3 months after hip fracture: Data from the East Anglian audit. *Health Trends, 29,* 55-60.

Leaffer, T., & Gonda, B. (2000). The Internet: An underutilized tool in patient education. *Computers in Nursing, 18,* 47-52.

Leirer, V. O., Morrow, D. G., Pariante, G. M., & Sheikh, J. I. (1988). Elders' nonadherence, its assessment, and computer assisted instruction for medication recall training. *Journal of the American Geriatrics Society, 36,* 877-884.

Lenhart, A. (2003). *The ever-shifting Internet population.* WA: Pew Internet & American Life Project.

Leslie, E., Marshall, A. L., Owen, N., & Bauman, A. (2005). Engagement and retention of participants in a physical activity website. *Preventive Medicine, 40,* 54-59.

Lewis, D. (1999). Computer-based approaches to patient education: A review of the literature. *Journal of the American Medical Informatics Association, 6,* 272-282.

Ley, P. (1988). *Communicating with patients: Improving communication, satisfaction and compliance.* Cheltenham, UK: Stanley Thornes.

Locke, E. A., & Latham, G. P. (1990). *A theory of goal setting and task performance.* NJ: Prentice Hall.

Lookinland, S., & Anson, K. (1995). Perpetuation of ageist attitudes among present and future health care personnel: Implications for elder care. *Journal of Advanced Nursing, 21,* 47-56.

Lord, S. R., Menz, H. B., & Tiedeman, A. (2003). A physiological profile approach to falls risk assessment and prevention. *Physical Therapy, 83,* 237-252.

Lord, S. R., Sherrington, C., & Menz, H. B. (2001). *Falls in older people, risk factors and strategies for prevention.* Cambridge, UK: University Press.

Luker, K. A., & Caress, A.-L. (1992). Evaluating computer assisted learning for renal patients. *International Journal of Nursing Studies, 29,* 237-250.

Luszczynska, A., & Schwarzer, R. (2005). Social cognitive theory. In M. Conner & P. Norman (Eds.), *Predicting health behaviour: Research and practice with social cognition models* (2nd ed., pp. 127-169). Berkshire, UK: Open University Press.

Luxon, L. M. (1984). Vertigo in old age. In M. R. Dix & J. D. Hood (Eds.), *Vertigo* (pp. 291-319). Chichester, UK: John Wiley & Sons.

Madden, M. (2006). *Internet penetration and impact.* WA: Pew Internet & American Life Project.

Mahoney, J. E., West, E., Wysocki, S., Wheeler, E., Lyons-Marx, M., Shea, T. et al. (2006). Recruiting older adults for falls prevention research. *Journal of the American Geriatrics Society, 54,* S16.

Marcus, B. H., Bock, B. C., Pinto, B. M., Forsyth, L. H., Roberts, M. B., & Traficante, R. M. (1998). Efficacy of an individualized, motivationally-tailored physical activity intervention. *Annals of Behavioral Medicine, 20,* 174-180.

Marcus, B. H., Owen, N., Forsyth, L. H., Cavill, N. A., & Fridinger, F. (1998). Physical activity interventions using mass media, print media, and information technology. *American Journal of Preventive Medicine, 15,* 362-378.

Marks, R., Allegrante, J. P., MacKenzie, C. R., & Lane, J. M. (2003). Hip fractures among the elderly: Causes, consequences and control. *Ageing Research Reviews, 2,* 57-93.

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

Massie, J. F., & Shephard, R. J. (1971). Physiological and psychological effects of training - a comparison of individual and gymnasium programs with a characterization of the exercise "drop-out". *Medicine and Science in Sports, 3,* 110-117.

Mays, N., & Pope, C. (1995). Qualitative research: Rigour and qualitative research. *British Medical Journal, 311,* 109-112.

Mazzeo, R. S., Cavanagh, P., Evans, W. J., Fiatarone, M., Hagberg, J., McAuley, E. et al. (1998). ACSM position stand: Exercise and physical activity for older adults. *Medicine and Science in Sports and Exercise, 30,* 992-1008.

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

McClure, R., Turner, C., Peel, N., Spinks, A., Eakin, E., & Hughes, K. (2005). Population-based interventions for the prevention of fall-related injuries in older people. *Cochrane Database of Systematic Reviews* (Issue 1, Art. No.: CD004441, DOI: 10.1002/14651858.CD004441.pub2).

McConatha, D. (2002). Aging online: Toward a theory of e-quality. In R. W. Morrell (Ed.), *Older adults, health information, and the World Wide Web* (pp. 21-41). London: Lawrence Erlbaum Associates.

McGrath, J. E., & Johnson, B. A. (2003). Methodology makes meaning: How both qualitative and quantitative paradigms shape evidence and its interpretation. In P. M. Camic, J. E. Rhodes, & L. Yardley (Eds.), *Qualitative research in psychology: Expanding perspectives in methodology and design* (pp. 31-48). WA: American Psychological Association.

McHugh, S. (1991). 'Old' – almost a four-letter word? *Generations Review, 3,* 2-4.

McInnes, E., & Askie, L. (2004). Evidence review on older people's views and experiences of falls prevention strategies. *Worldviews on Evidence-Based Nursing, 1,* 20-37.

McMullen, C. K., & Luborsky, M. R. (2006). Self-rated health appraisal as cultural and identity process: African American elders' health and evaluative rationales. *The Gerontologist, 46,* 431-438.

McMurdo, M. E. T. (2000). A healthy old age: Realistic or futile goal? *British Medical Journal, 321,* 1149-1151.

Meara, J. (2005). Website review. *Age and Ageing, 34,* 660.

Medical Research Council. (2000). *A framework for development and evaluation of RCTs for complex interventions to improve health.* London: Medical Research Council.

Melillo, K. D., Houde, S. C., Williamson, E., & Futrell, M. (2000). Perceptions of nurse practitioners regarding their role in physical activity and exercise prescription for older adults. *Clinical Excellence for Nurse Practitioners, 4,* 108-116.

Michie, S., & Abraham, C. (2004). Interventions to change health behaviours: Evidence-based or evidence-inspired? *Psychology and Health, 19,* 29-49.

Milan, F., Marcus, B. H., Goldstein, M., & Taylor, E. (1994). Training in exercise counseling. *Academic Medicine, 69,* 822-823.

Miller, R., & Miller, Y. D. (2003). Nifty after fifty: Evaluation of a physical activity directory for older people. *Australian and New Zealand Journal of Public Health, 27,* 524-528.

Miller, S. M., Fang, C. Y., Diefenbach, M. A., & Bales, C. B. (2001). Tailoring psychosocial interventions to the individual's health information-processing style: The influence of monitoring versus blunting in cancer risk and disease. In A. Baum & B. L. Andersen (Eds.), *Psychological interventions for cancer* (pp. 343-362). WA: American Psychological Association.

Miller, W. R., & Rollnick, S. (2002). *Motivational interviewing: Preparing people for change* (2 ed.). London: The Guilford Press.

Morrell, R. W., Mayhorn, C. B., & Bennett, J. (2002). Older adults online in the internet century. In R. W. Morrell (Ed.), *Older adults, health information, and the World Wide Web* (pp. 43-57). London: Lawrence Erlbaum Associates.

Murphy, J., & Isaacs, B. (1982). The post-fall syndrome: A study of 36 elderly patients. *Gerontology, 28,* 265-270.

Nahm, E.-S., & Resnick, B. (2001). Homebound older adults' experiences with the Internet and e-mail. *Computers in Nursing, 19,* 257-263.

National Institute for Clinical Excellence [NICE]. (2004). *Clinical practice guideline for the assessment and prevention of falls in older people: Draft for 2nd stage consultation period.* London: NICE.

National Institute on Aging, & National Library of Medicine. (2002). *Making your web site senior friendly: A checklist.* Retrieved January 06, 2008, from: http://www.nlm.nih.gov/pubs/checklist.pdf.

National Statistics. (2006a). *Adults who have ever used the Internet by sex/age (Great Britain): Individual Internet access.* Retrieved March 14, 2006, from: http://www.statistics.gov.uk/statbase/ssdataset.asp?vlnk=6928&More=Y.

National Statistics. (2006b). Internet access: Households and individuals. Retrieved October 25, 2006, from: http://www.statistics.gov.uk/StatBase/Product.asp?vlnk=5672.

National Statistics. (2007). Ageing: 16% of UK population are aged 65 or over. Retrieved September 17, 2007, from: http://www.statistics.gov.uk/cci/nugget.asp?id=949.

Nielsen, J. (2000). *Designing web usability: The practice of simplicity.* IN: New Riders.

O'Brien Cousins, S. (2000). "My heart couldn't take it": Older women's beliefs about exercise benefits and risks. *Journal of Gerontology: Psychological Sciences, 55B,* 283-294.

O'Brien Cousins, S., & Janzen, W. (1998). Older adult beliefs about exercise. In S. O'Brien Cousins (Ed.), *Exercise, aging and health: Overcoming barriers to an active old age* (pp. 71-96). Philadelphia: Taylor & Francis.

O'Leary, S., Mann, C., & Perkash, I. (1991). Access to computers for older adults: Problems and solutions. *The American Journal of Occupational Therapy, 45,* 636-642.

Oenema, A., Brug, J., & Lechner, L. (2001). Web-based tailored nutrition education: Results of a randomized controlled trial. *Health Education Research, 16,* 647-660.

Ogden, J. (2000). *Health psychology: A text book* (2nd ed.). Buckingham, UK: Open University Press.

Ogozalek, V. Z. (1993). The "automated pharmacist": Comparing the use of leaflets, text-based computers, and multimedia computers to provide medication information to the elderly. *Journal of Medical Education Technologies, Spring,* 6-11.

Orbell, S., & Sheeran, P. (2002). Changing health behaviours: The role of implementation. In D. Rutter & L. Quine (Eds.), *Changing health behaviour: Intervention and research with social cognition models* (pp. 123-138). Buckingham, UK: Open University Press.

Orleans, C. T. (1999). Context, confidentiality, and consent in tailored health communications: A cautionary note. *Annals of Behavioral Medicine, 21,* 307-310.

Ory, M., Hoffman, M. K., Hawkins, M., Sanner, B., & Mockenhaupt, R. (2003). Challenging aging stereotypes: Strategies for creating a more active society. *American Journal of Preventive Medicine, 25,* 164-171.

Owen, N., Lee, C., Naccarella, L., & Haag, K. (1987). Exercise by mail: A mediated behavior-change program for aerobic exercise. *Journal of Sport Psychology, 9,* 346-357.

Pallant, J. (2001). *SPSS survival manual: A step by step guide to data analysis using SPSS for windows (versions 10 and 11).* Berkshire, UK: Open University Press.

Paxton, S. J., Browning, C. J., & O'Connell, G. (1997). Predictors of exercise program participation in older women. *Psychology & Health, 12,* 543-552.

Payne, S., Large, S., Jarrett, N., & Turner, P. (2000). Written information given to patients and families by palliative care units: A national survey. *Lancet, 355,* 1792.

Peel, N. M., McClure, R. J., & Hendrikz, J. K. (2006). Health-protective behaviours and risk of fall-related hip fractures: A population-based case-control study. *Age and Ageing, 35,* 491-497.

Peel, N. M., McClure, R. J., & Hendrikz, J. K. (2007). Psychosocial factors associated with fall-related hip fractures. *Age and Ageing, 36,* 145-151.

Petty, R. E., & Cacioppo, J. T. (1979). Issue involvement can increase or decrease persuasion by enhancing message-relevant cognitive responses. *Journal of Personality and Social Psychology, 37,* 1915-1926.

Petty, R. E., & Cacioppo, J. T. (1981). *Attitudes and persuasion: Classic and contemporary approaches.* IA: Wm. C. Brown Company.

Petty, R. E., & Cacioppo, J. T. (1986). The elaboration likelihood model of persuasion. In L. Berkowitz (Ed.), *Advances in experimental social psychology (Vol. 19)* (pp. 123-205). London: Academic Press.

Petty, R. E., & Cacioppo, J. T. (1990). Involvement and persuasion: Tradition versus integration. *Psychological Bulletin, 107,* 367-374.

Petty, R. E., Cacioppo, J. T., & Schumann, D. (1983). Central and peripheral routes to advertising effectiveness: The moderating role of involvement. *Journal of Consumer Research, 10,* 135-146.

Petty, R. E., Cacioppo, J. T., Strathman, A. J., & Priester, J. R. (1994). To think or not to think: Exploring two routes to persuasion. In S. Shavitt & T. C. Brock (Eds.), *Persuasion* (pp. 113-147). London: Allyn & Bacon.

Petty, R. E., Rucker, D. D., Bizer, G. Y., & Cacioppo, J. T. (2004). The elaboration likelihood model of persuasion. In J. S. Seiter & G. H. Gass (Eds.), *Perspectives* *on persuasion, social influence and compliance gaining* (pp. 65-89). Boston: Allyn & Bacon.

Petty, R. E., & Wegener, D. T. (1999). The elaboration likelihood model: Current status and controversies. In S. Chaiken & Y. Trope (Eds.), *Dual process theories in social psychology* (pp. 41-72). NY: Guilford Press.

Pincock, S. (2003). Patients put their relationship with their doctors as second only to that with their families. *British Medical Journal, 327,* 581.

Post, J. A. (1996). Internet resources on aging. *The Gerontologist, 36,* 11-12.

Pothula, V. B., Chew, F., Lesser, T. H. J., & Sharma, A. K. (2004). Falls and vestibular impairment. *Clinical Otolaryngology, 29,* 179-182.

Prevention of Falls Network Europe [ProFaNE]. (2006a). A review of hip fractures (neck of femur and trochanteric) incidence across Europe over the last 10 years. Retrieved December 20, 2006, from: http://www.profane.eu.org/eu_map/Hip_Fracture_Review.php?PHPSESSID=ac194cf71363084580b7bd63347f00e3.

Prevention of Falls Network Europe [ProFaNE]. (2006b). Questionnaire to assess attitudes to balance and falling-related interventions. Retrieved March 6, 2006, from: http://www.profane.eu.org/profane_documents/AFRIS.rtf.

Prochaska, J. O., DiClemente, C. C., & Norcross, J. C. (1992). In search of how people change - applications to addictive behaviors. *American Psychologist, 47,* 1102-1114.

Province, M. A., Hadley, E. C., Hornbrook, M. C., Lipsitz, L. A., Miller, J. P., Mulrow, C. D. et al. (1995). The effects of exercise on falls in elderly patients: A preplanned meta-analysis of the FICSIT trials. *Journal of the American Medical Association, 273,* 1341-1347.

Prudham, D., & Evans, J. G. (1981). Factors associated with falls in the elderly: A community study. *Age and Ageing, 10,* 141-146.

Pursey, A., & Luker, K. (1995). Attitudes and stereotypes: Nurses' work with older people. *Journal of Advanced Nursing, 22,* 547-555.

Rakowski, W. (1999). The potential variances of tailoring in health behavior interventions. *Annals of Behavioral Medicine, 21,* 284-289.

RAND. (2003). *Evidence report: Falls prevention interventions in the medicare population.* Baltimore, MD: US Department of Health and Human Services, Health Care Financing Administration.

Reips, U.-D. (2000). The web experiment method: Advantages, disadvantages, and solutions. In M. H. Birnbaum (Ed.), *Psychological experiments on the Internet* (pp. 89-117). London: Academic Press.

Reips, U.-D. (2002). Standards for Internet-based experimenting. *Experimental Psychology, 49,* 243-256.

Resnick, B., Palmer, H., Jenkins, L. S., & Spellbring, A. M. (2000). Path analysis of efficacy expectations and exercise behaviour in older adults. *Journal of Advanced Nursing, 31,* 1309-1315.

Revere, D., & Dunbar, P. J. (2001). Review of computer-generated outpatient health behavior interventions: Clinical encounters "in absentia". *Journal of the American Medical Informatics Association, 8,* 62-79.

Rimal, R. N., & Adkins, A. D. (2003). Using computers to narrowcast health messages: The role of audience segmentation, targeting, and tailoring in health promotion. In T. L. E. Thompson, A. M. E. Dorsey, K. I. E. Miller, & R. E. Parrott (Eds.), *Handbook of health communication* (pp. 497-513). London: Lawrence Erlbaum Associates.

Rimer, B. K. (1999). Introduction. *Annals of Behavioral Medicine, 21,* 275.

Rippey, R. M., Bill, D., Abeles, M., Day, J., Downing, D. S., Pfeiffer, C. A. et al. (1987). Computer-based patient education for older persons with osteoarthritis. *Arthritis and Rheumatism, 30,* 932-935.

Robson, C. (1993). *Real world research: A resource for social scientists and practitioner-researchers*. Oxford, UK: Blackwell.

Rodgers, W. M., & Brawley, L. R. (1993). Using both self-efficacy theory and the theory of planned behavior to discriminate adherers and dropouts from structured programs. *Journal of Applied Sport Psychology, 5,* 195-206.

Rose, D. J. (2007). *A global report on falls prevention: The role of physical activity in the prevention of falls in older age.* Geneva: World Health Organisation.

Rothman, A. J., & Salovey, P. (1997). Shaping perceptions to motivate healthy behavior: The role of message framing. *Psychological Bulletin, 121,* 3-19.

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs: General & Applied, 80,* 609.

Royal College of Physicians. (2006). *National audit of the organisation of services for falls and bone health for older people*. London: Royal College of Physicians.

Royal College of Physicians., & Bone and Tooth Society of Great Britain. (2000). *Osteoporosis: Clinical guidelines for prevention and treatment*. London: Royal College of Physicians.

Rubak, S., Sandbœk, A., Lauritzen, T., & Christensen, B. (2005). Motivational interviewing: A systematic review and meta-analysis. *British Journal of General Practice, 55,* 305-312.

Rubenstein, L. Z. (2006). Falls in older people: Epidemiology, risk factors, and strategies for prevention. *Age and Ageing, 35,* ii37-ii41.

Rubenstein, L. Z., Kenny, R. A., Eccles, M., Martin, F., & Tinetti, M. E. (2003). Preventing falls in older people: New approaches and the development of clinical practice guidelines. *Journal of the Royal College of Physicians Edinburgh, 33,* 262-272.

Ryan, P., & Lauver, D. R. (2002). The efficacy of tailored interventions. *Journal of Nursing Scholarship, 34,* 331-337.

Sabir, M., Breckman, R., Meador, R., Wethington, E., Reid, M. C., & Pillemer, K. (2006). The CITRA research-practice consensus-workshop model: Exploring a new method of research translation in aging. *The Gerontologist, 46,* 833-839.

Sallis, J. F., Hovell, M. F., Hofstetter, C. R., & Barrington, E. (1992). Explanation of vigorous physical-activity during 2 years using social-learning variables. *Social Science & Medicine, 34,* 25-32.

Sattin, R. W., Easley, K. A., Wolf, S. L., Chen, Y., & Kutner, M. H. (2005). Reduction in fear of falling through intense Tai Chi exercise training in older, transitionally frail adults. *Journal of the American Geriatrics Society, 53,* 1168-1178.

Schaie, K. W. (1988). Methodological issues in ageing research: An introduction. In K. W. Schaie, R. T. Campbell, W. Meredith, & S. C. Rawlings (Eds.), *Methodological issues in ageing research* (pp. 1-11). NY: Springer.

Schonberg, M. A., Marcantonio, E. R., & Leveille, S. G. (2007). Preventive health care among older women: Missed opportunities and poor targeting. *Journal of the American Geriatrics Society, 55,* S206.

Schooler, C., Chaffee, S., Flora, J., & Roser, C. (1998). Health campaign channels: Tradeoffs among reach, specificity, and impact. *Human Communication Research, 24,* 410-432.

Schutzer, K. A., & Graves, B. S. (2004). Barriers and motivations to exercise in older adults. *Preventive Medicine, 39,* 1056-1061.

Scott, V. (2007). *A global report on falls prevention: Falls prevention: Policy, research and practice.* Geneva: World Health Organisation.

Scuffham, P., Chaplin, S., & Legood, R. (2003). Incidence and costs of unintentional falls in older people in the United Kingdom. *Journal of Epidemiology and Community Health, 57,* 740-744.

Secretary of State for Health. (1999). *Saving lives: Our healthier nation* (presented to parliament by command of her majesty, No. Cm 4386). London: The Stationery Office.

Seifert, K. L., Hoffnung, R. J., & Hoffnung, M. (1997). *Lifespan development.* MA: Houghton Mifflin Company.

Sellers, D. (1997). *Getting hits: The definitive guide to promoting your web site.* CA: Peachpit press.

Selwyn, N. (2004). The information aged: A qualitative study of older adults' use of information and communications technology. *Journal of Aging Studies, 18,* 369-384.

Shephard, R. J. (1994). Determinants of exercise in people aged 65 years and older. In R. K. Dishman (Ed.), *Advances in exercise adherence* (pp. 343-360). Leeds, UK: Human Kinetics.

Shephard, R. J. (1997). *Aging, physical activity, and health.* Leeds, UK: Human Kinetics.

Shuy, R. W. (2001). In-person versus telephone interviewing. In J. F. Gubrium & J. A. Holstein (Eds.), *Handbook of interview research: Context and method* (pp. 537-555). London: Sage.

Sidell, M. (1997). Older people's health: Applying Antonovsky's salutogenic paradigm. In M. Sidell, L. Jones, J. Katz, & A. Peberdy (Eds.), *Debates & dilemmas in promoting health: A reader* (pp. 9-15). London: The Open University.

Simpson, J. M., Darwin, C., & Marsh, N. (2003). What are older people prepared to do to avoid falling? A qualitative study in London. *British Journal of Community Nursing, 8,* 152-159.

Simpson, J. M., Harrington, R., & Marsh, N. (1998). Guidelines for managing falls among elderly people. *Physiotherapy, 84,* 173-177.

Simpson, J. M., & Mandelstam, H. (1995). Elderly people at risk of falling: Do they want to be taught how to get up again? *Clinical Rehabilitation, 9,* 65-69.

Simpson, J. M., Marsh, N., & Harrington, R. (1998). Guidelines for managing falls among elderly people. *British Journal of Occupational Therapy, 61,* 165-168.

Sivacek, J., & Crano, W. D. (1982). Vested interest as a moderator of attitude-behavior consistency. *Journal of Personality and Social Psychology, 43,* 210-221.

Sixsmith, A., & Sixsmith, J. (1995). 'Gerontechnology': New technology and the older person. *Generations Review, 5,* 11-12.

Skelton, D. A. (2001). Effects of physical activity on postural stability. *Age and Ageing, 30,* 33-39.

Skelton, D. A., & Dinan, S. M. (1999). Exercise for falls management: Rationale for an exercise programme aimed at reducing postural instability. *Physiotherapy Theory and Practice, 15,* 105-120.

Skelton, D. A., & Todd, C. J. (2004). *What are the main risk factors for falls amongst older people and what are the most effective interventions to prevent these falls?* Denmark: Health Evidence Network, World Health Organisation.

Skelton, D. A., & Todd, C. J. (2005). Thoughts on effective falls prevention intervention on a population basis. *Journal of Public Health, 13,* 196-202.

Skelton, D. A., Young, A., Walker, A., & Hoinville, E. (1999). *Physical activity in later life: Further analysis of the Allied Dunbar national fitness survey and the Health Education Authority national survey of activity and health.* London: Health Education Authority.

Skinner, C. S., Campbell, M. K., Rimer, B. K., Curry, S., & Prochaska, J. O. (1999). How effective is tailored print communication? *Annals of Behavioral Medicine, 21,* 290-298.

Skinner, C. S., Siegfried, J. C., Kegler, M. C., & Strecher, V. J. (1993). The potential of computers in patient education. *Patient Education and Counseling, 22,* 27-34.

Skinner, C. S., Strecher, V. J., & Hospers, H. (1994). Physicians recommendations for mammography - do tailored messages make a difference? *American Journal of Public Health, 84,* 43-49.

Slater, M. D. (1996). Theory and method in health audience segmentation. *Journal of Health Communication, 1,* 267-283.

Slater, M. D., & Flora, J. A. (1991). Health lifestyles: Audience segmentation analysis for public health interventions. *Health Education Quarterly, 18,* 221-233.

Snodgrass, S. J., Rivett, D. A., & Mackenzie, L. A. (2005). Perceptions of older people about falls injury prevention and physical activity. *Australasian Journal on Ageing, 24,* 114-118.

Southampton City Council [SCC]. (2002). *Housing strategy for older people 2003-2007.* Southampton, UK: SCC.

Speechley, M., & Tinetti, M. E. (1991). Falls and injuries in frail and vigorous community elderly persons. *Journal of the American Geriatrics Society, 39,* 46-52.

Spittaels, H., & De Bourdeaudhuij, I. (2006). Implementation of an online tailored physical activity intervention for adults in Belgium. *Health Promotion International, 21,* 311-319.

Stead, M., Wimbush, E., Eadie, D., & Teer, P. (1997). A qualitative study of older people's perceptions of ageing and exercise: The implications for health promotion. *Health Education Journal, 56,* 3-16.

Stoddart, H., Sharp, D., Harvey, I., & Whitley, E. (2002). Falls and the use of health services in community-living elderly people. *British Journal of General Practice, 52,* 923-925.

Stones, S. (2003). *Physical activity, ageing and health with the over fifties.* Unpublished master's thesis, University of Southampton, UK.

Stoop, A. P., van't Riet, A., & Berg, M. (2004). Using information technology for patient education: Realizing surplus value? *Patient Education & Counseling, 54,* 187-195.

Stout, R. (1997). *Web site stats: Tracking hits and analysing traffic.* CA: Osborne McGraw-Hill.

Strecher, V. J., Kreuter, M. W., Den Boer, D.-J., Kobrin, S., Hospers, H., & Skinner, C. S. (1994). The effects of computer-tailored smoking cessation messages in family practice settings. *Journal of Family Practice, 39,* 262-270.

Street Jr., R. L., & Rimal, R. N. (1997). Health promotion and interactive technology: A conceptual foundation. In R. L. Street Jr., W. R. Gold, & T. Manning (Eds.), *Health promotion and interactive technology: Theoretical applications and future directions* (pp. 1-18). London: Lawrence Erlbaum Associates.

Stuart-Hamilton, I. (1991). *The psychology of ageing: An introduction.* London: Jessica Kingsley.

Sutton, S. (1998). Predicting and explaining intentions and behavior: How well are we doing? *Journal of Applied Social Psychology, 28,* 1317-1338.

Swift, C. G. (2001). Falls in late life and their consequences - implementing effective services. *British Medical Journal, 322,* 855-857.

Swinburn, B. A., Walter, L. G., Arroll, B., Tilyard, M. W., & Russell, D. G. (1998). The green prescription study: A randomized controlled trial of written exercise advice provided by general practitioners. *American Journal of Public Health, 88,* 288-291.

Tabachnick, B. G., & Fidell, L. S. (2001). *Using multivariate statistics* (4th ed.). London: Allyn and Bacon.

Temple, B., Glenister, C., & Raynes, N. (2002). Prioritising home care needs: Research with older people from three ethnic minority community groups. *Health and Social Care in the Community, 10,* 179-186.

The Royal Society for the Prevention of Accidents. (2007). Home and leisure accident statistics. Retrieved January 18, 2007, from: http://www.hassandlass.org.uk/query/index.htm.

Thomas, E. P. A. (1997). *Falls, the beginning of the end: A qualitative study with older people and practice nurses.* Unpublished doctoral thesis, University of Southampton, UK.

Thompson, P. G. (1996). Preventing falls in the elderly at home: A community-based program. *Medical Journal of Australia, 164,* 530-532.

Tinetti, M. E. (1997). Falls. In C. K. Cassel, H. J. Cohen, E. B. Larson, D. E. Meier, N. M. Resnick, L. Z. Rubenstein, & et al. (Eds.), *Geriatric Medicine* (3 ed., pp. 787-799). London: Springer.

Tinetti, M. E., Deleon, C. F. M., Doucette, J. T., & Baker, D. I. (1994). Fear of falling and fall-related efficacy in relationship to functioning among community-living elders. *Journal of Gerontology, 49,* M140-M147.

Tinetti, M. E., & Powell, L. (1993). Fear of falling and low self-efficacy: A cause of dependence in elderly persons. *Journal of Gerontology, 48,* 35-38.

Tinetti, M. E., & Speechley, M. (1989). Prevention of falls among the elderly. *New England Journal of Medicine, 320,* 1055-1059.

Tinetti, M. E., Speechley, M., & Ginter, S. F. (1988). Risk-factors for falls among elderly persons living in the community. *New England Journal of Medicine, 319,* 1701-1707.

Tinetti, M. E., Williams, T. F., & Mayewski, R. (1986). Fall risk index for elderly patients based on number of chronic disabilities. *The American Journal of Medicine, 80,* 429-434.

Todd, C. J., Ballinger, C., & Whitehead, S. (2007). *A global report on falls prevention: Reviews of socio-demographic factors related to falls and environmental interventions to prevent falls amongst older people living in the community* Geneva: World Health Organisation.

Todd, C. J., Freeman, C. J., Camilleri-Ferrante, C., Palmer, C. R., Hyder, A., Laxton, C. E. et al. (1995). Differences in mortality after fracture of hip: The East Anglian audit. *British Medical Journal, 310,* 904-908.

Tse, T. (2005). The environment and falls prevention: Do environmental modifications make a difference? *Australian Occupational Therapy Journal, 52,* 271-281.

Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science, 211,* 453-458.

United Nations. (2002). *World population ageing 1950-2050.* NY: United Nations.

Vandelanotte, C., & De Bourdeaudhuij, I. (2003). Acceptability and feasibility of a computer-tailored physical activity intervention using stages of change: Project FAITH. *Health Education Research, 18,* 304-317.

Vandelanotte, C., De Bourdeaudhuij, I., Sallis, J. F., Spittaels, H., & Brug, J. (2005). Efficacy of sequential or simultaneous interactive computer-tailored interventions for increasing physical activity and decreasing fat intake. *Annals of Behavioral Medicine, 29,* 138-146.

Vellas, B. J., Cayla, F., Bocquet, H., de Pemille, F., & Albareole, J. C. (1987). Prospective study of restriction of activity in old people after falls. *Age and Ageing, 16,* 189-193.

Vellas, B. J., Wayne, S. J., Romero, L. J., Baumgartner, R. N., & Garry, P. J. (1997). Fear of falling and restriction of mobility in elderly fallers. *Age and Ageing, 26,* 189-193.

Verheijden, M. W., Jans, M. P., Hildebrandt, V. H., & Hopman-Rock, M. (2007). Rates and determinants of repeated participation in a web-based behavior change program for healthy body weight and healthy lifestyle. *Journal of Medical Internet Research, 9,* e1.

Wankel, L. M. (1993). The importance of enjoyment to adherence and psychological benefits from physical activity. *International Journal of Sport Psychology, 24,* 151-169.

Wantland, D. J., Portillo, C. J., Holzemer, W. L., Slaughter, R., & McGhee, E. M. (2004). The effectiveness of web-based vs. non-web-based interventions: A meta-analysis of behavioral change outcomes. *Journal of Medical Internet Research, 6,* e40.

Ward, R. A. (1984). *The ageing experience: An introduction to social gerontology* (2nd ed.). London: Harper & Row.

Ward-Griffin, C., Hobson, S., Melles, P., Kloseck, M., Vandervoort, A., & Crilly, R. (2004). Falls and fear of falling among community-dwelling seniors: The dynamic tension between exercising precaution and striving for independence. *Canadian Journal on Aging, 23,* 307-318.

Webb, T. L., & Sheeran, P. (2006). Does changing behavioral intentions engender behaviour change? A meta-analysis of the experimental evidence. *Psychological Bulletin, 132,* 249-268.

Weinberger, M., Cohen, S. J., & Mazzuca, S. A. (1984). The role of physicians' knowledge and attitudes in effective diabetes management. *Social Science and Medicine, 19,* 965-969.

Weinstein, N. D. (1980). Unrealistic optimism about future life events. *Journal of Personality and Social Psychology, 39,* 806-820.

Weinstein, N. D. (1988). The precaution adoption process. *Health Psychology, 7,* 355-386.

Wells, T. J. (1992). Managing falls, incontinence, and cognitive impairment: Nursing research. In S. G. Funk, E. M. Tornquist, M. T. Champagne, & R. A. Wiese (Eds.), *Key aspects of elder care: Managing falls, incontinence, and cognitive impairment* (pp. 20-27). NY: Springer.

Wenger, N. S., Solomon, D. H., Roth, C. P., MacLean, C. H., Saliba, D., Kamberg, C. J. et al. (2003). The quality of medical care provided to vulnerable community-dwelling older patients. *Annals of Internal Medicine, 139,* 740-747.

Wetle, T. (2002). The use of new information technologies in an aging population. In R. W. Morrell (Ed.), *Older adults, health information, and the World Wide Web* (pp. 3-11). London: Lawrence Erlbaum Associates.

Whitehead, C. H., Wundke, R., & Crotty, M. (2006). Attitudes to falls and injury prevention: What are the barriers to implementing falls prevention strategies? *Clinical Rehabilitation, 20,* 536-542.

Whitehead, S. H., Skelton, D. A., & Todd, C. J. (2008). *The quality of websites offering falls related advice to older members of the public and their families: A systematic style review.* Manuscript submitted for publication.

Wilkinson, S., Joffe, H., & Yardley, L. (2004). Qualitative data collection: Interviews and focus groups. In D. F. Marks & L. Yardley (Eds.), *Research methods for clinical and health psychology* (pp. 39-55). London: Sage.

Williams, D. M., Papandonatos, G. D., Napolitano, M. A., Lewis, B. A., Whiteley, J. A., & Marcus, B. H. (2006). Perceived enjoyment moderates the efficacy of an individually tailored physical activity intervention. *Journal of Sport & Exercise Psychology, 28,* 300-309.

Wilmes, B., Radhamanohar, M., Vogel, M., Bennett, G., & Underwood, M. (2004). *Involving users in the development of consumer health information on falls: Outcomes and experiences: Web/kiosk-based health information on falls delivered to older people in Tower Hamlets.* Queen Mary, University of London: Institute of Community Health Sciences.

Wu, C., & Shaffer, D. R. (1987). Susceptibility to persuasive appeals as a function of source credibility and prior experience with the attitude object. *Journal of Personality and Social Psychology, 52,* 677-688.

Wylie-Rosett, J., Swencionis, C., Ginsberg, M., Cimino, C., Wassertheil-Smoller, S., Caban, A. et al. (2001). Computerized weight loss intervention optimizes staff time: The clinical and cost results of a controlled clinical trial conducted in a managed care setting. *Journal of the American Dietetic Association, 101,* 1155-1162.

Yardley, L. (1994). *Vertigo and dizziness.* London: Routledge.

Yardley, L. (1997). Introducing discursive methods. In L. Yardley (Ed.), *Material discourses of health and illness* (pp. 25-49). London: Routledge.

Yardley, L. (1998). Fear of imbalance and falling. *Reviews in Clinical Gerontology, 8,* 23-29.

Yardley, L. (2000). Dilemmas in qualitative health research. *Psychology & Health, 15,* 215-228.

Yardley, L. (2004). Fear of falling: Links between imbalance and anxiety. *Reviews in Clinical Gerontology, 13,* 1-7.

Yardley, L., Beyer, N., Hauer, K., McKee, K. J., Ballinger, C., & Todd, C. J. (2007a). Recommendations for promoting the engagement of older people in activities to prevent falls. *Quality and Safety in Health Care, 16,* 230-234.

Yardley, L. & Bishop, F. Mixing qualitative and quantitative methods: A pragmatic approach. In C. Willig & W. Stanton-Rogers (Eds.), *Handbook of qualitative research in psychology.* London: Sage (in press).

Yardley, L., Bishop, F. L., Beyer, N., Hauer, K., Kempen, G. I. J. M., Piot-Ziegler, C. et al. (2006). Older people's views of falls prevention interventions in six European countries. *The Gerontologist, 46,* 650-660.

Yardley, L., Donovan-Hall, M., Francis, K., & Todd, C. J. (2007b). Attitudes and beliefs that predict older people's intention to undertake strength and balance training. *Journal of Gerontology: Psychological Sciences, 62B,* P119-P125.

Yardley, L., Sharples, K., Beech, S., & Lewith, G. (2001). Developing a dynamic model of treatment perceptions. *Journal of Health Psychology, 6,* 269-282.

Yardley, L., & Smith, H. (2002). A prospective study of the relationship between feared consequences of falling and avoidance of activity in community-living older people. *The Gerontologist, 42,* 17-23.

Yardley, L., & Todd, C. J. (2005a). *Don't mention the f-word!: Advice to practitioners on communicating falls prevention messages to older people.* London: Help the Aged.

Yardley, L., & Todd, C. J. (2005b). *Older people's views of falls prevention advice: How can we improve uptake of falls prevention activities?* London: Help the Aged.

Yoshida, S. (2007). *A global report on falls prevention: Epidemiology of falls*. Geneva: World Health Organisation.

Zijlstra, G. A. R., van Haastregt, J. C. M., van Eijk, J. T. M., van Rossum, E., Stalenhoef, P. A., & Kempen, G. I. J. M. (2007). Prevalence and correlates of fear of falling, and associated avoidance of activity in the general population of community-living older people. *Age and Ageing, 36,* 304-309.